MILITARY INSTITUTE OF SCIENCE AND TECHNOLOGY



SYLLABUS

BACHELOR OF SCIENCE IN COMPUTER SCIENCE AND ENGINEERING (CSE)

APPLICABLE FOR CSE – 21 TO ONWARD BATCHES

REVISED ON DECEMBER 2020

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING (CSE) MILITARY INSTITUTE OF SCIENCE AND TECHNOLOGY (MIST) MIRPUR CANTONMENT, DHAKA-1216, BANGLADESH

PREFACE

Military Institute of Science and Technology (MIST) offers undergraduate and graduate programs in the field of science and engineering. This syllabus is for the undergraduate students in the Department of Computer Science and Engineering (CSE) of MIST. Although this syllabus has been written mainly for the students, student advisers and teachers will find it valuable as a reference document. Also, anybody who desires to know about the course contents of CSE Department will find this book helpful.

This syllabus provides general information about MIST, its historical background, faculties and departments. Different aspects of the course system, such as rules and regulations relating to admission, grading system, requirement for degrees have been elaborated. It describes the course requirements, course objectives, detailed course outline and courses offered in different terms.

The fields of Computer Science and Computer Engineering are changing rapidly. So the departmental as well as the non-departmental courses for CSE students have been revised to cater for recent advancements in these fields. The introduction of a basic course on computer systems for a gentle introduction of the field to the newcomers is among the worth mentionable changes. Number of subjects in some semesters has also been reduced keeping the total credit hour almost unchanged. Moreover, students now have more freedom in subject selection to specialize in a certain direction in their final years.

The CSE Program of MIST presently follows the OBE (Outcome Based Education) approach for conducting courses. Consequently, Integrated Design Project, which is one of OBE's salient features, has been introduced from 2019 in all corresponding undergraduate batches. The revised curriculum as incorporated in this syllabus is approved by the committee of courses. It will be placed before the academic council, MIST for necessary approval.

According to the policy of MIST, the syllabus is revised minimum once in every three years. Some of the information recorded in this syllabus is likely to be modified from time to time. Everybody concerned is strongly advised to be in touch with the advisers or the undersigned regarding modifications to be introduced later. It is hoped that this syllabus will be of much use to everybody concerned.

CERTIFICATE

Certified that this syllabus of Bachelor of Science in Computer Science and Engineering (BSc in CSE) of Military Institute of Science and Technology (MIST) is prepared by the committee as under:

Convener:

Col Mohammad Shahjahan Majib, psc Head Department of Computer Science and Engineering (CSE) Military Institute of Science and Technology (MIST) Mirpur Cantonment, Dhaka-1216

Members (Internal, Department of CSE):

Brig Gen A K M Nazrul Islam, PhD Head Department of Electrical, Electronics and Communication Engineering (EECE) Military Institute of Science and Technology (MIST) Mirpur Cantonment, Dhaka-1216

Dr. Md. Mahbubur Rahman Professor Department of Computer Science and Engineering (CSE) Military Institute of Science and Technology (MIST) Mirpur Cantonment, Dhaka-1216 Col Siddharth Malik, SM Senior Instructor Department of Computer Science and Engineering (CSE) Military Institute of Science and Technology (MIST) Mirpur Cantonment, Dhaka-1216

Lt Col Muhammad Nazrul Islam, PhD, Sigs Instructor Class-A Department of Computer Science and Engineering (CSE) Military Institute of Science and Technology (MIST) Mirpur Cantonment, Dhaka-1216

Lt Col Md Fazle Rabbi, psc, EME Instructor Class-A Department of Computer Science and Engineering (CSE) Military Institute of Science and Technology (MIST) Mirpur Cantonment, Dhaka-1216

Lt Col Brajalal Sinha, PhD, AEC Instructor Class-A Department of Science & Humanities (SH) Military Institute of Science and Technology (MIST) Mirpur Cantonment, Dhaka-1216 Lt Col Tahmina Sultana, PhD, Engrs Instructor Class-A Department of Science & Humanities (SH) Military Institute of Science and Technology (MIST) Mirpur Cantonment, Dhaka-1216

Dr. T. M. Shahriar Sazzad Assistant Professor Department of Computer Science & Engineering (CSE) Military Institute of Science and Technology (MIST) Mirpur Cantonment, Dhaka-1216

Maj Md. Manwarul Haq, PhD, AEC Instructor Class-B Department of Science & Humanities (SH) Military Institute of Science and Technology (MIST) Mirpur Cantonment, Dhaka-1216

Lt Cdr S M Anisur Rahman, BN Instructor Class-B Department of Computer Science and Engineering (CSE) Military Institute of Science and Technology (MIST) Mirpur Cantonment, Dhaka-1216 Tasmiah Tamzid Anannya Lecturer Department of Computer Science & Engineering (CSE) Military Institute of Science and Technology (MIST) Mirpur Cantonment, Dhaka-1216

Members (BUP):

Brig Gen Md. Anwar Shafiq, ndc, psc Inspector of College Bangladesh University of Professionals (BUP)

Brig Gen Md Zahidur Rahim, ndc, afwc, psc Dean Faculty of Science and Technology (FST) Bangladesh University of Professionals (BUP)

Members (External, Industry):

Dr. M. Sohel Rahman Professor Department of Computer Science and Engineering (CSE) Bangladesh University of Engineering and Technology (BUET) Engr. Mohammad Enamul Kabir Director (Training & Development) Bangladesh Computer Council (BCC) Agargaon, Sher-E-Bangla Nagar, Dhaka

Muhammad Redwanul Haq Product Development Lead , ICT / IoT Products Grameen Phone Limited Basundhara Residential Area, Dhaka-1229

Nayeem Ahmad Managing Director and CEO Ishraak Solutions Limited Niketan, Gulshan 1, Dhaka

Dr. Rifat Shahriyar Associate Professor Department of Computer Science and Engineering (CSE) Bangladesh University of Engineering and Technology (BUET) Dr. Junaed Sattar Assistant Professor Department of Computer Science and Engineering (CSE) University of Minnesot

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CHAPTER 1

GENERAL INFORMATION

1.1 Introduction to MIST

Military Institute of Science and Technology (MIST), the pioneer Technical Institute of Armed Forces, started its journey from 19 April 1998. It was the visionary leadership of the Honorable Prime Minister of People's Republic of Bangladesh Sheikh Hasina to establish a Technical Institute of Armed Forces. Accordingly, the Honorable Prime Minister, People's Republic of Bangladesh, Sheikh Hasina unveiled the Foundation Plaque on 19 April 1998.MIST is located at Mirpur Cantonment, which is on the northwest of Dhaka City. Mirpur Cantonment is well known to be as an Education Village of Bangladesh Armed Forces, a hub of knowledge for military and civil professionals. First Academic Program at MIST was launched on 31 January 1999 with the maiden batch of Civil Engineering (CE). The pioneer batch comprised of only military students. Computer Science & Engineering (CSE) Program got underway from academic session 2000-2001. Following those Programs, Electrical, Electronic & Communication Engineering (EECE) and Mechanical Engineering (ME) programs including induction of Civil Students (both male and female) in various disciplines started from the session 2002-2003. Aeronautical Engineering (AE) program started at MIST from academic session 2008-2009. The department of Naval Architecture and Marine Engineering (NAME) began its journey from academic session 2012-201. The department of Nuclear Science and Engineering (NSE), the department of Biomedical Engineering (BME), the department of Architecture (Arch) and the department of Environment, Water and Coastal Engineering (EWCE) started their journey from academic session 2014-2015, and from academic session 2015-2016, the department of Petroleum and Mining Engineering (PME) and department of Industrial and Production Engineering (IPE) started their journey. Foreign students from Sri Lanka were admitted for the first time at MIST. Presently students from Maldives, Palestine, Nepal and Gambia are also studying in different Engineering Programs. MIST envisages creating facilities for military as well as civil students from home and abroad dedicated to pursue standard curriculum leading to Graduation Degree. As an Institution without any gender biasness, MIST is already on steady stride upholding its motto "Technology for Advancement". MIST remains committed to contributing to the wider spectrum of national educational arena and play a significant role in the development of human resources and ardently pursuing its goal to grow into a "Centre of Excellence".

MIST has well equipped class rooms with multimedia and web camera with internet facilities and laboratories with modern equipment. The medium of instruction for all engineering programs is English. All academic programs of MIST are affiliated with the Bangladesh University of Professionals (BUP) and have close cooperation with Bangladesh University of Engineering and Technology (BUET) and Dhaka University (DU). Academic Session of MIST normally starts in the last week of January. Admission process starts in September/October and Admission Test held in November every year. Admission formalities are completed by December/January. The total number of intake in a year is 595. In general a maximum of 50% seats are allocated to Armed Forces Officers. MIST has other miscellaneous facilities such as Medical Centre, Fitness Centre, Cyber Cafe, Broadband Internet facilities, Library and Students' Accommodation (Male & Female). Out of twelve programs, so far five departments of MIST namely CE, EECE, ME, CSE and AE have achieved accreditation from BAETE (IEB) which is certainly considered to be a pronounced achievement for its academic excellence in national and international arena.

1.2 Attributes of MIST

MIST is an educational entity where there is an opportunity of blending civil and military students with diversified skills, exposure, experience and outlook. Attributes those may be considered as strengths of MIST are:

- Rigorous admission and selection process for best possible screening.
- Interactive sessions in the classroom.
- Regular guest lectures and educational visits.
- Tradition of timeliness, commitment and uninterrupted curriculum.
- Flexibility in choosing competent faculties through outsourcing.
- Well thought-out and continuous feedback and assessment system.
- Effective teaching through innovative method.
- Industrial attachment for on job training.
- Emphasis on code of conduct and dress code.
- Focus to develop students as a good human with all possible attributes of successful leader.
- Continuous effort to build strong industry-academia bondage.
- Tranquil, pollution free and secure campus life.
- Continuous effort to build strong industry-academia bondage.

1.3 Mission and Vision of MIST

1.3.1 Vision of MIST

To be a center of excellence for providing quality education in the field of science, engineering and technology and conduct research to meet the national and global challenges.

1.3.2 Mission Statement

MIST is working on the following missions:

- i. Provide comprehensive education and conduct research in diverse disciplines of science, engineering, technology, and engineering management.
- ii. Produce technologically advanced intellectual leaders and professionals with high moral and ethical values to meet the socio-economic development of Bangladesh and global needs.
- iii. Conduct collaborative research activities with national and international communities for continuous interaction with academia and industry.
- iv. Provide consultancy, advisory, testing, and other related services to government, nongovernment and autonomous organization including personal for widening practical knowledge and to contribute in sustainable development of the society.

1.4 Objectives

- To establish a prestigious academic institute for studies in different fields of engineering and technology for military personnel and civil officials/ students from home and abroad at degree and post graduate levels.
- To organize courses on military science and technology in various areas of interest.

- To hold examinations and confer certificates of diplomas/ degrees, other academic distinctions, to and on persons who have persuaded a course of study and have passed examinations conducted by the institute.
- To confer research degrees, award fellowship, scholarship, exhibition, prizes, medals and honorary degrees to persons who have carried out research works under conditions as prescribed in the MIST regulations.
- To make provisions for advisory, research and consultation service including supervisions, material testing and to enter into suitable agreement with any persons/organizations for this purpose.
- To co-operate with Universities / Technical Institutions (both military and civil) including signing of Memoranda of Understanding (MOU) at home and abroad, in the manner and purpose as the institute may determine.
- To do such other acts, related to above-mentioned objectives, as may be required in order to expand the objectives of the institute.

1.5 Location

MIST is located at Mirpur Cantonment, northwest edge of the greater Dhaka city, a hub of knowledge for the armed forces. Mirpur Cantonment is a small, calm and quiet education village and free from all possible pollution of a city life. A garland like lake with migratory birds, three sides with extended green fields in the summer and water bodies in the rainy season, whistling birds on the tree branches and overall bounty of nature adds to the already existing splendid academic atmosphere. Other neighboring academic institutions are National Defense College (NDC) and Defense Services Command and Staff College (DSCSC) – two international standard education centers.

1.6 Capabilities

- To conduct under-graduate programs leading to B.Sc. Engineering Degrees in the following disciplines:
 - Civil Engineering (CE)
 - Computer Science and Engineering (CSE)
 - Electrical, Electronic and Communication Engineering (EECE)
 - Mechanical Engineering (ME)
 - Aeronautical Engineering (AE)
 - Naval Architecture and Marine Engineering (NAME)
 - Bachelor of Architecture (B. Arch)
 - Environment, Water and Coastal Engineering (EWCE)
 - Nuclear Science and Engineering (NSE)
 - Biomedical Engineering (BME)
 - Industrial and Production Engineering (IPE)
 - Petroleum and Mining Engineering (PME)
- To conduct post graduate program (Ph.D, M.Sc, M. Engg).
- To conduct diploma courses in surveying & mapping.
- To conduct diploma and certificate courses in CSE.
- To conduct professional advanced courses.

1.7 Affiliation

All academic programs of MIST are affiliated with the Bangladesh University of Professionals (BUP). All examinations are conducted as per the schedule approved by the same university. BUP also approves the results and awards certificates amongst the qualified students.

1.8 Faculties

1.8.1 Faculty of Civil Engineering (FCE)

Faculty of CE comprises of following departments:

- Civil Engineering (CE)
- Architecture (Arch)
- Civil, Environment, Water and Coastal Engineering (CEWCE)
- Petroleum and Mining Engineering (PME)

1.8.2 Faculty of Electrical & Computer Engineering (FECE)

Faculty of ECE comprises of the following two departments:

- Computer Science and Engineering (CSE)
- Electrical, Electronic and Communication Engineering (EECE)

1.8.3 Faculty of Mechanical Engineering (FME)

Faculty of ME comprises of the following departments:

- Mechanical Engineering (ME)
- Aeronautical Engineering (AE)
- Naval Architecture and Marine Engineering (NAME)
- Industrial and Production Engineering (IPE)

1.8.4 Faculty of Science & Engineering (FSE)

Faculty of SE comprises of the following departments:

- Biomedical Engineering (BME)
- Nuclear Science and Engineering (NSE)
- Department of Science (Mathematics, Physics, Chemistry) and Humanities (Only Post Graduate)

Presently MIST has 12 (twelve) departments to conduct B Sc. Engineering program under 04 (four) different engineering faculties. The departments impart education basing on common objectives and outcomes set by MIST and have defined program objectives and outcomes, specific to the departments respectively.

1.9 Eligibility of Students for Admission in MIST (Subject to review each year)

The students must fulfill the following requirements:

1.9.1 Bangladeshi Students

Minimum qualifications to take part in the admission test are as follows:

- a) Applicants must have passed SSC/Dhakhil/equivalent examination from Board of Intermediate and Secondary Education/ Madrasa Education Board/ Technical Education Board in Science group with minimum GPA 4.00 in a 5-point scale.
- b) Applicants must have passed HSC/Alim/equivalent examination from Board of Intermediate and Secondary Education/ Madrasa Education Board/ Technical Education Board in Science group with minimum GPA 4.00 in a 5-point scale.
- c) In HSC/Alim/equivalent examination the applicant must have obtained minimum "A" grade in any two (02) subjects out of four (04) subjects including Mathematics, Physics, Chemistry & English and minimum "A-" (A minus) grade in rest two (02)subjects.
- Applicants with GCE "O" Level/equivalent background must have to qualify in minimum five (05) subjects including Mathematics, Physics, Chemistry and English with minimum "B" grade in average.
- e) Applicants with GCE "A" Level/equivalent background must have to qualify in minimum three (03) subjects including Mathematics, Physics and Chemistry with minimum "B" grades separately.
- f) Applicants who have passed HSC or equivalent examination in the current year or one year before the notification for admission can apply.
- g) Sex: Male and female.

1.9.2 Foreign Students

Maximum 3% of overall vacancies available will be kept reserved for the foreign students and will be offered to foreign countries through AFD of the Government of the People's Republic of Bangladesh. Applicants must fulfill the following requirements:

- a) Educational qualifications as applicable for Bangladeshi civil students or equivalent.
- b) Must have security clearance from respective Embassy/ High Commission in Bangladesh.
- c) Sex: Male and female.

1.10 Admission Procedure

1.10.1 Syllabus for Admission Test

Admission test will be conducted on the basis of the syllabus of Mathematics, Physics, Chemistry and English (Comprehension and Functional) subjects of HSC examinations of all Boards of Secondary and Higher Secondary School Certificates. Admission test generally conducted out of 200 marks and the syllabus and distribution of marks is given below:

Serial	Subjects	Syllabus	Marks	
1	Mathematics		80	
		Syllabus of the current year of HSC		
		Examinations of all Boards of		
		Intermediate and Secondary		
2	Physics	Education	60	
3	Chemistry		40	
4	English	Comprehension and functional	20	
	Total 200			

1.10.2 Final Selection

Minimum qualifying marks in the written admission test is 40%. Students are taken as per merit and quota.

1.10.3 Medical Checkup

Civil candidates selected through admission test will go for medical checkup in MIST/CMH. If the medical authority considers any candidate unfit for study in MIST due to critical/contagious/mental diseases as shown in medical policy of MIST will be declared unsuitable for admission.

1.11 Withdrawal Policy

MIST has been established with an aim of providing quality education in various disciplines of Engineering leading to B.Sc Engineering to be conferred by BUP. A definite standard of education and general discipline will be followed in every level of the program. The unsuccessful students will therefore be withdrawn from the institute.

1.11.1 Definition of Terms

Permanent Withdrawal

It will imply a complete/permanent discontinuity from any course/program of the institute.

Temporary Withdrawal

It means that the student has been allowed by the Academic Council, MIST to discontinue temporarily from any course/program for a definite period. The student, so withdrawn, may reenter the course as per terms and conditions as set by the authority.

Permanent Expulsion

It means expulsion permanently from the institution on disciplinary ground. A student, if expelled permanently will never be allowed to re-enter the course or similar program in MIST and be subjected to other terms and conditions as set by the authority while approving the permanent expulsion order.

Temporary Expulsion

It means expulsion from an academic course/program for a certain period on disciplinary ground. A student, if expelled temporarily, may be allowed to re-enter the course/program on expiry of the punishment period and on fulfillment of other terms and conditions (if any) asset by the authority while approving the temporary expulsion order.

1.11.2 General Policy of Withdrawal

The under graduate (B.Sc) Engineering programs, in all Engineering disciplines are planned for 04 regular levels, comprising of 08 regular terms and for B. Arch it is planned for 05 regular levels, comprising of 10 regular terms. It is expected that all students will earn degree by clearing all the offered courses in the stipulated time. In case of failure MIST Examination policies will be adopted. Few salient aspects extracted from the existing MIST Exam Policies are as followings:

- Students failing in maximum two courses/subjects in any level, each comprising of two regular terms will be allowed to appear in the referred/re-examination on failed course(s)/subject(s) after a short term as per academic schedule. In case of Sessional Course referred examination will be allowed to maximum one course.
- Referred/re-examination, after a short term is to be conducted within 02 (two) weeks of commencement of the next academic session at the latest.
- Students failing in maximum one course/subject in the referred/re-examination will be promoted to the next higher level. The failed course/subject will be termed as "Backlog" subject and the students have to pass the "Backlog" subject in the next scheduled referred/re-examination, but without any short term. Otherwise, he/she will be withdrawn permanently from the course/program.
- No student will be allowed to appear in the referred/re-examination in the same subject more than twice in the whole undergraduate program. No 'Backlog' subject is allowed to
- Sessional Courses and students subjected to Referred in a Sessional Course must qualify during Referred Exam. Otherwise, he/she will be withdrawn permanently from the course/program.
- Students in all levels will be allowed to appear in the referred/re-examination on two courses/subjects including the "Backlog" one.
- Students will be promoted to the second term of each level irrespective of their results in the first term of the level.
- Students failing in three or more courses/subjects in any level, comprising of two regular terms, will be allowed to repeat the level once. Students repeating a level will be granted exemption for that/those subject(s) in which they earned "B+" and above grade in the previous academic year. For a military student, repeating a level will be subject to the approval of the respective Services Headquarters.
- Students will be allowed to repeat a particular level only once in the whole undergraduate program.
- After level-4 referred/re-examination, if any military student fails in maximum one course/subject, but not the "Backlog" subject, then he/she will leave MIST and will be allowed to appear in the next scheduled referred/re-examination of the respective course. In that examination if he/she cannot pass the course/subject, or if he/she does not appear in the referred examination within 06 (six) years of registration will lose the scope of completing graduation. This failure will also be recorded in the dossier of military student officers.
- In case of sickness, which leads to missing of more than 40% classes or miss term final examination (supported by requisite medical documents), students may be allowed to withdraw temporarily from that term and repeat the whole level with the regular level in the next academic session, subject to the approval of Academic Council, MIST. However, he/she has to complete the whole undergraduate program within 06 (six) academic years from the date of his/her registration.
- Whatever may be the cases, students have to complete the whole undergraduate program within 06 (six) academic years from the date of registration.
- Failure to secure/achieve minimum CGPA of 2.20 in two consecutive levels will also lead to withdrawal of the student from the program.

1.11.3 Expulsion/Withdrawal on Disciplinary Ground

1.11.3.1 Unfair Means

Adoption of unfair means may result in expulsion of a student from the program and so from the institution. The Academic Council of MIST will authorize such expulsion on the

basis of recommendation of the Disciplinary Committee, MIST and as per policy approved by the affiliating university. Following would be considered as unfair means adopted during examinations and other contexts:

- Communicating with fellow students for obtaining help in the examination.
- Copying from another student's script/report/paper.
- Copying from desk or palm of a hand or from other incriminating documents.
- Possession of any incriminating document whether used or not.

1.11.3.2 Influencing Grades

Academic council of MIST may expel/withdraw any student for approaching directly or indirectly in any form to influence a teacher or MIST authority for grades.

1.11.3.3 Other Indiscipline Behaviours

Academic council of MIST may withdraw/expel any student on disciplinary ground, if any form of indiscipline or unruly behavior is seen in him/her which may disrupt the academic environment/program or is considered detrimental to MIST's image.

1.11.3.4 Immediate Action by the Disciplinary Committee of MIST

The disciplinary committee, MIST may take immediate disciplinary action against any student of the institution. In case of withdrawal/expulsion, the matter will be referred to the academic council, MIST for post-facto approval.

1.11.4 Withdrawal on Own Accord

1.11.4.1 Permanent Withdrawal

A student who has already completed some courses and has not performed satisfactorily may apply for a permanent withdrawal.

1.11.4.2 Temporary Withdrawal

A student, if he/she applies, may be allowed to withdraw temporarily from the program, subject to the approval of academic council of MIST, but he/she has to complete the whole program within 06 (six) academic years from the date of his/her registration.

CHAPTER 2

THE DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

2.1 Introduction to the CSE Program

Computer plays vital and in fact indispensable role in all fields of modern human activities. Consequently, Computer Science and Engineering has established itself as one of the most important branches of engineering. Recent development in computer has a considerable impact on society. It has already expanded to all fields of study starting from genetic engineering to space technology. Recent development in Artificial Intelligence has taken the human history a new height. That day is not very far when man can make machine like him.

The Department of Computer Science and Engineering is one of the pioneer Departments of this Institute providing top-quality education in Computer Science and Engineering (CSE) at its undergraduate program. ICT is the leading sector in present day. It is already declared as a thrust sector in Bangladesh. Keeping this in mind the department offers B.Sc in CSE program to produce computer specialists.

In addition to the above, Department of Computer Science and Engineering is launched M.Sc. (Engg)/ M.Engg programs in October, 2014 and Ph.D. program in 2016. There are financial assistance program for the poor and meritorious students too.

2.2 Historical Background

Department of Computer Science and Engineering began its journey from the academic session in 2000-2001 as Department of CSIT with military students only. Later, civil students were inducted in the next session. The department was renamed as Department of CSE in January 2003. This year (2017), the 17th batch has begun their classes in Level-1. Over the years, this ever-flourishing department has been providing the technological foundation on ICT, scholarly guidance and leadership skills to the students that have contributed to produce 629 highly qualified and skilled CSE graduates. Our graduates are working proudly both at home and abroad. Besides, a good number of graduates are pursuing higher studies abroad with scholarship. Moreover, our CSE students actively participate in various events, like, national and international computer programming competition, software development competitions, Gaming and Robotic contest, Mobile Apps development, Debate and English speaking competition, national and international seminar and workshops on ICT and exhibit brilliant performances. With the relentless effort of the qualified, sincere and enthusiastic faculty and able guidance of the respected Commandant and Dean of MIST, the department has become a unique one of its field. With its excellent professional competence, expert teaching viewpoints and capabilities of training, B.Sc in Computer Science and Engineering (CSE) degree program has achieved accreditation from BAETE (IEB) on 10 July 2013 with a grade as "Good" and was renewed for three years in 2017.

This department produces highly qualified and skilled computer science graduates. Over the years, this rapidly flourishing department has been providing the technical foundation, scholarly guidance and leadership skills to the undergraduate and postgraduate students who proved their potentiality at home and abroad. Major areas of specialties of CSE department are Software, Hardware, Networking, Computer Graphics & Image Processing, Artificial Intelligence & Robotics, System Analysis Design & Development, Information Systems Security, Research etc.

With proper guidance of the respected Commandant and Dean of MIST, at present 28 faculties specialized from different background (civil, military and foreign) are serving in this department. In addition a good number of senior faculties from renowned universities like BUET, Dhaka University conduct courses as guest faculties. This department also offers adequate facilities for carrying out innovative research works in the field of CSE.

2.3 Study Programs

The Department of Computer Science and Engineering offers the degree of B. Sc. Engg in CSE. The courses and syllabus followed by this department for the above degree is considered to be the most modern ones like that of advanced countries as well as appropriate to the local needs. The syllabus is designed to contain all the necessary study materials so that a graduate can face the engineering problems readily after graduation. Also, the syllabus is reviewed and necessary changes are made in every three years by a "committee of courses" comprising the best academicians and experts of the field of Computer Science and Engineering coming from MIST and other leading Universities and Organizations.

2.3.1 CSE Program

2.3.1.1 Vision Statement

To create skilled and competent professionals in the field of Computer Science and Engineering with high morals to meet the national and global needs through creative research and innovations.

2.3.1.2 Mission of the Program

Department of CSE is working with the following missions in mind.

- i. To provide high quality state of the art education and knowledge in Computer Science and Engineering, to produce competent engineers, capable of solving real-world problems to meet the needs of industry and society.
- ii. To contribute towards the creation of new knowledge through eminence research and innovation in CSE and allied fields to address emerging national and global issues for well-being of the society.
- iii. To enable students in attaining required ethics with an attitude of entrepreneurial skills, ethical values and social consciences.
- iv. To embed leadership qualities amongst the students to follow successful professional career paths and to pursue advanced studies in computer engineering and a life-long learner in cutting edge developments in the field of computing and IT.

2.3.1.3 **Program Educational Outcomes (PEOs)**

The graduates of CSE program are expected to have the following skills:

1. Graduates will grow and develop in their chosen profession and/or progress toward an advanced degree by giving innovative solutions to complex problems.

- 2. Graduate will earn respects from others and demonstrate reliability as effective and ethical team members and achieve positions of leadership in an organization and/or on teams.
- 3. Graduates will be able to establish or run sustainable business enterprises along diverse career paths by creating, selecting, applying appropriate and modern technologies, skills and tools.
- 4. Graduates will be able contribute to the educational, cultural, social, technological and economic development of society through the ethical application of their knowledge and skills.

2.3.1.4 Program Outcomes (POs)

Program Outcomes (POs) represent the knowledge, skills and attitudes the students should have at the end of a four year engineering program. CSE program of MIST has 12 Program Outcomes. They are briefly described in the following table.

Serial	РО	Category	Description
1	PO1	Engineering Knowledge	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2	PO2	Problem Analysis	Identify, formulate, research literature, and analyze complex Engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3	PO3	Design/Development of Solutions	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety as well as cultural, societal and environmental concerns.
4	PO4	Investigation	Conduct investigations of complex problems, considering design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.
5	PO5	Modern Tool Usage	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6	PO6	The Engineer and Society	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, And cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7	PO7	Environment and Sustainability	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of need

			for sustainable development.
8	PO8	Ethics	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9	PO9	Individual and Team Work	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10	PO10	Communication	Communicate effectively on complex engineering activities with the engineering community and with society at large. Some of them are, being able to comprehend and write effective reports and design documentation, make effective presentation and give and receive clear instructions.
11	PO11	Project management and Finance	Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments
12	PO12	Lifelong learning	Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.

Table: List of Program Outcomes

2.3.1.5 Learning Outcomes (LO)

The Learning Outcomes (LO) are the resultant knowledge skills the student acquires at the end of a course. It defines the cognitive processes a course provides. Chapter 5 contains the detailed Learning Outcomes for each of the courses under the heading of Course Outcome (CO).

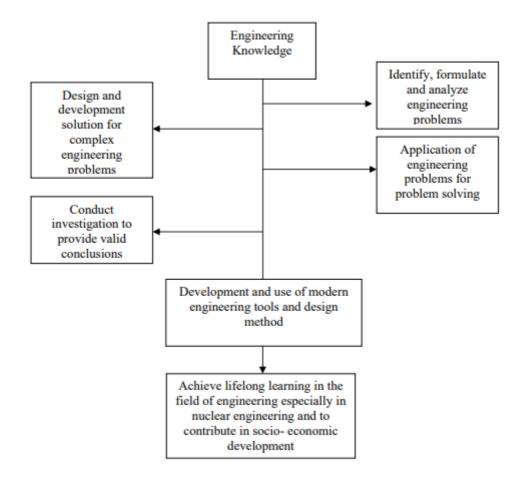
2.3.1.6 Generic Skills

After completion of the course, the graduates will be able to achieve certain level of Knowledge Profile, range of Complex Problem solving, range of Complex Engineering Activities, Learning Domain which are given in detail in Appendix A.

2.3.1.7 Curriculum/Skill Mapping

The courses of CSE program are designed in such a way that the corresponding Learning Outcomes (LO) contribute to the 12 Program Outcomes (POs) which eventually achieves the mission and vision of the program. Chapter 5 contains the mapping for each of the courses.

However, generic curriculum/ skill mapping is shown below:



2.4 Laboratory Facilities of the Department

The department endeavors to provide its faculty members and students adequate laboratory, library and other facilities. Departmental undergraduate courses are well supported by the following laboratories:

Software Engineering Lab: This department has a software engineering lab consisting of 60 computers as workstations. With co-located Artificial Intelligence and VLSI lab, class can be conducted for 70 students at a time providing each one PC.

Digital Design Lab: This department has a digital lab where sessional classes of different courses on digital electronics can be conducted. This lab is enriched with modern electronic equipment and facilities.

Artificial Intelligence and Robotics Lab: There is an Artificial Intelligence consisting of 70 computers as workstations in this department. With co-located software engineering lab, classes can be conducted for 70 students at a time providing each one PC and other equipment.

Network Lab: This department has a Network lab of 70 computers as workstations. All necessary network equipment and accessories are available in the lab for conducting sessional classes.

Microprocessor and Microcontroller Lab: This department has a Microprocessor and Microcontroller lab enriched with latest Micro kits.

Multimedia and Image Processing Lab: This department has a Multimedia and Graphics lab where sessional classes of different course on computer graphics and multimedia theory can be conducted. This lab has 70 computers donated by Indian government in 2013. Moreover, students undertaking different graphics design project also are assisted by all required accessories and components. Regular project showcase are held in this lab.

Postgraduate Research Lab: Postgraduate Research Lab is a highly furnished Lab equipped with state-ofthe art research facilities in the field of ICT. This lab sponsored under the "Info-Sarkar" project of the Government. The lab was inaugurated on 31st August 2016 by Mr. Zunaid Ahmed Palak, MP, Honorable State Minister, ICT Division, Ministry of Post, Telecommunication and Information Technology, Government of the peoples' Republic of Bangladesh. It will offer cutting-edge research opportunities for the researchers at postgraduate level as well as for the faculty members.

Mobile Apps and Game Testing Lab: This department has a Mobile Apps and Game Testing Lab consisting of 10 computers as workstation donated by ICT Division on 11 December 2017. The lab is mainly established for development and testing of mobile applications and games. Classes can be conducted for 20 students at a time. All necessary equipment including Computers (Brand and Model: HP EliteDesk 800 G3), Android Tab (Brand and Model: Samsung Galaxy Tab S3), Android Phone (Brand and Model: Samsung Galaxy Note 8), Wacom Intuos Pre Medium (Brand and Model: PTH-660/KO-CX) and other necessary software are available in this lab.

Other Computing Resources: This department has IBM and HP servers connecting all the PCs of MIST by Intranet, providing internet and other services. It has all the necessary equipment for multimedia lab. We have 24 hours Internet facilities including Wi-Fi.

Labs Under Construction:

The following labs are approved by Govt and CSe department is constructing them:

- (1) Internet and Web Design Lab
- (2) Data Base Design Lab
- (3) Simulation and Modeling Lab
- (4) Computing Lab

Labs Planned for Future Expansion: This department will have following labs in future:

- (1) HCI Lab
- (2) VLSI Lab
- (3) Big data and Cloud Computing Lab
- (4) Software Defined Network (SDN) Lab
- (5) Cyber Security Lab
- (6) Digital Forensic Lab

The laboratories of CSE Department are also used by the students of other departments for sessional classes and research work of relevant subject/courses.

2.5 Research Activities

The research work undertaken by the teachers and students of this department in the last few years is diversified in nature. The faculty members have a good number of publications in different national and international conferences and journals. MIST also regularly publishes MIST International Journal of Science and Technology (MIJST) biannually (June and December) where faculties and students of CSE department put their contributions. MIJST is a peer-reviewed open-access journal of the Military Institute

of Science and Technology (MIST). The OJS system based MIJST is designed for publishing open-access journal articles based on PHP, MySQL, Javascript, CSS, etc. As the MIJST Platform is an online system, it will provide a wide range of facilities for students, researchers, publishers, and readers from all over the world through knowledge sharing and research collaboration.

2.6 Co-curricular Activities

Students of this department have achieved remarkable success in co-curricular activities like programming contests, software and hardware project competitions, software fair etc. Besides, students take part and show significant performance in debate, sports and cultural programs.

CHAPTER 3

RULES AND REGULATIONS FOR UNDERGRADUATE PROGRAM

3.1 Overview

MIST has started course system for undergraduate studies from the academic session 2017-18. Therefore, the rules and regulations mentioned in this paper will be applicable to students for administering undergraduate curriculum through the Course System. This policy will be introduced with an aim of creating a continuous, even and consistent workload throughout the term for the students.

3.2 The Course System

The salient features of the Course System are as follows:

- a. Number of theory courses will be generally 06 or as per syllabus in each term. However, with the recommendation of course coordinator and Head of the Department, Commandant MIST may allow up to 07 courses in exceptional cases if department can accommodate within 24 credit hours.
- b. Students will not face any level repeat for failing.
- c. Students will get scope to improve their grading.
- d. Introduction of more optional courses to enable the students to select courses according to their individual needs and preferences.
- e. Continuous evaluation of students' performance.
- f. Promotion of student-teacher interaction and contact.

Beside the professional courses pertaining to each discipline, the undergraduate curriculum gives a strong emphasis on acquiring thorough knowledge in the basic sciences of mathematics, physics and chemistry. Due importance is also given on the study of several subjects in humanities and social sciences.

The first two years of bachelor's degree programs generally consist of courses on basic engineering, general science and humanities subjects; while the third and subsequent years focus on specific disciplines.

3.3 Number of Terms in a Year

There will be two terms Spring Term (Jan-Jun) and Fall Term (Jul-Dec) in an academic year.

3.4 Duration of Terms

Serial	Events	Durations
1.	Classes before Mid Term	7 weeks
2.	Mid Term Vacation 1 we	
3.	Classes after Mid Term	7 weeks
4.	Makeup Classes and Preparatory leave	2/3 weeks
5.	Term Final Examination	2/3 weeks
6.	Term End Vacation	1/2 week

The duration of each of Spring Term and Fall Term (maximum 22 weeks) may be as under:

3.5 Course Pattern and Credit Structure

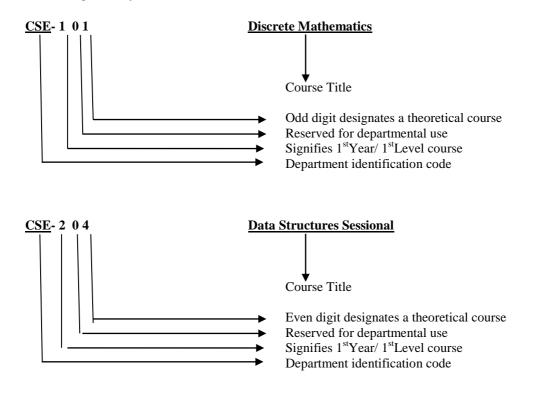
The undergraduate program is covered by a set of theoretical courses along with a set of laboratory (sessional) courses to support them.

3.6 Course Designation System

Each course is designated by a maximum of three/four letter code identifying the department offering the course followed by a three-digit number having the following interpretation:

- a. The first digit corresponds to the year/level in which the course is normally taken by the students.
- b. The second digit is reserved for departmental use. It usually identifies a specific area/group of study within the department.
- c. The last digit is an odd number for theoretical courses and an even number for sessional courses.

The course designation system is illustrated as Follows:



3.7 Assignment of Credits

The assignment of credits to a theoretical course follows a different rule from that of a sessional course.

- a. Theoretical Courses: One lecture per week per term is equivalent to one credit.
- b. Sessional Courses: Credits for sessional courses is half of the class hours per week per term.

Credits are also assigned to project and thesis work taken by the students. The amount of credits assigned to such work varies from one discipline to another.

3.8 Types of Courses

The types of courses included in the undergraduate curricula are divided into the following groups:

a. **Program Core:**

- i. **Core Courses**: In each discipline, a number of courses are identified as core courses, which form the nucleus of the respective bachelor's degree program. A student has to complete the entire designated core courses of his/her discipline.
- ii. **Technical Elective Courses**: Apart from the core courses, the students can choose from a set of technical elective courses. A required number of elective courses from a specified group have to be chosen.

b. <u>University Core</u>:

- i. **Language/Communicative Language**: This category includes different communicative languages like English which is also a mandatory for students.
- ii. **General education courses:** This category covers Sociology, Bangladesh Studies, Leadership and Management, Environment Sustainability and Law, Ethics and moral philosophy.
- iii. **Basic Science courses:** This category covers Physics and Chemistry courses and they are accompanied with appropriate laboratory works.
- iv. **Mathematics:** Students must complete four mathematics course to attain the degree which includes differential and integral calculus, vector analysis, matrix and coordinate geometry, differential equations, Laplace transform and Fourier transform, complex variable and statistics.
- v. **Interdisciplinary courses:** Some other departmental basic courses offered by other departments like CE, ME, EECE falls under this category.

3.9 Course Offering and Instruction

The courses to be offered in a particular term are announced and published in the Course Catalog along with the tentative Term Schedule before the end of the previous term. The courses to be offered in any term will be decided by Board of Undergraduate Studies (BUGS) of the respective department.

Each course is conducted by a course teacher who is responsible for maintaining the expected standard of the course and for the assessment of students' performance. Depending on the strength of registered students (i.e. on the number of students) enrolled for the course, the teacher concerned might have course associates and Teaching Assistants (TA) to aid in teaching and assessment.

3.10 Teacher-Student Interaction

The new course system encourages students to come in close contact with the teachers. For promotion of a high level of teacher-student interaction, each student is assigned to an adviser and the student is free to discuss all academic matters with his/her adviser. Students are also encouraged to meet any time with other

teachers for help and guidance in academic matters. However, students are not allowed to interact with teachers after the moderation of questions.

3.11 Student Adviser

One adviser is normally appointed for a group of students by the BUGS of the concerned department. The adviser advises each student about the courses to be taken in each term by discussing the academic program of that particular term with the student.

However, it is also the student's responsibility to keep regular contact with his/her adviser who will review and eventually approve the student's specific plan of study and monitor subsequent progress of the student.

For a student of second and subsequent terms, the number and nature of courses for which he/she can register is decided on the basis of academic performance during the previous term. The adviser may permit the student to drop one or more courses based on previous academic performance.

3.12 Course Registration

Any student who uses classroom, laboratory facilities or faculty-time is required to register formally. Upon admission to the MIST, students are assigned to advisers. These advisers guide the students in choosing and registering courses.

3.12.1 Registration Procedure

At the commencement of each term, each student has to register for courses in consultation with and under the guidance of his/her adviser. The date, time and venue of registration are announced in advance by the Registrar's Office. Counseling and advising are accomplished at this time. It is absolutely essential that all the students be present for registration at the specified time.

3.12.2 Pre-conditions for Registration

- a. For first year students, department-wise enrollment/admission is mandatory prior to registration. At the beginning of the first term, an orientation program will be conducted for them where they are handed over with the registration package on submission of the enrolment slip.
- b. Any student, other than the new batch, with outstanding dues to the MIST or a hall of residence is not permitted to register. Each student must clear their dues and obtain a clearance certificate, upon production of which, he/she will be given necessary Course Registration Forms to perform course registration.
- c. A student is allowed to register in a particular course subject to the class capacity constraints and satisfaction of pre-requisite courses. However, even if a student fails in a pre-requisite course in any term, the concerned department (BUGS) may allow him/her to register for a course which depends upon the pre-requisite course provided that his/her attendance and performance in the continuous assessment of the mentioned pre-requisite course is found to be satisfactory.

3.12.3 Registration Deadline

Each student must register for the courses to be taken before the commencement of each term. Late registration is permitted only during the first week of classes. Late registration after this date will not be accepted unless the student submits a written application to the registrar through the

concerned Head of the department explaining the reasons for delay. Acceptable reasons may be medical problems with supporting documents from the Medical Officer of MIST or some other academic commitments that prohibit enrollment prior to the last date of registration.

3.12.4 Penalty for Late Registration

Students who fail to register during the designated dates for registration are charged a late registration fee as per Institution policy. Penalty for late registration will not be waived.

3.13 Limits on the Credit Hours

A student should be enrolled for at least 15 credit hours and is allowed to take a maximum of 24 credit hours. Relaxation on minimum credit hours may be allowed. A student must enroll for the sessional courses prescribed in a particular term within the allowable credit hour limits.

In special cases where it is not possible to allot the minimum required 15 credit hours to a student, the concerned department (BUGS) may permit with the approval of the Commandant, a lesser number of credit hours to suit individual requirements. Only graduating students may be allowed to register less than 15 Cr Hr without approval of Commandant. A list of all such cases to be forwarded to Register Office, ICT directorate and Controller of Exam Office by the respective Department.

3.14 Course Add/Drop

A student has some limited options to add or drop courses from the registration list. Addition of courses is allowed only within the first two weeks of a regular term. Dropping a course is permitted within the first four weeks of a regular term. Add or drop is not allowed after registration of courses for Supplementary-I and Supplementary-II Examination.

Any student willing to add or drop courses has to fill up a Course Adjustment Form. This also has to be done in consultation with and under the guidance of the student's respective adviser. The original copy of the Course Adjustment Form has to be submitted to the Registrar's Office, where the required numbers of photocopies are to be made for distribution to the concerned adviser, Head, Dean, Controller of Examinations and the student.

All changes must be approved by the adviser and the Head of the concerned department. The Course Adjustment Form has to be submitted after being signed by the concerned persons.

3.15 Withdrawal from a Term

If a student is unable to complete the Term Final Examination due to serious illness or serious accident, he/she may apply to the Head of the degree awarding department for total withdrawal from the term before commencement of term final examination. However application may be considered during term final examination in special case. The application must be supported by a medical certificate from the Medical Officer of MIST. The concerned student may opt for retaining the sessional courses of the term. The Academic Council will take the final decision about such applications. However, the total duration for graduation will not exceed 6 academic years.

3.16 The Grading System

The total performance of a student in a given course is based on a scheme of continuous assessment, for theory courses this continuous assessment is made through a set of quizzes, class tests, class evaluation, class participation, homework assignment and a term final examination. The assessments for sessional courses are made by evaluating performance of the student at work during the class, viva-voce during laboratory hours and quizzes. Besides that, at the end there will be a final lab test. Each course has a certain number of credits, which describes its corresponding weightages. A student's performance is measured by the number of credits completed satisfactorily and by the weighted average of the grade points earned. A minimum grade point average (GPA) is essential for satisfactory progress. A minimum number of earned credits also have to be acquired in order to qualify for the degree.

Grading System				
Numerical Markings Grade		Grade Points		
80% and above	A+	4.00		
75% to below 80%	А	3.75		
70% to below 75%	A-	3.50		
65% to below 70%	B+	3.25		
60% to below 65%	В	3.00		
55% to below 60%	B-	2.75		
50% to below 55%	C+	2.50		
45% to below 50%	С	2.25		
40% to below 45%	D	2.00		
below 40%	F*	0.00		
	AB	Absent		
	DC	Dis-collegiate		
	VW	Voluntary Withdrawn		
	Х	Project/ Thesis Continuation		
	Е	Expelled		
	S	Satisfactory		

Letter grades and corresponding grade points will be given as follows:

* Subject in which the student gets F grade shall not be regarded as earned credit hours for the calculation of Grade Point Average (GPA)

3.17 Distribution of Marks

3.17.1 Theory

Forty percent (40%) of marks of a theoretical course shall be allotted for Continuous Assessment, i.e. assignments, class tests, pop quizzes, observations, projects and mid-term assessment. These marks must be submitted to Office of the Controller of Examinations before commencement of the final exam. The rest of the marks will be allotted to the Term Final Examination. The duration of final examination will be three (03) hours. The scheme of continuous assessment that a particular teacher would follow for a course will be announced on the first day of the classes. Distribution of marks for a given course per credit is as follows:

Class Performance	5%
Class Test/Assignment	20%
Mid-Term Assessment (Exam/Project)	15%
Final Examination (Section A & B)	60%
Total	100%

Note:

a. In final exam, each section can be used for achieving not more than two course outcomes (COs). The remaining COs should be attained from mid-term assessment or class tests. Course teacher has to inform the student the beginning of the terms.

b. Course teacher of a particular course has to inform the department whether he/she wants to assess mid-term through exam or project within first two weeks of beginning of a term. The duration of mid-term examination should not be more than 50 minutes which has to be conducted in between 6^{th} to 9^{th} week of a semester. If mid-term assessment is done through project, then there should be project report and presentation.

c. The weightage of class performance can be assessed through checking attentiveness during classes or arranging unnoticed pop quizzes.

d. The number of class tests shall be n for 3.0 and above credit courses and (n-1) shall be considered for grading where n is the number of credits of the course. However, for courses having credits below 3.0, the considered class tests shall be 2 out of 3.

e. All class test will carry 20 marks each. Exam software system will finally convert these achieved marks into total class test marks as per credit hour. i.e for n=1(20), n=2 (40), n=3 (60), n=4(80) etc.

f. Irrespective of the result of the continuous assessment (class performance, class test, mid-term assessment), a student has to appear in the final examination (where applicable) for qualifying/passing the concern course/ subject.

3.17.2 Laboratory/Sessional/Practical Examinations

Laboratory/sessional courses are designed and conducted by the concerned departments. Examination on laboratory/sessional/practical subjects will be conducted by the respective department before the commencement of term final examination. The date of practical examination will be fixed by the respective department. Students will be evaluated in the laboratory/sessional courses on the basis of the followings:

Conduct of Lab Tests/Class Performance	25%
Report Writing/Programming	15%
Mid-Term Evaluation	
(exam/project/assignment)	20%
Final Evaluation	
(exam/project/assignment)	30%
Viva Voce/Presentation	10%
Total	100%

<u>Note:</u> the above distribution of percentage is a general guideline. Department can rearrange to some extent if required.

3.17.3 Laboratory/Sessional Course in English

The distribution will be as under:

Class performance/observation	10%
Written Assignment	15%
Oral Performance	25%
Listening Skill	10%
Group Presentation	30%
Viva Voce	10%
Total	100%

3.17.4 Class attendance

Class attendance may be considered as a part of continuous assessment. No mark will be allotted for attending classes.

3.18 Collegiate, Non-collegiate and Dis-collegiate

Students having class attendance of 85% or above in individual subject will be treated as collegiate and less than 85% and up to 70% will be treated as non-collegiate in that subject. The non-collegiate student(s) may be allowed to appear in the examination subject to payment of non-collegiate fee/fine of an amount fixed by MIST/BUP. Students having class attendance below 70% will be treated as dis-collegiate and will not be allowed to appear in the examination and treated as fail. But in a special case such students may be allowed to appear in the examination of Commandant and it must be approved by the Academic Council.

3.19 Calculation of CGPA

Grade Point Average (GPA) is the weighted average of the grade points obtained of all the courses passed/completed by a student. For example, if a student passes/completes n courses in a term having credits of C1, C2... Cn and his grade points in these courses are G1, G2, ..., Gn respectively, then

 $GPA = \frac{Grade \ points \ earned \ in \ the \ semester}{Credits \ completed \ in \ the \ semester}$

 $= \frac{Summation of (Credit hours in a course * Grade point earned in that course)}{Total number of credit hours completed}$

$$=\frac{\sum_{i=1}^{n}Ci*Gi}{\sum_{i=1}^{n}Ci}$$

The Cumulative Grade Point Average (CGPA) is the weighted average of the GPA obtained in all the terms passed/completed by a student. For example, if a student passes/ completes n terms having total credits of TC1, TC2, ..., TCn and his GPA in these terms are GPA1, GPA2,..., GPAn, respectively then

$$CGPA = \frac{\sum_{i=1}^{n} TCi * GPAi}{\sum_{i=1}^{n} TCi}$$

Numerical Example: Suppose a student has completed nine courses in a term and obtained the following grades:

Course	Credit Ci	Grade Points	Gi	Ci*Gi
EECE-163	3.00	А	3.75	11.25
EECE-164	0.75	A+	4.00	3.00
MATH-141	3.00	A-	3.50	10.50
PHY-103	3.00	B+	3.25	9.75
HUM-101	3.00	А	3.75	11.25
HUM-102	1.50	А	3.75	5.625
CSE-101	3.00	А	3.75	11.25
CSE-103	3.00	A-	3.50	10.50
CSE-104	1.5	B+	3.25	4.875
Total	21.75			78.00

$$GPA = \frac{78.00}{21.75} = 3.59$$

Suppose a student has completed four terms and obtained the following GPA:

Level	Term	Earned Credit Hours	Earned GPA	TCi*GPAi
		TCi	GPAi	
1	Spring	21.75	3.75	81.5625
1	Fall	20.75	3.61	74.9075
2	Spring	19.50	3.21	62.595
2	Fall	21.00	2.98	62.58
Total		83.00		281.645

$$CGPA = \frac{281.645}{83} = 3.39$$

3.20 Impacts of Grade Earned

The courses in which a student has earned a 'D' or a higher grade will be counted as credits earned by him/her. Any course in which a student has obtained an 'F' grade will not be counted towards his/her earned credits or GPA calculation. However, the 'F' grade will remain permanently on the Grade Sheet and the Transcript.

A student who obtains an 'F' grade in a core course will have to repeat that particular course. However, if a student gets an 'F' in an optional course, he/she may choose to repeat that course or take a substitute course if available. When a student will repeat a course in which he/she has previously obtained an 'F', he/she will not be eligible to get a grade better than 'B+' in that repeated course.

If a student obtains a grade lower than 'B+' in a particular course he/she will be allowed to repeat the course only once for the purpose of grade improvement. However, he/she will not be eligible to get a grade better than 'B+' for an improvement course.

A student will be permitted to repeat for grade improvement purposes a maximum of 6 courses in BSc. Engineering programs and a maximum of 7 courses in B. Arch. Program.

If a student obtains a 'B+' or a better grade in any course he/she will not be allowed to repeat the course for the purpose of grade improvement.

3.21 Classification of Students

At MIST, regular students are classified according to the number of credit hours completed/ earned towards a degree. The following classification applies to all the students:

Level	Credit Hours Earned			
	Engineering/URP	Architecture		
Level 1	0.0 to 36.0	0.0 to 34.0		
Level 2	More than 36.0 to 72.0	More than 34.0 to 72.0		
Level 3	More than 72.0 to 108.0	More than 72.0 to 110.0		
Level 4	More than 108.0	More than 110.0 to 147.0		
Level 5	-	More than 147.0		

However, before the commencement of each term all students other than new batch are classified into three categories:

- a. **Category 1:** This category consists of students who have passed all the courses described for the term. A student belonging to this category will be eligible to register for all courses prescribed for the upcoming term.
- b. **Category 2:** This category consists of students who have earned a minimum of 15 credits but do not belong to category 1. A student belonging to this category is advised to take at least one course less since he might have to register for one or more backlog courses as prescribed by his/her adviser.
- c. **Category 3:** This category consists students who have failed to earn the minimum required 15 credits in the previous term. A student belonging to this category is advised to take at least two courses less than a category 1 student subject to the constraint of registering at least 15 credits. However, he will also be required to register for backlog courses as prescribed by the adviser.

Definition of Graduating Student. Graduating students are those students who will have ≤ 24 credit hour for completing the degree requirement.

3.22 Performance Evaluation

The performance of a student will be evaluated in terms of two indices, viz. Term Grade Point Average and Cumulative Grade Point Average which is the grade average for all the terms completed.

Students will be considered to be making normal progress toward a degree if their Cumulative Grade Point Average (CGPA) for all work attempted is 2.20 or higher. Students who regularly maintain a term GPA of 2.20 or better are making good progress toward the degrees and are in good standing with MIST. Students

who fail to maintain this minimum rate of progress will not be in good standing. This can happen when any one of the following conditions exists:

- a. The term GPA falls below 2.20.
- b. The Cumulative Grade Point Average (CGPA) falls below 2.20.
- c. The earned number of credits falls below 15 times the number of terms attended.

All such students can make up their deficiencies in GPA and credit requirements by completing courses in the subsequent term(s) and supplementary exams, if there are any, with better grades. When the minimum GPA and credit requirements are achieved the student is again returned to good standing.

3.23 Minimum Earned Credit and GPA Requirement for Obtaining Degree

Minimum credit hour requirements for the award of Bachelor's degree in Computer Science and Engineering (BSc Engg) must be of minimum 160 credit hours. A student must earn minimum 160 credit hour set in the for qualifying Bachelor's Degree. The minimum CGPA requirement for obtaining a Bachelor's degree in engineering and architecture is 2.20.

A student may take additional courses with the consent of his/her Adviser in order to raise CGPA, but he/she may take a maximum of 15 such additional credits(maximum 6 subjects) in computer science ad engineering beyond respective credit-hour requirements for Bachelor's degree during his/her entire period of study.

3.24 Application for Graduation and Award of Degree

A student who has fulfilled all the academic requirements for Bachelor's degree will have to apply to the Controller of Examinations through his/her Adviser for graduation. Provisional Degree will be awarded by BUP on completion of credit and GPA requirements.

3.25 Time Limits for Completion of Bachelor's Degree

A student must complete his/her studies within a maximum period of six years for engineering and seven years for architecture bachelor's degrees.

3.26 Attendance, Conduct and Discipline

MIST has strict rules regarding the issues of attendance in class and discipline.

3.26.1 Attendance

All students are expected to attend classes regularly. MIST believes that attendance is necessary for effective learning. The first responsibility of a student is to attend classes regularly and one is required to attend the classes as per MIST rules.

3.26.2 Conduct and Discipline

During their stay in MIST all students are required to abide by the existing rules, regulations and code of conduct. Students are strictly forbidden to form or be members of student organization or political party, club, society etc., other than those set up by MIST authority in order to enhance student's physical, intellectual, moral and ethical development. Zero tolerance in regards of sexual abuse and harassment in any forms, and drug abuse and addiction are strictly observed in the campus.

3.27 Teacher-Student Interaction

The academic system in MIST encourages students to come in close contact with the teachers. For promotion of high level of teacher-student's interaction, a course coordinator (CC) is assigned to each course. Students are free to discuss with CC about all academic matters. Students are also encouraged to meet other teachers any time for help and guidance for academic matters. Heads of the departments, Director of Administration, Director of Students Welfare (DSW), Dean and Commandant address the students at some intervals. More so, monthly Commandant's Parade is organized in MIST where all faculty members, staff and students are formed up, thereby increasing teacher-student interaction.

3.28 Absence during a Term

A student should not be absent from quizzes, tests, etc. during the term. Such absence will naturally lead to reduction in points/marks, which count towards the final grade. Absence in the Term Final Examination will result in an F grade in the corresponding course. A student who has been absent for short periods, up to a maximum of three weeks due to illness, should approach the course teacher(s) or the course coordinator(s) for make-up quizzes or assignments immediately upon return to classes. Such request has to be supported by medical certificate from competent authority (e.g. CMH/MIST Medical Officer).

3.29 Recognition of Performance

As recognition of performance and ensure continued studies MIST awards medals, scholarships and stipends as per existing rules and practices.

3.30 Types of Different Examination

Following different types of final examinations will be conducted in MIST to evaluate the students of Undergraduate Programs:

- **a.** <u>**Term Final Examination:**</u> At the end of each normal term (after 22wk or so), Term Final Examination will be held. Students will appear in the Term Final Examination for all the theory courses they have taken in the Term.
- b. <u>Supplementary Examination</u>: It will take place twice in a year. Supplementary-I is defined as provision of giving exam in the first week of Spring Term (Jan-Jun)/Fall Term(Jul-Dec) end break and Supplementary-II in the first week of Fall Term (Jul-Dec)/ Spring Term (Jan-Jun) end break, respectively. Students will be allowed to register for a maximum of two theory courses (Failed/Improvement) in Supplementary-I and maximum of one theory course (Failed/Improvement) in Supplementary-II.

c. Improvement Examination: It will be taken during Supplementary-I and Supplementary-II Examination. Questions will be same as the question of the regular examination of that Supplementary Examination (if any). Student can take maximum two subjects at a time (two subjects in supplementary-I and one subject in supplementary-II) and maximum 6 subjects in the whole academic duration. If a student obtains a grade lower than 'B+' in a course, he/she will be allowed to repeat the course only once for grade improvement. However, he/she will not be eligible to get a grade better then 'B+' for an improvement course. Among the previous result and improvement examination result, best one will be considered as final result for an individual student. However, performance of all examination i.e. previous to improvement examination shall be reflected in the transcript.

3.31 Rules of Different Examinations

3.31.1 Term Final Examination

Following rules to be followed:

- a. Registration to be completed before commencement of the Term. A student has to register his desired courses paying registration, examination fee and other related fees.
- b. Late registration will be allowed without penalty within first two weeks of the term.
- c. Within 1st two weeks of a term a student can Add/Drop course/courses. To add a course, in the 3rd week, one has to register the course by paying additional fees. To drop a course, one has to apply within three weeks and paid fees will be adjusted/ refunded. If anyone wants to drop a course after three weeks and within 4 weeks, that will be permitted but paid fees will not be refunded in that case.
- d. Registrar office will finalize registration of all courses within 7 (seven) weeks, issue registration slip and that will be followed by issuing Admit Card.
- e. Term Final Examination to be conducted in the 18-20th week of the term as per approved Academic Calendar.

3.31.2 Supplementary Examination

Following rules to be followed:

- a. Supplementary-I is defined as provision of giving exam in the first week of Spring Term (Jan-Jun)/Fall Term (Jul-Dec) end break and Supplementary-II in the first week of Fall Term (Jul-Dec)/Spring Term (Jan-Jun) end break, respectively.
- b. Students will be allowed to register for a maximum of two theory courses (Failed/Improvement) in Supplementary-I and maximum of one theory course (Failed/Improvement) in Supplementary-II.
- c. No class will be conducted.
- d. 40% marks will be considered from the previous exams.
- e. Maximum grading in Supplementary Exam will be 'B+'.
- f. No Sessional Exam will be conducted.
- g. Examination will be taken on 60% marks like Term Final Examination.
- h. If a student fails in a course more than once in regular terms, then for calculating 40% marks best one of all continuous assessment marks will be counted.
- i. If anyone fails in the laboratory/sessional course, that course cannot be taken in the supplementary examination.
- j. If any student fails in a course, he can clear the course retaking it 2nd time or, he can clear the examination appearing at the supplementary examination as well. Any one fails twice in a course, can only retake it in the regular term for appearing third time. But anyone fails even after appearing third time. He/she has to take approval of Academic Council of MIST for

appearing 4th (last) time in a course and need to pay extra financial penalty. If any student fails even 4thtime in a course, will not be allowed to appear anymore in this same course.

- k. Registration of Supplementary-I Exam to be done within 5th week after completion of Fall Term (July to Dec) and registration of Supplementary-II exam to be done during the Mid-Term break of Spring Term (Jan to Jun), paying all the required fees.
- 1. There will be no provision for add/drop courses after registration.
- m. Question Setting, Moderation, and Result Publication to be done following the same rules of Spring (Jan to Jun)/ Fall (July to Dec) Term Final Exam as per existing Examination Policy.
- n. Moderation of the questions for Supplementary-I will be done in the 5th week after completion of Fall Term (July to Dec) Final Exam and Supplementary-II with the moderation of the questions of Spring Term (Jan to Jun).
- o. Separate Tabulation sheet to be made.
- p. Final Year Research & Design Project: If a student cannot complete thesis in two consecutive terms, with the recommendation of the supervisor, he/she may continue for next one/two term within six academic years.

3.31.3 Improvement Examination

Following rules to be followed:

- a. Improvement examination is to be taken during the Supplementary-I and Supplementary-II examinations.
- b. For Improvement examination, registration is to be done during the registration of Supplementary-I and Supplementary-II examinations by paying all the fees.
- c. Question Setting, Moderation and Result Publication to be done with courses of Supplementary-I and Supplementary-II examinations.
- d. Any student gets a grading below 'B+' and desires to improve that course, he will be allowed to appear the improvement examination for that particular course.
- e. Highest grade of Improvement examination will be 'B+'.
- f. One student is allowed to appear at Improvement exam in 6 (six) courses in his whole graduation period taking maximum two courses at a time (two courses at supplementary-I and one course at supplementary-II).

The summary of all types of examinations are given briefly in Appendix B.

3.32 Irregular Graduation

If any graduating student clears his/her failed course in Spring Term/Fall Term/ Supplementary examinations and his graduation requirements are fulfilled, his graduation will be effective from the result publication date of Spring Term/Fall Term/Supplementary examinations and that student will be allowed to apply for provisional certificate.

CHAPTER 4

COURSE REQUIREMENTS FOR THE STUDENTS OF UNDERGRADUATE PROGRAM (B.Sc in CSE) OF THE DEPARTMENT OF CSE, MIST

Undergraduate students of the Department of Computer Science and Engineering (CSE) have to undertake a particular course schedule, the term-wise distribution of which is given below:

LEVEL-1 SPRING TERM

			Hou	rs/Week	a 1 ¹	D
	Course No	Course Title	Theory	Sessional	Credits	Pre-requisite
1.	CSE -101	Discrete Mathematics	3.00		3.00	
2.	CHEM-101	Fundamentals of Chemistry	3.00	-	3.00	
3.	CHEM-102	Chemistry Sessional	-	3.00	1.50	
4.	EECE-163	Electrical Circuit Analysis	3.00	-	3.00	
5.	EECE-164	Electrical Circuit Analysis Sessional	-	1.50	0.75	
6.	GEBS-101	Bangladesh Studies	2.00	-	2.00	
7.	MATH-101	Differential and Integral Calculus	3.00	-	3.00	
8.	PHY-101	Waves and Oscillations, Optics and Modern Physics	3.00	-	3.00	
9.	PHY-102	Physics Sessional	-	3.00	1.50	
	Total		17.00	7.50	20.75	

LEVEL-1 FALL TERM

		~	Hour	s/Week	~	
	Course No	Course Title	Theory	Sessional	Credits	Pre-requisite
1.	CSE-103	Digital Logic Design	3.00	-	3.00	
2.	CSE-104	Digital Logic Design Sessional	-	3.00	1.50	
3.	CSE-105	Structured Programming Language	3.00	-	3.00	
4.	CSE-106	Structured Programming Language Sessional	-	3.00	1.50	
5.	EECE-169	Electronic Devices and Circuits	3.00	-	3.00	EECE-163
6.	EECE-170	Electronic Devices and Circuits Sessional	-	1.50	0.75	
7.	LANG-102	Communicative English-I	-	3.00	1.50	
8.	MATH-105	Vector Analysis, Matrix and Coordinate Geometry	3.00	-	3.00	
9.	ME-122	Fundamental of Mechanical Engineering Sessional	-	4.00	2.00	
	Total		12.00	13.50	19.25	

LEVEL-2 SPRING TERM

			Hour	s/Week		
	Course No	Course Title	Theory	Sessional	Credits	Pre-requisite
1.	CSE-203	Data Structures and Algorithms-I	3.00	-	3.00	CSE-105
2.	CSE-204	Data Structures and Algorithms-I Sessional	-	3.00	1.50	
3.	CSE-205	Object Oriented Programming Language	3.00	-	3.00	CSE-105
4.	CSE-206	Object Oriented Programming Language Sessional-I	-	3.00	1.50	
5.	CSE-217	Theory of Computation	3.00	-	3.00	
6.	EECE-269	Electrical Drives and Instrumentation	3.00	-	3.00	EECE-169
7.	EECE-270	Electrical Drives and Instrumentation Sessional	-	1.50	0.75	EECE-170
8.	LANG-202	Communicative English-II	-	3.00	1.50	
9.	MATH-205	Differential Equations, Laplace Transform and Fourier Transform	3.00	-	3.00	
	Total		15.00	10.50	20.25	

LEVEL-2 FALL TERM

	~		Hour	Hours/Week		
	Course No	Course Title	Theory	Sessional	Credits	Pre-requisite
1.	CE-250	Engineering Drawing and CAD Sessional	-	3.00	1.50	
2.	CSE-213	Computer Architecture	3.00	-	3.00	
3.	CSE-215	Data Structures and Algorithms-II	3.00	-	3.00	
4.	CSE-216	Data Structures and Algorithms-II Sessional	-	3.00	1.50	
5.	CSE-219	Mathematical Analysis for Computer Science	3.00	-	3.00	
6.	CSE-220	Object Oriented Programming Sessional-II	-	1.50	0.75	
7.	EECE-279	Digital Electronics and Pulse Technique	3.00	-	3.00	
8.	EECE-280	Digital Electronics and Pulse Technique Sessional	-	1.50	0.75	EECE-279
9.	GELM-275	Leadership and Management	2.00	-	2.00	
10.	MATH-207	Complex Variable and Statistics	3.00	-	3.00	MATH-101
	Total		17.00	9.00	21.50	Total

LEVEL-3 SPRING TERM

		С Т '4	Hour	s/Week	a Pi	Pre-requisite
	Course No	Course Title	Theory	Sessional	Credits	
1.	CSE-301	Database Management Systems	3.00	-	3.00	
2.	CSE-302	Database Management Systems Sessional	-	3.00	1.50	
3.	CSE-303	Compiler	3.00	-	3.00	
4.	CSE-304	Compiler Sessional	-	1.50	0.75	
5.	CSE-305	Microprocessors, Micro-controllers and Assembly Language	3.00	-	3.00	CSE-217
6.	CSE-306	Microprocessors, Micro-controllers and Assembly Language Sessional	-	3.00	1.50	
7.	CSE-307	Operating System	3.00	-	3.00	CSE-201
8.	CSE-308	Operating System Sessional	-	1.50	0.75	
9.	CSE-317	Data Communication	3.00	-	3.00	
10.	CSE-318	Data Communication Sessional	-	1.50	0.75	
	Total		15.00	10.50	20.25	

LEVEL-3 FALL TERM

		с. т.н.	Hour	s/Week		Pre-requisite
	Course No	Course Title	Theory	Sessional	Credits	
1.	CSE-309	Computer Network	3.00	-	3.00	CSE-317
2.	CSE-310	Computer Network Sessional	-	3.00	1.50	
3.	CSE-315	Digital System Design	2.00	-	2.00	CSE-305
4.	CSE-316	Digital System Design Sessional	-	1.50	0.75	
5.	CSE-319	Software Engineering	3.00	-	3.00	
6.	CSE-320	Software Engineering Sessional	-	1.50	0.75	CSE-319
7.	CSE-364	Software Development Project - I	-	3.00	1.50	
8.	GERM-352	Fundamentals of Research Methodology	-	4.00	2.00	
9.	GES-301	Fundamentals of Sociology	2.00	-	2.00	
10.	GESL-303	Environment, Sustainability and Law	2.00	-	2.00	
	Total		12.00	13.00	18.50	

*LEVEL-3 INDUSTRIAL TRAINING

Course No	Course Title	Hou	rs/Week	Cradita	Pre-requisite
Course No	Course The	Theory	Sessional	Creans	r re-requisite
CSE-350	Industrial Training	-	4 Weeks	1.00	

***Note:** This course is mandatory. Evaluation report from industry is to be submitted at the end of the training and accordingly to be incorporated in the tabulation sheet.

LEVEL-4 SPRING TERM

	Course No	Course Title	Hours	s/Week	Credits	Pre-requisite	
			Theory	Sessional		-	
1.	CSE-400	Final Year Research & Design Project	-	6.00	3.00		
2.	CSE-405	Computer Interfacing	3.00	-	3.00	CSE-305	
3.	CSE-406	Computer Interfacing Sessional	-	1.50	0.75		
4.	CSE-415	Human Computer Interaction	3.00	-	3.00		
5.	CSE-429	Computer Security	3.00	-	3.00		
6.	CSE-464	Software Development Project-II	-	3.00	1.50		
7.	CSE-4XO	Technical Elective-I	3.00	-	3.00		
8.	GEEM-433	Engineering Ethics and Moral Philosophy	2.00	-	2.00		
	Total		14.00	10.50	19.25		

TECHNICAL ELECTIVE-I

	Course	Course Title	Hours	/Week	Credits	Pre-requisite
	No	Course Thie	Theory	Sessional	Cicuits	1 re-requisite
1.	CSE-407 Applied Statistics and Queuing Theory		3.00	-	3.00	
2.	CSE-417	Blockchaining and Cryptocurrency Technology	3.00	-	3.00	
3.	CSE-419	Advanced Algorithms	3.00	-	3.00	
4.	CSE-421	Basic Graph Theory	3.00	-	3.00	
5.	CSE-423	Fault Tolerance System	3.00	-	3.00	
6.	CSE-425	Basic Multimedia Theory	3.00	-	3.00	
7.	CSE-427	Digital Image Processing	3.00	-	3.00	
8.	CSE-431	Object Oriented Software Engineering	3.00	-	3.00	
9.	CSE-433	Artificial Neural Networks and Fuzzy Systems	3.00	-	3.00	
10.	CSE-435	Distributed Algorithms	3.00	-	3.00	
11.	CSE-437	Bioinformatics	3.00	-	3.00	
12.	CSE-439	Robotics	3.00	-	3.00	
13.	CSE-447	Telecommunication Engineering	3.00	-	3.00	

LEVEL-4 FALL TERM

		C TH	Hour	s/Week	Cuadita	D	
	Course No	Course Title	Course Title Theory S		Credits	Pre-requisite	
1.	CSE-400	Final Year Research & Design Project	-	6.00	3.00		
2.	CSE-401	Information System Design and Development	d 3.00 -		3.00	CSE-319	
3.	CSE-403	Artificial Intelligence	3.00	-	3.00		
4.	CSE-404	Artificial Intelligence Sessional	-	1.50	0.75		
5.	CSE-413	Computer Graphics	3.00	-	3.00		
6.	CSE-414	Computer Graphics Sessional	-	1.50	0.75		
7.	CSE-4XO	Technical Elective-II	3.00	-	3.00		
8.	CSE-4XE	Technical Elective-II Sessional	-	1.50	0.75		
9.	GEPM-463	Project Management and Finance	2.00	-	2.00		
	Total		14.00	10.50	19.25		

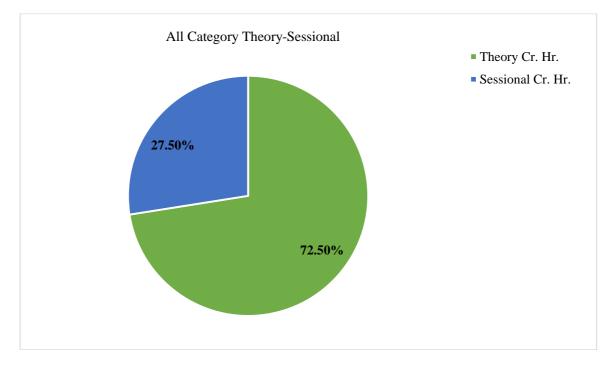
TECHNICAL ELECTIVE -II

	Course No	Course Title	Hour	s/Week	Credits	Pre-requisite
	Course No	Course Thie	Theory	Sessional	Creans	r re-requisite
1.	CSE-411	VLSI Design	3.00	-	3.00	
2.	CSE-412	VLSI Design Sessional	-	1.50	0.75	
3.	CSE-441	Machine Learning	3.00	-	3.00	
4.	CSE-442	Machine Learning Sessional	-	1.50	0.75	
5.	CSE-443	Pattern Recognition	3.00	-	3.00	
6.	CSE-444	Pattern Recognition Sessional	-	1.50	0.75	
7.	CSE-445	Digital Signal Processing	3.00	-	3.00	
8.	CSE-446	Digital Signal Processing Sessional	-	1.50	0.75	
9.	CSE-449	Mobile and Ubiquitous Computing	3.00	-	3.00	
10.	CSE-450	Mobile and Ubiquitous Computing Sessional	-	1.50	0.75	
11.	CSE- 451	Simulation and Modeling	3.00	_	3.00	
12.	CSE- 452	Simulation and Modeling Sessional	-	1.50	0.75	
13.	CSE-455	Natural Language Processing	3.00	-	3.00	
14.	CSE-456	Natural Language Processing Sessional	-	1.50	0.75	
15.	CSE-457	Advanced Database Management Systems	3.00	-	3.00	
16.	CSE-458	Advanced Database Management Systems Sessional	-	1.50	0.75	
17.	CSE-459	Internet of Things (IoT)	3.00	-	3.00	
18.	CSE-460	Internet of Things (IoT) Sessional	-	1.50	0.75	
19.	CSE-461	Industrial Revolution	3.00	-	3.00	
20.	CSE-462	Industrial Revolution Sessional	-	1.50	0.75	
21.	CSE-465	Cyber & Physical Security	3.00	-	3.00	
22.	CSE-466	Cyber & Physical Security Sessional	-	1.50	0.75	

Summary o	Summary of Departmental, Inter-disciplinary, Basic Science and Humanities Theory and Sessional Courses									
Level and	Hour	s/Week	Total		edits	Total	No of	Courses		
Term	Theory	Sessional	Cont. Hours	Theory	Sessional	Credit	Theory	Sessional		
Level 1 Spring Term	17.00	7.50	24.50	17.00	3.75	20.75	6	3		
Level 1 Fall Term	12.00	13.50	25.50	12.00	7.25	19.25	4	5		
Level 2 Spring Term	15.00	10.50	25.50	15.00	5.25	20.25	5	4		
Level 2 Fall Term	17.00	9.00	26.00	17.00	4.50	21.50	6	4		
Level 3 Spring Term	15.00	10.50	25.50	15.00	5.25	20.25	5	5		
Level 3 Fall Term	12.00	13.00	25.00	12.00	7.50	19.50	5	6		
Level 4 Spring Term	14.00	10.50	24.50	14.00	5.25	19.25	5	3		
Level 4 Fall Term	14.00	10.50	24.50	14.00	5.25	19.25	5	4		
Grand Total	116.00	85.00	201.00	116.00	44.00	160.00	41	34		

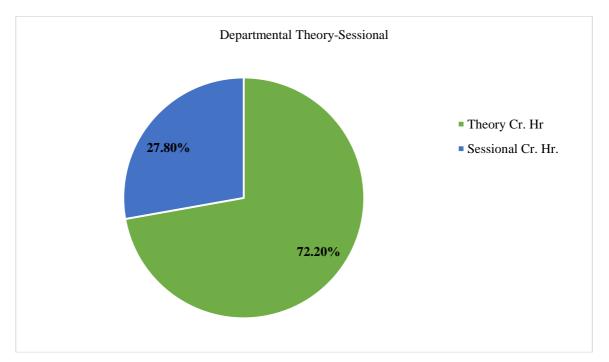
SUMMARY

<u>Pie Chart</u>



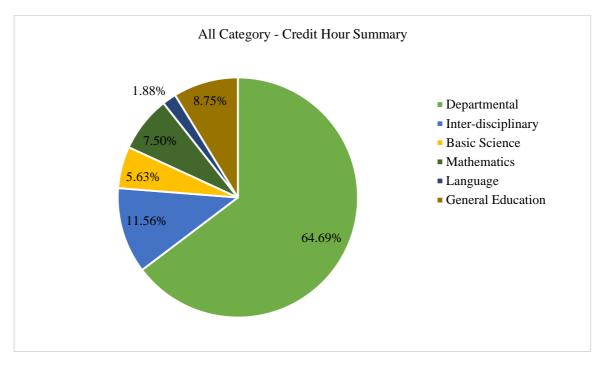
Sur	nmary of Departmental	Theory and Sessional Cours	es
Level/ Term	Theory Cr. Hr.	Sessional Cr. Hr.	Total Cr. Hr.
Level-1 Spring Term	3.00	0.00	3.00
Level-1 Fall Term	6.00	3.00	9.00
Level-2 Spring Term	9.00	3.00	12.00
Level-2 Fall Term	9.00	2.25	11.25
Level-3 Spring Term	15.00	5.25	20.25
Level-3 Fall Term	8.00	4.50	12.50
Level-4 Spring Term	12.00	5.25	17.25
Level-4 Fall Term	12.00	5.25	17.25
Total	74.00	28.50	102.50

Pie Chart:



Summar	Summary of Departmental, Inter-disciplinary, Basic Science, Language and General Education Courses								
Level/Term	Departmental	Inter-disciplinary	Basic Science	Mathematics	Language	General Education	Total		
Level 1 Spring Term	3.00	3.75	9.00	3.00	-	2.00	20.75		
Level 1 Fall Term	9.00	5.75	-	3.00	1.50	-	19.25		
Level 2 Spring Term	12.00	3.75	-	3.00	1.50	-	20.25		
Level 2 Fall Term	11.25	5.25	-	3.00	-	2.00	21.50		
Level 3 Spring Term	20.25	-	-	-	-	-	20.25		
Level 3 Fall Term	13.5	-	-	-	-	6.00	19.50		
Level 4 Spring Term	17.25	-	-	-	-	2.00	19.25		
Level 4 Fall Term	17.25	-	-	-	-	2.00	19.25		
Total	103.50	18.50	9.00	12.00	3.00	14.00	160.00		

Pie Chart:



CHAPTER 5

DETAIL OUTLINE OF UNDERGRADUATE COURSES OFFERED BY THE DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

LEVEL-1 SPRING TERM

CSE-101: Discrete Mathematics

	INFORMA							
Course Co		: CSE-101		Lecture Cont			3.00	
Course Ti	tle	: Discrete Mathematics		Credit Hours		::	3.00	
PRE-REC	QUISITE							
Course Co								
Course Ti	tle: Nil							
CURRIC	ULUM STR	UCTURE						
Outcome	Based Educat	ion (OBE)						
RATION	ALE							
The course	e is designed	to develop logical thinking an	d its a	pplication to c	omputer	scienc	e (to e	emphasize the
		g statements correctly and						
		nent). The subject enhances of	one's a	ability to reaso	on and ab	ility to	o prese	ent a coherent
	*	urate argument	_			_	_	
OBJECT								
		rete Mathematics and its appli						
		e of the problems of Discrete		hematics. To a	levelop k	nowle	edge o	f a variety of
math	nematical tool	s applicable in computer scien	nce.					
TEADNI								
LEAKNI		MES & GENERIC SKILLS				1	1	
No.		ourse Learning Outcome bletion of the course, the students		Bloom's	СР	CA	KP	Assessment
INO.	(Opon comp	be able to)	WIII	Taxonomy	Cr	CA	Kr	Methods
	Define an	argument using logical nota	ation					TASC
CO1		ine if the argument is or is		C2-C3,A2	1,2		1	T, ASG, Viva
	valid.							viva
CO2		simple mathematical proofs	and	C2,C3	1		1,2	Т
002		ability to verify them.		02,03	-		1,2	-
000		the understanding of		G2 G2	1		1.0	Mid Term,
CO3		and functions and mode	eling	C2-C3	1		1-3	F
		sing graphs and trees. the communication skills	by					
CO4	*	different topics on graphs		A2		1		Pr
0.04	trees.	unificient topies on graphs	ana	112		1		11
	1			II		L	1	I
		s, CA-Complex Activities, KI			e, T – Tes	st;PR	– Pro	ject ; Q –
Quiz; ASC	G – Assignme	ent; Pr – Presentation; R - Repo	ort; L'	T – Lab Test)				
COURSE	COURSE CONTENT							
The Four	ndations of	logic and proofs: Logic, Pr	oposi	tional Equival	ence, Pr	edicat	es and	l Quantifiers,
		ethods of Proofs; Basic Stru						
Functions	• Algorithi	ns: Algorithms. Integers	and	1 Division.	Inte	gers	and	Algorithms

Nested Quantifiers, Methods of Proofs; **Basic Structures of Sets and Functions:** Sets, Set Operations, Functions; **Algorithms:** Algorithms, Integers and Division, Integers and Algorithms, Mathematical Reasoning; **Induction and Recursion:** Mathematical Induction, Mathematical Reasoning, Recursive Definitions and Structural Induction; **Counting Methods:** Pigeonhole Principle and applications, Advance Counting Techniques, Recurrence Relations; **Relations**: Properties of Relations, Representing Relations, Equivalence Relations; **Graphs and Trees:** Introduction to Graphs and Trees, graph models, representing graphs and graph isomorphism, Euler and Hamilton Path, Application of trees.

SKILL MAPPING

					PI	ROG	RAN	101	JTC	OM	ES (I	PO)		
No.	Course Leas	rning Outcome	1	2	3	4	5	6	7	8	9	1 0	1 1	1 2
CO1	Define an argu- notation and deter is or is not valid.	ment using logical mine if the argument	Н											
CO2		mathematical proofs lity to verify them.		Н										
CO3	Demonstrate the understanding of sets, relations and functions and modeling problems using graphs and trees.				Н									
CO4		munication skill by nt topics on graphs										L		
(H – Hig	h, M- Medium, L-lo	w)												
JUSTIF	ICATION FOR CO)-PO MAPPING:												
Mapping	Level				Jus	stific	ation	s						
CO1-PO	1 High		in expressing mathematical properties formally via the formative y applying the knowledge fundamentals to the solution of primeering problems											
CO2-PO2	2 High	Develop the ability technique described	to ev			proot	f on t	he t	oasic	stru	uctur	e of e	each	proo
CO3-PO	3 High	Be able to specify a	nd n ons a	and v	vill a	lso t					objects such as sets, simple mathematical			
CO4-PO	10 Low	Develop the com presentation.					thro	ough	ı c	lass	par	ticipa	ation	and
TEACH	ING LEARNING S	STRATEGY												
	and Learning Activ	vities						Eı	ngag	geme	ent (h	ours)		
	Face Learning Lecture					42								
	Practical / Tutorial / Student-Centred Le									-	-			
	cted Learning	aming								-	-			
	Non-face-to-face le	arning								4	2			
	Revision									2				
	Assessment Prepara	tions								2	1			
Formal Assessment Continuous Assessment										-	2			
	Final Examination	-								3				
Total										13	31			
	NG METHODOL	OCT												
TEACH	ING METHODOL	JOGY												

COURSE	COURSE SCHEDULE									
Week	Lecture	Topics	Assessment Methods							
1	Lec 1	The Foundations: Logic, Propositional								
	Lec 2	Equivalence								
	Lec 3									
2	Lec 4	The Foundations: Predicates and Quantifiers,								

	Lec 5	Nested Quantifiers	Class Test 1
	Lec 6		
3	Lec 7	The Foundations: Methods of Proofs	
	Lec 8		
	Lec 9		
4	Lec 10	The Foundations: Sets, Set Operations, Functions	
	Lec 11		
	Lec 12		
5	Lec 13	The Fundamentals: Algorithms, Integers and	
	Lec 14	Division	
	Lec 15		Class Test 2
6	Lec 16	The Fundamentals: Integers and Algorithms	Class Test 2
	Lec 17		
	Lec 18		
7	Lec 19	Mathematical Reasoning, Induction and	
	Lec 20	Recursion: Mathematical Induction	
	Lec 21		
8	Lec 22	Mathematical Reasoning, Induction and	
	Lec 23	Recursion: Recursive Definitions and Structural	
	Lec 24	Induction	
9	Lec 25	Counting Methods: Pigeonhole Principle and	
	Lec 26	applications	
	Lec 27		Mid Term Exam
10	Lec 31	Advance Counting Techniques: Recurrence	
	Lec 32	Relations	
	Lec 33		
11	Lec 28	Relations: Properties of Relations; Representing	
	Lec 29	Relations	
	Lec 30		
12	Lec 34	Relations: Equivalence Relations	
	Lec 35		
	Lec 36		
13	Lec 33	Graphs and Trees: Introduction to Graphs and	
	Lec 38	Trees	Class Test 3
	Lec 39		01000 1000 0
14	Lec 40	Boolean Algebra: Boolean Functions,	1
1 T	Lec 40 Lec 41	Representing Boolean Functions, Logic Gates	
	Lec 41 Lec 42	Representing Doorean Functions, Logic Gates	
	LAC 72		1

ASSESSMENT STRATEGY

Com	Components		omponents Grading		СО	Bloom's Taxonomy
	Test 1.2	20%	CO1	C1, C2,P3,A1		
Continuous	Test 1-3		CO2	C2,C3		
Assessmen t (40%)	Class Participation	5%	CO4	C6,A2		
	Mid term	15%	CO3	C2-C4		
Final Exam		60%	CO3	C2-C4		
Total	Marks	100%				

(CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain) **REFERENCE BOOKS**

Discrete Mathematics and its Applications, 7th Edition by K. Rosen, McGraw Hill.
 Discrete Mathematics with Applications, 3rd Edition by Susanna S. Epp Gagne

REFERENCE SITE

CHEM-101: Fundamentals of Chemistry

COU	RSE INF	ORMATION								
Cours	e Code	: CHEM-101	Lecture	e Conta	ct Hour	s :	3.00			
Cours	e Title	: Fundamentals of Chemistry	Credit	Hours		:	3.00			
PRE-	PRE-REQUISITE									
	e Code: N									
Course Title: Nil										
CURRICULUM STRUCTURE										
Outcome Based Education (OBE)										
RATIONALE										
		designed to learn the basic chemistry								
		course will be emphasized on the basic co			to solv	e quan	ititative problems			
	ECTIVE	pplicable in a wide spectrum of engineerin	ig disciplines	•						
		he different noremeters and concents of in	onconio chon		ad mbro		h o mai o tara			
		he different parameters and concepts of ir the basic reaction mechanism of selective			ia phys	ical cr	lemistry			
	-	umerical problems of inorganic, organic a	-		v					
		OUTCOMES & GENERIC SKILLS	na physical c	ine ini su	<u>y</u> .					
LLAI			[r		r				
No.	(Upon c	Course Learning Outcome ompletion of the course, the students will be able to)	Bloom's Taxonomy	СР	CA	KP	Assessment Methods			
CO1	inorgani atomic bonding thermod	different basic parameters in the field of ic, organic and physical chemistry i.e., structure, periodic table, chemical g, acids and bases, chemical equilibrium, themistry and different types of s, phase rule etc.	C1	1		1	T, F, MT			
CO2	Explain selective reduction	different basic theories in the field of e organic reactions such as Oxidation-	C2	3		1	T, F, MT			
CO3	Solve of inorganic organic thermoc	quantitative problems in the field of	C3	2		2	T, F, MT, ASG			
CO4		the communication skill by presenting n operating systems.	A2		1		Pr			
	Complex	Problems, CA-Complex Activities, KP-Ki ssignment; Pr – Presentation; R - Report;								
COU	RSE CO	NTENT								
config Perio noble	gurations, dic Table gases nical Bor	ure: Concepts of atomic structure, Diffe Heisenberg's uncertainty principle : Periodic classification of elements, Peri nding: Types and properties, Lewis the	odic properti	es of el	ements	, Prope	erties and uses of			

Basic Concepts of Organic Chemistry: History, Physical and chemical properties, Classification **Hydrocarbon**: Chemistry of hydrocarbon, Nomenclature, Properties

Selective Organic Reactions: Oxidation-reduction, Substitution, Addition, Polymerization, Alkylation

reactions

Acids-Bases/Buffer Solution: Different concepts of acids-bases, Buffer solution, Mechanism of buffer solution, Henderson-Hasselbalch equation, Water chemistry and pH of water

Solutions: Solutions and their classification, Unit expressing concentration, Colligative properties and dilute solutions, Raoult's law, Van't Hoff's law of osmotic pressure

Thermochemistry: Laws of thermochemistry, Enthalpy, Hess's law, Heat of formation, Kirchoff's equations, Heat of neutralization, Heat of reaction

Electrochemistry: Conductors & nonconductors, Difference between electrolytic and metallic conduction, Electrolytic conductance, Factors influencing the conductivity of electrolytes, Kohlrausch Law & conductometric titrations

Chemical Equilibria: Equilibrium law/constant, Kp and Kc, Homogeneous and heterogeneous equilibrium, Van't Hoff's reaction isotherm, Le Chatelier's principle

Phase Rule: Basic terms and phase rule derivation, Phase diagram of water and carbon dioxide

Chemical Kinetics: Order and rate of reaction, Pseudo and zero order reaction, Half-life, Determination and factors affecting the rate of a reaction, First order reaction, Second order reaction, Collision theory, Transition state theory

No.		Course	Learning Outcome				ROG		101	JTC		ES (l			
140.			č	1	2	3	4	5	6	7	8	9	10	11	12
CO1	Defin field chem table, bases therm soluti	Н													
CO2	field as Ox Addin reacti	of selecti kidation-r tion, Poly ions etc.	ent basic theories in the ve organic reactions such eduction, Substitution, merization, Alkylation	Н											
CO3	of inc chem therm electr	e quantita organic, o listry i.e. nochemis rical prop	Н												
CO4	prese	nting top	ommunication skill by ics on operating systems.										L		
(H – Hi	gh, M-	Medium	, L-low)												
JUSTI	FICAT	TION FO	R CO-PO MAPPING												
Mapp	oing	Level					icatio								
CO1-PO	D1	High	The conceptual knowledg discipline.												
CO2-PO	D1	High	The theory-based knowled discipline.	•						••				•	
CO3-PO	D1	High	The numerical analysis-baengineering.	used	knov	ledg	e of	the r	natur	al s	cien	ces a	pplica	able t	o th
CO4-PO	D10	Low	Develop communication s	kills	throu	ıgh p	artic	ipatir	ng ir	ı qui	z, pi	resen	tation	etc.	
TEACI	HING	LEARN	ING STRATEGY												
			Activities								Er	igage	ement	(hou	rs)
Face-to	Lectu		orial / Studio								42 -				

Student-Centred Learning	-
Self-Directed Learning	
Non-face-to-face learning	42
Revision	21
Assessment Preparations	21
Formal Assessment	
Continuous Assessment	2
Final Examination	3
Total	131

TEACHING METHODOLOGY

Lecture and Discussion, Co-operative and Collaborative Method, Problem Based Method

Week	Topics	Assessme Method
Week 1	Atomic Structure	wiethou
Class 1	Concepts of atomic structure, Different atom models	
Class 2	Concepts of atomic structure, Different atom models	
Class 3	Quantum numbers, Electronic configuration	
Week 2	Atomic Structure/Periodic Table	
Class 4	Hydrogen spectral lines, Heisenberg's uncertainty principle	
Class 5	Classification of elements according to electronic configurations	Class Tes
Class 6	Periodic classification of elements	1
Week 3	Periodic Table/Chemical Bonding	
Class 7	Periodic properties of elements, Properties and uses of noble gases	
Class 8	Alkali metals: Chemical properties and uses	
Class 9	Chemical bonding (types, properties, Lewis theory, VBT)	
Week 4	Chemical Bonding	
Class 10	Molecular orbital theory (MOT)	
Class 11	Molecular orbital theory (MOT)	
Class 12	Hybridization and shapes of molecules	
Week 5	Chemical Bonding/Organic Chemistry	
Class 13	Hybridization and shapes of molecules	
Class 14	Hybridization and shapes of molecules	Class Tes
Class 15	Basic concepts of organic chemistry: History, Physical & chemical	2
	properties, Classification	
Week 6	Organic Chemistry	
Class 16	Chemistry of hydrocarbon, Nomenclature, Properties	
Class 17	Selective organic reactions: Oxidation-reduction, Substitution	
Class 18	Selective organic reactions: Addition, Polymerization, Alkylation	
Week 7	Acids-Bases	
Class 19	Different concepts of acids-bases	
Class 20	Buffer solution, Mechanism of buffer solution	
Class 21	Henderson-Hasselbalch equation	
Week 8	Acids-Bases/Solutions	
Class 22	Water chemistry and pH of water	Mid Terr
Class 23	Solutions and their classification, Unit expressing concentration	Exam
Class 24	Effect of temperature and pressure on solubility, Validity and limitations	
W L A	of Henry's law	
Week 9	Solutions/Thermochemistry	
Class 25	Colligative properties and dilute solutions, Raoult's law, deviation from	

Class 26	Freezing point depression, Van't Hoff's law of osmotic pressure	
Class 27	Thermochemistry: Laws of thermochemistry, Enthalpy	
Week 10	Thermochemistry/Electrochemistry	
Class 28	Hess's law, Kirchoff's equations	
Class 29	Heat of formation, Heat of neutralization, Heat of reaction	
Class 30	Electrolytic conduction and its mechanism	
Week 11	Electrochemistry	
Class 31	Faraday's law, Kohlrausch Law, Debye-Huckel-Onsagar theory	
Class 32	Conductrometric titrations	
Class 33	Different types of cells	
Week 12	Chemical Equilibrium	
Class 34	Reversible reactions, Characteristics of chemical equilibrium, Law of	
	mass action, Equilibrium constant, Units of equilibrium constant	C1
Class 35	Relation between Kp & Kc, Van't Hoff's reaction isotherm	Class
Class 36	Free energy and its significance Heterogeneous equilibrium, Le Chatelier's	TestT-3
	principle	
Week 13	Phase Rule/Chemical Kinetics	
Class 37	Phase Rule: Basic terms and phase rule derivation	
Class 38	Phase Diagram of water and carbon dioxide	
Class 39	Pseudo and zero order reaction, Half-life	
Week 14	Chemical Kinetics	
Class 40	Determination and factors affecting the rate of a reaction	
Class 41	First order reaction, Second order reaction	
Class 42	Collision theory, Transition state theory	

ASSESSMENT STRATEGY

r				
Comp	Components		СО	Blooms Taxonomy
	Test 1-3	200/	CO1	C1
Continuous		20%	CO2	C2
Continuous Assessment (40%)	Class Participation	5%	CO4	A2
(40%)	Mid term	15%	CO2	C2
	who term		CO3	C3
			CO1	C1
Final	Exam	60%	CO2	C2
			CO3	C3
Total	Marks	100%		

(CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

REFERENCE BOOKS

- Modern Inorganic Chemistry S. Z. Haider
 Concise Inorganic Chemistry (4th) J. D. Lee
 A Textbook of Organic Chemistry(22nd) Arun Bahl And B. S. Bahl
 Organic Chemistry (6th) Morrison and Boyd
 Principles of Physical Chemistry Haque and Nawab
 Exceptials of Physical Chemistry Babl and Tuli

- 6. Essentials of Physical Chemistry Bahl and Tuli
- Physical Chemistry Atkins 7.

REFERENCE SITE

CHEM-102: Chemistry Sessional

COU	RSE INFO	ORMATION						
	se Code	: CHEM-102		ntact Hours	: 3.00			
	se Title	: Chemistry Sessional	Credit Hou	rs	: 1.50			_
	REQUIS							
	se Code: C							
		namentals of Chemistry						
		M STRUCTURE						
		Education (OBE)						
	IONALE							
The c	ourse will	laboratory course for the bas be emphasized by fundament wide spectrum of engineering	tal experimer	nts on differer	nt fields	of cher	mistry	which can be
		c chemistry practically as well						
OBJI	ECTIVE							
1. To	develop b	asic chemistry knowledge prac	ctically					
		e use of basic scientific instru						
LEA	RNING O	UTCOMES & GENERIC S	KILLS					
No.	Course Learning Outcome			Bloom's Taxonomy	СР	CA	КР	Assessment Methods
CO1	inorgani	he different parameters regard c and physical chemistry.	-	C1	1		1	Q
CO2		e zinc, ferrous content in water various titrimetric methods.	r samples	C1	1		1	Т
CO3	group regardin		phenomena oiodimetric,	C3	1		2	F
CO4	-	a report for an experimental v		C2			2	R
Quiz;		Problems, CA-Complex Activi ssignment; Pr – Presentation; F						
dihyd Sodiu	rate (C ₂ H ₂ m Hydrox	n: Standardization of Sodiur ₂ O ₄ .2H ₂ O) Solution, Standard ide (NaOH) Solution, Standard	ization of H rdization of H	ydrochloric A Hydrochloric	Acid (H Acid (H	Cl) Sol ICl) Sol	ution v lution v	vith Standard
(Na25	S2O3.5H2	nate (Na2CO3) Solution, O) Solution with Standard Pot nanganate (KMnO4) Solutior	assium Dich	romate (K2C	r2O7)	Solution	n, Stand	•
Soluti (CaCl	ion; Dete 12.2H2O)	mination: Determination of Solution with Standard Di-S	f Calcium ((Sodium Ethy	Ca) Content lene Diamine	in a C e Tetra	Calcium Acetic	Chlori c acid	de dihydrate (Na2-EDTA
[FeSC	$D_4.(NH_4)_2S$	mination of Ferrous (Fe) C $O_4.6H_2O$] Solution with of Zinc (Zn) Content in a \pm	Standard P	otassium Pe	ermanga	inate (KMnC	4) Solution
Stand T inc	ard Di-Soo dicator; E	lium Ethylene Diamine Tetra. stimation: Estimation of C	Acetic acid (1 Copper (Cu)	Na2-EDTA) S Content in	Solution a Cop	by usir per Sul	ng Erio Iphate	chrome black Pentahydrate
		(Blue Vitriol) Solutions by	y loaometric	e wiethod w	in Sta	ndard S	oaium	mosuipnate

Pentahydrate (Na2S2O3.5H2O) Solution.

SKILL	MAF	PPING													
No.		Course	Learning Outcome			P	ROG	1	<i>1</i> OI	JTC		ES (I	20)		
110.				1	2	3	4	5	6	7	8	9	10	11	12
CO1	Define the different parameters regarding inorganic and physical H chemistry.														
CO2	sam		ferrous content in water using various titrimetric	Н											
CO3	Con or b pher iodo	struct Exp by a group nomena biodimetric, by titration									М				
CO4	Prej worl		port for an experimental										L		
	-	I- Medium,													
			R CO-PO MAPPING												
Mappi	ng	Level	TT 1				icati				. 1 *		<i>(</i> 1.		
CO1-P	01	High	The conceptual knowled discipline.												
CO2-P	-	High	The descriptive knowled discipline	-									the e	ngine	eering
CO3-P		Medium	Able to do work or comp							nd a	s a te	eam.			
CO4-PO		Low	Capable to write a report	on a	n exp	erim	ental	wor	k.						
			NG STRATEGY								-				
		Learning	Activities									ingag	gemer	it (ho	ours)
Face-to-	-race Lect	Learning											12	,	
			orial / Studio										18		
		lent-Centre	d Learning										-		
Self-Di		Learning													
			Lab Reports									18			
		paration of l									25				
		paration of									9				
Formal	-												-		
		tinuous As	sessment										2		
	Quiz												1		
Total	Fina	al Examinat	101								-		3 95		
	HING	METHO	DOLOGY								1		95	,	
Lecture	and I	Discussion,	Co-operative and Collabor	ative	e Met	hod,	Prot	lem	Base	ed M	letho	od			
COUR	SE SC	CHEDULE													
Wee	ek	Lab				7	Горі	cs							
1		Lab 1	Introduction												
2		Lab 2	Standardization of S Oxalic Acid dihydrat	e (C2	2H2C	.2F	H2O)	Solu	ition						
3		Lab 3	Standardization of H Hydroxide (NaOH) S			ic Ac	cid (I	HCl)	Solı	ition	n wit	h Sta	indaro	1 Soc	lium
4		Lab 4	Standardization of H Carbonate (Na2CO3)				cid (I	HCl)	Solı	itior	n wit	h Sta	indaro	d Soc	lium
5		Lab 5	Determination of Ca (CaCl2.2H2O) Soluti	lciui on w	n (C vith S	a) C tand									
			Acetic Acid (Na ₂ -ED	TA)	Solu	tion.									

6	Lab 6	Standardization of Sodium Thiosulphate Pentahydrate (Na2S2O3.5H2O) Solution with Standard Potassium Dichromate (K2Cr2O7) Solution.
7	Lab 7	Estimation of Copper (Cu) Content in a Copper Sulphate Pentahydrate (CuSO4.5H2O) (Blue Vitriol) Solutions by Iodometric Method with Standard Sodium Thiosulphate Pentahydrate (Na2S2O3.5H2O) Solution.
8	Lab 8	Standardization of Potassium Permanganate (KMnO4) Solution with Standard Oxalic Acid dihydrate (C2H2O4.2H2O) Solution.
9	Lab 9	Standardization of Potassium Permanganate (KMnO4) Solution with Standard Oxalic Acid dihydrate (C2H2O4.2H2O) Solution.
10	Lab 10	Determination of Ferrous (Fe) Content in a Ammonium Ferrous Sulphate (Mohr's Salt) [FeSO4.(NH4)2SO4.6H2O] Solution with Standard Potassium Permanganate (KMnO4) Solution.
11	Lab 11	Determination of Ferrous (Fe) Content in a Ammonium Ferrous Sulphate (Mohr's Salt) [FeSO4.(NH4)2SO4.6H2O] Solution with Standard Potassium Permanganate (KMnO4) Solution.
12	Lab 12	Determination of Zinc (Zn) Content in a Zinc Sulphate Heptahydrate (ZnSO4.7H2O) Solution with Standard Di-Sodium Ethylene Diamine Tetra Acetic acid (Na ₂ -EDTA) (Na ₂ -EDTA) Solution by using Eriochrome black T indicator.
13	Lab 13	Determination of Zinc (Zn) Content in a Zinc Sulphate Heptahydrate (ZnSO4.7H2O) Solution with Standard Di-Sodium Ethylene Diamine TetraAcetic acid (Na ₂ -EDTA) (Na ₂ -EDTA).
14	Lab 14	Determination of Zinc (Zn) Content in a Zinc Sulphate Heptahydrate (ZnSO4.7H2O) Solution by using Eriochrome black T indicator.

ASSESSMENT STRATEGY

			CO	Blooms Taxonomy
Com	ponents	Grading	60	Blooms Taxonomy
Continuous Assessment	Class Performance	10%	CO1	C1
(40%)	Report writing	30%	CO4	C2
Final Exam	Lab Test	30%		
(60%)	Viva	10%	CO1, CO2, CO3	C1, C3
(00%)	Quiz	20%		
Total Marks 100%				

(CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

REFERENCE BOOKS

- Practical Chemistry A Jabbar & M Haque
 Quantitative Chemical Analysis A I Vogel
 Analytical chemistry Gary D. Christian

REFERENCE SITE

EECE-163: Electrical Circuit Analysis

COU	RSE INF	ORMATION									
	se Code	: EECE-163		Contact Hours		: 3.0					
	se Title	: Electrical Circuit Analysis	Credit Ho	ours		: 3.0	00				
PRE-REQUISITE Course Code: Nil											
Course Title: Nil											
CUR	CURRICULUM STRUCTURE										
Outcome Based Education (OBE)											
RATIONALE											
The foundational course on electrical circuits is a basis of making freshmen engineering students well familiarize about the arena of DC and AC circuits. The course is aimed towards the methods of electric circuit analysis and evaluating their responses which can be very well achieved by the understanding of circuit laws, techniques and theorems for both AC and DC excitations. Investigation of first and second order DC circuits is vital in understanding circuit elements like capacitors and inductors used in daily life. A hands-on flavour of the poly phase circuits will enhance the practical knowledge, which addresses the issue of faults and power in the transmission lines. Although the course may seem somewhat rudimentary in its design, it imprints the groundwork for engineers who may pursue advanced course on electrical											
	eering. E CTIVE										
		oundation of basic electrical engir		1 .:							
3. D ci 4. In	Develop th ircuits. ntroduce	tion, Source Transformation) and ne understanding of AC steady students to poly-phase circuits as	state response	onse of singl	e-phase		s and	power in AC			
LEAI	RNING O	UTCOMES & GENERIC SKI	LLS			-					
No.	(Upon d	Course Learning Outcome completion of the course, the students able to)	s will be	Bloom's Taxonomy	СР	CA	KP	Assessment Methods			
CO1	correspondence also jus and theory	to interpret circuit laws and ap onding technique to find circuit qu tify selection particular circuit co orem(s) for simplifying complex c	uantities; oncept(s) circuits.	C5	1		3	T, F			
CO2	evaluate absence of	ent in analyse 1st and 2nd-order circu the responses both in the presence an of dc circuits.	nd	C4	1		2,3	T, MT			
CO3		to outline sinusoids and ph ing circuit parameters and analy		C2	-		1	F,MT			
CO4	of 3 ph and rej analyze	understand the current voltage ase circuits for different config produce knowledge of AC p real life power consumpt asion lines.	ure-tions ower to	C2	1		3,5	F, ASG, Pr			
Quiz;	(CP- Complex Problems, CA-Complex Activities, KP-Knowledge Profile,T – Test ; PR – Project ; Q – Quiz; ASG – Assignment; Pr – Presentation; R - Report; F – Final Exam, MT- Mid Term Exam) COURSE CONTENT										

Fundamental electrical concepts and measuring units; Direct current (dc): Current, voltage, resistance, power and energy; **Series/Parallel Circuits; Methods of network analysis and Network Theorems; Capacitors; Inductors and introduction to magnetic circuits; Alternating current (ac):** Instantaneous current, voltage and power for various combinations of R, L and C circuits, Effective current and voltage, Average power; **Phasor representation of sinusoidal quantities; Sinusoidal Single-Phase Circuit Analysis; Introduction to three phase circuits; Power factor and power equation (\Delta and Y circuits);**

				1											
No.		Course	Learning Outcome	_	-			RAN					r í		
	Car			1	2	3	4	5	6	7	8	9	10	11	12
			terpret circuit laws and presponding technique to												
001			quantities; also justify												
CO1			icular circuit concept(s)	Η											
) for simplifying complex												
		cuits.													
G 00			nalyse 1st and 2nd-order												
CO2			uate the responses both in labsence of dc circuits.	Μ											
		nage to	outline sinusoids and												
CO3			laining circuit parameters	М											
005		analysing													
			stand the current voltage												
			hase circuits for different												
CO4		figure-tions				М									
			AC power to analyze real sumptions of transmission												
	line	-	sumptions of transmission												
·		M- Medium	, L-low) R CO-PO MAPPING												
			K CO-PO MAPPING		-										
Mappi CO1-P		Level High	Problem analysis canabili	ty mi		ustifi			lor to		ma t	o cir	cuit e	olutic	me
011	01	mgn		ity must be present in order to come to circuit solutions. of capacitor and inductor properties and basic idea of											
יי ניטט	O2-PO1 Medium Fundamental knowledge o calculus are required to co		conduct transient and steady-state analysis of first-order s.										dea o	t	
CO2-P	01	Medium	calculus are required to co and second-order circuits.	onduc	et trai	nsien	t and	stea	dy-s	tate	anal	lysis	of fir	st-orc	ler
CO2-P	_	Medium Medium	calculus are required to co and second-order circuits. The knowledge of mathe be applied to describeSim	matic usoid	et trai	nsien ience phas	t and and sors a	stea elec along	dy-s trica wit	tate I en h A	anal gine C po	lysis ering wer.	of fir g scie	st-orc ncesł	ler nas
	01		calculus are required to co and second-order circuits. The knowledge of mathe	matic usoid a mu	et trai	nsien ience phas	t and and sors a	stea elec along	dy-s trica wit	tate I en h A	anal gine C po	lysis ering wer.	of fir g scie	st-orc ncesł	ler nas
CO3-P	O1 O3	Medium Medium	calculus are required to co and second-order circuits. The knowledge of mathe be applied to describeSim Investigative capability is	matic usoid a mu	et trai	nsien ience phas	t and and sors a	stea elec along	dy-s trica wit	tate I en h A	anal gine C po	lysis ering wer.	of fir g scie	st-orc ncesł	ler nas
CO3-P CO4-P FEAC Feachin	O1 O3 HINC	Medium Medium G LEARNI d Learning	calculus are required to co and second-order circuits. The knowledge of mathe be applied to describeSim Investigative capability is faults in transmission line NG STRATEGY	matic usoid a mu	et trai	nsien ience phas	t and and sors a	stea elec along	dy-s trica wit	tate I en h A	anal gine C po ver c	lysis eering wer. consu	of fir g scie	st-orc ncesh	ler nas d
CO3-P CO4-P FEAC Feachin	O1 O3 HIN(ng and -Face	Medium Medium G LEARNI d Learning e Learning	calculus are required to co and second-order circuits. The knowledge of mathe be applied to describeSim Investigative capability is faults in transmission line NG STRATEGY	matic usoid a mu	et trai	nsien ience phas	t and and sors a	stea elec along	dy-s trica wit	tate I en h A	anal gine C po ver c	lysis eering wer. consu	of fir g scie mptio	st-ord ncesh on an nt (ho	ler nas 1 d
CO3-P CO4-P FEAC Feachin	O1 O3 HIN(ng and -Face Lec	Medium Medium G LEARNI d Learning e Learning cture	calculus are required to co and second-order circuits. The knowledge of mathe be applied to describeSint Investigative capability is faults in transmission line NG STRATEGY Activities	matic usoid a mu	et trai	nsien ience phas	t and and sors a	stea elec along	dy-s trica wit	tate I en h A	anal gine C po ver c	lysis eering wer. consu	of fir	st-ord ncesh on an nt (ho	ler nas d
CO3-P CO4-P FEAC Feachin	O1 O3 HIN(1g and -Face Lec Pra	Medium Medium G LEARNI d Learning e Learning cture actical / Tute	calculus are required to co and second-order circuits. The knowledge of mathe be applied to describeSint Investigative capability is faults in transmission line NG STRATEGY Activities	matic usoid a mu	et trai	nsien ience phas	t and and sors a	stea elec along	dy-s trica wit	tate I en h A	anal gine C po ver c	lysis eering wer. consu	of fir g scie mptio	st-ord ncesh on an nt (ho	ler nas d
CO3-P CO4-P FEACI Feachin Face-to	O1 O3 HIN(ng and -Face Lec Pra Stu	Medium Medium G LEARNI d Learning e Learning cture actical / Tute	calculus are required to co and second-order circuits. The knowledge of mathe be applied to describeSint Investigative capability is faults in transmission line NG STRATEGY Activities	matic usoid a mu	et trai	nsien ience phas	t and and sors a	stea elec along	dy-s trica wit	tate I en h A	anal gine C po ver c	lysis eering wer. consu	of fir g scie mptio	st-ord ncesh on an nt (ho	ler nas d
CO3-P CO4-P FEACI Feachin Face-to	01 03 HIN(ng and -Face Lec Pra Stu rectee No:	Medium Medium G LEARNI d Learning e Learning cture actical / Tuto ident-Centro d Learning n-face-to-fa	calculus are required to co and second-order circuits. The knowledge of mathe be applied to describeSim Investigative capability is faults in transmission line NG STRATEGY Activities	matic usoid a mu	et trai	nsien ience phas	t and and sors a	stea elec along	dy-s trica wit	tate I en h A	anal gine C po ver c	lysis eering wer. consu	of fir g scie mptio gemer 42 - - 42	st-orc ncesh on an nt (ho	ler nas d
CO3-P CO4-P FEACI Feachin Face-to	O1 O3 HIN(ng and -Face Lec Pra Stu recteo No: Rev	Medium Medium G LEARNI d Learning e Learning cture actical / Tuto ident-Centre d Learning n-face-to-fa vision	calculus are required to co and second-order circuits. The knowledge of mathe be applied to describeSim Investigative capability is faults in transmission line NG STRATEGY Activities	matic usoid a mu	et trai	nsien ience phas	t and and sors a	stea elec along	dy-s trica wit	tate I en h A	anal gine C po ver c	lysis eering wer. consu	of fir g scie umptio gemer 42 - 42 21	st-orc ncesh on an nt (ho	ler nas d
CO3-P CO4-P FEACI Feachin Face-to Self-Di	O1 O3 HINO 1g ann 1g ann Lec Pra Stu rected No: Rev Ass	Medium Medium G LEARNI d Learning e Learning cture actical / Tuto dent-Centro d Learning n-face-to-fa vision sessment Pr	calculus are required to co and second-order circuits. The knowledge of mathe be applied to describeSim Investigative capability is faults in transmission line NG STRATEGY Activities	matic usoid a mu	et trai	nsien ience phas	t and and sors a	stea elec along	dy-s trica wit	tate I en h A	anal gine C po ver c	lysis eering wer. consu	of fir g scie mptio gemer 42 - - 42	st-orc ncesh on an nt (ho	ler nas d
CO3-P CO4-P FEACI Feachin Face-to Self-Di	O1 O3 HINO ng an- Face Lec Pra Stu rectee No Stu Res Asse	Medium Medium G LEARNI d Learning e Learning cture actical / Tuto dent-Centre d Learning n-face-to-fa vision sessment Pr essment	calculus are required to co and second-order circuits. The knowledge of mathe be applied to describeSim Investigative capability is faults in transmission line NG STRATEGY Activities orial / Studio ed Learning ce learning eparations	matic usoid a mu	et trai	nsien ience phas	t and and sors a	stea elec along	dy-s trica wit	tate I en h A	anal gine C po ver c	lysis eering wer. consu	of fir g scie mptio gemer 42 - - 42 21 21 21	st-orc ncesh on an nt (ho	ler nas d
CO3-P CO4-P FEACI Feachin Face-to Self-Di	O1 O3 HINO 1g and -Face Pra Stu rectee No: Asse Cor	Medium Medium G LEARNI d Learning e Learning cture actical / Tuto dent-Centro d Learning n-face-to-fa vision sessment Pr	calculus are required to co and second-order circuits. The knowledge of mathe be applied to describeSim Investigative capability is faults in transmission line NG STRATEGY Activities orial / Studio ed Learning ace learning eparations	matic usoid a mu	et trai	nsien ience phas	t and and sors a	stea elec along	dy-s trica wit	tate I en h A	anal gine C po ver c	lysis eering wer. consu	of fir g scie umptio gemer 42 - 42 21	st-orc ncesh on an nt (ho	ler nas d
CO3-P CO4-P FEACI Feachin Face-to Self-Di	O1 O3 HINO 1g and -Face Pra Stu rectee No: Asse Cor	Medium Medium G LEARNI d Learning e Learning cture actical / Tuto dent-Centro d Learning n-face-to-fa vision sessment Pr essment ntinuous As	calculus are required to co and second-order circuits. The knowledge of mathe be applied to describeSim Investigative capability is faults in transmission line NG STRATEGY Activities orial / Studio ed Learning ace learning eparations	matic usoid a mu	et trai	nsien ience phas	t and and sors a	stea elec along	dy-s trica wit	tate I en h A	anal gine C po ver c	lysis eering wer. consu	of fir g scie umptio gemer 42 - 42 21 21 21 21	ncesh ncesh n an nt (ho	ler nas d
CO3-P CO4-P FEACI Feachin Face-to Self-Di Formal	01 03 HINO 1g and -Face Pra Stu rected No: Rev Asse Con Fin	Medium Medium G LEARNI d Learning e Learning cture actical / Tuto dent-Centro d Learning n-face-to-fa vision sessment Pr essment ntinuous As	calculus are required to co and second-order circuits. The knowledge of mathe be applied to describeSint Investigative capability is faults in transmission line NG STRATEGY Activities orial / Studio ed Learning ace learning eparations essessment tion	matic usoid a mu	et trai	nsien ience phas	t and and sors a	stea elec along	dy-s trica wit	tate I en h A	anal gine C po ver c	lysis eering wer. consu	of fir g scie imptio gemer 42 - 42 21 21 21 21 2 3	ncesh ncesh n an nt (ho	ler nas d

Week	Lecture		Topics		Assessment Methods
	Lec 1	Charge and Curre	ent, Voltage, Power and Ener	σν	wienious
1	Lec 2		, Relevant Practice Problems	6)	
1	Lee 2 Lee 3		es, Branches and Loops; Kirc	hhoff's Laws	
	Lee 5		and Voltage Division, Parall		
	Lec 4		, Wye-Delta Transformations		Class Test 1
2	Lec 5		Nodal Analysis in Circuits wi		
	Lec 6		Mesh Analysis in Circuits wit		
	Lec 7		Analysis problems	n Bupermesn	
3	Lec 7 Lec 8	Superposition Th			
5	Lec 8 Lec 9		sRelevant to Superposition T	haoram	
	Lec 9 Lec 10	Thevenin's Theor		neorem	
4					
4	Lec 11	Norton's Theorem	sRelevant to Thevenin's Theo	brem	
	Lec 12				
	L_{co} 12		sRelevant to Norton's Theore		Class True C
~	Lec 13		erties of Capacitors, Serie	s and Parallel	Class Test 2
5	Lec 14	Capacitors	ntion of Industant Carin	and Domiti-1	
	Lec 15		erties of Inductors, Series	s and Parallel	
	1 17	Inductors	0:		
C	Lec 16	Source Free RC			
6	Lec 17	Source Free RL (
	Lec 18	Source Free RLC			
7	Lec 19	Step Response of			
7	Lec 20	Step Response of			
	Lec 21	Step Response of			
0	Lec 22		varying sinusoid excitations		
8	Lec 23	Concept of phase			
	Lec 24	Analysis of serie			
0	Lec 25		on; voltage and current division	on	
9	Lec 26		Source transformation		Mid Term
	Lec 27		stantaneous power and Aver		Exam
	Lec 28		omplex power, power trian	ngle, maximum	
10	Lec 29	average power	1		
	Lec 30		rement and power conservati	on.	
		Tie-set and Cut-		C	
	Lec 31		quilibrium equations in matri	x form	
11	Lec 32	Solution of resist		ishla resistant	
	Lec 33	load	r transfer theorems for var	lable resistance	
			nce load– Statement and appl	iantions	
	Lec 34	-	11		
12	Lec 35	incidence matrix	ph of a network, Concept of	uce and co-free,	
	Lec 36	menuenee maann	ase Circuits		
	Lec 37	Balanced Poly ph		ant	
13	Lec 37 Lec 38		elations and power measuren	ient.	Class Test 3
15	Lec 38 Lec 39	Unbalanced poly			or ASG+Pr
	Let 39	i ower measurem	ent and faults analysis		1
	Lec 40	Assorted problem	ns on poly phase circuits		
14	Lec 41	Practical Applica	tions of Electrical Circuit and	alysis	
	Lec 42		w and Open discussion		
SSESSME	NT STRATEG				
	nponents	Grading	СО	Bloom's Ta	axonomy
Continuous	Test 1-3	20%	C01	C5	5
Assessment	1050 1-5	20%	CO2	C4	L
(40%)	Class	5%	CO4	C2	

		Participation			
	-	Mid term	15%	CO2, CO3	C2, C4
				C01	C5
	Final Exam		60%	CO3	C2
				CO4	C2
	Total N	Marks	100%		

(CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

REFERENCE BOOKS

- 1. Fundamentals of Electric Circuit by C. K. Alexander & M. N. Sadiku
- 2. Introductory Circuit Analysis by R. L. Boylsted
- 3. Alternating Current Circuits by G. S. Corcoran & R. F. Kerchner
- 4. Electric Circuits by J. A. Edminister
- 5. Basic Engineering Circuit Analysis by J. D. Irwin & R. M. Nelms Electric Circuits by James William Nilsson

REFERENCE SITE

EECE-164: Electrical Circuit Analysis Sessional

COURSE INFORM	ATION									
Course Code Course Title	: EECE-164 : Electrical Circuit Analysis Sessional	Lecture Contact Hours Credit Hours	: 3.00 hrs in alternative week : 0.75							
PRE-REQUISITE										
Course Code: EECE 1 Course Title: Electrica										
CURRICULUM ST	RUCTURE									
Outcome Based Educa	ation (OBE)									

RATIONALE

This course of electrical engineering discipline aims to familiarize the students with implementation of basic electrical circuits in hardware domain. Designed for fresher students, experiments of this laboratory course will enable them to assemble beginner-level circuits to experimentally verify some fundamental circuit laws and theorems (KVL, KCL, Thevenin, Norton). This course also familiarizes the students with hardware implementation of AC circuits and measurement of ac quantities by oscilloscope. Finally, this course is targeted to introduce the students with hardware projects that will provide them with the first hand on experience about application of electrical engineering in real life and simulation of electrical circuits in a widely used simulation software (Proteus).

OBJECTIVE

- 1. To enable the students to apply the fundamental circuit laws (KVL, KCL, Ohm's law) in hardware domain.
- 2. To develop students' skills to simplify complex electrical circuits into simpler circuits by Thevenin and Norton's theorem and verify them in hardware.
- 3. To teach the students the basic operation of oscilloscope to measure AC quantities (magnitude and phase).
- 4. To impart the students the skills of analogue filter design by RLC circuit.
- 5. To familiarize the students with implementation of hardware electrical projects and a circuit simulation software (Proteus)

LEAI	RNING OUTCOMES & GENERIC SKILLS					
No.	Course Learning Outcome (Upon completion of the course, the students will be able to)	Bloom's Taxonomy	СР	CA	KP	Assessment Methods
CO1	Assemble electrical circuits that can verify fundamental electrical laws (KVL, KCL and Ohm's Law)	P5, A3	1		1,2,3	R, Q, T
CO2	Set up circuits to justify Thevenin's law and Norton's law in electrical circuits.	P5, A3	1		1,2,3	R, Q, T
CO3	Produce desired ac waves and measure amplitude and phase of ac waves in oscilloscope, design analogue RLC filter that can produce desired frequency response.	P6	1		1,2	R, Q, T
CO4	Develop collaborating nature by completing a simple project in both software and hardware and performing group activities.	P7, A4	2	1	5	PR, R, Pr

(CP- Complex Problems, CA-Complex Activities, KP-Knowledge Profile, T – Test ; PR – Project ; Q – Quiz; ASG – Assignment; Pr – Presentation; R - Report; F – Final Exam, MT- Mid Term Exam)

COURSE CONTENT

In this course, students will perform experiments to practically verify the theories and concepts learned in EECE 163 using different hardware equipment and simulation software.

SKILL MAPPING

Na	Course Looming Outcome			P	ROG	RAM	1 01	JTC	OM	ES (I	20)		
No.	Course Learning Outcome	1	2	3	4	5	6	7	8	9	10	11	12
CO1	Assemble electrical circuits that can verify fundamental electrical laws (KVL, KCL and Ohm's Law)									Н			
CO2	Set up circuits to justify Thevenin's law and Norton's law in electrical circuits.										Н		
CO3	Produce desired ac waves and measure amplitude and phase of ac waves in oscilloscope, design analogue RLC filter that can produce desired frequency response.					Н							
CO4	Develop collaborating nature by completing a simple project in both software and hardware and performing group activities.									Н			

(H-High, M-Medium, L-low)

JUSTIFICA	TION FO	R CO-PO MAPPING					
Mapping	Level	Justifications					
CO1-PO9	High	Assembling electrical circuits on Hardware level requirwork since experiments are done in groups.					
CO2-PO10 High Preparing lab reports on verification of Thevenin's and Norton's theorem require documentation and effective report writing skill.							
CO3-PO5	High	Producing and measuring ac signals and quantities need of digital oscilloscope which can be considered a moder					
CO4-PO9	High	Developing communication through participating grou viva.	p works, presentation and				
TEACHING	JEARNI	NG STRATEGY					
Teaching and	l Learning	Activities	Engagement (hours)				
Face-to-Face	Face-to-Face Learning						

Lecture	3
Practical / Tutorial / Studio	7
Student-Centred Learning	11
Self-Directed Learning	
Preparation of Lab Reports	3
Preparation of Lab Test	3
Preparation of presentation	2
Preparation of Quiz	3
Engagement in Group Projects	5
Formal Assessment	
Continuous Assessment	3
Final Examination	1
Total	41

TEACHING METHODOLOGY

Lecture and Discussion, Co-operative and Collaborative Method, Problem Based Method

COURSE SCHEDULE

Class	Торіс
1	Construction and operation of simple electrical circuits
2	Verification of KVL and KCL
3	Verification of Superposition Theorem and Thevenin's Theorem
4	Familiarization with alternating current (ac) waves
5	Study of R-L-C series circuit
6	Different types of filters and its characteristics with different input frequency
7	Lab test, Quiz and Viva

ASSESSMENT STRATEGY

	Components	Grading	СО	Blooms Taxonomy
			CO1	P5, A3
	Lab participation and Report	20%	CO2	P5, A3
			CO3	P6
Continuous			CO4	P7, A4
Assessment			CO1	P5, A3
(75%)	Labtest-1 ,Labtest-2	30%	CO2	P5, A3
	Lablest 1 ,Lablest 2	5070	CO3	P6
			CO4	P7, A4
	Project and Presentation	25%	CO4	P7, A4
			CO1	P5, A3
	Lab Quiz	25%	CO2	P5, A3
		2.3 70	CO3	P6
			CO4	P7, A4
	Total Marks	100%		

(CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

REFERENCE BOOKS

- 1. Fundamentals of Electric Circuit by C. K. Alexander & M. N. Sadiku
- 2. Introductory Circuit Analysis by R. L. Boylsted
- 3. Alternating Current Circuits by G. S. Corcoran & R. F. Kerchner
- 4. Electric Circuits by James William Nilsson Inc.

REFERENCE SITE

GEBS-101: Bangladesh Studies

COU	RSE INFO	ORMATION						
	e Code	: GEBS-101		ntact Hours	: 2.00			
	e Title	: Bangladesh Studies	Credit Hou	rs	: 2.00			
	REQUISI							
	e Code: N							
	e Title: N		_	_				
		A STRUCTURE						
Outco	me Based	Education (OBE)			_	_	_	
RATI	IONALE							
Bangl forma	adesh, and tion of B	been designed for undergradu l to provide them with basic angladesh and constitution en charter, cultural aspects wh	knowledge of Banglade	of historical of	events v trends	which e in ecor	eventua	lly led to the
OBJE	ECTIVE							
e 3. T 4. T	conomic de `o promote	historical roots of Banglades evelopments that have taken p an understanding of the devel n awareness among the stude	lace since its lopment of B	independence angladesh and	e. l its cult	ure.		
LEAI	RNING O	UTCOMES & GENERIC SI	KILLS					
No.	(Upon co	Course Learning Outcome ompletion of the course, the st be able to)		Bloom's Taxonomy	СР	CA	КР	Assessment Methods
CO1	history, and post	specific stages of Bangladesh through the ancient, medieve- colonial periods and variety of Bangladesh.	al, colonial	C1-C2	-	-	-	T, MT, F
CO2	Explain t	he economy and patterns of ec through qualitative and quanti		C2	_	-	-	MT, F
CO3		the communication skill by pr Bangladesh studies.	resenting	A2		1		Pr
	Complex P	roblems, CA-Complex Activi signment; Pr – Presentation; F						
COU	RSE CON	TENT						
Demo identi Comp contin mass Bangl contri bridge	ography of ty of the E bany, relig- nent, langu uprising of ladesh, Pre bution to v e, power pl	ography: Location, Area, H Bangladesh, Maritime zones Bengali race, main trends in ious and social reform move age movement 1948-1952, e of 1969, war of independence and post liberation developm world peace and its security, er ants, Karnaphuli River Tunne Economy and Culture: Land,	; History : C the history o ements, natio education mo ce and emer ant in the fie ngineering de l etc) and its	Overview of the formalist movement of 19 gence of Barded of engineer evelopments in impact on source of source of the formal description of the fore	he ancie engal, H nents, c 962, six ngladesl ering an n Bangl cio-ecol	ent Ben Bengal livision c-point h in 19 d techn adesh (nomic a	ngal, ar under t of the moven 071, Co ology, Kaptai aspect;	nthropological the East India e Indian sub- ment of 1966, onstitution of Bangladesh's Dam, Padma

biomass, Fish, Minerals, Health, Education, Agriculture, Industries, NGOs, Population, Sociological and Cultural aspects of Bangladesh, Economy and National development, Development and Progress of the Millennium Development Goals (MDGs), Public Administration in Bangladesh, State of Good Governance in Bangladesh, Art and Literature, Main traditional cultural events, Vision-2021, Digitalization, Tourism and Natural Resources, Bangladesh and International Relations;

SKILL	MAI	PPING													
No.		Course	Learning Outcome	1			1		1			ES (I	<u> </u>	11	10
	Iden	tify specif	ic stages of Bangladesh's	1	2	3	4	5	6	7	8	9	10	11	12
			ry, through the ancient,												
CO1	med	lieval, co	lonial and post-colonial						Η						
			riety of cultural identities												
		angladesh	onomy and patterns of												
CO2			iges through qualitative						Н						
	and	quantitativ	ve analysis.												
CO3			ommunication skill by										М		
	pres	enting top	ics on Bangladesh studies.												
(H – Hi	oh M	I- Medium	I-low)												
	*		R CO-PO MAPPING												
Mappi		Level				Insti	ficati	ons							
inappi	In order to identify specific stages of Bangladesh's										tical	histo	ory, tl	hroug	h the
			ancient, medieval, colo	nial	and	post	t-col	onial	per	iods	an	d cr	itical	ly ar	alyse
CO1- P	O6	High	plurality of cultural iden by contextual knowledge												
			and the consequent respo												
			and solutions to complex									8		-0 r-	
			In order to explain the	eco	nomy	and	d pa	ttern	s of	eco	nom	nic c	hange	es th	rough
CO1- P	06	High	qualitative and quantita contextual knowledge to												
01-1	00	Ingn	and the consequent respo												
			and solutions to complex	engi	neeri	ng p	roble	ems i	s req	uire	d.			01	
CO3-P(Medium	Develop communication	skill	s thro	ugh	parti	cipat	ing i	n pr	esen	tatio	ns.		
			ING STRATEGY												
		l Learning	Activities								E	Engag	gemei	nt (ho	ours)
Face-to-	-Face Lect	Learning ture											28	2	
			orial / Studio										-	,	
			ed Learning										-		
Self-Di		Learning	ace learning										28	2	
		rision	ice learning										14		
	Ass	essment Pi	reparations										14		
Formal													2		
		tinuous Aa al Examina											2 3		
Total	1 1110												89		
TEACH	HING	METHO	DOLOGY												
Lecture	and I	Discussion	, Co-operative and Collabor	ative	e Me	hod,	Prol	olem	Base	ed M	leth	od			
COUR	SE SO	CHEDUL	E												
Week	x 1	Lecture		То	pic							Γ	Asse: Me	ssme thods	
		Lec-1	Introductory class: Brief d basic requirements of the c								the				
1		Lec-2	course Bangladesh Geography: Location, Area, Boundar Physiography, River System, Forest and Climate, Demography										Class	Test	-1
		LCC-2	of Bangladesh.	, 1	01000	anu	CIIII	atc,	Dem	0510	·pnj				

	Lec-4	the Bengali race; main trends in the history of medieval	
		Bengal	
		Bengal under the East India Company,	
3	Lec-5	Religious and Social reform movements	
-	Lec-6	Nationalist movements, division of the Indian sub-continent	
4	Lec-7	Language movement 1948-1952, Education movement of	
	Lec-8	1962	
		Language movement 1948-1952, Education movement of 1962	
5	Lec-9	Six-point movement of 1966; Mass uprising of 1969;	
	Lec-10	War of Independence and Emergence of Bangladesh in 1971	
6	Lec-11	Constitution of Bangladesh	
	Lec-12	Constitution of Bangladesh	
7	Lec-13	Bangladesh's contribution to world peace and security, Pre	
	Lec-14	and post liberation development of engineering and	
		technology	Mid Term Exan
		Bangladesh's contribution to world peace and security, Pre	
		and post liberation development of engineering and	
		technology	
8	Lec-15	Land, Characteristics of tropical Monsoon climate, Forests and	
	Lec-16	biomass, Fish	
		Engineering development in Bangladesh (Kaptai Dam, Padma	
		bridge, power plants, Karnaphuli River Tunnel etc) and its	
		impact on socio-economic aspect	
9	Lec-17	Minerals, Health and Education,	
	Lec-18	Agriculture, Industries	
10	Lec-19	NGOs, Population, Sociological and Cultural aspects of	
	Lec-20	Bangladesh	
		Economy and national development,	
11	Lec-21	Development and Progress of the Millennium Development	
	Lec-22	Goals (MDGs)	
		Public Administration in Bangladesh, State of Good	
		Governance in Bangladesh	Class Test-2
12	Lec-23	Art and Literature	
	Lec-24	Traditional cultural events	
13	Lec-25	Vision-2021, Digitalization	
	Lec-26	Tourism and Natural Resources	
14	Lec-27	Bangladesh and International Relations	
14			1

Components		Grading	СО	Bloom's Taxonomy
Continuous	Test 1-2	20%	CO1	C1-C2
Assessment	Presentation	5%	CO3	A2
(40%)	Mid term	15%	CO1, CO2	C1-C2
Final Exam		60%	CO1, CO2	C1-C2
Total Marks		100%		

(CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

REFERENCE BOOKS

- 1. Bangladesh Studies: Md. Shamsul Kabir Khan and Daulatunnahar Khanam
- 2. The Constitution of the People's Republic of Bangladesh
- 3. Discovery of Bangladesh: Akbar Ali Khan
- 4. History of Bangladesh, Vols, 1-3: Sirajul Islam
- 5. History of Modern Bengal, Vol, 1: R C Majumdar
- 6. Dynastic History of Bengal: Dr. Abdul Mumin Chowdhury

- A History of Bangladesh: William Van Schendel 7.
- Geography of Bangladesh: Harun Er Rashid
 Banglapedia: National Encyclopedia of Bangladesh, Vols, 1-10: Sirajul Islam
- 10. History of Bengal: (Mughal Period 1526-1765): R. A. Chandra
- 11. Land of Two Rivers: Nitesh Sengupta
- 12. A History of Bangladesh: Cambridge University Press
- 13. Bengali Nationalism and the Emergence of Bangladesh : A.F Salahuddin Ahmed
- 14. Language Movement and The Making of Bangladesh: Safar Ali Akanda

REFERENCE SITE

MATH-101: Differential and Integral Calculus

COURSE INFORMATION							
Course Code	: MATH-101	Lecture Contact Hours	: 3.00				
Course Title : Differential and Integral Calculus		Credit Hours	: 3.00				
PRE-REQUISITE							
Course Code: Nil							
Course Title: Nil							

CURRICULUM STRUCTURE Outcome Based Education (OBE)

RATIONALE

This course is designed to introduce basic knowledge of Differential Calculus and use it in engineering study.

OBJECTIVE

- To impart basic knowledge on differential and Integral Calculus to solve engineering problems and 1. other applied problems.
- 2. To develop understanding some of the important aspects of rate of change, area, tangent, normal and volume.
- 3. To be expert in imparting in depth knowledge of functional analysis such as increasing, decreasing, maximum and minimum values of a function

LEARNING OUTCOME & GENERIC SKILLS

No.	Course Learning Outcome (Upon completion of the course, the students will be able to)	Bloom's Taxonomy	СР	CA	KP	Assessment Methods
CO1	Define the limit, continuity and differentiability of functions, identify the rate of change of a function with respect to independent variables and describe the different techniques of evaluating indefinite and definite integrals.	C1-C2	1		3	T, F, ASG
CO2	Apply the concepts or techniques of differentiation and integration to solve the problems related to engineering study.	C3	1		3	T, MT, F
CO3	Calculate the length, area, volume, center of gravity and average value related to engineering study	C3	1		3	MT, F, ASG

(CP- Complex Problems, CA-Complex Activities, KP-Knowledge Profile, T – Test; PR – Project; Q – Quiz; ASG – Assignment; Pr – Presentation; R - Report; F – Final Exam, MT- Mid Term Exam)

COURSE CONTENT

Differential Calculus: Introduction, Differential Calculus for Engineering, Function and Limit, Continuity and Differentiability, Successive Differentiation, Leibnittz's Theorem, Rolle's Theorem, Mean Value Theorem, Taylor's theorem, Expansion of Finite and Infinite forms, Lagrange's form of remainder, Cauchy's form of remainder, Expansion of functions differentiation and integration, Indeterminate form, Cartesian differentiation, Euler's theorem, Tangent, sub tangent and Normal, sub normal, Maxima and Minima, Curvature, Asymptotes, Partial differentiation.

Integral Calculus: Definition of Integration, Importance of Integration in Eng., Integration by substitution, Integration by parts, Standard integrals, Integration by successive reduction, Definite integrals and its use, Integration as a limit of sum, summing series, Walli's formula, Improper Integrals, beta and gamma function, multiple integral and its application, Area, volume of solid revolution, Area under a plain curve, Area of the region enclosed by two curves, Arc lengths of curves.

SKILL MAPPING

No.	Course Learning Outcome	PR	OGR	AM	OUT	CON	MES	(PC))				
INO.	Course Learning Outcome	1	2	3	4	5	6	7	8	9	10	11	12
CO1	Define the limit, continuity and differentiability of functions, identify the rate of change of a function with respect to independent variables and describe the different techniques of evaluating indefinite and definite integrals	Н											
CO2	Apply the concepts or techniques of differentiation and integration to solve the problems related to engineering study.	Н											
CO3	Calculate the length, area, volume, center of gravity and average value related to engineering study	Н											

(H – High, M- Medium, L-low)

JUSTIFICATION FOR CO-PO MAPPING

Mapping	Level	Justifications	Justifications						
CO1-PO1	High	The knowledge of mathematics, science and engineering	ng has to be applied to						
C01-F01	Ingn	describe the complete concept of differential and integral c	alculus.						
CO2-PO1 High To apply proper and improper integral in the field of engineering study, the									
knowledge of mathematics, science and engineering is required.									
CO3-PO1	High	In order to calculate volume, average, center of gravity and area of any							
005-101	Ingn	revolution object, the knowledge of mathematics and engin	neering is needed.						
TEACHIN	G LEARN	IING STRATEGY							
Teaching an	nd Learning	Engagement (hours)							
Face-to-Fac	Face-to-Face Learning								
10									

race-to-race Leanning	
Lecture	42
Practical / Tutorial / Studio	-
Student-Centred Learning	-
Self-Directed Learning	
Non-face-to-face learning	42
Revision	21
Assessment Preparations	21
Formal Assessment	
Continuous Assessment	2
Final Examination	3
Total	131
TEACHING METHODOLOGY	
Lecture and Discussion, Co-operative and Collaborative Method, Problem Based M	Aethod

Week	Lecture	Topics	Assessment Methods
1	Lec 1	Introduction to Differential Calculus for	
-	Lec 2	Engineering study, Basic limit theorems with	
	Lec 3	proofs, Limit of infinity and infinite limit,	
		Sandwich (Squeezing) theorem with problems.	
2	Lec 4	Basic concept of Differentiability, definition,	
	Lec 5	derivative of a function, differentiable function,	Class Test 1
	Lec 6	Differentiability – one sided derivatives,	
		Successive differentiation	
3	Lec 7	Leibnitz's theorem and its applications,	
	Lec 8	Determination of $(y_n)_0$, Mean Value theorem,	
	Lec 9	Taylor theorem	
4	Lec 10	Expansion of finite and infinite forms, Lagrange's	
	Lec 11	and Cauchy's form of remainder, Indeterminate	
	Lec 12	forms – concept and problem solving,	
		L'Hospital's rules with application	
5	Lec 13	Partial differentiation - partial derivatives of a	
	Lec 14	function of two/ several variables and problems,	
	Lec 15	Euler's theorem for several (two, three and m)	
		variables and problem solving	
6	Lec 16	Tangents and Normals in Cartesian, equation of	Class Test 2
~	Lec 17	tangent and sub tangents at the origin, equation of	
	Lec 18	normal of functions of explicit and implicit forms,	
	200 10	Angle between two intersection of two curves;	
		problem solving	
7	Lec 19	Maxima and minima of functions of single	
,	Lec 20	variables concept, Increasing and decreasing	
	Lec 21	function, Concave up and down with problems;	
	200 21	Curvature; Asymptotes	
8	Lec 22	Introduction to integral calculus, Standard	
0	Lec 22 Lec 23	integrals –concept of definite and indefinite	
	Lec 24	integrals, applications, Indefinite integrals –	
	Lee 24	Method of substitution, Techniques of integration	
9	Lec 25	Indefinite integrals – Integration by parts, Special	
,	Lec 26	types of integration, integration by partial fraction,	
	Lec 20 Lec 27	Integration by the method of successive reduction,	
	Lee 27	Definite integrals – definite integrals with	Mid Term Exam
		properties and problems	
10	Lec 31	Definite integrals – Reduction formula, Walli's	
10	Lec 31 Lec 32	formula, definite integral as the limit of the sum,	
	Lec 32 Lec 33	Beta function – concept and problem solving	
11	Lec 28	Gamma function - concept and problem solving,	
**	Lec 28 Lec 29	Relation between beta and gamma function,	
	Lec 30	Legendre duplication formula, problems and	
	Lee 50	applications, Multiple integrals – double integrals	
12	Lec 34	Multiple integrals – triple integrals, successive	
	Lec 35	integration for two and three variables, Area in	
	Lec 35	Cartesian	
13	Lec 37	Area in polar, Volume of solid revolution, Area	
10	Lec 37	under a plain curve in Cartesian and polar	Class Test 3
	Lec 38	coordinates	
14	Lec 40	Area of a region enclosed by two curves in	
	Lec 41	Cartesian and polar coordinates, Arc lengths of	
	Lec 42	curves in Cartesian and polar coordinates	

Com	oonents	Grading	СО	Blooms Taxonomy
Continuous	Test 1-3	20%	CO1, CO2 CO 2	C1, C2 C3
Assessment (40%)	Class Participation	5%	CO 3	C3
	Mid term	15%	CO 2, CO3	C3
			CO1	C1, C2
Final	Final Exam		CO2	C3
			CO3	C3
Total	Marks	100%		

(CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

REFERENCE BOOKS

Calculus (9th) - Howard Anton, Irl C. Bivens (Author), Stephen Davis.
 Calculus: An Intuitive and Physical Approach (2nd)-Morris Kline.

REFERENCE SITE

PHY-101: Waves and Oscillations, Optics and Modern Physics

COUR	RSE INF	ORMATION									
Course	e Code	: PHY-101		Lec	ture Co	ntact H	ours	: 3.00			
Course	e Title	: Waves and Oscillations, Optics and Mo	dern Physics	Cre	dit Hou	irs		: 3.00			
PRE-I	REQUIS	ITE									
00000	e Code: N e Title: N										
CURF	CURRICULUM STRUCTURE										
Outcon	Outcome Based Education (OBE)										
RATI	ONALE										
Moder	This course is designed to teach the basic physics in the field of Waves and Oscillations, Optics and Modern physics. The course will be emphasized basic concepts, theories and solve quantitative problems which can be applicable in a wide spectrum of engineering disciplines.										
OBJE	CTIVE										
		he different parameter and concepts of Wa					odern	physics.			
		the basic concepts of Waves and Oscillation nalytical problems regarding Waves and Oscillation	· 1								
			semations, Op	nies a		ern pny	sics.				
LEAK	KNING O	OUTCOMES& GENERIC SKILLS	r								
No.	(Upon o	Course Learning Outcome completion of the course, the students will be able to)	Bloom's Taxonomy	СР	CA	KP		essment ethods			
CO1	Waves physics harmon interfere photoel	different basic parameters in the field of and Oscillations, Optics and Modern such as periodic motion, simple ic motion, undamped oscillations, ence, diffraction, polarization and prism, ectric effect, Compton effect, matter atomic model, radioactive decay, fusion,	C1	1		1	T,	F, MT			

	fission etc.					
CO2	Explain different basic theories in the field of Waves and Oscillations, Optics and Modern physics such as the wave motion for different systems along with energy, different formula for interference, diffraction, polarization special theory of relativity, Compton theory, nuclear transformation, and nuclear reaction etc.	C1	1		1	MT, F
CO3	Solve quantitative problems in the field of Waves and Oscillations, Optics and Modern physics such as energy of wave motion, wavelength, diffraction pattern, relativistic energy, photon energy, Compton shift, nuclear binding energy etc.	C2	2		2	T, MT, F, ASG
CO4	Develop the communication skill by presenting topics on computer graphics.	A2		1		Pr

(CP- Complex Problems, CA-Complex Activities, KP-Knowledge Profile, T – Test; PR – Project; Q – Quiz; ASG – Assignment; Pr – Presentation; R - Report; F – Final Exam, MT- Mid Term Exam)

COURSE CONTENT

Waves and Oscillations: Simple Harmonic Motion (SHM) and its properties, Differential equation of a SHM and its solution, total energy of a body executing SHM, average kinetic and potential energy of a body executing SHM, LC oscillatory circuit; Pendulum- simple, compound and torsional pendulum, spring-mass system, two body oscillation and reduced mass, damped harmonic motion and its different condition, forced oscillation and its different condition, resonance, equation of a progressive wave, differential equation of a progressive wave, energy density of wave motion, average kinetic and potential energy of a body executing SHM, Stationary wave.

Optics: Lens, equivalent lens and power, defects of images and different aberrations, Interference of light, Young's double slit experiment, Interference in thin film and Newton's ring method, diffraction of light, diffraction by single slit, diffraction by double slits, Fraunhofer and Fresnel bi-prism, diffraction gratings, polarization of light, Brewster's law, Malus law, polarization by double refraction Nicole prism, optical activity and polarimeters, optical instruments, resolving power of optical instrument, Laser: spontaneous and stimulated emission

Modern Physics: Galilean relativity & Reference frame, Special theory of relativity postulates, Galilean transformation, Lorentz Transformation, Length contraction, Time dilation, Velocity addition, relativity of mass, mass energy relation, Momentum energy relation, Photoelectric effect, Compton effect, de Broglie matter wave, Bohr atom model and explanation, atomic orbital and energy equation, classification of nucleus, nuclear binding energy, radioactivity, radioactive decay law, half-life, mean life, nuclear reaction, introduction to nuclear reactor.

SKILL MAPPING

No.	Course Learning Outcome		PROGRAM OUTCOMES (PO)										
NO.	Course Learning Outcome	1	2	3	4	5	6	7	8	9	10	11	12
CO1	Define the different basic parameters such as periodic motion, interference, diffraction, polarization and prism, photoelectric effect etc.	Н											
CO2	Explain the wave motion for different systems along with energy, the techniques to derive different formula for interference, diffraction, polarization and prism, different theory regarding modern physics.	Н											
CO3	Solve quantitative problems in the field of Waves and Oscillations, Optics and	Н											

Mo	dern physics												
		communication skill by s on computer graphics.									L		
(H – High, M	I- Medium,	L-low)											
		CO-PO MAPPING											
Mapping	Level			Justif	ficati	ons							
CO1-PO1	High	The conceptual knowled discipline.	-									-	
CO2-PO1	High	The theory-based knowled discipline.	•									•	
CO3-PO1	High	The numerical analysis-b engineering.	ased kno	wledg	ge of	the 1	natu	ral s	cien	ces a	pplic	able t	to the
CO4-P10	Low	Develop communication	skills thr	ough	parti	cipat	ing i	n pr	esen	itatio	1.		
TEACHING	LEARNIN	NG STRATEGY											
Teaching and		Activities							Er	ngage	ment	(hou	rs)
Face-to-Face Learning													
	ture										42		
	ctical / Tutor dent-Centred										-		
Self-Directed		i Loanning						+			-		
	1-face-to-fac	e learning							42				
	vision	U									21		
	essment Pre	parations							21				
Formal Asse									2				
	tinuous Ass								2				
Fina Total	al Examinati	on							3				
	METHO								131				
TEACHING													
Lecture and	Discussion,	Co-operative and Collabor	ative Me	thod,	Prob	lem	Base	ed M	letho	od			
COURSE S	CHEDULE												
Week	Lecture		Topics								ssess Meth		
1	Lec 1	Simple harmonic mot	ion (SH	M) a	nd it	s di	ffere	entia	1	1			
_	Lec 2	equations, graphical re		,									
	Lec 3	K.E and total energy	•					Ĩ					
2	Lec 4	Spring-mass system, el										_	
	Lec 5	compound and torsiona	l pendulı	ım, C	ombi	inatio	on of	t two)	C	lass T	'est 1	
3	Lec 6 Lec 7	SHM Combination of two	SUM 7	Turo	hode	0.00		iona	_				
3	Lec 7 Lec 8	reduced mass, Damped											
	Lec 9	equation	* Oscillat	10113 (us ui		mia	•				
4	Lec 10	Displacement equation	of dam	ped c	scill	ation	, ele	ectric	2				
	Lec 11	damped oscillatory cir	cuit, Fo	ced	oscill	latior	n an	d its	s				
	Lec 12	differential equation, o	lisplacen	ent e	quat	ion o	of fo	orcec	1				
_	L ac 12	oscillation, resonance			lar -'	·	.f .						
5	Lec 13 Lec 14	Plane progressive wa Stationary wave, Len											
	Lec 14 Lec 15	power of lens	is and C	51101	nauto	-11 U	1 10	11505	,	C	lass T	est 2	
6	Lec 15	Defects of images	and	diffe	rent	abe	errat	ions					
	Lec 17	Interference of light, yo							<i></i>				
	Lec 18		-			-							
7	Lec 19	Interference in Thin f						el &	Ż				
	Lec 20	Fraunhofer diffraction,	<u>Diffrac</u> ti	on by	sing	le sli	t						

	Lec 21		
8	Lec 22	Diffraction by double slit, Diffraction gratings,	
-	Lec 23	Polarization and Production and analysis of polarized	
	Lec 24	light, Optics of crystals, Nicole prism	
9	Lec 25	Brewster's and Malus law, Optical activity and	
	Lec 26	polarimeter, Laser & its applications	
	Lec 27		Mid Term Exam
10	Lec 31	Frame of Reference, Postulates of special relativity,	
	Lec 32	Galilean Transformation, Lorentz Transformations,	
	Lec 33	Length Contraction and Time dilation	
11	Lec 28	Mass and Energy equivalence equation and concept of	
	Lec 29	Massless particle and its expression, Photoelectric	
	Lec 30	Effect, photocurrent and work function, kinetic energy,	
		stopping potential	
12	Lec 34	Definition, Compton wavelength shift, limitation, De	
	Lec 35	Broglie Concept, Condition for wave and particle	
	Lec 36	behavior, Bohr atomic model, expression for Bohr radii	
		and orbital energy for hydrogen atom	
13	Lec 37	Classification of Nucleus, nuclear binding energy,	Class Test 3
	Lec 38	Radioactivity and its transformation, Radioactive	
	Lec 39	Decay Law, half-life, mean life, nuclear reaction	
14	Lec 40	Concept of Fusion, Fission and nuclear chain reaction,	
	Lec 41	General idea on nuclear reactor and nuclear power plant	
	Lec 42		

Comr	oonents	Grading	СО	Blooms Taxonomy
			C01	C1
	Test 1-3	20%	CO2	C1
	ontinuous ssessment		CO3	C2
(40%)	Class Participation	5%	CO4	A2
	Mid term	15%	CO2	C1
			CO3	C2
Final	Exom	60%	CO1	C1
ГШа	Final Exam		CO2	C1
			CO3	C2
Total	Marks	100%		

(CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain) REFERENCE BOOKS

- 1. Fundamentals of Physics (10th) Halliday, Resnick and Walker
- 2. Physics for Scientists and Engineers(9th) Serway and Jewett
- 3. Concept of Modern Physics (6th) Arthur Beiser
- 4. University Physics with Modern Physics (14th) Hugh D. Young and Roger A. Freedman
- 5. Modern Physics for Science and Engineering Marshall L. Burns
- 6. Waves and Oscillations Walter Fox Smith
- 7. The Physics of Vibrations and Waves H. J. Pain
- 8. Waves and Oscillations (2nd)- BrijLal and Subramannyam
- 9. Fundamental of Optics Francis A. Jenkins and Harvey E.White
- 10. Introduction to Modern Optics Grant R. Fowles
- 11. Fundamental Optical Design Michael J. Kidger

PHY-102: Physics Sessional

COU	RSE INFO	ORMATION						
	e Code	: PHY-102	Lecture Cont		: 3.00			
	e Title	: Physics Sessional	Credit Hours		: 1.50			
	REQUIS							
	e Code: N e Title: N							
CUR	RICULU	M STRUCTURE						
Outco	ome Based	Education (OBE)						
RAT	IONALE							
Mech exper discip	anics, Electiments on olines. This	a laboratory course for the lettricity, Modern physics and different fields of physics a laboratory course will enable or individual.	Thermal physic which can be	cs. The cours applicable in	e will t a wid	be empl e spect	hasized trum of	l fundamenta f engineering
OBJI	ECTIVE							
		asic physics knowledge pract se of basic scientific instrume						
	•	UTCOMES & GENERIC						
No.		Course Learning Outcon ompletion of the course, the stude to)	Bloom's Taxonomy	СР	CA	КР	Assessmen Methods	
CO1	and Ose	the different parameters reg cillations, Optics, Mechanic physics and Thermal physics	C1	1		1	Q	
CO2	Describe	e the different phenomena re- cillations, Optics, Mechanic physics and Thermal physics	garding Waves cs, Electricity,	C1	1		1	T, F
CO3	Constru group to Waves	ct Experiments by an indivi- determine different phenon and Oscillations, Optics ty, Modern physics and Th	vidual or by a nena regarding s, Mechanics,	C3	1		2	T,F
CO4		a report for an experimental	work.	C2			2	R
Quiz; Exper	ASG – As imental E RSE CON s course, s	Problems, CA-Complex Activ ssignment; Pr – Presentation; xam – EE, Class performance TENT tudents will perform experim	R - Report; F –	Final Exam,	MT- N	fid Ter	m Exar	n, Viva – V,
	L MAPP	ING						
No.	1	Learning Outcome	PR	OGRAM OU	ТСОМ	ES (PC))	
			1		56	7 8		10 11 12
CO1	Waves Electric physics		chanics, ermal					
CO2	Waves	be the different phenomena ro and Oscillations, Optics, Me city, Modern physics and The s etc.	chanics,					

by a rega Mec The	group to de rding Waves chanics, Elec rmal physics												
CO4 Prej	pare a repor	t for an experimental work.									L		
(H – High, M	I- Medium, l	L-low)											
JUSTIFICA	TION FOR	CO-PO MAPPING											
Mapping	Mapping Level Justifications												
CO1-PO1	High	discipline.											
CO2-PO1	High	The descriptive knowledge discipline.	of the	natı	iral sc	eienc	es a	ppli	cable	e to	the e	ngine	ering
CO3-PO9	Medium	Able to do work or complete	e a task	c as	an ind	livid	ual a	and a	as a i	team	l.		
CO4-PO10	Low	Capable to write a report on	an exp	perir	nental	wo	rk.						
TEACHING	LEARNIN	G STRATEGY											
Teaching and		ctivities							E	ngag	gemer	nt (ho	urs)
Face-to-Face Lec	-										12	,	
	ctical / Tutor	ial / Studio									12		
	dent-Centred												
Self-Directed													
		ab Reports 18											
	paration of L paration of Q												
		ion of viva 9											
	Continuous Assessment 2												
~	Quiz 1												
Fina Total	al lab exam										3	,	
1000	METHOD										95)	
TEACHING				_			_			_			
		Co-operative and Collaborative	e Meth	nod,	Probl	em I	Base	d M	etho	d			
COURSE SO													
Week 1		Topics Introductory class: Brief disc	ussion	0.00	total	ov11c	huc	has	io r	anii	amar	ts of	the
		course.	ussion	I OII	totai	sync	ious,	, Das		equi	emer	115 01	ule
2		Evaluation system of the c							ferer	nt se	ectior	n of	the
2		laboratory, introduction to diff							:-	. 1		- M	
3		Determination of specific re Bridge.	sistanc	ce o	n ma	ier1a	15 0	га	wire	e by	usir	ıg M	eler
4		Determination of focal length	of a co	onca	ve ler	ıs bv	aux	iliar	y le	ns m	ethod	1.	
5		Determination of a high resist											n of
		specific heat of a liquid by the	metho	o bc	f cool	ing							
6		Determination of ECE of cop					vol	tame	eter /	/ Det	termi	natio	n of
7		the Young's modulus of bar by Determination of the waveleng					diff	racti	on a	ratir	ισ		
8		Determination of the focal 1										on's	ring
		method								., 1			8
9		Determination of the specific i											
10		Determination of the conducti								metl	hod		
11		Verification of the law of cons								0.000			
12		Determination of the accelerat pendulum	ion du	ie to	gravi	ty by	y me	ans	01 C	omp	ound		

_			
	13	Lab 13	Determination of the spring constant and the rigidity modulus of a spiral spring
	14	Lab 14	Determination of the Planck's constant using photoelectric effect

Со	Components		- CO	Blooms Taxonomy
Continuous Assessment	Class performance	10%	CO1	C1
(40%)	Report Writing	30%	CO4	C2
Final Exam	Lab Test	30%		
(60%)	Viva	10%	CO1, CO2, CO3	C1, C3
(00%)	Quiz	20%		
То	tal Marks	100%		

(CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

REFERENCE BOOKS

- 1. Practical Physics: G. L. Squires
- Practical Physics: Dr Giasuddin and Md. Sahabuddin.
 B.Sc. Practical Physics: C. L Arora
- 4. Practical Physics: S.L. Gupta and V. Kumar

LEVEL-1 FALL TERM

CSE-103: Digital Logic Design

COU	RSE INF	ORMATION						
	e Code	: CSE-103	Lecture Cont	act Hours	: 3.0			
	e Title	: Digital Logic Design	Credit Hours		: 3.0	0		
	REQUIS							
	e Code: N e Title: N							
		M STRUCTURE						
		Education (OBE)						
	IONALE			<u> </u>		0.11		
		esigned to learn about differ it different types of compute						
	t through		a chips and learn	to represent s	ignais	and se	quence	s of a digital
	ECTIVE							
		d the different boolean algeb	bra theorems and	apply them for	r simpl	ifving	logic f	unctions.
		d Karnaugh map and other						
logic	functions.		-	-				
		tand the usefulness of o			r, sub	tractor	, cod	e converter
		ers, multiplexers, de-multipl nd analysis of clocked seq			o diaa	rom	itata ta	bla differen
atche		nu analysis of clocked seq	uentiai circuits,	mp-mops, stat	le ulag	, ann, s	state ta	ble, uniterer
		d the analysis of various reg	sisters, shift-regis	sters, counters	and h	ow mo	ore con	plex system
	onstructed.			-				1 7
LEAI	RNING (OUTCOMES & GENERIC	C SKILLS					
		Course Learning Outcom		Bloom's				Assessmen
No.	(Upon co	mpletion of the course, the stud	lents will be able	Taxonomy	СР	CA	KP	Methods
	Rememi	to) ber and understand the num	ber system and					Т
CO1		algebra and basic propert		C1-	1		1, 2	-
	algebra	to simplify simple Boolean f	functions.	C2,P3,A1				
		anding and applying the		a a				Т
CO2	Karnaug	h map methods for tional circuits.	simplifying	C2,C3	1,2		1,3	
		the basic sequential logic c	omponents: SR					MT, F
CO3		Different Flip-Flops and the		C2-C4	1-3		1-3	
	able to a	nalyze sequential logic circu	uits.					
		and develop different digitation						Pr
CO4		counters, registers by preser	nting in front of	A2		1		
	the class	•						
CP- C	Complex I	Problems, CA-Complex Acti	vities, KP-Know	ledge Profile,	T – Te	st : PF	l – Pro	iect : 0 –
		ssignment; Pr – Presentation						
Z								
	RSE CON	ITENT						

algebra, De-Morgan's theorems, logic gates and their truth tables, canonical forms, combinational logic circuits, minimization techniques; **Simplification of Boolean Functions:** The Map Methods, Product of sum simplification, the NAND, NOR implementation, the tabulation method, the don't care implementation; **Combinational Logic:** Arithmetic and data handling logic circuits, decoders and encoders, multiplexers and de-multiplexers; **Sequential Logic:** Flip-flops, Counters, asynchronous counters, synchronous counters and their applications, Synchronous and asynchronous logic design, Design of sequential circuit, State diagram, Mealy and Moor machines, State minimizations and assignments, Pulse

mode logic, Fundamental mode design, PLA design using MSI and LSI components; **Registers, Counters and the memory Unit:** Registers and basic memory unit, Shaft registers, Ripple counters, synchronous counters.

SKILL MAPPING

No.		Course Learning	Outcome				RO					1	(PO)		
110.				1	2	3	4	5	6	7	8	9	10	11	12
			tand the number												
CO1			lgebra and basic	Н											
		ties of Boole													
	simplify simple Boolean functions.														
CO2	O2 Understanding and applying the tabulation and Karnaugh map methods				Н										
02			ational circuits.		п										
			equential logic												
			, Different Flip-												
CO3			ge and able to		Н										
		e sequential logi													
			different digital												
GO (system		ers, counters,										Ŧ		
CO4			g in front of the										L		
	class														
(H–Higl	h, M–Me	dium, L–Low)													
JUSTIF	FICATIO	ON FOR CO-P) MAPPING:												
Mapping	g	Level			Justifications										
CO1-PC	CO1-PO1 High Applying the kno					e of	dif	ferei	nt n	umh	er s	vstem	is nos	stulate	es an
00110	/1	Ingn	theorems of bo		0						•		· •		.5 un
CO2-PC)2	High	To simplify th												digita
	_	8	circuits, need t												
			best result.						I	1			11	5 0	
CO3-PC)2	High	To solve digita	al cir	cuits	, nee	ed to	h kn	ow a	and	anal	yze w	hich o	compo	onen
		-	like flip-flops, better.	enco	encoder/decoder, multiplexer, PLA, counter etc will be										
CO4-PC	D10	Low	Able to dev	elop	elop communication skill through effective class										
			presentation by	pres	presenting the design of respective digital systems .										
TEACE	HING LE	CARNING STR	ATEGY												
Teachin	g and Le	arning Activitie	3	Т	-	-	_	E	nga	gem	ent (hours	5)		_
	Face Lea									-					
	Lecture				42										
		l / Tutorial / Stu									-				
		-Centred Learni	ng								-				
Self-Dir	ected Le	-													
Non-face-to-face learning											42				
	Revision										21				
	Assessn	nent Preparation	S								21				
											2				
Formal .	Assessme										2				
Formal .	Continu	ous Assessmen									2				
Formal .	Continu	ous Assessment camination								1	3				
	Continu Final Ez									1	3 . 31				

Week	Lecture		Topics		Assessment Method	
1	Lec 1	Number System	ns, Components and codes			
	Lec 2		-			
	Lec 3					
2	Lec 4	Digital Logic, H	Boolean algebra and De-Morg	gan's		
	Lec 5	theorems				
	Lec 6					
3	Lec 7	Logic gates and	their truth tables, canonical	forms	Class Test 1	
	Lec 8					
	Lec 9	~				
4	Lec 10		logic circuits, minimization			
	Lec 11	techniques,				
5	Lec 12 Lec 13	A	data han dina la sia sinerita			
5	Lec 15 Lec 14	Antimetic and	data handling logic circuits			
	Lec 14 Lec 15					
6	Lec 15	Decoders and e	ncoders, multiplexers and de-	_	Class Test 2	
U	Lec 10 Lec 17	multiplexers	nessers, multiplexers and de-			
	Lec 17 Lec 18	manipieners				
7	Lec 19	Flip-flops, race	around problems			
	Lec 20	ггэ, 1400	· · · r			
	Lec 21					
8	Lec 22	Counters; async	chronous counters, synchrono	ous		
	Lec 23	counters and the	eir applications			
	Lec 24					
	x 25	D 11	· · ·			
9	Lec 25	Registers and b	asic memory unit			
	Lec 26					
	Lec 27				Mid Term Exam	
10	Lec 31	Synchronous ar	nd asynchronous logic design			
10	Lec 31 Lec 32	Bynemonous ar	la asynemonous logic design			
	Lec 33					
11	Lec 28	Design of seque	ential circuit: State diagram			
	Lec 29					
4.5	Lec 30		11. 0			
12	Lec 34		or machines; State minimizati	ons		
	Lec 35	and assignment	8			
13	Lec 36	Dulas modelas	ia. Fundamental mada da da da			
13	Lec 37 Lec 38	Puise mode log	ic; Fundamental mode design	1	Class Test 3	
	Lec 38 Lec 39				Class Test 3	
14	Lec 39 Lec 40	PLA design usi	ng MSI and LSI components			
14	Lec 40 Lec 41	i La cosigni usi	ing mor and Lor components			
	Lec 41 Lec 42					
SESSMEN	T STRATEG	Y				
	I DIMILO	-				
0		$\overline{C} = 1^{1}$	СО	В	looms Taxonomy	
Com	oonents	Grading	CO1			
ontinuous	Test 1-3	20%	CO1 CO2		C1, C2,P3,A1	
Continuous Assessmen	Class				C2,C3	
t (40%)	Participation	5%	CO4		C6,A2	
	Mid term	15%	% CO3 C2-C4			

Final Exam	60% CO3 C2-C4									
Total Marks	100%									
(CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)										
REFERENCE BOOKS	REFERENCE BOOKS									
1. Digital Logic and Computer 2. Digital Computer Electronic										
REFERENCE SITE										

CSE-104: Digital Logic Design Sessional

COU	COURSE INFORMATION									
	se Code		Lecture Contact H	Hours		3.00				
Cours	Course Title: Digital Logic Design SessionalCredit Hours: 1.50									
PRE-	PRE-REQUISITE									
	se Code: N									
Cours	se Title: N	il								
CUR	CURRICULUM STRUCTURE									
Outco	ome Based	Education (OBE)								
RAT	IONALE									
stude	systems. The basic building blocks of combinational and sequential circuits are introduced to enable students to develop circuit solutions to problems and to understand the design and operation of hardware models of digital systems.									
OBJI	OBJECTIVE									
1. To gain basic knowledge on logic design and the basic building blocks used in digital systems, in										
-	particular digital computers.									
2. T	To design o	lifferent types of combinational and sequer	ntial logic circuit a	and the	ir imp	lemen	tations.			
LEAI	RNING C	OUTCOMES & GENERIC SKILLS								
No.	(Upon c	Course Learning Outcome ompletion of the course, the students will be ab to)	le Bloom's Taxonomy	СР	CA	KP	Assessment Methods			
CO1		laboratory equipment by implementing a ng simple combinational digital circuits.	nd C2,A2		1,2	1	Viva, Q, R			
CO2	Analyse a given problem and apply the acquired									
CO3	characte	and the relationship between abstract log rizations and practical implementations rigning a system.			1-3	5	Viva, LT, R			
		Problems, CA-Complex Activities, KP-Kno ssignment; Pr – Presentation; R - Report; L		Γ – Tes	st ; PR	– Pro	ject ; Q –			

COURSE CONTENT

Boolean and Logic gates: Logic gates and their truth tables, canonical forms, combinational logic circuits, minimization techniques; **Combinational Circuits:** Arithmetic and data handling logic circuits, Adder,

Subtractor, Comparator decoders and encoders, multiplexers and de-multiplexers; **Sequential Circuits:** Flip-flops, race around problems; **Counters**: Asynchronous counters, synchronous counters and their applications; **Memory:** Registers and basic memory unit; **Logic Design:** Synchronous and asynchronous logic design; **Design of sequential circuit:** State diagram; State minimizations and assignments.

SKILL	MAPPING												
No.	Course Learning Outcome	PROGRAM OUTCOMES (PO)											
INO.	Course Learning Outcome	1	2	3	4	5	6	7	8	9	10	11	12
CO1	Operate laboratory equipment by implementing and simulating simple combinational digital circuits.	Н											
CO2	Analyse a given problem and apply the acquired knowledge to design both combinational and sequential circuits.		Н										
CO3	Understand the relationship between abstract logic characterizations and practical implementations while designing a system.			Н							Н		

(H – High, M- Medium, L-low)

3

JUSTIFICA	FION FOR CO-	PO MAPPING:								
Mapping	Level	Level Justifications								
CO1-PO1	High	Able to apply knowledge of different number systems, postulates and theorems of boolean algebra to simplify and design digital circuits.								
CO2-PO2	High	implementing diff								
CO3-PO3	High		and implement a complete comb g different gates and ICs.	inational/sequential						
CO3-PO10	High	Group work and individuals.	l viva will increase the comm	unication skill of						
TEACHING	LEARNING ST	RATEGY								
Teaching and	Learning Activiti	es	Engagement (hou	ırs)						
Face-to-Face	Learning									
Lect	ure		-							
Prac	tical / Tutorial / S	tudio	42							
Viva	1		-							
Self-Directed	Learning									
Repo			14							
Revi	ision		-							
Asse	essment Preparation	ons	2							
Formal Asses										
	Test		3 X 2=6							
Total			64							
TEACHING	METHODOLO	GY								
Lectures, clas	s performance, Q	uiz, Viva, Lab tests, R	leport							
COURSE SO	CHEDULE									
Week	Week Topics Remarks									
1	Verify Basic Lo	ogic Gates and Truth	Tables of the Logic Gates							
2	Combinational	Circuit (Light Your L	amp)							

Experiments Based on Truth tables and Boolean functions

Experiments Based on Truth tables and K-maps

5	Design and implementation of the Logic Circuits using K-maps (7 Segment Display)	
6	Experiments Based on Adder/Subtractor	
7	Experiment based in real life examples	
8	Experiments Based on Comparator	
9	Design and implementation of Combinational circuit using Multiplexer	
10	Design and Implementation of encoder and decoder	
11	Design and implement Flip Flop using basic gates	
12	Design and implement counters using Flip-Flops	
13	Design and implement counters, registers using Flip-Flops	
14	Experiments based on real life example	

Components	Grading	CO	Bloom's Taxonomy
Lab Test	40%	CO2	C3-C5
Lab Test		CO3	C4-C6
Quiz	20%	CO1	C2, A2
	10%	CO1	C2, A2
Viva		CO2	C3-C5
		CO3	C4-C6
Class Performance	20%	CO2	C3-C5
Class Fertormance		CO3	C4-C6
	10%	CO1	C2, A2
Report		CO2	C3-C5
		CO3	C4-C6
Total Marks	100%		

(CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

REFERENCE BOOKS

- 1. Digital Logic and Computer Design by M. Morris Manno
- 2. Digital Computer Electronics by Albert P. Malvino, Jerald A Brown

CSE-105: Structured Programming Language

COU	RSE INF	ORMATION						
	e Code	: CSE-105		Lectur	e Conta	ct Hour	s :3	3.00
Cours	e Title	: Structured Programming Language		Credit	Hours		:3	3.00
PRE-	REQUIS	ITE						
	e Code: N							
	e Title: N	-						
CUR	RICULUI	M STRUCTURE						
Outco	ome Based	Education (OBE)						
RATI	IONALE							
mecha develo covers	anism of opment. T s other im	Programming Language course is desi programming skills and develop basic he course begins with introductory concep portant topics related to structured progr tack and queue.	prog ts of s	rammin tructure	g skill d progi	s to pr amming	ogram g langu	design and age and then
OBJE	ECTIVE							
2. "	To know a	be algorithms and solve problems using con about various syntax, semantics of structure p basic programming skills with respect to	d prog	rammin		-	nent.	
LEAF	RNING O	UTCOMES & GENERIC SKILLS						
No.	(Upon o	Course Learning Outcome completion of the course, the students will be able to)		om's onomy	СР	CA	KP	Assessment Methods
CO1	compute		C1	-C3	1		1	Т
CO2	characte program	the fundamental principles, typical ristics and mechanisms of a structured ming language.	(C4	3		2	T, F, MT
CO3	program	basic programming skills with respect to design and development.	(26	1,3		5	F
CO4		the communication skill by presenting a Structured programming Language.	I	42		1		PR
		Problems, CA-Complex Activities, KP-Kno ssignment; Pr – Presentation; R - Report; F						
COU	RSE CON	ITENT						
Intro	duction 1	to computer programming: Programm						

Structured Programming Language; Number System: binary, octal, decimal and hexadecimal systems; Basic programming Structures: Data types and their memory allocation, Operators, Expressions, Basic Input/output; Control Structure: "if else", "switch", Flow Charts, Loop, Nested Loop; Arrays: Onedimensional array, Multi-dimensional array, Character array/ string; Function: Function definition, Function declaration, Function call, Recursion; Pointer: Different types of pointers, Pass pointer as arguments, Call by value vs call by reference; Dynamic Memory Allocation: Malloc, Calloc, Free, Realloc; User defined data types: Structures, Unions, Enumerations; Bitwise operations: AND, OR, NOT, XOR, Left shift, Right Shift; File I/O: Read write append from files; Header file and Preprocessors: Header files, Preprocessor; Error Handling: Exception handling; Basic Data Structures: Stack, Queue and Review

SKILL MAPPING

N		Course Learning Outcome												
N	0.	Course Learning Outcome	1	2	3	4	5	6	7	8	9	10	11	12

CO1			ithm and solve problems	н											
		computer													
			fundamental principles,												
CO2			eristics and mechanisms		Η										
			programming language. programming skills with			-									
CO3	respec		program design and			Н									
		opment.	program design and			11									
			communication skill by												
CO4			opics on Structured										L		
	progr	amming I	Language.												
(H – Hi	oh M-	Medium,	I-low)												
	*		R CO-PO MAPPING												
Марр	oing	Level				Justif	ficati	ons							
	-	xx: 1	In order to solve comple	ex er	ngine	ering	pro	blen	ns, k	now	ledg	e of	algoi	ithm	s and
CO1 – 1	POI	High	computer usage is very in				, r .		,			,	0		
			To analyse the comple												
CO2 – 1	PO2	High	fundamental principles,	typic	al ch	narac	teris	tics	and	mec	hani	sms	of a	struc	tured
			programming language. To design and develop so	1.1					• • •			. 1. 1 .			. 1
CO3 – 1	PO3	High	develop basic programmi			or co	mpi	ex er	igine	erin	g pr	oblei	ns, o	ne ne	ed to
			In order to give presenta			he se	elect	ive to	onics	s fro	m t	he co	urse	tang	nt we
CO4-PO	D10	Low	need strong communication						- F					8-	
TEACI	HING	LEARNI	NG STRATEGY												
Teachir	ng and I	Learning .	Activities								E	Engag	gemei	nt (ho	urs)
		earning													
	Lectu												42		
			orial / Studio										-		
Salf Di		nt-Centre Learning	d Learning										-		
Sen-Di			ce learning										42		
	Revis												21		
			eparations										21		
Formal															
		nuous As											2		
Total	Final	Examina	tion								_		3	1	
	ma												13	1	
TEAC	HING	METHO	DOLOGY												

Lecture and Discussion, Co-operative and Collaborative Method, Problem Based Method

COURSE SCHEDULE

Week	Lecture	Topics	Assessment Methods
1	Lec 1	Programming Concepts, Program Development	
	Lec 2	Stages, Structured Programming Language	
	Lec 3		
2	Lec 4	Number System: binary, octal, decimal and	
	Lec 5	hexadecimal systems; Data types and their	Class Test – 1
	Lec 6	memory allocation	
3	Lec 7	Operators, expressions, Basic Input/output;	
	Lec 8	Control Structure: "if else", "switch", Flow Charts	
	Lec 9		
4	Lec 10	Control Structures: Loop	Class Test – 2
	Lec 11		

	Lec 12		
5	Lec 13	Control Structures: Nested Loop	
	Lec 14		
	Lec 15		
6	Lec 16	One-dimensional array, Multi-dimensional array	
	Lec 17		
	Lec 18		
7	Lec 19	Character array/ String	
	Lec 20		
	Lec 21		
8	Lec 22	Function definition, function declaration, function	
	Lec 23	call	
	Lec 24		
9	Lec 25	Different types of pointers, pass pointer as	
	Lec 26	arguments, call by value vs call by reference	Mid Term Exam
	Lec 27		
10	Lec 31	Dynamic Memory Allocation: Malloc, calloc,	
	Lec 32	realloc, free	
	Lec 33		
11	Lec 28	Recursion	
	Lec 29		
	Lec 30		
12	Lec 34	Structures, unions, enumerations. File I/O; Header	
	Lec 35	files, Preprocessor	
	Lec 36		Class Test – 3
13	Lec 37	Error Handling; Bitwise Operations	Class Test = 3
	Lec 38		
	Lec 39		
14	Lec 40	Stack, Queue and Review	
	Lec 41		
	Lec 42		

Comr	oonents	Grading	СО	Bloom's Taxonomy
1			CO1	C1-C3
Continuous	Test 1-3	20%	CO2	C4
Assessment (40%)	Assessment Class		CO4	A2
	Mid term	15%	CO2	C4
Final	Exam	60%	CO2	C4
Filla	Exam	00%	CO3	C6
Total	Marks	100%		

(CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain) REFERENCE BOOKS

1. Teach Yourself C (3rd Edition) by Herbert Schidlt

2. Programming in Ansi C (6th Edition) by E Balagurusamy

3. C: The Complete Reference (4th Edition) by Herbert Schildt

4. C Programming Language (2nd Edition) by Dennis M. Ritche

CSE-106: Structured Programming Language Sessional

COUR	SE INFORMATION												
Course	Code : CSE-106				Lec	ture	Cont	act I	Hour	s :	3.00		
Course	Title : Structured Programming Langua	ge Se	essic	onal	Cree	dit H	ours			:	1.50		
PRE-R	EQUISITE												
	Code: Nil Title: Nil												
	ICULUM STRUCTURE												
Outcon	ne Based Education (OBE)												
RATIC	DNALE												
fundam program	tructured Programming Language Session tental principles, mechanism of programm n design and development. The lab begin nming language and then covers other impor	ing s wi	skil th p	ls an practi	id de cing	evelc intr	op ba oduc	asic tory	pro cor	gram icept	ming s of	skil struc	ls to tured
OBJE													
	learn basic ideas of programming languages	•		_			_			_			
	learn how to program with C.	a a 1-		1	+	a1a4		to			n a 1.		
3. To	learn how to think about the problems, their	solu	tions	s and	tran	siatii	1g 1t	to pi	rogra	amm	ng la	ngua	ge.
LEAR	NING OUTCOMES & GENERIC SKILL	S											
No.	Course Learning Outcome (Upon completion of the course, the students wi able to)	ill be	,	Bloo Taxo	om's nom		СР	C	CA	KP		ssess Meth	
COI	Discuss algorithms and solve problems using computers.	5		C1	-C3		1		3	5	ł	F, T, A	ASG
CO2	Analyze the fundamental principles, typical characteristics and mechanisms of a structure programming language practically.	ed		C	24		3			7	F	, T, A Q	
CO3	Apply practical knowledge to develop basic programming skills with respect to program design and development.			C3,	, C6		1,3		3	7		AS	G
	omplex Problems, CA-Complex Activities, K ASG – Assignment; Pr – Presentation; R - Re											; Q –	
COUR	SE CONTENT												
allocati problem dimens Functio problem Dynam defined	orogramming Structures: Mathematical pro on, Operators, Expressions, Basic Input/out ns on "if else", "switch", Flow Charts, Lo- ional array, Multi-dimensional array, Cha on, Parameter Passing Convention; Recursi ns on Different types of pointers, Pass poin ic Memory Allocation: Dynamically alloc I data types: Practice problems on Structure	out, I op, N racte on: I nter ate n s, U	Data Nesto r ar Prac as a nem nion	type ed Lo ray/ tice rgum ory u s, En	con cop; strin prob ients ising ume	versi Arr ng; F lems , Cal g Mai ration	ion; (ays: func on f l by lloc, ns; F	Con Pra tion recu val Cal `ile I	trol ctice Pr rsion ue v loc, [/O:	Stru e pro actic n; Po rs cal Free, Read	ctur blem e pro ointe i by Rea l, wri	e: Pra s on oblem :: Pra refere lloc; te, ap	One- one- one- one- one- one- one- one- o
in file; handlin	Header Files and Preprocessors: Heag;	der	files	, Pre	eproc	cesso	r; E	rro	r H	andli	ing:	Exce	ption
	MAPPING												
No.	Course Learning Outcome			PI	ROG	RAN	1 OL	JTC		ES (F	PO)		
	Discuss algorithms and solve problems	1	2	3	4	5	6	7	8	9	10	11	12
CO1	using computers.									Н			
CO2	Analyze the fundamental principles, typical characteristics and mechanisms						Н						
	of a structured programming language.												

CO3	basic	programm	knowledge to develop H ning skills with respect to H
(H – Hi	gh, M-	- Medium,	L-low)
	-		R CO-PO MAPPING
Mappi	ng	Level	Justifications
	8		In order to function effectively as a member or leader of a team, one needs to
CO1 – I	PO9	High	discuss algorithms with team members in order to solve problems using computers.
CO2 – H	PO6	High	In order to apply reasoning and take responsibilities relevant to the professional engineering practice, one needs to analyse the fundamental principles, typical characteristics and mechanisms of a structured programming language.
CO3 – I	206	High	In order to apply reasoning and take responsibilities relevant to the professional engineering practice, Apply practical knowledge to develop basic programming skills with respect to program design and development
TEACH	HING	LEARNI	NG STRATEGY
		Learning .	Activities Engagement (hours)
	Lectu Pract Stude	tical / Tuto ent-Centre	rial / Studio 42 d Learning -
	Non- Revis Asse	sion ssment Pro	ce learning
Formal	Cont	sment inuous As Examina	ion 3
Total			49
TEACH	HING	METHO	DOLOGY
Lecture	and D	viscussion,	Co-operative and Collaborative Method, Problem Based Method
COURS	SE SC	HEDULE	
We	ek	Lab	Topics
-	1	Lab 1	Mathematical problems using printf, scanf
2	2	Lab 2	Introduction to data types, mathematical problems using data types, data type conversion
	3	Lab 3	Practice Problems on "if else", "else if", "switch"
	4	Lab 4	Practice Problems on Nested "if else"
4	5	Lab 5	Practice Problems on Problem on Loop- For, Do While, Nested Loop
	6	Lab 6	Practice Problems on Nested Loop, One-dimensional array
	7	Lab 7	Practice Problems on Multi-dimensional array
8	8	Lab 8	Practice Problems on Nested Loop, Character array/String
9	9	Lab 9	Practice Problems on Function, Parameter Passing Convention
1	0	Lab 10	Practice problems on Different types of pointers, Pass pointer as arguments, Dynamically allocate memory using calloc, malloc, free, realloc
1	1	Lab 11	Practice problem on Recursion
1	2	Lab 12	
1	3	Lab 13	
1	4	Lab 14	

Comp	oonents	Grading	СО	Bloom's Taxonomy
	Lab Test	20%	CO1	C1-C3
Continuous	Lab Test	20%	CO2	C4
Assessment (40%)	Class Participation	5%	CO1	C1-C3
	Assignment	15%	CO3	C3, C6
Onling	Test – 1	200/	CO1	C1-C3
Online	1 est - 1	20%	CO2	C4
Online	Test 0	2004	CO1	C1-C3
Online	Test – 2	20%	CO2	C4
Viva	/ Quiz	20%	CO2	C4
Total	Marks	100%		÷

(CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

REFERENCE BOOKS

- 1. Teach Yourself C (3rd Edition) by Herbert Schidlt
- 2. Programming in Ansi C (6th Edition) by E Balagurusamy
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REFERENCE SITE

EECE-169: Electronic Devices and Circuits

COURSE INFO	ORMATION		
Course Code	: EECE-169	Lecture Contact Hours	: 3.00
Course Title	: Electronic Devices and Circuits	Credit Hours	: 3.00
PRE-REQUISI	ТЕ		
Course Code: El	ECE 163		
Course Title: Ele	ectrical Circuit Analysis		
CURRICULUM	A STRUCTURE		
Outcome Based	Education (OBE)		
RATIONALE			
the concepts, pri It is targeted to	lassified under the applied technology graciples and working of basic electronic of provide a basic foundation for technologial electronics as well as instrumentation	components and their implementation gy areas like electronics devices, co	s on circuits. mmunication

OBJECTIVE

- 1. To be able to understand the basics of electronic devices like diode, Transistor, MOSFET etc and their applications.
- 2. To be able to differentiate between the working principal of different electronic components.
- 3. To become skilled at designing different electronic circuits like rectifier, amplifiers etc.
- 4. To apply theoretical knowledge for solving complex mathematical problems.

LEAI	RNING OUTCOMES & GENERIC SKILLS					
No.	Course Learning Outcome (Upon completion of the course, the students will be able to)	Bloom's Taxonomy	СР	CA	KP	Assessment Methods
CO1	Explain the basic operation of diodes, BJT, MOSFET, JFET, Op-Amp, oscillators, TRIAC, DIAC and their characteristics to solve engineering problems.	C2			1,3	T, MT
CO2	Compare the characteristics of different types of diodes, transistors, OP-Amp and oscillators.	C3			1	T, MT, F
CO3	Solve various mathematical problems to meet specific design criteria.	C3			2,5	F, ASC
CO4	Apply the knowledge of semiconductor diodes, BJT, MOSFET, JFET, Op-Amp etc to solve real life engineering problems such as rectification, switching and amplification.	C5			3	F

(CP- Complex Problems, CA-Complex Activities, KP-Knowledge Profile, T – Test; PR – Project; Q – Quiz; ASG – Assignment; Pr – Presentation; R - Report; F – Final Exam, MT- Mid Term Exam)

COURSE CONTENT

Introduction to semiconductors: p type and n type semiconductors, p-n junction diode characteristics. **Diode applications:** Half and full wave rectifiers, clipping and clamping circuits, regulated power supply using Zener diode.

Bipolar Junction Transistor (BJT): Principle of operation, I-V characteristics, transistor circuit configurations (CE, CB, CC), BJT biasing, load lines, BJTs at low frequencies, hybrid model- h parameters, simplified hybrid model, small signal analysis of single and multi-stage amplifiers, frequency response of BJT amplifiers.

Field Effect Transistor (FET): Principle of operation of JFET and MOSFET, depletion and enhancement type NMOS and PMOS, biasing of FETs, low and high frequency models of FETs, switching circuits using FETs, introduction to CMOS.

Operational Amplifiers (OP-AMPS): Linear applications of OPAMPs, gain, input and output impedances; active filters, frequency response and noise.

Introduction to oscillators SCR, TRIAC, DIAC and UJT: Characteristics and applications, Introduction to IC fabrication processes.

2	3	4	5	6	7	8	9	10	11	12
Н										
	Н									
	М									
		Н	H	H	H	H	H	H	H	H

SKILL MAPPING

USTIFI	CATION F	OR CO-PO MAPPING			
Mapping	Level	Justifications			
		Basic of fundamental engineering relates to the basi	c operations of var		
CO1-PO1	High	electronic components.	1		
	II. 1	To identify the problems with research literature and res	aching a solution wil		
CO2-PO2	High	needed to create comparison among some of their workin	g principle.		
CO3-PO3	High	To solve various mathematical problems to meet sp	ecific criteria will		
.05-F05	High	designing and developing solutions.			
CO4-PO3	Medium	The skill of designing and developing solutions is needed	d to apply the knowle		
		and solve real life problems.			
		NING STRATEGY	F		
		g Activities	Engagement (hour		
	ace Learnin	5			
	Lecture		42		
		utorial / Studio	-		
		tred Learning	-		
	ted Learnin				
		face learning	42		
	Revision		21		
		Preparations	21		
	ssessment		2		
Continuous Assessment					
	Final Exami	nation	3		
`otal	_		131		
EACHI	NG METH	ODOLOGY			
ecture ar	d Discussio	n, Co-operative and Collaborative Method, Problem Based M	lethod		
COURSE	SCHEDU	LE			
Week	Lecture	Topics	Assessme Method		
	Lec 1	Basic ideas and example about Electronics			
1	Lec 1 Lec 2	comparison between electronic and electrical equipment and	l their		
1	Lec 2 Lec 3	application			
	Ltt J	Introduction to semiconductor devices and its classifications	3		
	Lec 4	P-type and N-type materials and doping			
2	Lec 5	Semiconductor diode and its band diagram	Class Tes		
	Lec 6	Biasing of semiconductor diodes			
	Lec 7	I-V characteristics of diode and equivalent circuit of diodes,			
3	Lec 8	Shockley's equation			
2	Lec 9	Zener diode and related math			
		Applications of diode			
	Lec 10	Diode rectifiers			
4	Lec 11	Ripple factor and related mathematical problems.			
	Lec 12	Clipper circuit and related problems			
	Lec 13	Clamper circuit and related problems			
5	Lec 14	Diodes in voltage multiplier circuit			
	Lec 15	Voltage doubler, Tripler and quadrupler circuit			
T	Lec 16	Introduction to BJT and construction			
6	Lec 17	Working principle, operating regions of BJT			
	Lec 18	BJT configurations and characteristics curves			
		DIT Dissing singuits DIT as an anglifian bissing the DIT f	or Class Tes		
	L ao 10	BJT Biasing circuits, BJT as an amplifier, biasing the BJT fe	01 01400 100		
7	Lec 19	discrete circuits			
7	Lec 20				
7		discrete circuits			
7	Lec 20	discrete circuits Small signal equivalent circuit models BJT as a switch and mathematical problems	nd FET		
7	Lec 20 Lec 21	discrete circuits Small signal equivalent circuit models			

Mathematical problems related to JFET

Lec 24

	Lec 25	Small signal analysis of JFET			
9	Lec 26	Mathematical problems			
	Lec 27	Mathematical problems			
	Lec 28 Introduction to MOSFET, Construction and operating principle				
10	Lec 29	Types and Characteristics curve of MOSFET			
	Lec 30	Biasing of MOSFET and related problems			
		Threshold voltage, Body effect, current-voltage characteristics of			
	Lec 31	enhancement MOSFET			
11	Lec 32	Single-stage MOSFET, multi stage MOSFET and application of			
	Lec 33	MOSFET as switch.			
		Introduction to CMOS circuits			
	Lec 34	Basics of Operational Amplifier.			
12	Lec 35	Different types of operational amplifier and introduction to Filters			
	Lec 36	Mathematical problems related to op-amp			
	Lec 37	Basic Principle of oscillation			
13	Lec 38	Different type of oscillators	Class Test 3		
	Lec 39	Mathematical problems			
	Lec 40	Concepts of negative feedback			
14	Lec 41	Characteristics and applications of SCR, TRIAC, DIAC and UJT			
	Lec 42	Review class			

Com	ponents	Grading	СО	Blooms Taxonomy
	Test 1-3	20%	CO1	C2
<u>C</u>	Test 1-5	20%	CO2	C3
Continuous Assessment (40%)	Class Participation	5%		
(4070)	Mid term	15%	CO1	C2
			CO2	C3
			CO2	C3
Final	Exam	60%	CO3	C3
			CO4	C5
Total	Marks	100%		

(CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

REFERENCE BOOKS

- 1. Electronic Devices and Circuit Theory -Robert L. Boylestad and Louis Nashelsky
- 2. Electronic Principles Albert P. Malvino.
- 3. Microelectronics Circuits-Adel S. Sedra & Keneth C. Smith-Oxford University Press
- 4. Operation Amplifiers and Linear Integrated Circuits-Robert F. Coughlin-Prentice Hall of India Private Limited

EECE-170: Electronic Devices and Circuits Sessional

COU	RSE INF	ORMATION							
					Lectu	ire Cor	tact Ho	urs : 3	.00 hrs in
	e Code e Title	: EECE-170 : Electronic Devices and Circuits	s Sessio	onal	Credi	it Hour	S	alt	ernative week .75
PRE-	REQUIS	ITE							
	e Code: E								
		ectronic Devices and Circuits							
		M STRUCTURE							
Outco	me Based	Education (OBE)							
	IONALE								
electro device with t	onic composed and circ these basic onic device	ces and Circuits Sessional course onents and to examine the charac uits by hand-held experiments and c components, students will be s to perform different mathematic	cteristic d comp able	es an outer to aj	nd worki aided si pply the	ing of imulati e achie	these co on tool. eved kn	omponen After b owledge	ts in electronic eing acquainted to implement
	ECTIVE								
pe er 3. To el 4. To pr	erform dit ngineering o introduc lectronic ci o augmen rojects and	e the students with the use of cir- rcuits and thereby enrich their ski t student's creative thinking, co presentations.	and cuit sir lls in d ommur	oscil nula esigi nicati	llator c tion soft ning vari	ircuits tware I ious co	for ap PSpice S mplex e	plicatior Schemati electronic	is in real life cs in analyzing c circuits.
	RNING (OUTCOMES & GENERIC S	KILL				1	1	-
No.	(Upon co	Course Learning Outcome mpletion of the course, the students w able to)	vill be		loom's xonomy	СР	CA	KP	Assessment Methods
CO1	types of	to analyze the characteristics of v active and passive electronic compo tructing simple circuits using	onents		P2			3	R,Q,T
CO2	perform	to construct basic electronic devic different mathematical operation coscillator circuits.			P4			2, 3, 5, 6	R,Q,T
CO3		to construct an electronic devic on in real life adapting the de ents.			Р5	1		3, 5, 6	PR, Pr
		roblems, CA-Complex Activities, signment; Pr – Presentation; R - R							
	RSE CO								
		idents will perform experiments to different hardware equipment and					ories an	d conce	ots learned in
SKIL	LL MAPF	ING							
No.		Course Outcome	1 1	<u> </u>	1 1	1	1 1	OMES (P	<i></i>
CO1	Be able various electror	to analyze the characteristics of types of active and passive tic components by constructing circuits using this element.		2	3 4	<u>5</u> 6 H	7 8	9 1	0 11 12

				<u> </u>	1		-						1	-
CO2			struct basic electronic											
	devices	to	perform different				Н							
			perations and construct											
CO 2	oscillator													
CO3			onstruct an electronic											
		for application in real life									Н			
		the desired requirements using									11			
	both hard	rdware and simulation tools.												
	gh, M- N													
JUSTI	FICATIO	ON FO	OR CO-PO MAPPINO	Ĵ										
Mappir	ng Le	vel			Jı	ıstific	ation	S						
CO1-PO	5 Hi	gh ŀ	Knowledge of the engi	ineerir	ng fi	undam	entals	s is	nee	eded	to	cons	truct	simple
		e	electronic circuits using v	arious	type	es of el	ectro	nic c	com	onei	nts (d	diode	, BJT	, JFET
		а	and to analyze the charac	cteristi	cs o	f these	com	pone	ents	to ci	reate	, sele	ect and	d apply
			ppropriate techniques.											
CO2-PO	95 Hi		Modern simulation tools					ing	the	oper	atior	n of c	oscilla	tor and
			nathematical operations p											
CO3-PO	9 Hi		While constructing an el											
			lesired requirements will										ual, a	nd as a
		n	nember or leader in diver	se tea	ms, a	ind in	multi	discl	ipliı	hary s	settii	ıgs.		
TEACH	HING LI	EARN	ING STRATEGY											
	g and Lear		ctivities								Eng	agem	ent (h	ours)
Face-to-	Face Lear	ning												
	Lecture												7	
	Experime												14	
Self-Dire	ected Lean													
			Lab Report										15	
	Preparati												2	
	Preparati												2	
			resentation										5	
	00		Group Projects										12	
Formal A	Assessmen													
	Continuo		essment										10	
	Final Qu	1Z								_			1	
Total												(58	
														Deciao
TEACH Lecture 1 Based M	followed		tical experiments and dis	scussio	on, C	o-ope	rative	and	Col	labo	rativ	e Me	thod,	
Lecture f Based M	followed	by prac	tical experiments and dis	scussio	on, C	o-oper	rative	and	Col	labo	rativ	e Me	thod,	
Lecture 1 Based M COURS Week	followed Iethod SE SCH	by prac EDUL Topic	tical experiments and dis E s			-								
Lecture 1 Based M COURS	followed Iethod SE SCH	by prac EDUL Topic Study	tical experiments and dis E s of Diode Characteristic			-								
Lecture 1 Based M COURS Week Week	followed i Iethod SE SCH	by prac EDUL Topic Study PSpice	tical experiments and dis E s of Diode Characteristic e Schematics	cs usi	ng F	Hardwa	are in	nple	men	tatio	n an	ıd sir	nulati	on in
Lecture 1 Based M COURS Week	followed i Iethod SE SCH	by prac EDUL Topic Study PSpice Implei	tical experiments and dis E s of Diode Characteristic e Schematics mentation of Diode Rect	cs usi ifier C	ng H Lircui	Hardwa	are in	nple:	men eir re	tation	n an	ıd sir	nulati	on in
Lecture f Based M COURS Week Week 1 Week 2	followed Iethod SE SCH 1 2	by prac EDUL Topic Study PSpice Impler using	tical experiments and dis E s of Diode Characteristic e Schematics mentation of Diode Rect Hardware implementatio	cs usi ifier C n and	ng H lircui	Hardwa its and lation	are ir study	nple y the pice	men eir re Sch	tation ectific	n an catio tics.	d sir	nulati aracte	on in ristics
Lecture 1 Based M COURS Week Week	followed Iethod SE SCH 1 2	by prac EDUL Topic Study PSpice Impler using Constr	tical experiments and dis E s of Diode Characteristic e Schematics mentation of Diode Rect Hardware implementatio ruction of n-p-n CE (co	cs usi ifier C n and mmor	ng H Circui simu	Hardwa Its and lation itter) a	are ir study in PS and C	nple y the pice	men eir re Sch	tation ectific nemation mon	n an catio tics. base	id sin on cha	nulati aracter	on in ristics r and
Lecture f Based M COURS Week Week 1 Week 2	followed Iethod SE SCH 1 2	by prac EDUL Topic Study PSpice Impler using Constr detern	tical experiments and dis E s of Diode Characteristic e Schematics mentation of Diode Rect Hardware implementatio ruction of n-p-n CE (co nine their input and outj	cs usi ifier C n and mmor	ng H Circui simu	Hardwa Its and lation itter) a	are ir study in PS and C	nple y the pice	men eir re Sch	tation ectific nemation mon	n an catio tics. base	id sin on cha	nulati aracter	on in ristics r and
Lecture f Based M COURS Week Week 1 Week 2 Week 2	followed fol	by prac EDUL Topic Study PSpice Implet using Constr determ simula	tical experiments and dis E s of Diode Characteristic e Schematics mentation of Diode Rect Hardware implementatio ruction of n-p-n CE (co nine their input and outp ation in PSpice Schematic	cs usi ifier C n and mmor out ch c.	ng H Sircui simu n em aract	Hardwa its and lation itter) a eristic	are ir study in PS and C s usin	nple y the pice B (on ng H	men eir re Sch com Iard	tation ectific mon ware	n an catio tics. base imp	d sin on cha e) tra leme	nulati aracter nsisto ntatio	on in ristics r and n and
Lecture f Based M COURS Week Week 1 Week 2	followed fol	by prac EDUL Topic Study PSpice Impler using Constri determ simula Study	tical experiments and dis E s of Diode Characteristic e Schematics mentation of Diode Rect Hardware implementatio ruction of n-p-n CE (co nine their input and outp ation in PSpice Schematic of Characteristics of Ju	cs usi ifier C <u>n and</u> mmor put ch c. unction	ng H Sircui simu i em aract	Hardwa Its and lation itter) a eristic Id Eff	are in studiin PS and C s usin ect T	nple y the pice B (on ng H	men eir re Sch com Iard	tation ectific mon ware	n an catio tics. base imp	d sin on cha e) tra leme	nulati aracter nsisto ntatio	on in ristics r and n and
Lecture f Based M COURS Week Week 2 Week 2 Week 2	followed followed followed followed followed for the sector of the secto	by prac EDUL Study PSpice Impler using Constri determ simula Study impler	tical experiments and dis E s of Diode Characteristic e Schematics mentation of Diode Rect Hardware implementatio ruction of n-p-n CE (co nine their input and outj ation in PSpice Schematic of Characteristics of Ju mentation and simulation	cs usi ifier C n and mmor put ch c. inction in PS	ng H Sircui simu aract n Fie pice	Hardwa its and lation itter) a eristic ld Eff	are ir study in PS and C s usin ect T natic.	nple: y the pice B ((ng H rans	men eir re Sch com Iard	tation ectific mon ware • (JF)	n an catio tics. base imp ET)	d sin on cha e) tra leme using	nulati aracter nsisto ntatio g Haro	on in ristics r and n and dware
Lecture f Based M COURS Week Week Week 2 Week 2	followed followed followed followed followed for the sector of the secto	by prac EDUL Study PSpice Impler using Constr detern simula Study impler Mathe	tical experiments and dis E s of Diode Characteristic e Schematics mentation of Diode Rect Hardware implementatio ruction of n-p-n CE (co nine their input and outj ation in PSpice Schematic of Characteristics of Ju mentation and simulation ematical operations usin	cs usi ifier C n and mmor put ch c. inctior in PS ag OP	ng F Sircui simu aract aract pice -AM	Hardwa its and lation itter) a eristic ld Eff Schen IP (Ad	are in study in PS and C s usin ect T natic. Ider	nple: y the pice B ((ng H rans	men eir re Sch com Iard	tation ectific mon ware • (JF)	n an catio tics. base imp ET)	d sin on cha e) tra leme using	nulati aracter nsisto ntatio g Haro	on in ristics r and n and dware
Lecture f Based M COURS Week 1 Week 2 Week 2 Week 2	followed Iethod SE SCH 1 2 3 4 5	by prac EDUL Study PSpice Impler using Constr detern simula Study impler Mathe impler	tical experiments and dis E s of Diode Characteristic e Schematics mentation of Diode Rect Hardware implementatio ruction of n-p-n CE (co nine their input and out ₁ ation in PSpice Schematic of Characteristics of Ju mentation and simulation matical operations usin mentation and simulation	cs usi ifier C n and mmor put ch c. in PS ig OP in PS	ng F Circui simu aract r Fie pice pice	Hardwa Its and Iation itter) a ceristic Id Eff Schen IP (Ao Schen	are ir study in PS and C s usin ect T natic. Ider natic.	nple: y the pice B ((ng H rans and	men Sch com Iard ¹ istor	tation ectific email mon ware · (JF)	n an catio tics. base imp ET) ET)	d sin on cha e) tra leme using using	nulati aracter nsisto ntatio g Haro g haro	on in ristics r and n and dware dware
Lecture f Based M COURS Week Week 2 Week 2 Week 2	followed Iethod SE SCH 1 2 3 4 5	by prac EDUL Topic Study PSpice Impler using 1 Constr determ simula Study impler Mathe impler	tical experiments and dis E s of Diode Characteristic e Schematics mentation of Diode Rect Hardware implementatio ruction of n-p-n CE (co nine their input and outj ation in PSpice Schematic of Characteristics of Ju mentation and simulation ematical operations usin	cs usi ifier C <u>n and</u> mmor out ch c. in PS in PS ng OP in PS ng C	ng I Sircui simu aract a Fie pice pice P-AM	Hardwa its and lation itter) a ceristic ld Eff Schen IP (Ad Schen MP (are in study in PS and C s usin ect T natic. dder natic. Integn	nple y the pice B (4 ng H rans and	men Sch com Iard istor Sul	tation ectific mon ware · (JF) btract	n an catio tics. base imp ET) ET)	d sin on cha e) tra leme using using	nulati aracter nsisto ntatio g Haro g haro	on in ristics r and n and dware

				
Comp	oonents	Grading	CO	Blooms Taxonomy
	Lab	rticipation 20% nd Report Labtest- 30%	CO1	P4, C4
Continuous	participation and Report		CO2	P1, P4
Assessment	Labtest-		CO1	P4, C4
(40%)	1,Labtest-2		CO2	P1, P4
	Project and	25%	CO3	P5, P6
	Presentation	23%	CO4	A5
Lab	Ouia	25%	CO1	P4, C4
Lao	Quiz	23%	CO2	P1, P4
Total	Total Marks			

(CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

REFERENCE BOOKS

1. Electronic Devices and Circuit Theory -Robert L. Boylestad and Louis Nashelsky

- 2. Electronic Principles Albert P. Malvino.
- 3. Micro Electronics Circuits-Adel S. Sedra & Keneth C. Smith-Oxford University Press
- 4. Operation Amplifiers and Linear Integrated Circuits-Robert F. Coughlin-Prentice Hall of India Private Limited

REFERENCE SITE

LANG-102: Communicative English - 1

COURSE INFORMATION							
Course Code	: LANG-102	Lecture Contact Hours	: 3.00				
Course Title	: Communicative English - 1	Credit Hours : 1.50					
PRE-REQUISITE							
Course Code:	Nil						
Course Title: Nil							
CURRICULUM STRUCTURE							
Outcome Base	ed Education (OBE)						
RATIONAL	Æ						
students. The within various	as mainly been designed to improve course includes instructions and expe s real life situations, formal and inform native, persuasive and interactive.	rience in speech preparatio	n and speech delivery				

OBJECTIVE

- 1. To develop English language skills to communicate effectively and professionally.
- 2. To strengthen students' presentation skills.
- 3. To develop competency in academic reading and writing.

LEA	RNING OUTCOMES & GENERIC SKI	LLS				
No.	Course Learning Outcome (Upon completion of the course, the students will be able to)	Bloom's Taxonomy	СР	CA	KP	Assessment Methods
CO1	Understand the techniques of academic reading and become familiar with technical terms and develop competency in academic reading, preparing report written communication/ presentation.	C2	1	-	1	ASG, Q
CO2	Analyze any problem critically, analyze and interpret data and synthesize information to provide valid conclusions.	C3	-	-	1	ASG/ Pr, Q
CO3	Communicate effectively within the shortest possible time to present their reports and academic writings	C4	-	-	1	Pr, Q
CO4	Apply the techniques to find out the main points of any long article within a very limited time as well as know the techniques of any effective writing.	C5	-	-	1	ASG/ Pr,Q

 $(CP-\ Complex\ Problems,\ CA-\ Complex\ Activities,\ KP-\ Knowledge\ Profile, T-\ Test\ ;\ PR-\ Project\ ;\ Q-\ Quiz;\ ASG-\ Assignment;\ Pr-\ Presentation;\ R-\ Report;\ F-\ Final\ Exam,\ MT-\ Mid\ Term\ Exam)$

COURSE CONTENT

Speaking: Introduction to Language: Introducing basic skills of language, English for Science and Technology, Self-introduction and introducing others: How a speaker should introduce himself to any stranger / unknown person / a crowd, Asking and giving directions, Discussing everyday routines and habits, Making requests /offers /invitations /excuses /apologies/complaints, Describing personality, discussing and making plans(for a holiday or an outing to the cinema), Describing pictures / any incident / event, Practicing storytelling, Narrating personal experiences/Anecdotes, Telephone conversations (role play in group or pair), Situational talks / dialogues: Practicing different professional conversation (role play of doctor-patient conversation, teacher -student conversation); Listening: Listening and understanding: Listening, note taking and answering questions; Difference between different accents: British and American accents; Documentaries from BBC and CNN will be shown and students will try to understand; Listening to short conversations between two persons/more than two; Reading: Reading techniques: scanning, skimming, predicting, inference; Reading Techniques: analysis, summarizing and interpretation of texts; Writing: Introductory discussion on writing, prewriting, drafting; Topic sentence, paragraph development, paragraph structure, describing a person/scene/picture, narrating an event Paragraph writing, Compare-contrast and cause- effect paragraph.

SKILL MAPPING

No.	Course Learning Outcours	PROGRAM OUTCOMES (PO)											
INO.	Course Learning Outcome	1	2	3	4	5	6	7	8	9	10	11	12
CO1	Understand the techniques of academic reading and become familiar with technical terms and develop competency in academic reading, preparing report written communication/ presentation.	Н											
CO2	Analyze any problem critically, analyze and interpret data and synthesize information to provide valid conclusions.	Н											
CO3	Communicate effectively within the shortest possible time to present their reports and academic writings										М		

CO4	main a ve	n points of ry limited technique	nniques to find out the any long article within time as well as know s of any effective	L					
(H – Hi	igh, M	- Medium,	L-low)						
			OR CO-PO MAPPING						
Mappi	ing	Level	Justifications						
CO1-PC	D1	High	In order to listen, understand, and learn the techniques of note taking and answering questions, the knowledge of mathematics, natural science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems is to applied.						
CO2-PO	D1	High	In order to listen, understand, and learn the techniques of note taking and answering questions, identification, formulation, research literature and analysis of complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences are required.						
CO3-PO	D10	Medium	In order to communicate effectively within the shortest possible time to present their ideas and opinions, it is required to communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.						
CO4-PO	D10	Low	In order to develop competency in reading, writing and oral communication/presentation, it is required to communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.						
TEAC	HIN	G LEARN	VING STRATEGY						
Teachin	ng and	Learning	Activities	Engageme	ent (hou	ırs)			
Face-to-		Learning							
	Lect				-				
			orial / Studio d Learning	4					
0.10 5			a Leanning						
Self-Di	irected Learning								
Self-Di			ce learning	-	-				
Self-Di	Non Revi	-face-to-fa		-					
	Non Revi Asse	-face-to-fac ision essment Pro		-	-				
Self-Dir Formal	Non Revi Asse	-face-to-face-to-face fision essment Pressment	eparations	-	-				
	Non Revi Asses Con	-face-to-fac ision essment Pro	eparations	-	- - 1				
	Non Revi Asses Con	face-to-face-to-face ision essment Pro- ssment tinuous As	eparations		-				
Formal	Non Revi Asses Asses Con Fina	l-face-to-fa ision essment Pro- sment tinuous As Il Examinat	eparations		- - 1				
Formal Total TEAC	Non Revi Asse Asses Con Fina	l-face-to-fa ision essment Pro ssment tinuous As Il Examinat G METH	eparations sessment tion	8	- - 1				
Formal Total TEAC Lecture	Non Revi Asses Con Fina	i-face-to-fac ision essment Pro- ssment tinuous As il Examinat G METH Discussion,	eparations sessment tion ODOLOGY Co-operative and Collaborative Method, Problem Based	8	- - 1				
Formal Total TEAC Lecture	Non Revi Asses Con Fina HIN and I RSE S	I-face-to-fac ision essment Pro- ssment tinuous As I Examinat G METH Discussion, CHEDU	eparations sessment tion ODOLOGY Co-operative and Collaborative Method, Problem Based LE	8	- - 1				
Formal Total TEAC Lecture	Non Revi Asses Con Fina HIN and I RSE S	i-face-to-fac ision essment Pro- ssment tinuous As il Examinat G METH Discussion,	eparations sessment tion ODOLOGY Co-operative and Collaborative Method, Problem Based	Method	- - 1				
Formal Total TEAC Lecture COUR Wee	Non Revi Asses Con Fina HIN and I RSE S	I-face-to-fac ision essment Pro- ssment tinuous As I Examinat G METH Discussion, CHEDUI Lab	eparations sessment tion ODOLOGY Co-operative and Collaborative Method, Problem Based LE Topic Introduction to Language, Self-introduction and introdu	Method cing others	4				
Formal Total TEAC Lecture COUR 1	Non Revi Asses Con Fina HIN and I RSE S	I-face-to-fac ision essment Pro- ssment tinuous As il Examinat G METH Discussion, CHEDU Lab Lab 1	eparations sessment tion ODOLOGY Co-operative and Collaborative Method, Problem Based LE Topic Introduction to Language, Self-introduction and introdu Self-introduction and introducing others Asking and answering questions, Expressing likings	Method cing others and dislikin habits,	4				

		outing to the cinema), Describing pictures / any incident / event
5	Lab 5	Practicing storytelling, Narrating personal experiences/Anecdotes
6	Lab 6	Telephone conversations (role play in group or pair), Situational talks / dialogues
7	7 Lab 7 Listening and understanding: Listening, note taking and answering question	
8	Lab 8	British and American accents, Documentaries from BBC and CNN will be
0	Lab o	shown and students will try to understand
9	Lab 9	Listening to short conversations between two persons/more than two
10	Lab 10	Reading techniques: scanning, skimming, predicting, inference;
11	Lab 11	Reading Techniques: analysis, summarizing and interpretation of texts
12	Lab 12	Introductory discussion on writing, prewriting, drafting
13	Lab 13	Topic sentence, paragraph development, paragraph structure, describing a
15	La0 15	person/scene/picture, narrating an event
14	Lab 14	Paragraph writing, Compare-contrast and cause- effect paragraph

Com	ponents	Grading	СО	Blooms Taxonomy
Gardin	Class Participation	20%	CO1, CO2, CO4	C2, C3, C5
Continuous Assessment	Reading Test	15%	CO1, CO2, CO4	C2, C3,C5
(40%)	Listening Test	15%	CO1, CO3, CO4	C2,C4, C5
(40%)	Public Speaking	20%	CO2, CO3, CO4	C3-C5
Group P	resentation	30%	CO1-CO4	C2-C5
Tota	l Marks	100%		

(CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

REFERENCE BOOKS

1. Langan, J. (2005). College Writing Skills with Readings (6th). McGraw-Hill Publication

- 2. Interactions 1 (Reading), John Langan, Latest edition, McGraw-Hill Publication
- 3. Jones, L. (1981). Functions of English. (Student's Book, 2nd) Melbourne, Australia: Cambridge University Press.
- 4. Dixon, R.J. (1987). Complete course in English. (Book 4). New Delhi, India: Prentice Hall of India. (For book presentation)
- 5. From Paragraph to Essay Maurice Imhoof and Herman Hudson
- 6. Headway Series Advanced Level (2 parts with CDs): Oxford University Press Ltd.
- 7. Speak like Churchill stand like Lincoln James C. Humes
- 8. Cambridge IELTS Practice Book
- 9. Selected Sample Reports and Selected Research Articles

MATH-105: Vector Analysis, Matrix and Coordinate Geometry

	C INFORMATION		_			Τ.
Course Co				Contact	Hours	: 3.00
Course Ti	· · · · · · · · · · · · · · · · · · ·	Geometry	Credit H	lours		: 3.00
PRE-RE						
Course Co						
Course Ti						
CURRIC	ULUM STRUCTURE					
Outcome	Based Education (OBE)					
RATION	ALE					
Geometry	he students the basic Concepts, Principles and op . The aim of this course is to develop the analyti is course is designed to develop the capability of	ical capability	of Vector	or, Matri	ices and	
OBJECT	IVE					
	miliarize the students with the working principl		ng differ	entiation	n and in	ntegration o
 To pr solve To be 	r valued functions in Cartesian, cylindrical and s ovide knowledge on using the concept of vector other applied problems. e expert in imparting depth knowledge on the vector NG OUTCOMES & GENERIC SKILLS	or, matrix and	Geome	•	•	-
 To pr solve To be 	ovide knowledge on using the concept of vector other applied problems. expert in imparting depth knowledge on the vector NG OUTCOMES & GENERIC SKILLS Course Learning Outcome (Upon completion of the course, the students will	or, matrix and	Geome	nd co-ord	•	•
 To pr solve To be LEARNI 	ovide knowledge on using the concept of vector other applied problems. expert in imparting depth knowledge on the vector NG OUTCOMES & GENERIC SKILLS Course Learning Outcome (Upon completion of the course, the students will be able to) Define and identify the physical explanation of different vector notation, explain the basic	or, matrix and etor analysis, r Bloom's	Geome	nd co-ord	dinate g	geometry. Assessmen
 To pr solve To be LEARNI No. 	ovide knowledge on using the concept of vector other applied problems. e expert in imparting depth knowledge on the vector NG OUTCOMES & GENERIC SKILLS Course Learning Outcome (Upon completion of the course, the students will be able to) Define and identify the physical explanation	or, matrix and etor analysis, r Bloom's Taxonomy	Geome natrix ar CP	nd co-ord	dinate g	geometry. Assessmen Methods

Vector Analysis: Definition of Vector, Scalars and Vectors, Equality of direction ratios and vectors, Addition and Subtraction and Multiplication of vectors by scalars, Position Vector of a point, Scalar and vector products of two vectors and their geometrical interpretation, Linear dependence and independence of vectors, Differentiation of vectors, Gradient of scalar functions, Divergence and curl of point functions, physical significance of gradient, divergence and curl, Definition of line, surface and volume integral, Integration of Vectors, Green's, stroke's and Gauss theorem and their application;

Matrix: Definition of Matrix, different types of matrices, Algebra of Matrices, Multiplication of matrices, Transpose and adjoint of a matrix, inverse of a matrix, rank and elementary transformation, solution of linear equation or System of Linear Equation, linear dependence and independence of vectors, quadratic forms, matrix polynomials, determination characteristic roots and vectors, null space and nullity of matrix, characteristic subspace of matrix, Eigen values and Eigen Vectors, Caley-Hamilton theorem;

Coordinate Geometry: Introduction to geometry, Rectangular co-ordinates, Angle between two lines, Transformation of co-ordinates, changes of axes, The plane-angle between two planes, pair of straight lines, general equation of second degree and reduction to its standard forms and properties, circles (tangents, normal, chord of contact, pole and polar), equation of conics, homogeneous equations of second degree, angle between straight lines, pair of lines joining the origin to the point of intersection of two given curves,

equations of parabola, ellipse in Cartesian and polar coordinates, system of circles (radical axes, coaxial circles, limiting points), Three dimensional co-ordinate system, direction cosines, projections, the plane (angle between two planes, parallel & perpendicular plane, distance of a point from a plane) and the straight line (coplanar lines, shortest distance between two given straight lines), standard equation of sphere, ellipsoid, hyperboloid.

SKILL MAPPING

No.	Course Learning Outcome	PROGRAM OUTCOMES (PO)											
NO.	Course Learning Outcome	1	2	3	4	5	6	7	8	9	10	11	12
CO1	Be able to define and identify the physical explanation of different vector notation, explain the complete concept about matrix, 2D and 3D geometry.	Н											
CO2	Be able to interpret mathematics, science and engineering such as calculating volume and area of any object in a vector field.	Н											
CO3	Be proficient to analyse and demonstrate the technique in engineering problems which is taught in vector, matrix and Geometry.	Н											

(H – High, M- Medium, L-low)

JUSTIFICATION FOR CO-PO MAPPING

Mapping	Level	Justifications
CO1-PO1	High	The knowledge of mathematics, science and engineering has to be applied to describe the operation of being able to identify the physical explanation of different vector notation, explain the complete concept about matrix, 2D and 3D geometry.
CO2-PO1	High	In order to interpret mathematics, science and engineering such as calculating inverse matrix and volume and area of any object in vector field.
CO3-PO1	High	In order to construct and calculate the area of objects related to engineering study by using vector, solve the system of linear equations using matrix and geometry related problems.

TEACHING LEARNING STRATEGY

Teaching and Learning Activities	Engagement (hours)
Face-to-Face Learning	
Lecture	42
Practical / Tutorial / Studio	-
Student-Centred Learning	-
Self-Directed Learning	
Non-face-to-face learning	42
Revision	21
Assessment Preparations	21
Formal Assessment	
Continuous Assessment	2
Final Examination	3
Total	131
TEACHING METHODOLOGY	

Lecture and Discussion, Co-operative and Collaborative Method, Problem Based Method

	SCHEDUI	TE				
Week	Lecture			Topics		Assessment Method
1	Lec 1			, Scalars and Vectors, Equality	of	
	Lec 2			vectors, operations of vectors,		
	Lec 3			point, Scalar and vector product		
				r geometrical interpretation, Tri		
				le products, Linear dependence	and	
		indeper	ndence of vec	ctors, Differentiation of vectors		
2	Lec 4	Gradie	nt of scalar fu	inctions, Divergence and curl of	f	Class Test 1
	Lec 5	point fu	unctions.Phys	sical significance of gradient,		
	Lec 6	-	ence and curl	6 ,		
3	Lec 7	-		rs (line, surface and volume		
3	Lec 7 Lec 8	-		is (line, surface and volume		
		integral	ls)			
	Lec 9					
4	Lec 10			d Gauss's theorem and their		
	Lec 11	applica	tion			
	Lec 12					
5	Lec 13			, different types of matrices,		
	Lec 14			ion, Transpose and adjoint of a		
	Lec 15			matrix, Rank and elementary		
			rmation.	-		Class Test 2
6	Lec 16	System	of Linear Ec	uation, Linear dependence and		Class Test 2
	Lec 17			tors, Quadratic forms, matrix		
	Lec 18			ination characteristic roots and		
	-	vector	,			
7	Lec 19		ace and nulli	ty of matrix, characteristic subs	pace	
	Lec 20			ues and Eigen Vectors Caley-	1 ···	
	Lec 20 Lec 21			concepts and problems		
8	Lec 22			netry, Rectangular co-ordinates		
0	Lec 22 Lec 23			lines, Transformation of co-	,	
	Lec 23 Lec 24			of axes, The plane-angle betwee	n two	
			pair of straig			
9	Lec 25			, general equation of second de	oree	
,	Lec 25 Lec 26			standard forms and properties,	5100	
	Lec 26 Lec 27			ormal, chord of contact, pole and	a I	Mid Term Exam
		polar)	(tangents, fit	mai, chord of contact, pole all	u	
10	Lec 31	1 /	n of conice	Homogeneous equations of seco	and	
10	Lec 31 Lec 32	degree	in or comes,	romogeneous equations of seco	JIG	
	Lec 32 Lec 33	ucgiee				
11	Lec 33 Lec 28	Angla	netween strei	ght lines, pair of lines joining th		
11	Lec 28 Lec 29			f intersection of two given curve		
	Lec 29 Lec 30			a, ellipse in Cartesian and polar		
	Let 30	coordir		ia, empse in Cartesian and pola	L	
12	Lec 34			adical axes, coaxial circles, limi	ting	
14	Lec 34 Lec 35				ung	
		points)	, mee-unne	nsional co-ordinate system		
10	Lec 36	D'	•	notions The slow (1 1		
13	Lec 37			rojections, The plane (angle bet		Class Test 3
	Lec 38	-	· •	& perpendicular plane, distance	e of a	
	Lec 39		om a plane).			
14	Lec 40			planar lines, shortest distance		
	Lec 41			straight lines), standard equation	1	
	Lec 42	of sphe	re, ellipsoid,	hyperboloid)		
SESSM	IENT STR	ATEGY				
C	omponents		Grading	СО	B	looms Taxonomy
ontinuo	110			CO1, CO2		C1, C2, C3
ssessme	lest	1-3	20%	CO2		C1, C2, C3 C3, A6
2202201110	/11L			002		C_{3}, A_{0}

(40%)	Class Participation	5%	CO3	C2, C3
	Mid term	15%	CO2, CO3	C2, C3
			CO 1	C1, C2
Final	Exam	60%	CO 2	C1, C2, C3
			CO 3	C3
Total	Marks	100%		

(CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

REFERENCE BOOKS

- 1. Vector Analysis(2nd) Seymour Lipschutz, Dennis Spellman and Murray R. Spiegel, Schaum's outlines.

- Vector Analysis M. D. Raisinghania.
 Elementary Linear algebra (12th) Wiely, Howard Anton and Chris Rorres.
 A Text Book on Co-ordinate Geometry with Vector Analysis Rahman & Bhattacharjee.
- 5. Analytic Geometry Abdur Rahman.
- 6. Analytical Solid Geometry- Shanti Narayan.

REFERENCE SITE

ME-122: Fundamentals of Mechanical Engineering Sessional

COURSE INFORMATION	
Course Code : ME-122	Lecture Contact Hours : 4.00
Course Title : Fundamentals of Mechanical Egineering Set	ssional Credit Hours : 2.00
PRE-REQUISITE	
Course Code: Nil	
Course Title: Nil	
CURRICULUM STRUCTURE	
Outcome Based Education (OBE)	
RATIONALE	
This course is designed to introduce the students with varie special consideration to the fields relevant to the computer number of theory based and lab based sessions are included this branch of engineering.	science and engineering discipline. A good
OBJECTIVE	
1. To make the students familiar to with engine and its vario	
2. To make the students familiar with various types of powe	
3. To make the students familiar with various heat transferri4. To make the students familiar with power and motions tra	
 To make the students familiar with power and motions ua To make the students familiar with various types of robot 	
LEARNING OUTCOMES & GENERIC SKILLS	
No. Course Learning Outcome (Upon completion of the course, the students will be able to)	Bloom's Taxonomy CP CA KP Assessment Methods
CO1 Understand theoretical and practical knowledge of vehicle components and control.	C2 1 1,2 ASG, Q, R
CO2 Explain introductory theoretical and practical	L C4 1 1 ASG, Q, R

	knowledge of power plant and their main components.					
CO3	Demonstrate fundamental ideas about heat transferring devices	P2	1	1	2	ASG, Q, R
CO4	Demonstrate basic knowledge about power transferring elements and components of robot.	Р3	2	1, 2	2	ASG, Q, R

 $(CP-\ Complex\ Problems,\ CA-\ Complex\ Activities,\ KP-\ Knowledge\ Profile,\ T-\ Test\ ;\ PR-\ Project\ ;\ Q-\ Quiz;\ ASG-\ Assignment;\ Pr-\ Presentation;\ R-\ Report;\ F-\ Final\ Exam,\ MT-\ Mid\ Term\ Exam)$

COURSE CONTENT

IC Engine, Automobile, Hybrid and Electric Vehicle: Types of IC Engine, Operating principle, thermodynamic cycle, Valve timing diagram, VVTi, ECM, Sensors used in modern vehicle, Hybrid Technology, Electric vehicle; Power plant: Types of power plant, Introduction to Coal based, Gas based and Nuclear power plant, Control system of power plant, Steam generator, Cooling tower; Heat Transfer and equipment: Modes of heat transfer, Heat transfer using finned surface, Thermo-electric cooling, Heat pipe, Cooling of microchip and processor; Pump, Compressor, Valve: Centrifugal pump, Positive displacement pump, Hydraulic and pneumatic actuator, Control valve (Pressure, flow and direction control valve); Kinematics of Rigid body: Truss, Frame, Kinematic linkage; Power transferring devices: Belt-pulley, Various types of gear and gear train, Fluid Coupling, CVT; Robotics and Control: Introduction to Robotics, Plane, rotational and spatial motion with applications to manipulators, Geometric configurations, arms and grippers, Control system of robots;

SKILL MAPPING

SILLE													
No.	Course Learning Outcome			PI	ROG	RAM	1 OU	JTC	OM	ES (I	20)		
		1	2	3	4	5	6	7	8	9	10	11	12
CO1	Understand theoretical and practical knowledge of vehicle components and control.		Н										
CO2	Explain introductory theoretical and practical knowledge of power plant and their main components.	Н											
CO3	Demonstrate fundamental ideas about heat transferring devices			L									
CO4	Demonstrate basic knowledge about power transferring elements and components of robot.		Н										

(H – High, M- Medium, L-low)

JUSTIFICAT	TION FOR	CO-PO MAPPING
Mapping	Level	Justifications
CO1-PO2	High	Students will have both theoratical and practical knowledge regarding engine snd vehicle components and operation that will impet both knowledge from basic science and engineering practice.
CO2-PO1	High	Students will have theoretical knowledge as well as established engineering practices on power plant components and their operation.
CO3-PO3	Low	Students will have and use knowledge on cooling tower that guide the design of

	C	ooling tower in 1	eal field.	
CO4-PO2	High S	tudents will lear	n technique to peform analysi	is of simple robot structure.
TEACHING	LEARNING S	TRATEGY		
Feaching and 1	Learning Activi	ties		Engagement (hours)
Face-to-Face I	earning			
Lectu	ire			56
Pract	ical / Tutorial /	Studio		25
	ent-Centred Lea	rning		
Self-Directed	-			
	face-to-face lea	rning		-
Revis				-
	ssment Preparat	ions		-
Formal Assess				
	nuous Assessm	ent		
	Examination			5.5
Fotal				96.5
FEACHING	METHODOL	OGY		
Class Lecture,	Lab Experimen	its, Report, Prob	lem Solving	
COURSE SC	HEDULE			
Class	Topics			
1-8	principle, the modern vehic	modynamic cyc le, Hybrid Tech	id and Electric Vehicle — Ty le, Valve timing diagram, VV nology, Electric vehicle.	Ti, ECM, Sensors used in
9-14			er plant, Introduction to Coal of power plant, Steam generate	based, Gas based and Nuclear
15-18	Heat Transfer	and equipment-		at transfer using finned surface
19-24	Pump, Comp			
	and pneumati		Centrifugal pump, Positive dis rol valve (Pressure, flow and o	splacement pump, Hydraulic
25-34		e actuator, Cont		placement pump, Hydraulic direction control valve)
25-34 35-44	Kinematics o Power transfe	c actuator, Cont f Rigid body – T rring device – B	rol valve (Pressure, flow and o	splacement pump, Hydraulic direction control valve) age,
	Kinematics o Power transfe Coupling, CV Robotics – In	c actuator, Cont f Rigid body – 7 rring device – B T roduction to Ro	rol valve (Pressure, flow and o Fruss, Frame, Kinematic linka elt-pulley, Various types of g botics, Plane, rotational and s	ear and gear train, Fluid
35-44 45-56	Kinematics o Power transfe Coupling, CV Robotics – In	c actuator, Cont f Rigid body – 7 rring device – B T roduction to Ro rs, Geometric co	rol valve (Pressure, flow and o Fruss, Frame, Kinematic linka elt-pulley, Various types of g botics, Plane, rotational and s	placement pump, Hydraulic direction control valve) age, ear and gear train, Fluid patial motion with applications
35-44 45-56 ASSESSMEN	Kinematics o Power transfe Coupling, CV Robotics – In to manipulato	e actuator, Cont f Rigid body – 7 rring device – B T rroduction to Ro rs, Geometric co	rol valve (Pressure, flow and o Fruss, Frame, Kinematic linka elt-pulley, Various types of g botics, Plane, rotational and s	placement pump, Hydraulic direction control valve) age, ear and gear train, Fluid patial motion with applications
35-44 45-56 ASSESSMEN Comp	Kinematics of Power transfe Coupling, CV Robotics – In to manipulato	c actuator, Cont f Rigid body – 7 rring device – B T roduction to Ro rs, Geometric co	rol valve (Pressure, flow and o Fruss, Frame, Kinematic linka elt-pulley, Various types of g botics, Plane, rotational and s onfigurations, arms and grippe	placement pump, Hydraulic direction control valve) age, ear and gear train, Fluid patial motion with applications ers, Control system of robots.
35-44 45-56 ASSESSMEN	Kinematics o Power transfe Coupling, CV Robotics – In to manipulato	e actuator, Cont f Rigid body – 7 rring device – B T rroduction to Ro rs, Geometric co	rol valve (Pressure, flow and o Fruss, Frame, Kinematic linka elt-pulley, Various types of g botics, Plane, rotational and s onfigurations, arms and grippe	placement pump, Hydraulic direction control valve) age, ear and gear train, Fluid patial motion with applications ers, Control system of robots.
35-44 45-56 ASSESSMEN Comp Continuous Assessment	Kinematics of Power transfe Coupling, CV Robotics – In to manipulato	e actuator, Cont f Rigid body – 7 rring device – B T roduction to Ro rs, Geometric co Grading	rol valve (Pressure, flow and or Fruss, Frame, Kinematic linka elt-pulley, Various types of g botics, Plane, rotational and s onfigurations, arms and grippe	placement pump, Hydraulic direction control valve) age, ear and gear train, Fluid patial motion with applications ers, Control system of robots. Blooms Taxonomy

(CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

REFERENCE BOOKS

- A Text Book of Thermal Engineering R S Khurmi& J K Gupta
 Heat Engines D. A. Low
 Thermal Engineering- Mahesh M Rathor

REFERENCE SITE

LEVEL-2 SPRING TERM

CSE-203: Data Structures & Algorithms I

COURSE INFORMATION													
	e Code : CSE-203		cture		act I	Iours		: 3.0					
	e Title : Data Structures & Algorithms I	Cre	edit H	lours		_		: 3.0	0		_	_	
PRE-	REQUISITE												
	e Code: CSE 105												
	e Title: Structured Programming Language												
	RICULUM STRUCTURE												
Outco	me Based Education (OBE)												
RATI	ONALE												
the da basic linked	This Data Structures & Algorithms I course is designed to provide a clear concept on the essential parts of the data structures and algorithms related to computer science. This course begins with the introduction of basic concepts of some commonly used data structures and algorithms and then covers time complexity, linked list, stack, queue, graph, sorting and various relevant important topics.												
	CCTIVE												
	develop a general understanding of basic data develop Programming skills for advanced data												
	RNING OUTCOMES & GENERIC SKILL		icture	s and	i aig	onun	115						
No.	Course Learning Outcome (Upon completion of the course, the students will be able to)		Bloo: Faxon		Γ	СР		CA	k	KP		ssessn Metho	
CO1	Express the fundamentals of static and												
CO2	Demonstrate advantages and disadvantages of specific algorithms and data structures.		C4	1		1				1	N	fid Te Exan	
CO3	Select basic data structures and algorithms for autonomous realization of simple programs or program parts.	e	C1-0	C5		1,2				1		F	
CO4	Determine and demonstrate bugs in the program, recognize needed basic operations with algorithms and data structures.		C1-0	C5		1				1		F	
CO5	Develop the communication skill by presenting topics on data Structures and algorithms		Aź	2				1				Pr	
	Complex Problems, CA-Complex Activities, K			-			' – T	est;	PR	– Pr	oject	; Q –	
	ASG – Assignment; Pr – Presentation; R - Re	port;	; F –]	Final	Exa	m)							
	RSE CONTENT												
mappi sort, 1 Queue depth Hashi	Introduction: Introduction to data structures and algorithms, array representation in memory, array mapping function, asymptotic notation; Array searching: Linear search, Binary search; Sorting: Bubble sort, Insertion sort, Count sort; Linked list: Single linked list, double linked list; FIFO-LIFO: Stack, Queue; Graph Theory: Introduction, classification of graph, representation of graph, breadth first search, depth first search; Trees: Classification of trees, tree traversal, Binary search tree, Segment tree; List and Hashing: Skip list, Hash table, Hashing; String matching algorithm: Knuth–Morris–Pratt(KMP) algorithm.												
	L MAPPING												
				PI	ROG	RAM	101	JTC	OMI	ES (PO)		
No.	Course Learning Outcome	1	2	3	4	5	6	7	8	9	10	11	12
CO1	Express the fundamentals of static and dynamic data structures and relevant standard algorithms.	Н											

CO2		onstrate lvantages of	advantages and specific algorithms and	Н											
		structures.	1 0												
	Selec	et basic	data structures and												
CO3	algor	rithms for au	tonomous realization of		Μ										
			or program parts.												
	Dete		lemonstrate bugs in the												
CO4	prog	ram, recog	gnize needed basic		Н										
04	opera	ations with	algorithms and data	gorithms and data											
	struc	tures.													
	Deve	elop the co	ommunication skill by												
CO5	prese	enting topics	on Data Structures &									I			
	Algo	orithms													
(H – Hi	gh, M-	- Medium, L	-low)												
JUSTI	FICAT	FION FOR	CO-PO MAPPING:												
Mappin	g	Level				Just	ificat	ions							
CO1-PC	$\overline{)1}$	High	Increase breadth and d										ıdar	nenta	als o
	71	Ingli	static and dynamic data												
CO2 PC	1	High	Increase breadth and	depth	of k	nov	vledg	ge by	de	mons	stratin	g ad	van	tage	s and
CO2-PC	71	High	disadvantages of specif	ic algo	orithr	ns a	nd d	ata st	ructi	ires				-	
			Analyse and formulat								s to	selee	ct ł	oasic	data
CO3-PC	02	Medium	structures and algorith												
			program parts												
	Analyse and formulate different methods of analysis to determine and														
CO4-PC	02	High demonstrate bugs in the program, recognize needed basic operations with													
		C	algorithms and data structures												
CO5-PC	D10	Low	Develop communicatio	n skill	s thr	oug	h par	ticina	ating	in p	resent	ation	ı.		
			-			8	- F ···	F		r					
			G STRATEGY								·		4 (1-		
теясний	ig and	Learning Ac	cuviues						_	Е	ngage	men	t (n	ours	
	Aching and Learning Activities Engagement (hours) ze-to-Face Learning														
	-Face l	Learning										40			
	-Face l Lectu	Learning ure	1/0/ 1									42			
	-Face I Lectu Pract	Learning ure tical / Tutoria										42 -			
Face-to-	-Face I Lectu Pract Stude	Learning ure tical / Tutori ent-Centred										42 - -			
Face-to-	-Face I Lectu Pract Stude	Learning ure tical / Tutoria ent-Centred Learning	Learning									-			
Face-to-	-Face I Lectu Pract Stude rected Non-	Learning ure tical / Tutori ent-Centred Learning face-to-face	Learning									- - 42			
Face-to-	-Face I Lectu Pract Stude rected Non- Revis	Learning ure tical / Tutori ent-Centred Learning face-to-face sion	Learning learning									- 42 21			
Face-to-	-Face I Lectu Pract Stude rected Non- Revis Asse	Learning ure tical / Tutori ent-Centred Learning face-to-face sion ssment Prep	Learning learning									- - 42			
Face-to-	-Face I Lectu Pract Stude rected Non- Revis Asses	Learning ure tical / Tutoris ent-Centred Learning face-to-face sion ssment Prep sment	Learning learning arations									- 42 21 21			
Face-to-	-Face I Lectu Pract Stude rected Non- Revis Asses Assess Cont	Learning ure tical / Tutoris ent-Centred Learning face-to-face sion ssment Prep sment inuous Asse	Learning learning arations ssment									- 42 21 21 2			
Face-to- Self-Dir Formal	-Face I Lectu Pract Stude rected Non- Revis Asses Assess Cont	Learning ure tical / Tutoris ent-Centred Learning face-to-face sion ssment Prep sment	Learning learning arations ssment									- 42 21 21 2 3			
Face-to- Self-Dir Formal	-Face I Lectu Pract Stude rected Non- Revis Asse Assess Cont Final	Learning ure tical / Tutori ent-Centred Learning face-to-face sion ssment Prep sment inuous Asse Examinatio	Learning learning arations ssment n									- 42 21 21 2			
Face-to- Self-Dir Formal	-Face I Lectu Pract Stude rected Non- Revia Asses Cont Final	Learning ure tical / Tutori ent-Centred Learning face-to-face sion ssment Prep sment inuous Asse l Examinatio	Learning learning arations ssment n DLOGY									- 42 21 21 2 3			
Face-to- Self-Dir Formal Total TEACH Lecture	-Face I Lectu Pract Stude rected Non- Revia Asses Cont Final HING and D	Learning ure tical / Tutori ent-Centred Learning face-to-face sion ssment Prep sment inuous Asse Examinatio METHODO	Learning learning arations ssment n	ative M	Ńeth	od,	Prob	lem I	3ased	d Me	thod	- 42 21 21 2 3			
Face-to- Self-Dir Formal Total TEACH Lecture	-Face I Lectu Pract Studa rected Non- Revia Asse Cont Final HING and D	Learning ure tical / Tutori ent-Centred Learning face-to-face sion ssment Prep sment inuous Asse l Examinatio	Learning learning arations ssment n DLOGY			od,	Prob	lem I	3asec	d Me		42 21 21 2 3 131			
Face-to- Self-Dir Formal Total TEACH Lecture COURS W	-Face I Lectu Pract Studa rected Non- Revia Asse Cont Final HING and D SE SC eek	Learning ure tical / Tutori ent-Centred Learning face-to-face sion ssment Prep sment inuous Asse Examinatio METHODO viscussion, C HEDULE	Learning learning arations ssment n DLOGY o-operative and Collabor	Торі	cs	od,	Prob	lem I	3ased	d Me	thod	42 21 21 2 3 131		Meth	ods
Face-to- Self-Dir Formal Total TEACH Lecture COURS W	-Face I Lectu Pract Studa rected Non- Revia Asse Cont Final HING and D	Learning ure tical / Tutori ent-Centred Learning face-to-face sion ssment Prep sment inuous Asse Examinatio METHODO viscussion, C HEDULE Lecture Lec 1	Learning learning arations ssment n DLOGY o-operative and Collabor e Introduction to data s	Topi structu	cs re		Prob	lem I	3ase	d Me		42 21 21 2 3 131		Meth	ods
Face-to- Self-Dir Formal Total TEACH Lecture COURS W	-Face I Lectu Pract Studa rected Non- Revia Asse Cont Final HING and D SE SC eek	Learning ure tical / Tutoring inter-Centred Learning face-to-face sion ssment Prep sment inuous Asse Examinatio METHODO viscussion, C CHEDULE Lec 1 Lec 2	Learning learning arations ssment n DLOGY o-operative and Collabor e Introduction to data s Representation of arr	Topi structu ay in 1	cs re		Prob	lem I	3asee	d Me		42 21 21 2 3 131		Meth	ods
Face-to- Self-Dir Formal Total TEACH Lecture COURS W	-Face I Lectu Pract Studa rected Non- Revia Asse Cont Final HING and D SE SC eek	Learning ure tical / Tutori ent-Centred Learning face-to-face sion ssment Prep sment inuous Asse Examinatio METHODO viscussion, C HEDULE Lecture Lec 1	Learning learning arations ssment n DLOGY o-operative and Collabor e Introduction to data s Representation of arr Array mapping funct	Topi structu ay in 1	cs re		Prob	lem I	3ased	d Me		42 21 21 2 3 131		Meth	ods
Face-to- Self-Dir Formal Total TEACH Lecture COURS W	-Face I Lectu Pract Studa rected Non- Revia Asse Cont Final HING and D SE SC eek	Learning ure tical / Tutoring inter-Centred Learning face-to-face sion ssment Prep sment inuous Asse Examinatio METHODO viscussion, C CHEDULE Lec 1 Lec 2	Learning learning arations ssment n DLOGY o-operative and Collabor e Introduction to data s Representation of arr Array mapping funct Asymptotic notation	Topi structu ay in 1 ion	re mem	ory				d Me		42 21 21 2 3 131		Meth	ods
Face-to- Self-Dir Formal Total TEACH Lecture COURS	-Face I Lectu Pract Studa rected Non- Revia Asse Cont Final HING and D SE SC eek	Learning ure tical / Tutoring inter-Centred Learning face-to-face sion ssment Prep sment inuous Asse Examinatio METHODO viscussion, C CHEDULE Lec 1 Lec 2	Learning learning arations ssment n DLOGY o-operative and Collabor e Introduction to data s Representation of arr Array mapping funct	Topi structu ay in 1 ion	re mem	ory				d Me		42 21 21 2 3 131		Meth	ods
Face-to- Self-Dir Formal Total TEACH Lecture COURS W	-Face I Lectu Pract Stude rected Non- Revia Asses Cont Final HING and D SE SC feek 1	Learning ure tical / Tutori ent-Centred Learning face-to-face sion ssment Prep sment inuous Asse Examinatio METHODO viscussion, C HEDULE Lec 1 Lec 2 Lec 3	Learning learning arations ssment n DLOGY o-operative and Collabor e Introduction to data s Representation of arr Array mapping funct Asymptotic notation	Topi structu ay in 1 ion inear a	re mem	ory ch, F	Binar	y sea	rch	d Me		42 21 21 2 3 131		Meth	ods
Face-to- Self-Dir Formal Total TEACH Lecture COURS W	-Face I Lectu Pract Stude rected Non- Revia Asses Cont Final HING and D SE SC feek 1	Learning ure tical / Tutori ent-Centred Learning face-to-face sion ssment Prep sment inuous Asse Examinatio METHODO biscussion, C HEDULE Lec 1 Lec 2 Lec 3 Lec 4	Learning learning arations ssment n DLOGY o-operative and Collabor e Introduction to data s Representation of arr Array mapping funct Asymptotic notation Searching in array: L	Topi structu ay in 1 ion inear a	re mem	ory ch, F	Binar	y sea	rch	d Me	Asses	42 21 21 2 3 131	nt N		ods
Face-to- Self-Dir Formal Total TEACH Lecture	-Face I Lectu Pract Stude rected Non- Revia Asses Cont Final HING and D SE SC feek 1	Learning ure tical / Tutori ent-Centred Learning face-to-face sion ssment Prep sment inuous Asse Examinatio METHOD(iscussion, C EHEDULE Lec 1 Lec 2 Lec 3 Lec 4 Lec 5	Learning learning arations ssment n DLOGY o-operative and Collabor e Introduction to data s Representation of arr Array mapping funct Asymptotic notation Searching in array: L	Topi structu ay in 1 ion inear a	re mem	ory ch, F	Binar	y sea	rch	d Me	Asses	42 21 21 2 3 131	nt N		ods

	Lec 9		
4	Lec 10	Doubly Linked List	
	Lec 11		
	Lec 12		
5	Lec 13	Stack	
	Lec 14	Queue	
	Lec 15		
6	Lec 16	Introduction to Graph Theory	Class Test 2
	Lec 17	Notations of Graph	
	Lec 18	Classification of Graph	
7	Lec 19	Introduction to Graph Theory	
	Lec 20	Notations of Graph Theory	
	Lec 21	Representations of Graph	
		Classification of Graph	
8	Lec 22	Breadth first search	
	Lec 23	Depth first search	
	Lec 24		
9	Lec 25	Introduction to Trees	
	Lec 26	Classification of Trees	
	Lec 27	Tree traversal techniques: Preorder, Inorder,	
		Postorder	Mid Term Exam
10	Lec 31	Binary Search Tree	-
	Lec 32		
	Lec 33		
11	Lec 28	Segment Tree	
	Lec 29		
	Lec 30		
12	Lec 34	Skip list	
	Lec 35		
	Lec 36		
13	Lec 37	Hash table, Hashing	
	Lec 38		Class Test 3
	Lec 39		
14	Lec 40	Knuth–Morris–Pratt string matching algorithm	
	Lec 41		
	Lec 42		1

Comp	oonents	Grading	СО	Bloom's Taxonomy
Gutin	Class Test	20%	CO1	C1-C3
Continuous Assessmen t (40%)	Class Participation	5%	CO5	A2
ι (40%)	Mid term	15%	CO 2	C4
Final	Exam	60%	CO3	C1-C5
ГШа	Exam	00%	CO4	C1-C5
Total Marks 100%				

(CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

REFERENCE BOOKS

1. Introduction to Algorithms (CLRS) 3rd Edition Sep 2009

2. Data Structures and Algorithm Analysis in C++ 2014

REFERENCE SITE

https://www.cs.usfca.edu/~galles/visualization/Algorithms.html https://www.shafaetsplanet.com/ https://forthright48.com/

CSE-204: Data Structures & Algorithms I Sessional

COUR	RSE INF	ORMATION												
Course	e Code	: CSE-204				Le	ectur	e Co	ontac	ct Ho	ours	: 3.	00	
Course	e Title	: Data Structures & Algorithms I	Sessio	nal		C	redit	Ηοι	ırs			:1.	50	
	REQUIS													
	e Code: (~ ·											
Course Title: Structured Programming Language Sessional														
		M STRUCTURE												
Outcome Based Education (OBE)														
	ONALE													
		ctures & Algorithms I sessional												
		of the essential parts of the data st with the implementation of some co												
		covers various relevant important t							.5 110	Juu	ing fi	incu	11st,	STACK
<u></u>	CTIVE		1											
		general understanding of basic dat	a struc	ture	es and	algo	orithu	ms						
		rogramming skills for advanced da												
LEAR	NING O	OUTCOMES & GENERIC SKIL	LS											
		Course Learning Outcome		Τ	Bloc	om's						А	ssess	ment
No.	(Upon completion of the course, the students will be able to)			-	Taxo		y	СР	C	CA	KP		Meth	
CO1	Identify	advantages and disadvantag	es of	f	Р	1				1	1	Е		
COI		algorithms and data structures.		\perp	r	1	\perp			T	1			
CO2		basic data structures and algorith nous realization of simple progr			Р	2				1	1	0		
002	program		anis Ol	·	r	5				T	1			
CO2		practical knowledge to determine	ne and	1		5				1	1			
CO3	demons	strate bugs in programs.			Р	5				1	1	Q		
004		ate new solutions for proble			~					1	1			
CO4		e existing code using learned algo a structures.	orithms	;	Р	0				1	1	0		
	und udt								1		1	1		
		Problems, CA-Complex Activities,						Г — Л	ſest	; PR	– Pr	oject	; Q –	
Quiz; A	ASG – A	ssignment; Pr – Presentation; R - R	eport;	F –	Final	l Exa	.m)							
COUR	RSE CON	NTENT												
		ons: Operations on static array list	st one	rativ	one c	n du	mam	ic a	rrav	liet	· A m	av C	eare	hing
		Linked List: Single linked list,												
Theor	y: Graph	representation, Breadth first search	ı, Dept	th fi	irst se									
	0	ee; String matching algorithm: K	MP al	gori	thm									
SKILI	L MAPP	ING												
No.		Course Learning Outcome	1	2	1					_	ES (F		11	10
	Demo		1	2	3	4	5	6	7	8	9	10	11	12
001	e e					1	1	1						
CO1	data structures.						l							

CO3 detern progr CO4 or im algori (H – High, M-	O2 algorithms for autonomous realization of simple programs or program parts. H Initiate practical knowledge to determine and demonstrate bugs in programs. M Formulate new solutions for problems Image: Constraint of the solution of the solu														
	r	'O MAPPING				r									
Mapping	Increase breadth and depth of knowledge by							v de	mor	otrat	ina a	dvan	tana		
CO1-PO1	CO1-PO1 High and disadvantages of specific algorithms and d										uvan	lages	,		
CO2-PO1	Increase breadth and depth of knowledge by selecting basic d								grams						
CO3-PO2	CO3-PO2 Medium Analyse and formulate different methods of analysis to determine a demonstrate bugs in programs Analyse and formulate different methods of analysis to formulate network														
CO4-PO2	High	solutions for prol and data structure	blem												
TEACHING	LEARNING ST	RATEGY													
	Learning Activiti	es								Engagement (hours)					
Stude	re ical / Tutorial / St ent-Centred Learn										42				
Revis Asses	face-to-face learn sion ssment Preparatio	-													
	ment inuous Assessmer Examination	nt										4 3			
Total												49			
TEACHING	METHODOLO	GY													
Lecture and Di	iscussion, Co-ope	erative and Collabor	ative	Met	hod,	Prob	lem	Base	d M	etho	d				
COURSE SC	HEDULE														
Wee	k Lab						T	opics	5						ſ
1	Lab Lab Lab	2			Ope	eratio	ons of	n stat	tic a	rray	list				
2	Lab Lab Lab	4 5		(Opera	ation	s on	dyna	mic	arra	y list	;			
3	Lab Lab Lab	8				1	Binar	ry sea	arch						
4	Lab Lab Lab	11	Single linked list												

5	Lab 13 Lab 14 Lab 15	Double linked list
6	Lab 16 Lab 17 Lab 18	Stack implementation by array and linked list
7	Lab 19 Lab 20 Lab 21	Queue Circular Queue
8	Lab 22 Lab 23 Lab 24	Graph Representation
9	Lab 25 Lab 26 Lab 27	Breadth first search
10	Lab 31 Lab 32 Lab 33	Depth first search
11	Lab 28 Lab 29 Lab 30	Tree Construction Preorder, Inorder, Postorder traversal
12	Lab 34 Lab 35 Lab 36	Binary search tree
13	Lab 37 Lab 38 Lab 39	Segment Tree
14	Lab 40 Lab 41 Lab 42	KMP Algorithm
ASSESSMENT STR	RATEGY	

Components	Grading	СО	Bloom's Taxonomy
Continuous Evaluation	30%	CO 1	P1
Final Online Exam 1 & 2	50%	CO 2	P3
Final Online Exam 1 & 2	30%	CO 4	P6
Quiz	20%	CO3	P5
Total Marks	100%		

(CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

REFERENCE BOOKS

Introduction to Algorithms (CLRS) 3rd Edition Sep 2009
 Data Structures and Algorithm Analysis in C++ 2014

REFERENCE SITE

https://www.cs.usfca.edu/~galles/visualization/Algorithms.html https://www.shafaetsplanet.com/ https://forthright48.com/

CSE-205: Object Oriented Programming Language

COUR	RSE INFO	ORMATION							
Course Code : CSE-205 Lecture Contact Hours : 3.00									
Course	e Title	: Object Oriented Programming Languag	ge Ci	redit Hour	S		: 3.00		
PRE-REQUISITE									
Course Code: CSE 105									
Course Title: Structured Programming Language									
CURR	RICULUM	I STRUCTURE							
Outcon	me Based	Education (OBE)							
	ONALE								
		nted programming course is designed t							
	• •	radigm that includes or relies on the con		ects, enca	psulate	ed data	structures that		
have p	roperties a	and functions and which interact with othe	er objects						
OBJE	CTIVE								
		oasic idea on Object Oriented Programmin	ig Languag	e					
		ect-oriented aspects of C++							
	· · ·	amming with C++							
LEARNING OUTCOMES & GENERIC SKILLS									
NT.		Course Learning Outcome	Bloom'	S CP	C A	VD	Assessment		
No.	(Upon co	ompletion of the course, the students will be able to)	Taxonon	iy CP	CA	KP	Methods		
CO1	Grasp an	ad utilize the fundamental features of an	C1- C3	1		1	T		
CO1		riented programming language	CI-C3	1		1	Т		
		and the benefits of object-oriented					Mid Term		
CO2		and analyse when it is an appropriate	C2, C4	1,3		1	Exam		
		logy to use. object-oriented solutions for small							
CO3		s, involving multiple objects.	C3, C5, C	26 1,3		5	T, F		
	Illustrate	good programming style and identify				1			
CO4		pact of style on developing and	C3-C4,C	6 3		8	F		
		ing programs.							
CO5		the communication skill by presenting Object Oriented Programming.	A2		1		PR		
	Complex P	roblems, CA-Complex Activities, KP-Kno signment; Pr – Presentation; R - Report; F					oject ; Q –		
Quiz, I	- DG- AS	signment, i i – i resentation, K - Kepolt, F		ann, 1 vi i -	ivitu 10		a111 <i>)</i>		
COUR	RSE CON	TENT							
OOP	Introduct	tion: Philosophy of Object Oriented P	rogrammin	g (OOP).	Adva	ntages	of OOP over		
		amming; Features: Encapsulation, Inheri							
		es and objects, access specifiers, station							
Destructors: Constructors, Destructors, Copy Constructors; Pointers of objects: Array of objects, object									
pointers, and object references; Functions: Member Functions, In-line functions, friend functions, static functions; Inheritance ; single and multiple inheritance; Polymorphism ; overloading, abstract classes									
	functions; Inheritance: single and multiple inheritance; Polymorphism: overloading, abstract classes, virtual functions and overriding; Error Handling: Exception Handling; Object Oriented I/O: Object								

virtual functions and overriding; Error Handling: Exception Handling; Object Oriented I/O: Object Oriented I/O ; Templates: Template functions and classes; Namespace and template libraries: Concept of Namespaces, Overview of Standard Template Library (Vectors & Iterators); Threads: Multi-threaded Programming, Abstract Data Types. Basic Concept on java, basic operation and command line. Class abstraction, Interface, Closure. Generic Class and Methods, Java I/O (serialization) and stream, Collection Frameworks, Concurrency.

SKILL MAPPING

No.	Course Learning Outcome		-	PI	ROG	RAN	101	JTC	OM	ES (I	PO)		
140.	Course Learning Outcome	1	2	3	4	5	6	7	8	9	10	11	12
CO1	Grasp and utilize the fundamental features of an object oriented language	Н											
CO2	Understand the benefits of object oriented design and analyse when it is an appropriate methodology to use.		Н										
CO3	Deduce object oriented solutions for small problems, involving multiple objects.			Н									
CO4	Illustrate good programming style and identify the impact of style on developing and maintaining programs.				Н								
CO5	Develop the communication skill by presenting topics on Object Oriented Programming.										L		

(H – High, M- Medium, L-low)

JUSTIFICATION FOR CO-PO MAPPING

Mapping	Level	Justifications
CO1 – PO1	High	In order to solve complex engineering problems, knowledge of fundamental features of object-oriented programming language is very important.
CO2 – PO2	High	To analyse the complex engineering problems, one need to understand the benefit and analyse when object-oriented programming is an appropriate methodology to use.
CO3 – PO3	High	To design and develop solutions for complex engineering problems, one need to be able to deduce object-oriented solutions for small problems, involving multiple objects.
CO4 - PO4	High	To investigate complex problems, one need to have skill on good programming style and identify the impact of style on developing and maintaining programs
CO5 – PO10	Low	In order to give presentation on the selective topics from the course taught we need strong communication skills.

TEACHING LEARNING STRATEGY

Teaching and Learning Activities	Engagement (hours)
Face-to-Face Learning	
Lecture	42
Practical / Tutorial / Studio	-
Student-Centred Learning	-
Self-Directed Learning	
Non-face-to-face learning	42
Revision	21
Assessment Preparations	21
Formal Assessment	
Continuous Assessment	2
Final Examination	3
Total	131
TEACHING METHODOLOGY	

TEACHING METHODOLOGY

Lecture and Discussion, Co-operative and Collaborative Method, Problem Based Method

Week	Lecture	Topics	Assessment Method
1	Lec 1	Overview of Object Oriented Programming (OOP)	
	Lec 2	and introduction to C++; Features of OOP,	
	Lec 3	namespaces	
2	Lec 4	Introduction to class and objects, Access	
	Lec 5	Specifiers	
	Lec 6	*	
3	Lec 7	Member Functions, In-line functions, Friend	Class Test 1
	Lec 8	functions, Function Overloading	
	Lec 9		
4	Lec 10	Introduction to the concept of Constructors and	
	Lec 11	Destructors	
	Lec 12		
5	Lec 13	Copy Constructor	
	Lec 14	15	
	Lec 15		
6	Lec 16	Using arrays of objects and references of objects,	Class Test 2
	Lec 17	using objects as arguments and returning objects	
	Lec 18	from functions	
7	Lec 19	Inheritance: Introduction, derived and base	
	Lec 20	classes,	
	Lec 21	accessing base class members, access specified for	
		'protected'	
8	Lec 22	Multiple inheritance, Constructor and destructor	
0	Lec 22 Lec 23	in Inheritance	
	Lec 24		
9	Lec 25	Virtual functions, runtime polymorphism and	
,	Lec 26	overriding Abstract class	
	Lec 27		
10	Lec 31	Operator overloading: Introduction, overloading of	
10	Lec 32	unary operators, binary operators, multiple	Mid Term Exam
	Lec 33	overloading, Comparison operators	
	200 00	overloading, comparison operators	
11	Lec 28	Basic Concept on java, basic operation and	
	Lec 29	command line	
	Lec 30		
12	Lec 34	Class abstraction, Interface, Closure	
	Lec 35		
	Lec 36		
13	Lec 37	Generic Class and Methods, Exception Handling	
-	Lec 38		Class Test 3
	Lec 39		
14	Lec 40		
	Lec 41	Java I/O (serialization) and stream, Collection	
	Lec 42	Frameworks, Concurrency	

ASSESSMENT STRATEGY

Comp	oonents	Grading	СО	Blooms Taxonomy
	Test 1-3	20%	CO1	C1-3
Continuous	Test 1-5	20%	CO3	C3, C5, C6
Assessment (40%)	Class Participation	5%	CO5	A2
	Mid term	15%	CO2	C2, C4
Final Exam		60%	CO3	C3, C5, C6

		CO4	C3-C4,C6						
Total Marks	100%								
(CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)									
REFERENCE BOOKS 1. Teach Yourself C++ - Herbert Schidlt									
2. Introduction to Algorithm		n Sep 2009							
3. Data Structures and Algo	rithm Analysis in C-	++ 2014							
REFERENCE SITE									

CSE-206: Object Oriented Programming Language Sessional

COURSE INFORMATION											
	se Code se Title	: CSE-206 : Object Oriented Programming Language Ses		ecture C redit Ho	s :3.00 :1.50						
PRE-	PRE-REQUISITE										
	Course Code: 106 Course Title: Structured Programming Language Sessional										
CUR	CURRICULUM STRUCTURE										
Outco	ome Based	Education (OBE)									
RATI	IONALE										
The Object-oriented programming course is designed to provide a comprehensive understanding to a programming paradigm that includes or relies on the concept of objects, encapsulated data structures that have properties and functions and which interact with other objects.											
OBJECTIVE											
2. To	present of	basic idea on Object Oriented Programming Lab oject-oriented aspects of C++ gramming with C++	nguage								
LEAI	RNING O	UTCOMES & GENERIC SKILLS									
No.	(Upon co		Bloom's								
	(Opon cc	Course Learning Outcome mpletion of the course, the students will be able to)	Taxonom	y CP	CA	KP	Assessment Methods				
CO1	Design			y CP	CA 3	KP 5					
	Design of problem Demons impact of program	mpletion of the course, the students will be able to) object-oriented solutions for small systems/ s, involving multiple objects. trate good programming style and discuss the of style on developing and maintaining is.	Taxonom	y			Methods				
CO1	Design of problem Demons impact of program Identify designs,	mpletion of the course, the students will be able to) object-oriented solutions for small systems/ s, involving multiple objects. trate good programming style and discuss the of style on developing and maintaining	Taxonom C6	1		5	Methods E, O				

(CP- Complex Problems, CA-Complex Activities, KP-Knowledge Profile, E - Evaluation; PR – Project ; Q – Quiz; ASG – Assignment; Pr – Presentation; R - Report; O – Online, V - Viva)

COURSE CONTENT

Introduction to OOP: Advantages of OOP over structured programming; Introduction to classes and objects: Encapsulation, classes and objects, access specifiers, static and non-static members; Introduction

to Constructors and Destructor: Constructors, Destructors and Copy Constructors; Array of objects: Array of objects, object pointers, and object references; Function: Member Functions, In-line functions, friend functions, static functions; Inheritance: single and multiple inheritance; Polymorphism: overloading, abstract classes, virtual functions and overriding; Exception Handling: Exception Handling; OOP I/O: Object Oriented I/O; Templates: Template functions and classes; Namespace: Concept of Namespaces, Overview of Standard Template Library (Vectors & Iterators); Thread: Multi-threaded Programming, Abstract Data Types.

		2		PROGRAM OUTCOMES (PO)													
No.		Course	Learning Outcome	1	2	3	4	5	6	7	8	9	10	11	12		
	Desig	n object-	oriented solutions for														
CO1			problems, involving									Η					
		ple object															
			ood programming style														
CO2			impact of style on												Η		
			l maintaining programs.														
CON			ative merits of different														
			signs, programming data structures.						Η								
			t, document and prepare														
CO4			looking package for									Н					
0.04			ms / problems.									11					
	speen																
·		Medium,													_		
JUSTI	FICAT	ION FO	R CO-PO MAPPING														
Mapp	ping	Level			J	lustif	icatio	ons									
	In order to function effectively as an individual or least																
CO1– I	209	High	learn to design object-oriented solutions for small systems/ problems, involving														
			multiple objects.	1	1	.1	1 .1.				• 1•	<u>c 1</u>	1				
CO2 –	DO12	Uich	To recognize the need for and have the ability to engage in life long learning, must be able to demonstrate good programming style and discuss the impact														
CO2 -	FO12	High	style on developing and maintaining programs.					e ai	and discuss the impact of								
									ities	es relevant to the professional							
CO3 –	PO6	High	engineering practice, one need to identify the relative merits of														
		0	algorithmic designs, prog														
			In order to function effect														
CO4 –	PO9	High	able to write code, test, d	locun	nent a	and p	orepa	re a	prof	essio	onal	loo	king p	packag	ge fo		
			specified systems / proble	ems													
TEAC	HING I	LEARNI	NG STRATEGY														
			Activities								Ε	nga	geme	nt (ho	ırs)		
Face-to		earning															
Lecture								-									
Practical / Tutorial / Studio Student-Centred Learning								42	2								
Salf Di		Learning								-+			-				
9611-DI			ce learning										-				
	Revis												_				
			eparations										-				
Formal	Assess		1														
			sessment										4				
	Final	Examina	tion										3				

Total

SKILL MAPPING

TEACHING METHODOLOGY

Lecture and Discussion, Co-operative and Collaborative Method, Problem Based Method

49

COURSE SCHEDULE

Week	Topics						
1	Introductory session on OOP						
2	Structure and Classes with namespace						
3	Class and objects with access specifier						
4	Member Functions, In-line functions, Friend functions						
5	Function Overloading						
6	Introduction to the concept of Constructors and Destructors						
7	Copy Constructors						
8	Inheritance: Introduction, derived and base classes, accessing base class members, access specified for 'protected'						
9	Multiple inheritance, Constructor and destructor in Inheritance						
10	Virtual functions, runtime polymorphism						
11	Overriding Abstract class						
12	Operator overloading: Introduction, overloading of unary operators						
13	Operator overloading: Overloading of binary operators,						
14	Multiple overloading						

ASSESSMENT STRATEGY

Com	Components		СО	Blooms Taxonomy
Com	Components Class		CO1	C6
Continuous	Evaluation	20%	CO4	C3, C6
Assessmen t (40%)	Class Participation	5%	CO4	C3, C6
	Assignment	10%	CO4	C3, C6
Online	Test – 1	25%	CO1	C6
Onnie	1 est - 1	23%	CO2	C3
Onlina	Test 2	25%	CO1	C6
Onnie	Online Test – 2		CO2	C3
Quiz	z/ Viva	15%	CO3	Р5
Total	Marks	100%		

(CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

REFERENCE BOOKS

1. Teach Yourself C++ by Herbert Schildt

2. Object Oriented Programming with C++ by E Balagurusamy

3. Complete Reference C++ by Herbert Schildt

4. Programming with C++ by Schaums Outline Series

REFERENCE SITE

CSE-217: Theory of Computation

COU	RSE INFORMATION													
	e Code : CSE-217	Lecture C		ours	: 3.									
Course Title : Theory of Computation Credit Hours : 3.00														
	REQUISITE													
	e Code: Nil e Title: Nil													
CURI	RICULUM STRUCTURE													
Outco	me Based Education (OBE)													
RATI	ONALE													
	ourse is designed to learn how problem thms and the elementary ways in which a		-	solve	ed on	a r	node	el of	f com	puta	tion	using		
-	· ·		WOIKS.			_								
	CCTIVE				•									
	o understand the mathematical foundation o have a solid foundation of the theory o							the	eory.					
	o analyse and design finite automata, p			-				s, fo	rmal	lang	uage	s and		
	inguages, and grammars.			,	0			,		C				
LEAF	RNING OUTCOMES & GENERIC SH	KILLS												
No.	Course Learning Outcome		Bloo		CI	Р	CA	4	KP			ment		
	(Upon completion of the course, the students wi Identify the mathematical found		Тахог	nomy							Meth	lods		
CO1	1computation including mathematical proofs for computation.C3, C511, 3							Τ, F						
CO2	Design finite automata and regular e for regular languages.	xpressions	C4,	C6	1,2	,3			1,3,5	1,3,5 T, F				
CO3	Design context free grammar and automata for context free languages.	pushdown	C4,	C6	1,2	,3			1, 5		Τ,	F		
CO4	Illustrate Turing machines and investimits of algorithmic solvability.	-	C2,	C4	1				1,3,8		Τ,	F		
CO5	Develop the communication skill by topics on theory of computation.	presenting	А	2			1				P	r		
Quiz; COUI Regul	Complex Problems, CA-Complex Activit ASG – Assignment; Pr – Presentation; R RSE CONTENT ar language: deterministic finite aut	a - Report;	F – Final	l Exan	n, M7	Г-N	Aid 7	Terr mata	n Exa	m) uiva	lence	and		
langua Greiba	rsion of deterministic and nondetern ages, the pumping lemma; Context-free ach Normal Form, Pushdown automata; Curing machines, combining Turing mach	e language Turing Ma	: Contex achines:	t free basic	e gran mach	nma nine	ars, es, co	Cho onfig	omsky gurati	noi on, e	mal comp	form, uting		
SKIL	L MAPPING													
	Course Learning Outcome	1	PH 2 3	ROGR		OU 6		OME 8	<u> </u>	D) 10	11	12		
No.	Course Learning Outcome	1	- J	+	5	U	'	0	/	10	11	14		
No. CO1	Identify the mathematical foundations		М											

CO3	pushdown aut	xt free grammar and omata for context free		Н									
CO4		uring machines and e limits of algorithmic			М								
CO5	Develop the communication skill by												
	h, M- Medium,		_										
		R CO-PO MAPPING		r									
Mapping	g Level	A (1 1 (111			icatio		.1			1	6 6	1.0	<u> </u>
CO1-PO2	2 Medium	As the graduates will have computation models.		•						-			
CO2-PO	3 High	As the graduates will hav different regular language	meeting	speci	fic ne	eds (of th	le la	ngu	age.	•		
CO3-PO	3 High	As the graduates will h automaton for different language.	context	free	langu	age	mee	eting	g sp	ecifi	c nee	ds o	f the
CO4-PO4	4 Medium	for illustrating it using Tu	Graduates will have to research thoroughly to find out solvability of any algorithm for illustrating it using Turing Machines.										
CO5- PO10	As the graduates will have to present on some topic of theory of computation, it												
TEACHING LEARNING STRATEGY													
Teaching and Learning Activities								Engagement (hours)					
	Face Learning												
	Lecture Practical / Tuto Student-Centre										42		
	cted Learning												
	Non-face-to-fa	ce learning									42		
	Revision								21				
	Assessment Pro	eparations									21		
	Continuous As	sessment									2		
	Final Examinat	~ - ~ ~ ~									3		
Total											131		
	ING METHO												
		Co-operative and Collabor	ative Met	hod,	Probl	lem I	Base	d M	letho	od			
COURS	E SCHEDULE									1	A		and 1
Week	Lectur			pics								essm ethod	
1	Lec 1 Automata, Computability, and Complexity, Mathematical Notation and Terminology, Sets												
2	Lec 4 Lec 5 Lec 6	Finite Automata Formal Definition	of a Finit	e Aut							Clas	s Tes	st 1
3	Lec 7 Lec 8 Lec 9	Designing Determi	nistic Fin			ata							
4	Lec 9 The Regular Operations						s Tes	st 2					

	T 10		1	
_	Lec 13	Nondeterminism		
5	Lec 14	Equivalence of NFAs and DFAs		
	Lec 15	Closure under the Regular Operations		
	Lec 16	Regular expressions		
6	Lec 17	Formal definition of a regular expression		
	Lec 18	roman deminition of a regular expression		
	Lec 19	Nonregular Languages,		
7	Lec 20	The Pumping Lemma for Regular Languages.		
	Lec 21	The Fullping Lemma for Regular Languages.		
	Lec 22	Context-Free Languages		
8	Lec 23	Context-Free Grammars		
	Lec 24	Formal Definition of CFG		
	Lec 25	Examples of CEC Designing CEC	Mid Term	
9	Lec 26	Examples of CFG, Designing CFG	Exam	
	Lec 27	Ambiguity	Exam	
	Lec 31	Chamalay Normal Form I		
10	Lec 32	Chomsky Normal Form I		
	Lec 33	Chomsky Normal Form II		
	Lec 28	Pushdown Automata		
11	Lec 29	Formal Definition of a Pushdown Automaton		
	Lec 30	Examples of Pushdown Automata.		
	Lec 34	Non-context-free languages		
12	Lec 35	The pumping lemma for context-free languages and		
	Lec 36	proofs	Class Test 2	
	Lec 37	Turring Mashings Formal Definition of a	Class Test 3	
13	Lec 38	Turning Machines, Formal Definition of a		
	Lec 39	Turing Machine, Examples of Turing Machines.		
	Lec 40	Desidebiliter desideble languages		
14	Lec 41	Decidability, decidable languages,		
	Lec 42	Decidable problems concerning Regular languages		

ASSESSMENT STRATEGY

			CO	Please Tevenemy
Comp	oonents	Grading	CO	Blooms Taxonomy
			CO1	C3, C5
	Test 1-3	20%	CO2	C4, C6
Continuous			CO3	C4, C6
Assessment (40%)	Class Participation	5%	CO5	A2
	Mid term	15%	CO2	C4, C6
	Mid term	13%	CO3	C4, C6
			CO1	C3, C5
Einal	Exam	60%	CO2	C4, C6
Filla	Exam	00%	CO3	C4, C6
			CO4	C2, C4
Total	Marks	100%		

(CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

REFERENCE BOOKS

- 1. Introduction to the Theory of Computation, 3rd edition, 2012- Michael Sipser.
- 2. Introduction to Automata Theory, Languages, and Computation. Addison-Wesley Longman Publishing Co., Inc., 3rd ed., 2008 J. E. Hopcroft, R. Motwani, and J. D. Ullman.
- 3. Elements of the Theory of Computation. Upper Saddle River, NJ, USA: Prentice Hall PTR, 2nd edition, 1997- H. R. Lewis and C. H. Papadimitriou.

REFERENCE SITE

EECE-269: Electrical Drivers and Instrumentation

Course	e Code	: EECE-269	Lecture Co	ntact H	ours	:	3.00
Cours	e Title	: Electrical Drivers and Instrumentation	Credit Hou				3.00
PRE-]	REQUIS						
	e Code: E						
Course	e Title: El	ectrical Circuit Analysis					
CURF	RICULUI	M STRUCTURE					
Outco	me Based	Education (OBE)					
RATI	ONALE						
princij measu	ples, char rement ar	burse is designed with the basic contents racteristics and applications.Students with and instrumentation techniques, data condition applications.	ill also be a	ble to	learn	differ	ent electrica
OBJE	CTIVE						
		e the operating principle and construction motor generator	al details of e	energy	conver	sion de	vices such a
tra 2. To 3. To di 4. To	ansformer o develop o impart ifferent m	e the operating principle and construction , motor, generator. understanding on practical use of energy c the knowledge of the basics of electrica ethods of measurement. the ability to analyse typical measurement	onversion devi al measuremer	ices. nt syste	em cor	nponent	ts along wit
tra 2. To 3. To di 4. To m	ansformer o develop o impart ifferent mo o develop netrics.	, motor, generator. understanding on practical use of energy c the knowledge of the basics of electrica ethods of measurement.	onversion devi al measuremer	ices. nt syste	em cor	nponent	ts along wit
tra 2. To 3. To di 4. To m	ansformer o develop o impart ifferent mo o develop netrics. RNING O	r, motor, generator. understanding on practical use of energy c the knowledge of the basics of electrica ethods of measurement. the ability to analyse typical measurement	onversion devi al measuremer	ices. at syste	em cor	nponent	ts along wit
tr: 2. T 3. T di 4. T m LEAF	ansformer o develop o impart ifferent mo o develop netrics. XNING O (Upon o Be profin generato	r, motor, generator. understanding on practical use of energy of the knowledge of the basics of electrical ethods of measurement. the ability to analyse typical measurement UTCOMES & GENERIC SKILLS Course Outcome completion of the course, the students will be	onversion devi al measuremer nent data obta Bloom's	ices. at syste	em cor and de	mponent termine	ts along wit performanc Assessmer
tra 2. To 3. To di 4. To m LEAR	ansformer o develop o impart ifferent mo o develop tetrics. RNING O (Upon o Be profin generato demons Be capa measure	r, motor, generator. understanding on practical use of energy of the knowledge of the basics of electrical ethods of measurement. to the ability to analyse typical measurement UTCOMES & GENERIC SKILLS Course Outcome completion of the course, the students will be able to) cient to describe the operating principles of r, motor and transformer and be able to trate the practical application. ble to understand the basics of electrical	onversion devi al measuremer nent data obta Bloom's Taxonomy	ices. at syste	em cor und de CA	nponent termine KP	ts along wit performanc Assessmer Methods

COURSE CONTENT

Introduction: Three phase circuits, alternators and transformers, principles & operation of DC Machines, synchronous, induction, universal and stepper motors, thyristor and microprocessor-based speed control of motors;

Instrumentation amplifiers: Differential, logarithmic, and chopper amplifiers, frequency and voltage measurements using digital techniques, recorders and display devices, spectrum analyzers and logic analyzers, data acquisition and interfacing to microprocessor-based systems;

Transducers: Terminology, types of transducers, principles and applications of photovoltaic, piezoelectric, thermoelectric, variable resistance and opto-electronics transducers. Noise reduction in instrumentation;

SKILL	MAF	PPING													
	1			r —											
No.		Course Learni	ng Outcome					-				ES (l			
	D			1	2	3	4	5	6	7	8	9	10	11	12
	-	-	cribe the operating												
CO1		ciples of gener	rator, motor and e to demonstrate the	Μ											
		tical application.	e to demonstrate the												
	_		stand the basics of												
		rical measurem													
CO2			ristics and different	Η											
		surement methods.													
002	Be a	adept in analyzin	g measurement data	тт											
CO3			asurement systems	Η											
(H – Hi	gh, M	- Medium, L-low)												
JUSTII	FICA'	TION FOR CO-	PO MAPPING												
Mappi	ing	Level					istifio								
CO1-P	201	Medium	Breadth and dept	th of	f kn	owle	dge	will	be	ach	ieve	ed pa	artiall	y th	roug
2011	J 1	meanain	describing operatin												
CO2-P	001	Uigh	Breadth and depth												
CO2-P	01	High	generator, motor problems	and	uar	18101	шег	10	SOIV	ະຫ	e r	cai-li	ne e	ngine	ent
000 F		-	Breadth and depth	of k	now	ledge	e wil	be	achi	eved	thr	ough	exnl	ainin	g an
CO3-P	01	Low	defining different i										P1		ر
ГЕАСИ	HING	LEARNING ST	TRATEGY												
		Learning Activit	ies								F	Engag	gemei	nt (ho	urs)
Face-to		Learning													
	Lect	ture etical / Tutorial / S	tudio										42	2	
		lent-Centred Lear											-		
			ining										-		
Self-Di		Learning													
		-face-to-face lear	nıng										42		
		ision essment Preparati	ons										21 21		
- 1			0115										21		
Formal	Asses	ssment											2		
		tinuous Assessme	ent										3		
Fotal	Fina	ll Examination											12	1	
	HING	METHODOLO	GY										13	1	
			berative and Collabor	ative	Met	hod,	Prot	lem	Base	ed M	letho	od.			
COUR	SE SC	CHEDULE													
We	ek		Тор	ics										smer	
Wee	k 1		DC Ger	erat	or								Met	hods	
Clas		(Overview of Electrica			conv	ersio	n							
Clas			ion to DC generator						atior	1		1			
Clas			Commutation princ]			
Wee			DC Ger	ierat	or										
Clas			struction of DC gene												
Clas			vinding and wave wi							1		_			
Clas		Emt equation	of DC generator and DC M			nath	emat	ical p	probl	lems		-			
Wee	КЭ		DC M	lotor	-							1			

Class 7	Construction and operating principle of DC motor	~ ~ ~
Class 8	Flemings right hand rule and left-hand rule, conversion of energy	Class Test 1
Class 9	Differences between DC generator and DC motor	
Week 4	DC Motor	
Class 10	Back emf and related equations for DC motor	
Class 11	Speed control, Torque –speed characteristics of different types DC	
<u>Class</u> 12	motors.	
Class 12	Related mathematical problems of DC motor Transformer	Class Test 2
Week 5		Clubs 105t 2
Class 13	Introduction to Transformer and its principle of operations	
Class 14	Types of transformer and ideal characteristics	
Class 15	Equivalent circuit of Transformer	
Week 6	Transformer	
Class 16	Vector diagrams of transformer under different conditions	
Class 17	Mathematical problems of Transformer	
Class 18	Losses in transformer and their explanations	
Week 7	Synchronous Generator	
Class 19	Synchronous Generator: Operating principle	
Class 20	Excitation systems of Synchronous Generator	
Class 21	equivalent circuit of synchronous Generator	
Week 8	Instruments & Measurement overview	
Class 22	Introduction on Measurement and instrumentation	
Class 23	Basic requirements, significance and methods of measurement.	
Class 24	Functional elements of a generalized measurement system and	
XX 1 0	classification of instruments.	
Week 9	Transducers	
Class 25	Transducers: Introduction, advantage of using Electrical Transducers	
Class 26	. Resistance, Inductance and Capacitive transducer	
Class 27	Hall effect transducer and Optical transducer.	
Week 10	Transducers	
Class 28	Thermocouple, Resistance Temperature Detector and Thermistor.	
Class 29	Thermal Imaging- Applications, Measurement of Strain	
Class 30	Measurement of Force (piezoelectric sensors) and Torque.	Mid Term Exar
Week 11 Class 31	Noise Performance Analysis	
Class 51	Noise in a measurement system: Typical source of noise in a	
Class 32	measurement system. Types of noise in measurement system- Electromagnetic Interference,	
C1035 52	Inductive and Capacitive coupling.	
Class 33	Techniques for compensation of noise: Shielding, Filtering and Ground	
C1035 55	isolation.	
Week 12	Signal Conditioning	
Class 34	Overview of signal conditioning: Noise elimination and compensation,	
	Amplification, Linearization.	
Class 35	Different methods in use: $A D$ and $D A$ conversion for suitable output	
	devices and data acquisition.	
Class 36	A\D converters: Basics, techniques- parallel/flash, single slope (ramp),	
	successive approximation, sample and hold circuit	
Week13	Instrumentation Amplifiers	Class Test 3
Class 37	Different instrumentation amplifier, Operation amplifiers	
Class 38	Application of amplifiers, filters for signal conditioning	
Class 39	Data Acquisition system: Microprocessor and embedded system	
	applications.	
Week 14	Data Transmission, Telemetry and Data Presentation	
Class 40	Current, Voltage and Frequency telemetry. Telemetry Applications	
Class 41	Various types of display devices and their interfacing and applications	
Class 41		

ASSESSMEN	Г STRATEGY			
Co	omponents	Grading	CO	Bloom's Taxonomy
Continuous	Class Test &	20%	CO 1	C3
Assessment	Assignment 1-3	20%	CO 2	C6
	Class Participation	5%	CO 2	C6
(40%)	Mid term	15%	CO3	C3
Fi	nal Exam	60%	CO 1	C6
To	otal Marks	100%		

(CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

REFERENCE BOOKS

1. Electrical Machinery Fundamentals- Stephen J Chapman

2. A Textbook of Electrical Technology - B.L Theraja

- 3. A Course in Electrical and Electronic Measurements and Instrumentation by A. K. Sawhney
- 4. Electronic Instruments and Instrumentation Technology', by M. M. S. Anand

REFERENCE SITE

EECE-270: Electrical Drives and Instrumentation Sessional

COURSE INFO	ORMATION					
Course Code Course Title	: EECE-270 : Electrical Drives and Instrumentation		e Conta	act Hour		.00 hrs in ernbative wk
Course Thie	Sessional		Hours		: 0.	
PRE-REQUISI	TE					
Course Code: El	ECE 269 ectrical Drives and Instrumentation.					
	A STRUCTURE					
Outcome Based	Education (OBE)					
RATIONALE						
their theoretical	his course is targeted to verify the pro- knowledge. Our aim is to give the stud- burse is also designed to give the st	lents the basic	idea of	how the	se machi	ines fit in large
OBJECTIVE						
alternator et					•	
	e various parameters of machines lil nder various load conditions and comp		ulation	, efficier	ncy etc.,	observe their
-	ne basic knowledge of electrical contro	•				
i	ractical knowledge on electrical machi	ne crafting and	develo	p collab	orative I	earning skill.
COURSE OUT	COMES & GENERIC SKILLS	Γ	1			
No. (Upor	Course Outcomes a completion of the course, the students will be able to)	Bloom's Taxonomy	СР	CA	KP	Assessment Methods
CO1 Compute ficier	5 5	Р3		1	2	R, Q, LT

	transformer, alternator, dc motor etc. and justify these characteristics under various loading condition.					
CO2	Identify the characteristics of electrical machines like dc generator, dc motor etc. and trace various curves like armature voltage vs. armature current curve for dc generator or torque-speed curve of dc motor.	P4	1	1	1,3,6	R, Q, LT
CO3	Apply the basic idea of control system through the controlling of water level and water flow by feedback transducer.	P4	1	1	3,6	R, Q, LT
CO4	Perform project task and design electrical machine adapting to requirement.	P6	1	1,3,5	5	LT, PR, Pr

(CP- Complex Problems, CA-Complex Activities, KP-Knowledge Profile, T – Test ; PR – Project ; Q – Quiz; ASG – Assignment; Pr – Presentation; R - Report; F – Final Exam)

COURSE CONTENT

In this course, students will perform experiments to practically verify the theories and concepts learned in EECE 269 using different hardware equipment and simulation software.

SKILL MAPPING

No.	Course Outcome			I	PRO	GRA	.M (DUT	CON	MES	(PO)		
INO.	Course Outcome	1	2	3	4	5	6	7	8	9	10	11	12
CO1	Compute the voltage regulation and efficiency of electrical machine, like transformer, alternator, dc motor etc. and justify these characteristics under various loading condition.									Н			
CO2	Identify the characteristics of electrical machines like dc generator, dc motor etc. and trace various curves like armature voltage vs. armature current curve for dc generator or torque-speed curve of dc motor.					М							
CO3	Apply the basic idea of control system through the controlling of water level and water flow by feedback transducer.									Н			
CO4	Perform project task and design electrical machine adapting to requirement.										М		

(H-High, M-Medium, L-low)

JUSTIFICATION FOR CO-PO MAPPING

Mapping	Level	Justificati	ions
CO1-PO9	High	Students will function effectively as a or leader in diverse teams thro electrical machines performance.	
CO2-PO5	Medium	Level of understanding of the approachieved through working with the devi	
CO3-PO9	High	While designing electrical machine, the and team management.	ey will learn about individual role
CO4-PO10	Medium	Communication skills will improve, project.	while presenting the designed
TEACHING LEAR	NING STR	ATEGY	
Teaching and Learni	ng Activities		Engagement (hours)
Face-to-Face Learnin	ıg		

Lectur	e			7
Practic	cal			14
Self-Directed L	earning			-
Prepar	ation of Lab Rep			3
	ation of Lab Tes			3
	ation of presenta	tion		2
	ation of Quiz	Projects		3 10
Formal Assess	ement in Group	rojecis		10
	uous Assessmen	t		7
	Examination	•		1
Total				50
TEACHING M	1ETHODOLOG	θY		
Lecture followe Based Method.	ed by practical e	xperiments and o	discussion, Co-operative a	and Collaborative Method, Projec
COURSE SCH	IEDULE			
Week			Topics	
Week 1, 2	-		regulation of the Transform	
Week 3, 4	Expt-02:	Study the prope	rties of DC self and separa	ately excited shunt generator.
Week 5, 6	Expt-03: efficiency		characteristics of DC shun	t motor & calculating the
Week 7, 8	Expt-04:	Study the proper	rties of Three-Phase Altern	nator in various loads.
Week 9, 10	Expt-05:	Flow rate contro	ol of water by feedback tra	nsducer
Week 11, 12	Expt-06:	Water level con	trol by feedback transduce	er.
Week 13, 14	Lab Test,	Quiz, Project P	resentation and viva	
ASSESMENT	STRATEGY			
Comp	onents	Grading	СО	Bloom's Taxonomy
	Lab		CO1	P3
	Participation	20%	CO2	P4
Continuous	and Report		<u>CO 3</u>	P4
Assessment	Lahtast	200/	CO1 CO2	P3
(40%)	Labtest	30%	CO 3	P4 P4
	Project and	07 0/		
	Presentation	25%	CO4	P6
			CO 1	P3
Lab	Quiz	25%	CO 2	P4
		1000/	CO 3	P4
	Marks	100%	nain D - Davahamatar D	omain, A = Affective Domain)
REFERENCE		Cogmuve Don	nam, r = r sycholiotor D	omani, A = Anecuve Domain)
	Machinery Funda	montale Starks	n I Chanman	
	nachinery and Ti	-	1	
	nachines- Samar		IIIG 12. IX050 W.	
	k of Electrical Te		Theraja.	
			- Jack Rosenblatt & Friedr	nan
REFERENCE				

LANG-202: Communicative English - II

	RSE INFO	ORMATION						
	e Code	: LANG-202		Contact Hours	8	: 3.00		
	e Title	: Communicative English - II	Credit H	lours		: 1.50		
	REQUIS							
	e Code: E e Title: C	NG -102 ommunicative English – I						
CURI	RICULU	M STRUCTURE						
Outco	me Based	Education (OBE)						
RATI	IONALE							
intera	ctive and v	nic purposes especially in readin will involve individual, pair and ructive feedback on students' or	group work	k. In addition,				
OBJE	ECTIVE							
		English language skills to commen students' presentation skills.	numicate ef	rectively and p	profess	ionally.		
		competency in academic reading	g and writi	ng.				
3. T	o develop			ng.				
3. T	o develop	competency in academic reading	ILLS	ng. Bloom's Taxonomy	СР	СА	КР	Assessment Methods
3. Т LEAH	o develop RNING O (Upon c Understa	Course Learning Outcome completion of the course, the student able to) and the techniques of academic ecome acquainted with	ILLS ts will be	Bloom's	СР 1	CA	КР 1	
3. T LEAH No.	o develop RNING O (Upon o Understa and b vocabula Understa writing s	competency in academic reading UTCOMES & GENERIC SKI Course Learning Outcome completion of the course, the student able to) und the techniques of academic ecome acquainted with uries und the techniques of effective uch as research article/report wr	ts will be c reading technical academic titing	Bloom's Taxonomy	-	CA		Methods
3. T LEAH No. CO1	o develop RNING O (Upon o Understa and b vocabula Understa writing s Commu possible work	competency in academic reading UTCOMES & GENERIC SKI Course Learning Outcome completion of the course, the student able to) and the techniques of academic ecome acquainted with aries and the techniques of effective	ILLS ts will be c reading technical academic citing shortest d research	Bloom's Taxonomy C2	-	CA 2	1	Methods ASG, Q

(CP- Complex Problems, CA-Complex Activities, KP-Knowledge Profile, T – Test; PR – Project; Q – Quiz; ASG – Assignment; Pr – Presentation; R - Report; F – Final Exam, MT- Midterm Exam)

COURSE CONTENT

Reading: Reading Comprehension - Practice using different techniques, Academic reading - comprehension from departmental or subject related passages, Vocabulary for Engineers (some common Engineering terms for both general and dept specific), reading subject specific text to develop vocabulary; **Writing:** Writing semi-formal, Formal/official letters, Official E-mail, Applying for a job - Writing Cover Letter and Curriculum Vitae, Statement of Purpose (SOP) writing, Proposal Writing: writing steps, principles and techniques, outlining, revising, editing, proofreading; Report writing, article writing: comparison-contrast and cause – effect, argumentative and opinion expression, assignment writing; Analyzing and describing graphs or charts Practicing analytical and argumentative writing;

Speaking: Public Speaking: Basic elements and qualities of a good public speaker, Set Speech: How to get ready for any speech, Individual / Group presentation: How to be ready for presentation, prepare script for good speech, preparing powerpoint slides, etc. Selected books/Selected stories for presentation;

Listening: Listening to long lecture on some topics, Listening and understanding speeches/lectures of different accent;

	MAPP	ING													
						PI	ROG	RAM	101	JTC	OM	ES (F	PO)		
No.		Course L	earning Outcome	1	2	3	4	5	6	7	8	9	1 0	1 1	1 2
CO1	reading		techniques of academic ecome acquainted with laries	Н											
CO2	acaden		techniques of effective ng such as research iting	Н											L
CO3	Comm shortes	unicate	effectively within the e time to present any									М	Н		
CO4	Analyz and i	ze any pro interpret	blem critically, analyze data and synthesize rovide valid conclusions		М		М						Н		
(H – Hi	gh, M- N	Medium, I	L-low)												
JUSTII	FICATI	ON FOR	CO-PO MAPPING												
Mapp	oing	Level				Justi	ficati	ions							
CO1-PO	D1	High	Obtain the basic knowle	dge o	of aca	adem	ic rea	ading	g and	l tec	hnic	al vo	cabul	laries	5.
CO2-PC	D1	High	Gather deep knowledge	of th	e tec	hniq	ues ir	nvolv	ing	acad	lemi	c arti	cle w	ritin	g.
CO-2-P	012	Low	Apply this skill in acade	mic	fields	s thro	oughe	out th	e en	tire	life.				
CO3-PO	09	Medium	Communicate in a team	and	adapt	: with	n the	dive	sity	ofh	numa	an na	ture.		
CO3-PO	D10	High	Build string communica	tion	skills	with	nin sh	ortes	st po	ssib	le ti	me.			
CO4-PO	02	Medium	Able to analyse the com	plexi	ity of	a cri	itical	situa	tion	and	der	ive so	olutio	n.	
CO4-PO	D4	Medium	Able to investigate throuproblem.	ugh t	he pr	oble	m to	achi	eve	a be	tter	undei	stanc	ling (of tł
CO4-PO	D10	High	Able to communicate w	ith pe	eople	to p	rovid	le a s	ignit	ficar	nt co	nclus	ion.		
TEACH	HING L	EARNIN	G STRATEGY												
	0	earning A	ctivities								E	engag	emer	nt (ho	ours
Face-to-	-Face Le Lectur	0													
			ial / Studio										42		
			Learning										42		
Self-Di	rected L		. ·												
	Non-fa Revisi	ce-to-face	e learning										-		
		ment Prep	parations										-		
Formal	Assessn														
		uous Asse Examinatio											4		
Total	i illai E								- 88						
	HING M	IETHOD	OLOGY												
-	and Dis	cussion, C	Co-operative and Collabor	ative	Met	hod,	Prob	lem l	Base	d M	letho	od			
		EDULE													
Lecture	SE SCH														
Lecture		Class			Тор	ic								Rm	ks

	x 1 0		
2	Lab 2	Academic reading: comprehension from departmental or subject	
2		related passages	
	Lab 3	Vocabulary for Engineers (some common Engineering terms for	
3		both general and dept specific)	
		Reading subject specific text to develop vocabulary	
	Lab 4	Writing court formed Formed/official latters Official E mail	
4		Writing semi-formal, Formal/official letters, Official E-mail	
		Applying for a job: Writing Cover Letter and Curriculum Vitae	
_	Lab 5	Statement of Purpose (SOP) writing: writing steps, principles and	
5		techniques, outlining, revising, editing, proofreading;	
	Lab 6	Proposal writing: writing steps, principles and techniques,	
6	Lab 0	outlining, revising, editing, proofreading;	
	Lab 7		
	Lau 7	Report writing: comparison-contrast and cause – effect,	
7		argumentative and opinion expression, assignment writing;	
		Article writing: comparison-contrast and cause – effect,	
-		argumentative and opinion expression, assignment writing;	
8	Lab 8	Analyzing and describing graphs or charts	
9	Lab 9	Practicing analytical and argumentative writing	
1.0	Lab 10	Public Speaking: Basic elements and qualities of a good public	
10		speaker	
11	Lab 11	Set Speech: How to get ready for any speech.	
11			
	Lab 12	Individual / Group presentation: How to be ready for presentation,	
12		prepare script for good speech, preparing power point slides, etc.	
		Selected books/Selected stories for presentation.	
13	Lab 13	Listening to long lecture on some topics	
14	Lab 14	Listening and understanding speeches/lectures of different accents	
	1		

ASSESSMENT STRATEGY

Com	ponents	Gradin g	СО	Blooms Taxonomy
Cantinuana	Class Participation	20%	CO1, CO2, CO4	C2, C3
Continuous Assessment	Reading Test	15%	CO1, CO2	C2
(40%)	Listening Test	15%	CO1, CO3, CO4	C2, C4, C3
(4070)	Public Speaking	20%	CO2, CO3, CO4	C2, C3, C4
Group P	resentation	30%	CO1-CO4	C2,C3,C4
Tota	l Marks	100%		

(CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain) REFERENCE BOOKS

1. Jones, L. (1981). Functions of English. (Student's Book, 2nd Ed.) Melbourne, Australia: Cambridge University Press.

2. Dixon, R.J. (1987). Complete course in English. (Book 4). New Delhi, India: Prentice Hall of India. (For book presentation)

3. Langan, J. (2005). College Writing Skills with Readings (6th Ed). McGraw-Hill Publication

4. Interactions 1 (Reading), John Langan, Latest edition, McGraw-Hill Publication

5. Headway Series – Advanced Level (2 parts with CDs): Oxford University Press Ltd.

6. Speak like Churchill stand like Lincoln - James C. Humes

7. Cambridge IELTS Practice Book

8. Selected Sample Reports and Selected Research Articles

REFERENCE SITE

MATH-205: Differential Equations, Laplace Transform and Fourier Transform

	SE INFORMATION			_					
Course Course		e Trans	form and		ure Cor lit Hour	ntact Ho 's	urs	: 3.00 : 3.00	
PRE-F	REQUISITE								
	Code: Nil Title: Nil								
	ICULUM STRUCTURE								
	ne Based Education (OBE)								
This co Equation this con	DNALE burse is designed to teach the students th on, Laplace Transform and Application urse is to develop the analytical and prac- urier Analysis.	n of Fo	ourier Analysis i	in Engi	neering	probler	n. Tł	ne aim of	
OBJE	CTIVE								
 To provide a physical interpretation of the Differential Equations and Laplace Transform. To explain the characteristics of Ordinary Differential Equations and Laplace Transform. To apply Laplace and Fourier Transform in solving complex problems. To use differential operations for simplification of complex engineering expressions 									
LLAN	NING OUTCOMES & GENERIC SK	ILLS			1	T			
No.	Course Learning Outcome (Upon completion of the course, the stude will be able to)	ents	Bloom's Taxonomy	СР	CA	KP		sessment lethods	
CO1	Identify differential equations of va types and recognize the basic properti Laplace and Fourier transform.	ies of	C1-C2	1		1, 3	, 3 T, F		
CO2	Interpret the classifications of difference equations and estimate the technique Laplace transform and Fourier transfor some elementary function.	ue of rm of	C2	1		3	T,	MT, F	
CO3	Solve different types of difference equations and apply Laplace transfor Ordinary Differential Equation and For as well as Inverse Fourier transformake use of boundary value problem. Engineering fields	rm to ourier rm to	C3	1,3		3	МТ	F, ASG	
	omplex Problems, CA-Complex Activitie ASG – Assignment; Pr – Presentation; R							Q –	
COUR	SE CONTENT								
Difference second factorize function and its first on Equation initial	ential Equations (DE): Introduction and ential Equation (ODE), first order but hig and higher order, Euler's homogeneous zation, Application of ODE, Frobenious ns, Legendre's polynomial, Power series application to engineering problem, For- order Partial Differential Equation (PDE on of second order with variable coeffici- condition, Integral surface passing thro	ther deg us linea method s solution mation c), Stan ents, w pugh gi	gree DE and also ar DEs, Soluti ds, Differential e on of DE and th of partial differ dard form Line ave equation, particular ven curve, Nom	o by va on of equation heir app rential e ear Equ articula h-linear	rious m DEs ns of the plication equations ations r solution PDE c	ethods, by met e higher n, Integr s, linear (LE) of ons with of order	gener hods order al for r and f high n bour one,	al LEs of based on , Bessel's m of DE nonlinear ner order, ndary and Charpit's	

Applications of PDE. Laplace Transform (LT): Definition and properties of Laplace transform, Sufficient conditions for existence of Laplace transforms, Laplace transform of some basic functions, LT of derivatives, Unit step

method, Second order PDE and classification to canonical solution, Linear PDE with constant coefficients,

function, Periodic function, Some special theorems on LT, Inverse Laplace transform, Partial fraction, Heaviside expansion formula, Convolution theorem, Evaluation of improper integral, Solution of Differential Equations by LT, Application of LT.

Fourier Transform: Real and Complex form of Fourier Series, Definition and expansion of a function of x in a Fourier Series, Physical application of Fourier Series, Finite Fourier Transform, Fourier Integral, Inverse Fourier transform, Fourier transform and their uses in solving boundary value problems, Diffusion, wave, Laplace Equation

SKILL MAPPING

No.	Course Learning Outcome	PROGRAM OUTCOMES (PO)											
INO.			2	3	4	5	6	7	8	9	10	11	12
CO1	Identify differential equations of various types and recognize the basic properties of Laplace and Fourier transform.	Н											
CO2	Interpret the classifications of differential equations and estimate the technique of Laplace transform and Fourier transform of some elementary function.	Н											
CO3	Solve different types of differential equations and apply Laplace transform to DE and Fourier and inverse Fourier transform to make use of boundary value problems in Engineering fields.	Н											

(H-High, M-Medium, L-low)

JUSTIFICATION FOR CO-PO MAPPING

Mapping	Level	Justifications						
CO1-PO1 High Be able to recognize differential equations of various types and compare the basic properties of Laplace and Fourier transform. For gaining the knowledge of mathematics, science and engineering field.								
CO2-PO1	In order to expound the classifications of differential equations and estimate the							
CO3-PO1	High	In order to analyse basic estimation of solving DE and complex engineering problems using Laplace as knowledge of these fields are required.						
TEACHING	LEARNI	NG STRATEGY						
Teaching and	Learning A	Activities	Engagement (hours)					
Face-to-Face	Learning							
Lect			42					
		rial / Studio	-					
	lent-Centre	d Learning	-					
Self-Directed								
	-face-to-fac	ce learning	42					
	ision		21					
	essment Pre	eparations	21					
Formal Asses			2					
	tinuous Ass		2					
-	al Examinat	10n	3					
Total			131					
TEACHING	METHOI	DOLOGY						
Lecture and I	Lecture and Discussion, Co-operative and Collaborative Method, Problem Based Method							

Week	Lecture	Topics	Assessment Methods
1	Lec 1	Introduction to DE, Formulation of DE, Degree and	
	Lec 2	order of ODE, Solution of first order DE by various	
	Lec 3	methods	
2	Lec 4	Solution of first order DE by various methods, first	
	Lec 5	order but higher degree DE, solution of general LEs of	Class Test 1
	Lec 6	second and higher order, Solution of Euler's	Class Test I
		homogeneous linear DEs	
3	Lec 7	Solution of DEs by methods based on factorization,	
	Lec 8	Frobenious methods – concept and problems	
	Lec 9		
4	Lec 10	Solution of differential equations of the higher order,	
	Lec 11	Bessel's functions, Legendre's polynomial, Power	
	Lec 12	series solution of DE and their application, Integral	
		form of DE and its application to engineering problem	
5	Lec 13	Formation of partial differential equations, linear and	
	Lec 14	non-linear first order PDE, Standard form LEs of	
	Lec 15	higher order, Integral surface passing through given	
		curve	Class Test 2
6	Lec 16	Non-linear PDE of order one, Charpit's method, Linear	
	Lec 17	PDE with constant coefficients	
	Lec 18		
7	Lec 19	Equation of second order with variable coefficients,	
	Lec 20	Second order PDE and classification to canonical	
	Lec 21	solution, wave equation, Application of ODE and PDE	
8	Lec 22	Definition, properties and sufficient conditions for	
	Lec 23	existence of Laplace transforms, Laplace transform of	
	Lec 24	some basic functions, LT of derivatives	
9	Lec 25		
	Lec 26	Unit step function, periodic function, some special	
	Lec 27	theorems on LT, inverse Laplace transform	Mid Term Exa
10	Lec 31	Partial function, Heaviside expansion formula,	
	Lec 32	Convolution theorem	
	Lec 33		
11	Lec 28	Evaluation of improper integral, solution of DE by LT,	
	Lec 29	Application of LT	
	Lec 30		
12	Lec 34	Real and complex form Fourier series, definition and	
	Lec 35	expansion of function of x in a Fourier series, physical	
	Lec 36	application of Fourier series	
13	Lec 37	Finite Fourier series, Fourier integral, inverse Fourier	
10	Lec 37 Lec 38	series	Class Test 3
	Lec 38		
14	Lec 40	Fourier transform and their uses in solving boundary	
17	Lec 40 Lec 41	value problems, Diffusion, wave, Laplace equation	

ASSESSMENT STRATEGY

Comr	oonents	Grading	СО	Blooms Taxonomy
•	Test 1-3	20%	CO1, CO2	C1, C2
Continuous Assessment	Class	F 0/	CO2	<u> </u>
(40%)	Participation	5%	CO3	C3
	Mid term	15%	CO2, CO3	C2, C3

		CO 1	C1, C2
Final Exam	60%	CO 2	C2
		CO 3	C3
Total Marks	100%		

(CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

REFERENCE BOOKS

Ordinary and Partial Differential Equations (18th)- M.D.RAISINGHANIA.
 Differential Equations (3rd)- Shepley L. Ross.
 Differential Equations by Glen R. Hall.
 Theory and problems of Laplace Transform, Schaum's outlines series, Murray R. Spiegel.

REFERENCE SITE

LEVEL-2 FALL TERM

CE-250: Engineering Drawing & Cad Sessional

COUR	COURSE INFORMATION												
Course Course		iomol				Lectu			ict H	lour	S	: 3.00	
	Title : Engineering Drawing & Cad Sess EQUISITE	Ional				Credi	по	urs				: 1.50	<u> </u>
	Course Code: Nil												
	Course Title: Nil												
CURR	CURRICULUM STRUCTURE												
Outcom	Outcome Based Education (OBE)												
RATIC	RATIONALE												
	This course is designed to give a clear picture of all things in a construction site to an engineering student by drawing different geometric view of landscape and other site details												
OBJEC			nei	site u	etan	5							
	understand views of simple objects in free	space											
	apply the knowledge to draw sectional actures by hand and AutoCAD.	view,	pla	an vie	ew a	nd e	leva	tion	of	vari	ous	object	s and
LEAR	NING OUTCOMES & GENERIC SKILI	LS											
No.	Course Learning Outcome (Upon completion of the course, the students will b to)	(Upon completion of the course, the students will be able			om's nom		СР	C.	A	KP		Assess Meth	
CO1	Understand 2D and 3D views of simple of	nd 2D and 3D views of simple objects.		C2			2	1		4	А	Clas Ssessi ASG	ment, , Q
CO2	Apply the knowledge to draw sectional plan view and elevation of various objec structures by hand and AutoCAD.			C	23	2 1		4	А	Class Assessment, ASG, Q			
	omplex Problems, CA-Complex Activities, SG – Assignment; Pr – Presentation; R - Re						T – '	Test	; Pl	R – 1	Projec	ct;Q	_
COUR	SE CONTENT												
their use Geome	ering Drawing & CAD Sessional Introdu e; tric view: Sectional views and isometric of one-story building, Detailed drawing of	view	s of	solic	l geo	ometr	rical	figu	ure,	Pla	n, Ele		
SKILL	MAPPING												
				PI	<u>80</u> G	RAN	101	ITC	OM	ES ((PO)		
No.	No. Course Learning Outcome PROGRAM OUTCOMES (PO) 1 2 3 4 5 6 7 8 9 10 11 12							12					
CO1	Understand 2D and 3D views of simple objects.	Н											
CO2	Apply the knowledge to draw sectional												

(H – High, M- Medium, L-low)

JUSTIFICAT	TION FOR CO-	PO MAPPINO	G:
Mapping	Level		Justifications
CO1-PO1	High	views of diff	depth of knowledge will be achieved through understanding erent object in 2D and 3D space.
CO2-PO2	High		vill able compare between different elevations of objects ying drawing knowledge of CAD.
TEACHING	LEARNING ST	RATEGY	
	Learning Activit	ies	Engagement (hours)
Face-to-Face	-		12
Lectu	ure tical / Tutorial / S	Studio	12
	ent-Centred Lear		<u> </u>
Self-Directed		0	
	gnment Preparati	on	24
Revi		one	- 03
Formal Asses	ssment Preparati	0115	
Quiz			2
Viva			1
	s Performance		18
Total			60
TEACHING	METHODOLO	OGY	
Power point p	resentation, whit	e board, Refere	ences and lecture notes.
COURSE SC	HEDULE		
Week	Lab		Topics
			on engineering drawing, Various instruments and their use,
1	Lab-1		surement, Concept of 3D view, Difference between
			oblique & isometric view, concept of isometric nic view, home assignment
2	Lab-2		ographic view and problem solving
3	Lab-3		ment, drawing orthographic from isometric and isometric
		from orthog	
4	Lab-4		on of Building
5	Lab-5 Lab-6	Section of B	uilding
7	Lab-0	- CSE Drawin	g
8	Lab-8	AutoCad To	
9	Lab-9	AutoCad To	
10	Lab-10		ols + Isometric Views
<u>11</u> 12	Lab-11 Lab-12		thographic + Sectional views
12	Lab-12 Lab-13	AutoCau Pla	an of Building
13	Lab-14	AutoCad Ele	evation + Section of Building
ASSESSMEN	NT STRATEGY		
Com	nonents	Grading	CO Blooms Taxonomy
	ponents	Grading	CO1 C1
	Quiz	20	CO2 C2
Continuous	Class	10	
Assessment (40%)	Participation	10	CO1 C1
	Assignment/	30	CO2 C2
	Report		

Einal Exam	Lab Test	400/	CO1	C1
Final Exam	Lab Test	40%	CO2	C2
Total	Marks	100%		

(CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

REFERENCE BOOKS

- Civil Engineering Drawing by Gurcharan Singh &Subash Chandra
 Prathomic Engineering Drawing by Hamonto Kumar Bhottacharjo
- Engineering Drawing by Basant Agrawal and C M Agrawal 3.

REFERENCE SITE

CSE-213: Computer Architecture

COURS	COURSE INFORMATION											
Course C	Code	: CSE-213	Lecture Con	tact Ho	urs	: 3.00						
Course T	Title	: Computer Architecture	Credit Hours	3		: 3.00						
PRERE	PREREQUISITE											
	Course Code: CSE-103 Course Title: Digital Logia Design											
	Course Title: Digital Logic Design CURRICULUM STRUCTURE											
Outcome	e Based Ed	ucation (OBE)										
RATIO	NALE											
work. It of program, executab	This course is designed to introduce students to the basic concepts of computers, their design and how they work. It encompasses the definition of the machine's instruction set architecture, its use in creating a program, and its implementation in hardware. The course addresses the bridge between gate logic and executable software, and includes programming both in assembly language (representing software) and HDL (representing hardware).											
OBJEC	ГIVE											
		asic idea about computer architecture nniques of high performance parallel		ms.								
LEARN	ING OUT	COMES & GENERIC SKILLS										
No.		Course Learning Outcome npletion of the course, the students will be able to)	Bloom's Taxonomy	СР	CA	KP	Assessment Methods					
CO1	System,	nd the Overview, Computer Arithmetic and logic, Central g unit and parallel organization	C2	2	-	1	T, F					
CO2	Design, l internal	nd the Computer and Processor Hazards; Exceptions; external and memory Pipeline and multiple r systems.	C2	4	-	3	T, M, F					
CO3	Develop and design an instruction set											
CO4	-	the communication skill by g topics on computer architecture.	A2			5	Q, Pr					
	mplex Prot	olems, CA-Complex Activities, KP-K nment; Pr – Presentation; R - Report					ect ; Q –					

COURSE CONTENT

Fundamentals of Computer Organization and Architecture: Fundamentals of computer Design, Processor Design, Computer Evolution and Performance, Processor Design; Computer Function and Interconnection: overview of computer BUS standards; Multiprocessors: types of multiprocessors, performance, single bus multiprocessors, multiprocessors connected by network, clusters; Cache Memory: Computer Memory System Overview, Cache Memory Principles, Elements of Cache Design, Pentium 4 Cache Organization, ARM Cache Organization; Internal Memory : Memory organization, ARM Cache Organization, cache, Error Correction, virtual memory, channels; Concepts of DMA and Interrupts, Advanced DRAM Organization; External Memory: Magnetic Disk, RAID, Solid State Drives, Optical Memory, Magnetic Tape; Input/ Output: External Devices, I/O Modules, Programmed I/O, Interrupt Driven I/O, Direct Memory Access, I/O Channels and Processors, Thunderbolt and Infini Band; Operating System Support: Operating System Overview, Scheduling, Memory Management, Pentium Memory Management, ARM Memory Management; Number Systems, Computer Arithmetic, Machine Instruction Characteristics, Types of Operands, Types of Operations; Processor Structure and Function; Processor design: datapaths - single-cycle and multi-cycle implementations; Control Unit design: hardwired and micro-programmed; Hazards; Exceptions; Reduced Instruction Set Computers; RISC Processor; Pipeline: pipelined datapath and control, superscalar and dynamic pipelining; Parallel Processing: Instruction-Level Parallelism and Machine Parallelism, Instruction Issue Policy, Register Renaming, Machine Parallelism, Branch Prediction; Superscalar Processors: Superscalar Execution, Superscalar Implementation; Parallel Organization: Multiple Processor Organizations, Symmetric Multiprocessors, Cache Coherence and the MESI Protocol, Multithreading and Chip Multiprocessors, Clusters, Non-uniform Memory Access, Vector Computation.

SKILL MAPPING

No.	Course Learning Outcome			P	ROG	RAN	101	UTC	COM	IES	(PO)		
110.	Course Learning Outcome	1	2	3	4	5	6	7	8	9	10	11	12
CO1	Understand the Overview, Computer System, Arithmetic and logic, Central processing unit and parallel organization	Н											
CO2	Understand the Computer and Processor Design, Hazards; Exceptions; external and internal memory Pipeline and multiple processor systems.		Н										
CO3	Develop and design an instruction set architecture and subsystems of central processing unit.			Н									
CO4	Develop the communication skill by presenting topics on computer architecture.										L		

(H – High, M- Medium, L-low)

(H – Hign, M- Medium, L-Iow)								
JUSTIFICATION FOR CO-PO MAPPING:								
Mapping	Level	Justification	Justifications					
CO1-PO1	High	Increase breadth & depth of knowledge through understanding the structure of computer architectures.						
CO2-PO2	High	Understand and solve various complex problems by analysing processor design, hazards and exceptions.						
CO3-PO3	High	Understand and implement the design issues of instruction set architecture and subsystems of central processing unit.						
CO4-PO10 Low Develop communication skills through participating in quiz, presentation etc								
TEACHING LEARNING STRATEGY								
Teaching and Learni	Engagement (hours)							

Face-to-Face Learning

Lecture

42

Practical / Tutorial / Studio	-					
Student-Centred Learning	-					
Self-Directed Learning						
Non-face-to-face learning	42					
Revision	21					
Assessment Preparations	21					
Formal Assessment						
Continuous Assessment	2					
Final Examination	3					
Total	131					

TEACHING METHODOLOGY

Lecture and Discussion, Co-operative and Collaborative Method, Problem Based Method

COURSE SC	1		· · ·
Week	Lecture	Topics	Assessment Methods
1	Lec 1	Fundamentals of Computer Organization and	
	Lec 2	Architecture: Fundamentals of computer Design,	
	Lec 3	Processor Design	
2	Lec 4	Computer Evolution and Performance, Processor	
	Lec 5	Design	
	Lec 6		Class Test 1
3		Computer Function and Interconnection: overview	
	Lec 7	of computer BUS standards, Multiprocessors: types	
	Lec 8	of multiprocessors, performance, single bus	
	Lec 9	multiprocessors, multiprocessors connected by	
		network, clusters	
4	Lec 10	Cache Memory: Computer Memory System	
	Lec 11	Overview, Cache Memory Principles, Elements of	
	Lec 12	Cache Design, Pentium 4 Cache Organization,	
		ARM Cache Organization	
5	Lec 13	Internal Memory : Memory organization, ARM	1
	Lec 14	Cache Organization, cache, Error Correction,	
	Lec 15	virtual memory, channels; Concepts of DMA and	
		Interrupts, Advanced DRAM Organization	Class Test 2
6	Lec 16	External Memory: Magnetic Disk, RAID, Solid	
Ū	Lec 17	State Drives, Optical Memory, Magnetic Tape	
	Lec 18	Suid Dirves, Optical Memory, Magnetic Fape	
7		Input/ Output: External Devices, I/O Modules,	
,	Lec 19	Programmed I/O, Interrupt Driven I/O, Direct	
	Lec 20	Memory Access, I/O Channels and Processors,	
	Lec 21	Thunderbolt and Infini Band	
8	Lec 21	Operating System Support: Operating System	
0	Lec 22 Lec 23	Overview, Scheduling, Memory Management,	
	Lec 24	Pentium Memory Management, ARM Memory	
	200 2 1	Management	
9	Lec 25	Number Systems, Computer Arithmetic, Machine	1
,	Lec 25 Lec 26	Instruction Characteristics, Types of Operands,	Mid Term Exam
	Lec 20 Lec 27	Types of Operations	
10	Lec 31	Processor Structure and Function; Processor design:	1
10	Lec 31 Lec 32	datapaths, single-cycle and multi-cycle	
	Lec 32 Lec 33	implementations; Control Unit design - hardwired	
	Let 33	and microprogrammed; Hazards; Exceptions;	
11	Lec 28		
11		Reduced Instruction Set Computers; RISC	
	Lec 29	Processor, Pipeline: pipelined datapath and control,	
10	Lec 30	superscalar and dynamic pipelining;	C1
12	Lec 34	Parallel Processing: Instruction-Level Parallelism	Class Test 3
	Lec 35	and Machine Parallelism, Instruction Issue Policy,	
	Lec 36	Register Renaming, Machine Parallelism, Branch	1

		Prediction
13	Lec 37	Superscalar Processors: Superscalar Execution,
	Lec 38	Superscalar Implementation
	Lec 39	
14		Parallel Organization: Multiple Processor
	Lec 40	Organizations, Symmetric Multiprocessors, Cache
	Lec 41	Coherence and the MESI Protocol, Multithreading
	Lec 42	and Chip Multiprocessors, Clusters, Nonuniform
		Memory Access, Vector Computation

ASSESSMENT STRATEGY

Comp	Components		Components Grading		СО	Blooms Taxonomy
	Test 1-3	20%	CO1	C2		
Continuous	Test 1-5	20%	CO2	C2		
Assessment (40%)	Class Participation	5%	CO4	A2		
	Mid term	15%	CO2	C2		
			CO1	C2		
Final	Final Exam		Final Exam 60%		CO2	C2
			CO3	C4, C6		
Total Marks 100%						

(CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

REFERENCE BOOKS

- 1. Computer Organization and Architecture, 9th Edition William Stalling
- 2. Computer Organization and Design, 4th Edition David A Patterson
- 3. Structured Computer Organization, 6th Edition Andrew S. Tanenbaum

REFERENCE SITE

CSE-215: Data Structures & Algorithms II

COURSE INFO	COURSE INFORMATION								
Course Code	: CSE-215	Lecture Contact Hours	: 3.00						
Course Title	: Data Structures & Algorithms II	Credit Hours : 3.00							
PRE-REQUISI	TE								
Course Code: C	Course Code: CSE-101, CSE 105, CSE-203								
Course Title: Di	screte Mathematics, Structured Programming La	nguage, Data structure and Al	gorithm-I						
CURRICULUM STRUCTURE									
Outcome Based Education (OBE)									
RATIONALE									
The course is designed to focus on basic and essential topics in data structures and algorithms, including different types of trees, heap, trie, disjoint set, greedy algorithms, dynamic programming, sorting algorithms, flow networks, string matching algorithms, graph sorting, backtracking, algorithm analysis and approximation algorithms.									
OBJECTIVE									
1. To use the data structures in different types of algorithms									

2.	2. To choose the appropriate algorithm based one scenario and constraints							
LEAF	LEARNING OUTCOMES & GENERIC SKILLS							
No.	Course Learning Outcome (Upon completion of the course, the students will be able to)	Bloom's Taxonomy	СР	CA	KP	Assessment Methods		
CO1	Be familiar with commonly used data structures and algorithms.	C1	1		1	Т		
CO2	Apply required modification and optimization in any data structure and algorithm in common engineering design.	C2-C6	1, 3		1- 3	МТ		
CO3	Illustrate important algorithmic design paradigms and methods of analysis.	C2-C5	1, 3		1- 3	T,F		
CO4	Analyse the running time complexity and correctness of any algorithm.	C2-C4	1		2, 3	F		
CO5	Develop the communication skill by presenting topics on operating systems.	A2		1		Pr		

⁽CP- Complex Problems, CA-Complex Activities, KP-Knowledge Profile, T – Test ; PR – Project ; Q – Quiz; ASG – Assignment; Pr – Presentation; R - Report; F – Final Exam, MT- Mid Term Exam)

COURSE CONTENT

Trees: Heap, Priority Queue, AVL Tree, TRIE; **Set-List:** Disjoint set, Skip List; **Greedy Strategy:** Prim's algorithm, Kruskal's algorithm, Dijkstra's algorithm; **Dynamic Programming:** Bellman Ford's algorithm, Matrix chain multiplication, 0-1 knapsack, Longest common subsequence finding; **String Matching:** KMP algorithm; **Flow network:** Maximum flow problem; Graph Sorting: Directed Acyclic Graph, Topological sorting; **Backtracking:** Map coloring problem, 0-1 Knapsack by branch and bound; **Solving Recurrences:** Algorithm analysis, Master theorem; **Approximation Algorithms:** NP Completeness

SKILL MAPPING

No.	Course Learning Outcome	PROGRAM OUTCOMES (PO)											
INO.	Course Learning Outcome	1	1 2		4	5	6	7	8	9	10	11	12
CO1	Be familiar with commonly used data structures and algorithms.	Н											
CO2	Apply required modification and optimization in any data structure and algorithm in common engineering design.	н											
CO3	Illustrate important algorithmic design paradigms and methods of analysis.		Н										
CO4	Analyse the running time complexity and correctness of any algorithm.	Н											
CO5	Develop communication skills by presenting topics on data structures and algorithms.										L		

(H – High, M- Medium, L-low)

JUSTIFICATION FOR CO-PO MAPPING

Mapping	Level							
CO1-PO1	Н	Increase breadth and depth of knowledge by being familiar with commonly used data structures and algorithms.						
CO2-PO3	Н	Understand and implement the required data structures and algorithms with required modifications based on the scenario.						
CO3-PO2	Н	Analyse and formulate different methods of analysis to illustrate important algorithmic design paradigms.						
CO4-PO2	Н	Analyse the time complexity and correctness of any algorithm by using different analytical approaches						

CO5- PO10	L De	velop communication skills through participating in p	resentation etc.
TEACHING	LEARNING	STRATEGY	
Teaching and I	Learning Activ	vities	Engagement (hours)
Face-to-Face I			
Lectu	42		
	ical / Tutorial / ent-Centred Le		-
Self-Directed I		anning	-
	face-to-face le	arning	42
Revis	sion	-	21
	ssment Prepara	ations	21
Formal Assess	ment nuous Assessi	mont	2
	Examination	nent	3
Fotal	Enterintetion		
			131
FEACHING	METHODOL	.OGY	
Lecture and Di	iscussion. Co-	operative and Collaborative Method, Problem Based	Method
COURSE SCI	1		
Week	Lecture	Topics	Assessment Methods
1	Lec 1 Lec 2	Heap, Priority Queue	
	Lec 2 Lec 3		
2	Lec 4	TRIE, AVL Tree	
	Lec 5	,	
	Lec 6		_
3	Lec 7	Disjoint Set, Skip List	Class Test 1
	Lec 8		
4	Lec 9 Lec 10	Prim's Algorithm, Kruskal's Algorithm	
-	Lec 10 Lec 11	i ini s Algorithin, Kruskar s Algorithin	
	Lec 12		
5	Lec 13	Dijkstra's Algorithm, Bellman Ford Algorithm	
	Lec 14		
6	Lec 15 Lec 16	Fractional Knapsack, 0-1 Knapsack	Class Test 2
U	Lec 10 Lec 17	racuonai Knapsack, 0-1 Knapsack	
	Lec 18		
7	Lec 19	Longest Common Subsequence Finding	1
	Lec 20		
O	Lec 21	Matrix Chain Multiplication	
8	Lec 22 Lec 23	Matrix Chain Multiplication	
	Lec 23 Lec 24		
9	Lec 25	Mergesort, Quicksort	
	Lec 26		
4.0	Lec 27		Mid Term
10	Lec 31	Flow Network	
	Lec 32 Lec 33		
11	Lec 28	Directed Acyclic Graph, Topological Sort,	
	Lec 29	Strongly Connected Components	
	Lec 30		
12	Lec 34	Map Coloring Problem, 0-1 Knapsack by Branch	
	Lec 35	and Bound	Class Test 3
	Lec 36		

13	Lec 37	Algorithm Analysis, Master Theorem								
	Lec 38									
	Lec 39									
14	Lec 40	NP Completeness Approximation Algorithms								
	Lec 41									
	Lec 42									

Comp	oonents	Grading	СО	Blooms Taxonomy
	Test 1-3	20%	CO1	C1
Continuous	10811-5	20%	CO3	C2-C5
Assessment (40%)	Class Participation	5%	CO5	A2
	Mid term	15%	CO2	C2-C6
Final	Evom	60%	CO3	C2-C5
гша	Final Exam		CO4	C2-C4
Total	Total Marks			

(CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

REFERENCE BOOKS

1. Introduction to Algorithms (Third Edition), Thomas H. Cormen

2. Data Structures and Algorithm Analysis in Cpp (Fourth Edition) - Mark Alan Weiss

REFERENCE SITE

CSE-216: Data Structures and Algorithms-II Sessional

COURSE INFORMATION									
Course Code : CSE-216 Lecture Contact Hours : 3.00									
Course Title	e : Data Structures and Algorithms-II Sessional Credit Hours : 1.50								
PRE-REQUISI	PRE-REQUISITE								
Course Code: CS	SE-106								
Course Title: Str	uctured Programming Language Sessional								
CURRICULUM	1 STRUCTURE								
Outcome Based	Education (OBE)								
RATIONALE									

The Data Structure and Algorithm-II course is designed to provide hands on implementation of commonly used data structures and algorithms. The lab begins with the implementation of some commonly used data structures and then covers the implementation of some important algorithms with required modifications and optimizations.

OBJECTIVE

- 1. To implement some commonly used data structures
- 2. To implement some commonly used algorithms with required modifications based on requirements

LEARNING OUTCOMES & GENERIC SKILLS

No.	Course Learning Outcome (Upon completion of the course, the students will be able to)	Bloom's Taxonomy	СР	CA	KP	Assessment Methods
CO1	Understand the implementation of any data structure or algorithm	P1	3	2	1	FT, ASG
CO2	Implement any algorithm from its pseudo code and writing pseudo code from its algorithm	C2	1	3	3	FT, ASG
CO3	Choose appropriate data structure and algorithm at the appropriate scenario	C3,C4	2	5	4	ASG
CO4	Apply changes and modifications in the existing data structures and algorithms to reduce the time and space complexity of any problem	C3-C6	1	3	5	Q

(CP- Complex Problems, CA-Complex Activities, KP-Knowledge Profile, T – Test ; PR – Project ; Q – Quiz; ASG – Assignment; Pr – Presentation; R - Report; F – Final Exam, MT- Mid Term Exam)

COURSE CONTENT

Data Structure: Binary Search Tree, Heap-Priority Queue, TRIE; **Greedy Method:** Prim's Algorithm, Kruskal's Algorithm, Dijkstra's Algorithm; **Dynamic Programming:** Matrix Chain Multiplication, Longest Common Subsequence, 0-1 Knapsack; **Divide and Conquer:** Quick Sort, Merge sort; **Pattern Matching:** KMP Algorithm; **Flow Network:** Ford Fulkerson's Algorithm; **Graph Searching and Sorting:** Topological Sort, Finding Strongly Connected Components; **Backtracking:** 0-1 Knapsack

SKILL MAPPING

No.	Course Learning Outcome		PROGRAM OUTCOMES (PO)										
INO.	Course Learning Outcome	1	2	3	4	5	6	7	8	9	10	11	12
CO1	Understand the implementation of any data structure or algorithm	Н											
CO2	Implement any algorithm from its pseudo code and writing pseudo code from its algorithm		М										
CO3	Choose appropriate data structure and algorithm at the appropriate scenario					Н							
CO4	Apply changes and modifications in the existing data structures and algorithms to reduce the time and space complexity of any problem			Н									

(H – High, M- Medium, L-low)

JUSTIFICATION FOR CO-PO MAPPING

Mapping	Level	Justifications								
CO1-PO1	High	Increase breadth and depth of knowledge by understanding the implementation of any data structure or algorithm								
CO2-PO2	Medium	Improving the skill of analysing a problem by implementing any algorithm from its pseudo code.								
CO3-PO5	High	Increase the level of understanding of the appropriateness of the tool by choosing appropriate data structure and algorithm at the appropriate scenario								
CO4-PO3	High	Understand and implement algorithms for applying required changes and modifications in the existing data structures and algorithms which solutions have previously been identified and coded.								

eaching a	nd Learnin	g Activities			Engagement (hou
ice-to-Fa	e Learning				
	ecture				-
		utorial / Studio			42
		tred Learning			-
	ed Learnin				
	evision	face learning			-
		Preparations			
Formal Ass					
Co	ontinuous A	Assessment			04
Fi	nal Exami	nation			03
otal					49
TEACHIN	G METH	ODOLOGY			
ecture and	l Discussio	on, Co-operative and	l Collaborative Method	l, Problem Bas	ed Method
COURSE	SCHEDU	LE			
Week	Lecture		Topics		Remarks
1	Lab 1	Binary Search T			
2	Lab 2	Heap, Priority Q	ueue		
3	Lab 3	TRIE			
4	Lab 4	Prim's Algorith			
5	Lab 5	Kruskal's Algor			
<u>6</u> 7	Lab 6 Lab 7	Dijkstra's Algor Matrix Chain M			
8	Lab 7	Longest Commo			
<u>8</u> 9	Lab 8	0-1 Knapsack	ni Subsequence		
<u>)</u> 10	Lab J	Quick Sort			
10	Lab 10	Merge Sort			
12	Lab 12	Ford Fulkerson'	s Algorithm		
13	Lab 13	Topological Sor	t, Finding Strongly Cor	nnected	
	X 1 14	Components	10117 1		
14	Lab 14	•	nd: 0-1 Knapsack		
ASSESSM	ENT STR	ATEGY			
					Blooms
	Compone	ents	Grading	CO	Taxonomy
				CO1	
Contir	uous	Lab Test	20%	CO2	
Assess	ment	Class	5%	CO1	
(409	%)	Participation			
		Assignment	15%	CO3	
	Online Tes	st – 1	20%	CO1	
			_0,0	CO2	
	Online Tes	st – 2	20%	C01	
	Viva/ Q	117	20%	CO2 CO4	
	Total Ma		100%	04	0-00
00 0					
(()) — (())	rse Outco	me, $C = Cognitive$	Domain, $P = Psychon$	notor Domain	, A = Affective Domain)

REFERENCE SITE

https://www.cs.usfca.edu/~galles/visualization/Algorithms.html https://www.shafaetsplanet.com/ https://forthright48.com/

CSE-219: Mathematical Analysis for Computer Science

COU	RSE INFO	ORMATION												
	e Code	: CSE-219				Leo	cture	e Co	nta	et He	ours		· ·	3.00
Course							e Credit Hours							3.00
PRE-REQUISITE														
	e Code: N													
Course	e Title: Ni													
CURF	RICULUN	1 STRUCTURE												
Outcome Based Education (OBE)														
RATIONALE														
		imed to gain introductory knowledge		-		ty, c	omp	outat	tion	of	prob	abili	ty wi	th its
practic	cal and the	oretical application in studying compu	iter s	ciend	ce.									
OBJE	CTIVE													
2. To in	o understa discrete a	thematical models and methods to ana nding basics of probability theorem, the nd continuous cases. application of stochastic process and	ne co	ncep	t of r	andc								ions
		UTCOMES & GENERIC SKILLS	-											
No.	(Upon co	Course Learning Outcome npletion of the course, the students will be	able	to)		oom [*]		CF		CA	KI		Assess Meth	
CO1		of computational problem using tical models and methods			C3, C4		4	2		2	2		Τ,	F
CO2		nd the basics of probability theorem, on variable	conce	ept	C2			1			1, 3		Q,M	T,F
CO3	Apply sta continuo	andard distributions in discrete and us cases			C	3, Pé	5	4		3	5		AS	G
CO4	Apply st	ochastic process and Queuing theory			C	3, A2	2				2,8	3	Q,	F
Quiz;		roblems, CA-Complex Activities, KP signment; Pr – Presentation; R - Repo TENT											; Q -	
Probability : Probability Models, Sample Space, Events, Algebra of Events, Probability Axioms, Conditional Probability, Multiplication Rule, Total Probability, Bayes" rule. Random Variables : Discrete, Continuous and Mixed Random Variables, Probability Mass, Distribution and Cumulative Distribution Functions. Probability Distributions : Discrete probability distributions -Binomial, Poisson, Negative Binominal Distributions and Their Properties Continuous probability distributions -Uniform, Normal, Exponential Distributions and their Properties. Stochastic process; Markov chains (discrete parameter, continuous parameter, birth-death process), Hidden Markov Model; Queuing models (birth-death model, Monrovian model), open and closed queuing network; Application of queuing models.														
SKILL MAPPING														
					PR	OGR	RAN	101	JTC	OM	ES ((\mathbf{PO})		
No.		Course Learning Outcome	1	2	3	4	5	6	7	8	9	10	11	12

CO2	Understand the basics of probability theorem, concept of random variable	Н	М						
CO3	Apply standard distributions in discrete and continuous cases			Н					
CO4	Apply stochastic process and Queuing theory			М					

(H – High, M- Medium, L-low)

JUSTIFICATION FOR CO-PO MAPPING

Mapping	Level	Justifications					
CO1-PO2	High	Able to increase problem analysis by analysis of computational problem					
CO2-PO1	High	Understanding the basics theorem will highly increase the breadth and depth of knowledge					
CO2-PO2	Medium	Concept of the theorem will increase the analytic capability					
CO3-PO3	High	Application of standard distribution will help to understand the breadth and uniqueness of engineering problem					
CO4-PO3	Medium	Application of stochastic process and Queuing theory enable to develop solutions for different problem					

TEACHING LEARNING STRATEGY

Teaching and Learning Activities	Engagement (hours)
Face-to-Face Learning	
Lecture	42
Practical / Tutorial / Studio	-
Student-Centred Learning	=
Self-Directed Learning	
Non-face-to-face learning	42
Revision	21
Assignment Preparations	21
Formal Assessment	
Continuous Assessment	2
Final Examination	3
Total	131

TEACHING METHODOLOGY

Lecture and Discussion, Co-operative and Collaborative Method, Problem Based Method

COURSE SCH	EDULE		
Week	Lecture	Topics	Assessment Methods
1	Lec 1	Recurrence Problems: The Tower of Hanoi	
	Lec 2	Lines in The Plane	
	Lec 3	The Josephus Problem	
2	Lec 4	Sums: Manipulation of sums, Multiple Sums,	
	Lec 5	General Methods, Finite and Infinite Calculus,	
	Lec 6	Infinite Sums	
3	Lec 7	Number Theory: Divisibility, Primes, Prime	Class Test 1
	Lec 8	Examples, Factorial Factors	
	Lec 9		
4	Lec 10	Number Theory: Relative Primarily, mod: The	
	Lec 11	Congruence Relation, Independent Residues,	
	Lec 12	Additional Applications, Phi and Mu	
5	Lec 13	Special Numbers: Stirling Numbers, Eulerian	Class Test 2
	Lec 14	Numbers, Harmonic Numbers	Class Test 2
	Lec 15		
6	Lec 16	Special Numbers: Harmonic Summation,	
	Lec 17	Bernoulli Numbers, Fibonacci Numbers	

	Lec 18		
7	Lec 19	Generating Functions	
	Lec 20		
	Lec 21		
8	Lec 22	Introduction to Probability: Definition,	
	Lec 23	Conditional Probability, Independent Probability,	
	Lec 24	Bayes' Formula	
9	Lec 25	Discrete Random variables: The Bernoulli	
	Lec 26	Random Variable, The Binomial Random	
	Lec 27	Variable, The Geometric Random Variable, The	
		Poisson Random Variable	Mid Term Exam
10	Lec 31	Continuous Random variables: The Uniform	
	Lec 32	Random Variable, Exponential Random Variables,	
	Lec 33	Gamma Random Variables, Normal Random	
		Variables,	
11	Lec 28	Expectation of a Random Variable: The Discrete	
	Lec 29	Case, The Continuous Case, Variance	
	Lec 30		
12	Lec 34	Stochastic Process: Definition with application	
	Lec 35	Markov chains: Definition, Transforming a	
	Lec 36	Process into a Markov Chain, Chapman-	
		Kolmogorov Equations	
13	Lec 37	Hidden Markov Model: Modelling	Class Test 3
	Lec 38		
	Lec 39		
14	Lec 40	Queuing models: open and closed queuing	
	Lec 41	network; Application of queuing models	
	Lec 42		

Comp	oonents	Grading	CO	Blooms Taxonomy
	Test 1-3	20%	CO 1	C1, C2
Continuous	Test 1-5	20%	CO 2	C3, C4
Assessment	Class	5%	CO3, CO4	A2
(40%)	Participation			
	Mid term	15%	CO 2	C2
Final	Exam	60%	CO 1, CO 2, CO 4	C2, C3, C4, A2
Total	Marks	100%		

(CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

REFERENCE BOOKS

1. Concrete Mathematics -BY Graham, Knuth, Patashnik, 2nd Edition.

- 2. Introduction to Probability Models BY Sheldon M. Ross, 9th Edition.
- 3. Introduction to Probability BY Dimitri P. Bertsekas and John N. Tsitsiklis

CSE-220: Object Oriented Programming language Sessional-II

Course	RSE INF	ORMATION													
	e Code e Title	: CSE-220 : Object Oriented P language Sessional			Lectur Credit			t Hoi	ırs	,	: 3.00 wk : 0.75		rs in	altern	ative
PRE-I	REQUIS	00	-11			по	115				0.7.	,			
	e Code: 1														
	e Title: N														
CURF	RICULU	M STRUCTURE													
Outco	me Base	d Education (OBE)													
RATI	ONALE														
		iented programming													
		olymorphism, and I			progr	amr	ning	in a	n ef	fect	ive 1	nai	nner	and	solve
		oblems by building	real-time projec	ts.		-	-	-	-	-	-	_	-		
					• • •			•	1		(1		<u>\</u>		
		the concept of OOP how to use advance	1 5				0	•	_	<u> </u>	Č (·		
	ithreadin		programming re	ature	s suci	as	GUI	desig	gn, e	xcep	nion	па	nam	ig and	
		how to design and d	evelop a comple	te rea	al-woi	ld s	oftwa	are so	oluti	on.					
LEAR	RNING (OUTCOMES& GE	NERIC SKILL	S											
No.		Course Learn					Bloo			P	CA	L	KΡ		ssmen
110.		ompletion of the cours			ble to)	1	axor	nomy		.1	СЛ	ľ	71	Me	thods
CO1		the concept of OOI programming lang		ect-			P1,	P2		1	5		4		E
		and express how to										-			
CO2		nming features such		exce	otion		P3,	P4		1	5		6		0
	handlin	g and multi-threadin	lg.	-			-)								
CO3		strate how to design		ompl	lete		C3,	P5		1	5		5		Q
	real-wo	rld software solution	1.				,	-							
Quiz;	ASG – A	Problems, CA-Com ssignment; Pr – Pre													_
Quiz;		ssignment; Pr – Pre													-
Quiz; COUI Objec	ASĜ – A RSE CO et-Orient	Assignment; Pr – Pre NTENT ed Programming	(JAVA): Basic	eport	; F – H	inal on	Exa	m, N 1, ba	IT- N	Mid oper	Tern	n E	com	n) mand	line,
Quiz; COUI Objec	ASG – A RSE CO et-Orient s and c	Assignment; Pr – Pre NTENT ed Programming lasses in Java, clas	(JAVA): Basic ss inheritance,	eport cor poly	; F – F	inal on	Exa java	m, N n, ba ceptio	IT- I sic	Mid oper and	Tern ratior ling,	n E	com bstra	mand mard	line, Isses,
Quiz; COUI Objec objects interfa	ASG – A RSE CO et-Orient s and c aces, Jav	Assignment; Pr – Pre NTENT ed Programming lasses in Java, clas a Array, String, J	(JAVA): Basic (JAVA): Basic ss inheritance, AVA I/O (seri	eport cor polyn aliza	; F – F ncepts morph tion)	inal on ism and	Exa java , exc stre	m, M n, ba ceptio am,	IT- I sic on I Gen	Mid oper nand eric	Tern ratior ling, Cla	n E	com bstra	mand mard	line, Isses,
Quiz; COUI Object objects interfa Collec	ASG – A RSE CO et-Orient s and c aces, Jav	ssignment; Pr – Pre NTENT ed Programming lasses in Java, clas a Array, String, J imeworks; Concurr	(JAVA): Basic (JAVA): Basic ss inheritance, AVA I/O (seri	eport cor polyn aliza	; F – F ncepts morph tion)	inal on ism and	Exa java , exc stre	m, M n, ba ceptio am,	IT- I sic on I Gen	Mid oper nand eric	Tern ratior ling, Cla	n E	com bstra	mand mard	line, Isses,
Quiz; COUI Object objects interfa Collec	ASG – A RSE CO t-Orient s and c aces, Jav ction Fra	ssignment; Pr – Pre NTENT ed Programming lasses in Java, clas a Array, String, J imeworks; Concurr	(JAVA): Basic (JAVA): Basic ss inheritance, AVA I/O (seri	eport cor polyn aliza	; F – F ncepts morph tion)	inal on ism and	Exa java , exc stre	m, M n, ba ceptio am,	IT- I sic on I Gen	Mid oper nand eric	Tern ratior ling, Cla	n E	com bstra	mand mard	line, Isses,
Quiz; COUI Objec object: interfa Collec SKIL	ASG – A RSE CO t-Orient s and c aces, Jav ction Fra	Assignment; Pr – Pre NTENT ed Programming asses in Java, clas a Array, String, J meworks; Concurr PING	(JAVA): Basic (JAVA): Basic ss inheritance, AVA I/O (seri ency ; GUI: Sw	eport cor polyn aliza	; F – F ncepts morph tion)	on ism and nent	Exa java , exc stre	m, M a, ba ceptio am, <u>l swi</u>	sic on h Ger ng L	vid oper and eric ayou	Tern atior ling, Cla uts.	n E	com bstra and	mand act cla l met	line, Isses,
Quiz; COUI Object objects interfa Collec	ASG – A RSE CO t-Orient s and c ices, Jav ction Fra L MAPI	Assignment; Pr – Pre NTENT ed Programming lasses in Java, class a Array, String, J imeworks; Concurr PING Course Learning C	(JAVA): Basic (JAVA): Basic ss inheritance, AVA I/O (seri rency; GUI: Sw	eport cor polyn aliza	; F – F ncepts morph tion)	on ism and nent	java java , exc stre s and	m, M a, ba ceptio am, <u>l swi</u>	sic on h Ger ng L	vid oper and eric ayou	Tern ation ling, Cla uts.	n E	com bstra and	mand act cla l meth	line, Isses,
Quiz; COUI Object objects interfa Collec SKILI No.	ASG – A RSE CO t-Orient s and c ices, Jav ction Fra L MAPI Identi	Assignment; Pr – Pre NTENT ed Programming asses in Java, class a Array, String, J meworks; Concurr PING Course Learning C fy the concept of OC	(JAVA): Basic (JAVA): Basic ss inheritance, AVA I/O (seri rency; GUI: Sw Putcome DP with a pure	cor poly aliza ing c	; F – I ncepts morph tion) ompo	on ism and nent	java java stre s anc	m, M n, ba ceptic am, l swi	sic on h Gen ng L	vid oper and eric ayou	Tern ation ling, Cla uts.	n E	com bstra and	mand act cla l meth	line, Isses, hods;
Quiz; COUI Objec object: interfa Collec SKIL	ASG – A RSE CO et-Orient s and c ices, Jave tion Fra L MAPI Identi object	NTENT ed Programming lasses in Java, clas a Array, String, J meworks; Concurr PING Course Learning C fy the concept of OC i-oriented programm	(JAVA): Basic (JAVA): Basic ss inheritance, AVA I/O (seri rency; GUI: Sw Putcome DP with a pure	eport cor polyn aliza ing c	; F – I ncepts morph tion) ompo	on ism and nent	java java stre s anc	m, M n, ba ceptic am, l swi	sic on h Gen ng L	vid oper and eric ayou	Tern ation ling, Cla uts.	n E	com bstra and	mand act cla l meth	line, Isses, hods;
Quiz; COUI Object objects interfa Collec SKILI No.	ASG – A RSE CO et-Orient s and c ices, Jav etion Fra L MAPI Identi objec (Java)	NTENT ed Programming lasses in Java, clas a Array, String, J meworks; Concurr PING Course Learning C fy the concept of OC i-oriented programm	(JAVA): Basic (JAVA): Basic ss inheritance, AVA I/O (seri ency; GUI: Sw butcome DP with a pure ing language	cor poly aliza ing c	; F – I ncepts morph tion) ompo	on ism and nent	java java stre s anc	m, M n, ba ceptic am, l swi	sic on h Gen ng L	vid oper and eric ayou	Tern ation ling, Cla uts.	n E	com bstra and	mand act cla l meth	line, Isses, hods;
Quiz; COUI Object objects interfa Collec SKILI No.	ASG – A RSE CO et-Orient s and c ces, Jave ction Fra L MAPI Identi object (Java) Identi	Assignment; Pr – Pre NTENT ed Programming lasses in Java, clas a Array, String, J meworks; Concurr PING Course Learning C fy the concept of OC -oriented programm b.	(JAVA): Basic (SAVA): Basic (SAVA): Basic (SAVA): Basic (SAVA): Composite (SAVA): Co	cor poly aliza ing c	; F – I ncepts morph tion) ompo	on ism and nent	java java stre s anc	m, M n, ba ceptic am, l swi	sic on h Gen ng L	vid oper and eric ayou	Tern ation ling, Cla uts.	n E	com bstra and	mand act cla l meth	line, Isses, hods;
Quiz; COUI Object objects interfa Collec SKILI No.	ASG – A RSE CO t-Orient s and c ces, Jave tion Fra L MAPI Identi objec (Java) Identi progra design	NTENT ed Programming lasses in Java, class a Array, String, J meworks; Concurr ING Course Learning O fy the concept of OC c-oriented programm fy and express how amming features suc h, exception handling	(JAVA): Basic (JAVA): Basic ss inheritance, AVA I/O (seri rency; GUI: Sw butcome DP with a pure ing language to use advance h as GUI	cor poly aliza ing c	; F – I ncepts morph tion) ompo	on ism and nent	java java stre s anc	m, M n, ba ceptic am, l swi	sic on h Gen ng L	vid oper and eric ayou	Tern ation ling, Cla uts.	n E	com bstra and	mand act cla l meth	line, Isses, hods;
Quiz; . COUI Object object: interfa Collect SKILI No.	ASG – A RSE CO t-Orient s and c ces, Jave tion Fra L MAPI Identi object (Java) Identi progra	NTENT ed Programming lasses in Java, class a Array, String, J meworks; Concurr ING Course Learning O fy the concept of OC c-oriented programm fy and express how amming features suc h, exception handling	(JAVA): Basic (JAVA): Basic ss inheritance, AVA I/O (seri rency; GUI: Sw butcome DP with a pure ing language to use advance h as GUI	cor poly aliza ing c	; F – I ncepts morph tion) ompo	on ism and nent	java java stre s anc	m, M a, ba am, l swi 5	sic on h Gen ng L	vid oper and eric ayou	Tern ation ling, Cla uts.	n E	com bstra and	mand act cla l meth	line, Isses, hods;
Quiz; . COUI Object object: interfa Collect SKILI No.	ASG – A RSE CO t-Orient s and c ices, Jave tion Fra L MAPI Identi objec (Java) Identi progra design threac Demo	NTENT ed Programming lasses in Java, class a Array, String, J meworks; Concurr ING Course Learning O fy the concept of OC c-oriented programm fy and express how amming features suc h, exception handling	(JAVA): Basic (JAVA): Basic ss inheritance, AVA I/O (seri rency; GUI: Sw Dutcome DP with a pure ing language to use advance h as GUI g and multi- n and develop	cor poly aliza ing c	; F – I ncepts morph tion) ompo	on ism and nent	java java stre s anc	m, M a, ba am, l swi 5	sic on h Gen ng L	vid oper and eric ayou	Tern ation ling, Cla uts.	n E	com bstra and	mand act cla l meth	line, Isses, hods;

JUSTIFICA	TION FOR	CO-PO MAPPINO	y J		
Mapping	Level		Justifications		
CO1 – PO1	High	specializations, on object-oriented pro	ly the knowledge of mathemati e must be able to identify the con- ogramming language.	cept of	OOP with a pure
CO2 – PO5	Medium	able to express how exception handling	create, apply appropriate techniques w to use advance programming fea g and multi-threading	tures su	ch as GUI design,
CO3 – PO3	Medium		n solutions for complex engineering o design and develop a complete rea		
TEACHING	G LEARNIN	IG STRATEGY			
	d Learning A	ctivities		Eng	gagement (hours)
Face-to-Face	U				
	cture ctical / Tutor	ial / Studia			- 21
	dent-Centere				21
Self-Directed					
	n-face-to-fac	e learning			-
	vision				-
	sessment Pre	parations			-
Formal Asse	essment ntinuous Ass	ossmont			4
	al Examinati				4 3
Total					28
TEACHING	G METHOD	OLOGY			
Lecture and	Discussion.	Co-operative and Col	llaborative Method, Problem Based	Method	
COURSE S		I			
Week	Lab		Topics		Remarks
1	Lab 1,2	Basic Concept on	java, basic operation and command	line	
2	Lab 3,4	-	o class, inheritance, access specifier		
3	Lab 5,6		abstraction, Interface, Closure	-	2.00 has in
4	Lab 7,8	Java Array	y and String, Exception Handling		3:00 hrs in alternate week
5	Lab 9,10	· · · · · · · · · · · · · · · · · · ·	tion) and stream, Collection Framew	vorks	unternate week
	Lab 11,12		Class and Methods, Concurrency		
7	Lab 13,14	Introduct	ion with swings, Swing Layouts		
ASSESSME	ENT STRAT	EGY			
		C	СО	Blooms	Taxonomy
	nponents Evaluation	Grading 30%	CO1	D	
	Duline I	25%	CO1 CO2		1, F2 73, P4
	nline II	25%	CO2		23, P4
-	Quiz	20%	CO3		23, P5
Tot	al Marks	100%			
(CO = Co)	urse Outcon	ne, C = Cognitive D	omain, P = Psychomotor Domain,	$\mathbf{A} = \mathbf{A}\mathbf{f}$	fective Domain)
REFEREN					
			d) - Herbert Schildt (2014)		
2. Intr	oduction To	Java Programming C	Comprehensive Version 10 th Edition	- Υ. Dε	aniel Liang
REFEREN					

EECE-279: Digital Electronics and Pulse Technique

		ORMATION										
Course	e Code e Title	: EECE-279 : Digital Electronics	and Pulse Te	chnique			e Conta Hours	ct Ho	ırs	:3.00		
PRE-I	REQUISI	TE										
	e Code: N											
	e Title: Ni											
CURF	RICULUN	I STRUCTURE										
Outco	me Based	Education (OBE)										
RATI	ONALE											
		signed to learn and fa			ogic g	gates	as well	as to l	be able	to des	sign var	ious
		nd sequential circuits	using logic ga	ates.	-	-						-
	CTIVE	4. 1	- C 1'- '- 1 1-	1.	1	. 1 .	1		1 1	. 1	1.	
		the basic knowledge conic circuits.	of digital lo	igic leve	ers a	na a	ррпсан	on of	KNOWI	eage t	o unde	rstan
2. To	o prepare :	students to perform th	e analysis and	d desigr	ı of v	vario	us comł	oinatio	nal and	d sequ	ential c	ircui
	sing gates.			_			_	_	_	_	_	
LEAR	RNING O	UTCOMES & GEN		LS				1	T		1	
No.	(Upon c	Course Learning completion of the course to)		ill be ab	le		oom's onomy	СР	CA	KP	Asses Met	smer hods
CO1	-	he structure of variou t its application in dig	•	tems an	d		C2			1,3	Т, А	SG, I
CO2		arious combinational		al circui	ts.		C6	2		1,5		MT, G, F
CO3		the memory elements of the sequential circ		nd state	;		C4			1,5	M	Γ,F
	Complex 1	Problems, CA-Comp	ex Activities									; Q
Quiz; COUI	Complex 1 ASG – As RSE CON	Problems, CA-Comp signment; Pr – Preser TENT	ex Activities ntation; R - Re	eport; F	– Fi	nal E	xam, M	T- Mi	d Tern	n Exar	n)	
Quiz; COUI Introd proble algebr logic optimi transis compa field p of latc sequer	Complex 1 ASG – As RSE CON Juction to ems, Binar a, combin gates in (ization of ization of stor, pass arators, bin programma ches, flip-	Problems, CA-Compl signment; Pr – Preser	ex Activities ntation; R - Re and codes: ad synthesis minimization OS: DC chara inational logi emultiplexer ents and ALU programmable n using ASM	Number of digit of com acteristic c circuit and the U desige read on 1 appro	- Final Fina	ase of gic c gic c ional ioise Iodu nplen rogr nemo timii	xam, M convers ircuits: logic; margin lar con nentatic ammat ry; Seq ng anal	ion, C Basic Imple and Ibinat on in C Ile log uentia ysis au	d Tern Comple logic menta power ional c CMOS ic dev il circu nd pov	m Exar ements functi tion o dissip circuit , deco rices: nits: D ver op	n) and r ons, Bo f basic ation. 1 design der, en Logic a ifferent timizati	elate polea stati Powe : Pas code arrays type ion c
Quiz; COUI Introd proble algebr logic boptimi transis compa field p of lato sequer applic	Complex I ASG – As RSE CON Juction t ems, Binar a, combin gates in (ization of 1 stor, pass arators, bin programma ches, flip- ntial circu	Problems, CA-Complesignment; Pr – Preser TENT D number systems y codes; Analysis ar ational logic design, a CMOS and BiCMC basic gates and comb gates, multiplexer, d hary arithmetic elem ble logic arrays and p clops and their desig gits; Modular seque	ex Activities ntation; R - Re and codes: ad synthesis minimization OS: DC chara inational logi emultiplexer ents and ALU programmable n using ASM	Number of digit of com acteristic c circuit and the U desige read on 1 appro	- Final Fina	ase of gic c gic c ional ioise Iodu nplen rogr nemo timii	xam, M convers ircuits: logic; margin lar con nentatic ammat ry; Seq ng anal	ion, C Basic Imple and Ibinat on in C Ile log uentia ysis au	d Tern Comple logic menta power ional c CMOS ic dev il circu nd pov	m Exar ements functi tion o dissip circuit , deco rices: nits: D ver op	n) and r ons, Bo f basic ation. 1 design der, en Logic a ifferent timizati	elate polea stati Powe : Pas code array type
Quiz; COUI Introd proble algebra logic optimi transis compa field p of latc sequer applica	Complex I ASG – As RSE CON Juction to ems, Binar a, combin gates in o ization of l stor, pass arators, bin orogramma ches, flip ntial circu ations; L MAPPI	Problems, CA-Complesignment; Pr – Presen TENT D number systems y codes; Analysis ar ational logic design, a CMOS and BiCMC basic gates and comb gates, multiplexer, d hary arithmetic elem ble logic arrays and p lops and their desig its; Modular seque NG	ex Activities ntation; R - Re and codes: ad synthesis of minimization OS: DC chara inational logi emultiplexer ents and ALU programmable n using ASM ential logic	Number of digit of com acteristic c circuit and the U desige read of 1 appro circui	- Fi er ba al lo binat cs, n ts; M tir in n; P nly n ach, t de	nal E ase of gic c ional oise Iodu nplen rogr nemo timin esign PRC	xam, M convers ircuits: logic; margin lar con mentatic ammah ry; Seq ng anal : shift	ion, C Basic Imple and binat on in C ble log uentia ysis an regis	d Tern Complee logic menta power ional c CMOS ic dev il circu ad pov ters, c	n Exar ements functi tion o dissip circuit , deco rices: nits: D ver op counter	n) and r ons, Bo f basic ation. I design der, en Logic a ifferent timizati rs and	elate oolea stati Powe : Pas code array. t type t type
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Quiz; COUI Introd proble algebra logic optimi transis compa field p of latc sequer applica	Complex I ASG – As RSE CON Juction to ems, Binar a, combin gates in o ization of stor, pass arators, bin programma ches, flip- ntial circu ations; L MAPPI	Problems, CA-Complesignment; Pr – Presen TENT D number systems y codes; Analysis ar ational logic design, in CMOS and BiCMC basic gates and comb gates, multiplexer, d hary arithmetic elem ble logic arrays and p lops and their design its; Modular seque NG Course Learning Outor to the structure of variage and interpret its approximations of the second construction of the second second second second second problems, CA-Complexing and the second second second second second second second second second se	ex Activities itation; R - Re and codes: ad synthesis of minimization OS: DC chara inational logic emultiplexer ents and ALU programmable n using ASM cential logic come come	Number of digit of com acteristic c circuit and the U desige read of 1 appro circui	- Fi er ba al lo binat cs, n ts; M tir in n; P nly n ach, t de	nal E ase of gic c ional oise Iodu nplen rogr nemo timin esign PRC	xam, M convers ircuits: logic; margin lar con mentatic ammah ry; Seq ng anal : shift	T- Mi ion, C Basic Imple and binat on in C ble log uentia ysis an regis	d Tern Complee logic menta power ional c CMOS ic dev il circu ad pov ters, c	n Exar ements functi tion o dissip circuit , deco rices: nits: D ver op counter	n) and r ons, Bo f basic ation. I design der, en Logic a ifferent timizati rs and	elate oolea stati Powe : Pas code array. t type t type
Quiz; COUI Introd proble algebra optimi transis compa field p of lato sequer applica SKIL	Complex I ASG – As RSE CON Juction te ems, Binar a, combin gates in (ization of l stor, pass urators, bin orogramma ches, flip-i ntial circu ations; L MAPPI Identify systems digital Design sequent	Troblems, CA-Complesignment; Pr – Presen TENT D number systems y codes; Analysis ar ational logic design, in CMOS and BiCMC Dasic gates and comb gates, multiplexer, d hary arithmetic elem ble logic arrays and p flops and their design its; Modular seque NG Course Learning Outer to the structure of varies and interpret its ap lesign.	ex Activities ntation; R - Re and codes: ad synthesis of minimization OS: DC chara inational logi- emultiplexer ents and ALD orogrammable n using ASM ential logic	Number of digit of com acteristic c circuit and the U desig e read of 1 appro circui	- Fi er bi al lo binat cs, n ts; M nir in n; P nly n ach, t de	nal E ase of gic c ional oise Iodu nplen rogr nemo timin esign PRC	xam, M convers ircuits: logic; margin lar con mentatic ammah ry; Seq ng anal : shift	T- Mi ion, C Basic Imple and binat on in C ble log uentia ysis an regis	d Tern Complee logic menta power ional c CMOS ic dev il circu ad pov ters, c	n Exar ements functi tion o dissip circuit , deco rices: nits: D ver op counter	n) and r ons, Bo f basic ation. I design der, en Logic a ifferent timizati rs and	elate oolea stati Powe : Pas code array type ion (the

JUSTIFIC	ATION FO	R CO-PO MAPPING		
Mapping	Level	Justifications		
CO1-PO1	High	Basic knowledge of number system is required to diffe number systems and comprehend their application in rega circuits.		
CO2-PO2	Medium	Competence to generate solutions for dynamic an combinational and sequential circuits is necessary.		-
CO3-PO3	Medium	Ability to design sequential circuits with maximum effici friendly elements is needed.	ency and	l environmenta
TEACHIN	G LEARNI	NG STRATEGY		
Teaching an	d Learning	Activities	Engag	ement (hours)
Face-to-Fac				42
Le	cture			-
		orial / Studio		-
	ident-Centre	ed Learning		
Self-Directe				
	n-face-to-fa	ce learning		42
	vision	<i>.</i> .		21
	sessment Pr	eparations		21
Formal Ass	essment ntinuous As	sees ment		2
	nal Examina			3
Total		1011		131
Total				151
TFACHIN	C METHO			
TEACHIN				
		Co-operative and Collaborative Method, Problem Based M	lethod	
	Discussion,	Co-operative and Collaborative Method, Problem Based M	lethod	
Lecture and	Discussion,	Co-operative and Collaborative Method, Problem Based M	lethod	Assessment Methods
Lecture and COURSE S	Discussion, SCHEDULI	Co-operative and Collaborative Method, Problem Based M	lethod	
Lecture and COURSE S	Discussion, SCHEDULI Lecture Lec-1 Lec-2	Co-operative and Collaborative Method, Problem Based M E Topics Number base conversion Complements and related problems	lethod	
Lecture and COURSE S Week	Discussion, CHEDULI Lecture Lec-1	Co-operative and Collaborative Method, Problem Based M Topics Number base conversion	lethod	
Lecture and COURSE S Week	Discussion, SCHEDULI Lecture Lec-1 Lec-2	Co-operative and Collaborative Method, Problem Based M E Topics Number base conversion Complements and related problems	lethod	Methods
Lecture and COURSE S Week	Discussion, SCHEDULI Lecture Lec-1 Lec-2 Lec-3	Co-operative and Collaborative Method, Problem Based M	lethod	
Lecture and COURSE S Week	Discussion, SCHEDULI Lecture Lec-1 Lec-2 Lec-3 Lec-4	Co-operative and Collaborative Method, Problem Based M	lethod	Methods
Lecture and COURSE S Week	Discussion, CHEDULI Lecture Lec-1 Lec-2 Lec-3 Lec-4 Lec-5	Co-operative and Collaborative Method, Problem Based M Topics Number base conversion Complements and related problems Binary codes Basic theories and properties of Boolean Algebra Canonical and standard forms		Methods
Lecture and COURSE S Week	Discussion, CHEDULI Lec-1 Lec-2 Lec-3 Lec-4 Lec-5 Lec-6 Lec-7 Lec-8	Co-operative and Collaborative Method, Problem Based M		Methods
Lecture and COURSE S Week 1 2	Discussion, CHEDULI Lec-1 Lec-2 Lec-3 Lec-4 Lec-5 Lec-6 Lec-7	Co-operative and Collaborative Method, Problem Based M Topics Number base conversion Complements and related problems Binary codes Basic theories and properties of Boolean Algebra Canonical and standard forms Mathematical problems on Boolean Algebra Simplification of Boolean functions through Map method Product of Sums simplification NAND and NOR implementation		Methods
Lecture and COURSE S Week 1 2 3	Discussion, CHEDULI Lec-1 Lec-2 Lec-3 Lec-3 Lec-4 Lec-5 Lec-6 Lec-7 Lec-8 Lec-9 Lec-10	Co-operative and Collaborative Method, Problem Based M Topics Number base conversion Complements and related problems Binary codes Basic theories and properties of Boolean Algebra Canonical and standard forms Mathematical problems on Boolean Algebra Simplification of Boolean functions through Map method Product of Sums simplification NAND and NOR implementation Simplification with Don't Care conditions		Methods
Lecture and COURSE S Week 1 2	Discussion, CHEDULI Lec-1 Lec-2 Lec-3 Lec-4 Lec-5 Lec-6 Lec-7 Lec-8 Lec-9 Lec-10 Lec-11	Co-operative and Collaborative Method, Problem Based M Topics Number base conversion Complements and related problems Binary codes Basic theories and properties of Boolean Algebra Canonical and standard forms Mathematical problems on Boolean Algebra Simplification of Boolean functions through Map method Product of Sums simplification NAND and NOR implementation Simplification with Don't Care conditions The Tabulation method of simplification		Methods
Lecture and COURSE S Week 1 2 3	Discussion, CHEDULI Lec-1 Lec-2 Lec-3 Lec-4 Lec-5 Lec-6 Lec-7 Lec-8 Lec-9 Lec-10 Lec-11 Lec-12	Co-operative and Collaborative Method, Problem Based M Topics Number base conversion Complements and related problems Binary codes Basic theories and properties of Boolean Algebra Canonical and standard forms Mathematical problems on Boolean Algebra Simplification of Boolean functions through Map method Product of Sums simplification NAND and NOR implementation Simplification with Don't Care conditions The Tabulation method of simplification Related mathematical problem solving		Methods
Lecture and COURSE S Week 1 2 3 4	Discussion, CHEDULI Lec-1 Lec-2 Lec-3 Lec-4 Lec-5 Lec-6 Lec-7 Lec-8 Lec-9 Lec-10 Lec-11 Lec-12 Lec-13	Co-operative and Collaborative Method, Problem Based M Topics Topics Number base conversion Complements and related problems Binary codes Basic theories and properties of Boolean Algebra Canonical and standard forms Mathematical problems on Boolean Algebra Simplification of Boolean functions through Map method Product of Sums simplification NAND and NOR implementation Simplification with Don't Care conditions The Tabulation method of simplification Related mathematical problem solving Introduction to Combinational Logic		Methods
Lecture and COURSE S Week 1 2 3	Discussion, CHEDULI Lec-1 Lec-2 Lec-3 Lec-4 Lec-5 Lec-6 Lec-7 Lec-8 Lec-9 Lec-10 Lec-11 Lec-12 Lec-13 Lec-14	Co-operative and Collaborative Method, Problem Based M Topics Topics Number base conversion Complements and related problems Binary codes Basic theories and properties of Boolean Algebra Canonical and standard forms Mathematical problems on Boolean Algebra Simplification of Boolean functions through Map method Product of Sums simplification NAND and NOR implementation Simplification with Don't Care conditions The Tabulation method of simplification Related mathematical problem solving Introduction to Combinational Logic Discussion on Design procedure		Methods
Lecture and COURSE S Week 1 2 3 4	Discussion, CHEDULI Lec-1 Lec-2 Lec-3 Lec-4 Lec-5 Lec-6 Lec-7 Lec-8 Lec-9 Lec-10 Lec-11 Lec-12 Lec-13 Lec-14 Lec-15	Co-operative and Collaborative Method, Problem Based M Topics Number base conversion Complements and related problems Binary codes Basic theories and properties of Boolean Algebra Canonical and standard forms Mathematical problems on Boolean Algebra Simplification of Boolean functions through Map method Product of Sums simplification NAND and NOR implementation Simplification with Don't Care conditions The Tabulation method of simplification Related mathematical problem solving Introduction to Combinational Logic Discussion on Design procedure Adders and subtractors		Methods Class Test-1
Lecture and COURSE S Week 1 2 3 4 5	Discussion, CHEDULI Lec-1 Lec-2 Lec-2 Lec-3 Lec-4 Lec-5 Lec-6 Lec-7 Lec-8 Lec-7 Lec-8 Lec-9 Lec-10 Lec-11 Lec-12 Lec-13 Lec-14 Lec-15 Lec-16	Co-operative and Collaborative Method, Problem Based M Topics Number base conversion Complements and related problems Binary codes Basic theories and properties of Boolean Algebra Canonical and standard forms Mathematical problems on Boolean Algebra Simplification of Boolean functions through Map method Product of Sums simplification NAND and NOR implementation Simplification with Don't Care conditions The Tabulation method of simplification Related mathematical problem solving Introduction to Combinational Logic Discussion on Design procedure Adders and subtractors Code conversion		Methods Class Test-1
Lecture and COURSE S Week 1 2 3 4	Discussion, CHEDULI Lec-1 Lec-2 Lec-2 Lec-3 Lec-4 Lec-5 Lec-6 Lec-7 Lec-8 Lec-7 Lec-10 Lec-11 Lec-12 Lec-13 Lec-14 Lec-15 Lec-16 Lec-17	Co-operative and Collaborative Method, Problem Based M Topics Number base conversion Complements and related problems Binary codes Basic theories and properties of Boolean Algebra Canonical and standard forms Mathematical problems on Boolean Algebra Simplification of Boolean functions through Map method Product of Sums simplification NAND and NOR implementation Simplification with Don't Care conditions The Tabulation method of simplification Related mathematical problem solving Introduction to Combinational Logic Discussion on Design procedure Adders and subtractors Code conversion Boolean function implementations		Methods Class Test-1
Lecture and COURSE S Week 1 2 3 4 5	Discussion, CHEDULI Lec-1 Lec-2 Lec-3 Lec-4 Lec-5 Lec-6 Lec-7 Lec-8 Lec-9 Lec-10 Lec-11 Lec-12 Lec-13 Lec-14 Lec-15 Lec-16 Lec-17 Lec-18	Co-operative and Collaborative Method, Problem Based M Topics Number base conversion Complements and related problems Binary codes Basic theories and properties of Boolean Algebra Canonical and standard forms Mathematical problems on Boolean Algebra Canonical and standard forms Mathematical problems on Boolean Algebra Simplification of Boolean functions through Map method Product of Sums simplification NAND and NOR implementation Simplification with Don't Care conditions The Tabulation method of simplification Related mathematical problem solving Introduction to Combinational Logic Discussion on Design procedure Adders and subtractors Code conversion Boolean function implementations Exclusive-OR AND equivalence functions		Methods Class Test-1
Lecture and COURSE S Week 1 2 3 4 5 6	Discussion, CHEDULI Lec-1 Lec-2 Lec-3 Lec-4 Lec-5 Lec-6 Lec-7 Lec-8 Lec-9 Lec-10 Lec-11 Lec-12 Lec-13 Lec-14 Lec-15 Lec-16 Lec-17 Lec-18 Lec-19	Co-operative and Collaborative Method, Problem Based M Topics Number base conversion Complements and related problems Binary codes Basic theories and properties of Boolean Algebra Canonical and standard forms Mathematical problems on Boolean Algebra Canonical and standard forms Mathematical problems on Boolean Algebra Simplification of Boolean functions through Map method Product of Sums simplification NAND and NOR implementation Simplification with Don't Care conditions The Tabulation method of simplification Related mathematical problem solving Introduction to Combinational Logic Discussion on Design procedure Adders and subtractors Code conversion Boolean function implementations Exclusive-OR AND equivalence functions Parity generation and checking		Methods Class Test-1
Lecture and COURSE S Week 1 2 3 4 5	Discussion, CHEDULI Lec-1 Lec-2 Lec-2 Lec-3 Lec-4 Lec-5 Lec-6 Lec-7 Lec-8 Lec-9 Lec-10 Lec-10 Lec-11 Lec-12 Lec-13 Lec-14 Lec-15 Lec-16 Lec-17 Lec-18 Lec-20 Lec-20	Co-operative and Collaborative Method, Problem Based M Topics Number base conversion Complements and related problems Binary codes Basic theories and properties of Boolean Algebra Canonical and standard forms Mathematical problems on Boolean Algebra Simplification of Boolean functions through Map method Product of Sums simplification NAND and NOR implementation Simplification with Don't Care conditions The Tabulation method of simplification Related mathematical problem solving Introduction to Combinational Logic Discussion on Design procedure Adders and subtractors Code conversion Boolean function implementations Exclusive-OR AND equivalence functions Parity generation and checking Combinational logic with MSI and LSI		Methods Class Test-1
Lecture and COURSE S Week 1 2 3 4 5 6	Discussion, CHEDULI Lec-1 Lec-2 Lec-3 Lec-4 Lec-5 Lec-6 Lec-7 Lec-8 Lec-9 Lec-10 Lec-11 Lec-12 Lec-13 Lec-14 Lec-15 Lec-16 Lec-17 Lec-18 Lec-19	Co-operative and Collaborative Method, Problem Based M Topics Number base conversion Complements and related problems Binary codes Basic theories and properties of Boolean Algebra Canonical and standard forms Mathematical problems on Boolean Algebra Canonical and standard forms Mathematical problems on Boolean Algebra Simplification of Boolean functions through Map method Product of Sums simplification NAND and NOR implementation Simplification with Don't Care conditions The Tabulation method of simplification Related mathematical problem solving Introduction to Combinational Logic Discussion on Design procedure Adders and subtractors Code conversion Boolean function implementations Exclusive-OR AND equivalence functions Parity generation and checking Combinational logic with MSI and LSI Coder/decoder and multiplexer/demultiplexer design.		Methods Class Test-1 Class Test-2
Lecture and COURSE S Week 1 2 3 4 5 6	Discussion, CHEDULI Lec-1 Lec-2 Lec-3 Lec-4 Lec-5 Lec-6 Lec-7 Lec-8 Lec-9 Lec-10 Lec-11 Lec-12 Lec-13 Lec-14 Lec-15 Lec-16 Lec-17 Lec-18 Lec-19 Lec-20 Lec-21	Co-operative and Collaborative Method, Problem Based M Topics Number base conversion Complements and related problems Binary codes Basic theories and properties of Boolean Algebra Canonical and standard forms Mathematical problems on Boolean Algebra Simplification of Boolean functions through Map method Product of Sums simplification NAND and NOR implementation Simplification with Don't Care conditions The Tabulation method of simplification Related mathematical problem solving Introduction to Combinational Logic Discussion on Design procedure Adders and subtractors Code conversion Boolean function implementations Exclusive-OR AND equivalence functions Parity generation and checking Combinational logic with MSI and LSI Coder/decoder and multiplexer/demultiplexer design. Modular combinational circuit design: Pass transistor		Methods Class Test-1 Class Test-2 Mid Term
Lecture and COURSE S Week 1 2 3 4 5 6 7	Discussion, CHEDULI Lec-1 Lec-2 Lec-2 Lec-3 Lec-4 Lec-5 Lec-6 Lec-7 Lec-8 Lec-9 Lec-10 Lec-11 Lec-12 Lec-13 Lec-14 Lec-15 Lec-16 Lec-17 Lec-18 Lec-19 Lec-20 Lec-21 Lec-22	Co-operative and Collaborative Method, Problem Based M Topics Number base conversion Complements and related problems Binary codes Basic theories and properties of Boolean Algebra Canonical and standard forms Mathematical problems on Boolean Algebra Simplification of Boolean functions through Map method Product of Sums simplification NAND and NOR implementation Simplification with Don't Care conditions The Tabulation method of simplification Related mathematical problem solving Introduction to Combinational Logic Discussion on Design procedure Adders and subtractors Code conversion Boolean function implementations Exclusive-OR AND equivalence functions Parity generation and checking Combinational logic with MSI and LSI Coder/decoder and multiplexer/demultiplexer design. Modular combinational circuit design: Pass transistor gates	, pass	Methods Class Test-1 Class Test-2
Lecture and COURSE S Week 1 2 3 4 5 6	Discussion, CHEDULI Lec-1 Lec-2 Lec-3 Lec-4 Lec-5 Lec-6 Lec-7 Lec-8 Lec-9 Lec-10 Lec-11 Lec-12 Lec-13 Lec-14 Lec-15 Lec-16 Lec-17 Lec-18 Lec-19 Lec-20 Lec-21	Co-operative and Collaborative Method, Problem Based M Topics Number base conversion Complements and related problems Binary codes Basic theories and properties of Boolean Algebra Canonical and standard forms Mathematical problems on Boolean Algebra Simplification of Boolean functions through Map method Product of Sums simplification NAND and NOR implementation Simplification with Don't Care conditions The Tabulation method of simplification Related mathematical problem solving Introduction to Combinational Logic Discussion on Design procedure Adders and subtractors Code conversion Boolean function implementations Exclusive-OR AND equivalence functions Parity generation and checking Combinational logic with MSI and LSI Coder/decoder and multiplexer/demultiplexer design. Modular combinational circuit design: Pass transistor	; pass MOS	Methods Class Test-1 Class Test-2 Mid Term

	Lec-25	Programmable logic devices: Logic arrays	
9	Lec-26	Field programmable logic arrays	
	Lec-27	Programmable read only memory	
	Lec-28	Sequential circuits: Different types of latches	
10	Lec-29	Flip-flops: master-slave, D, JK, T	
	Lec-30	Design of flip-flops using ASM approach	
	Lec-31	Timing analysis	
11	Lec-32	Power optimization of sequential circuits	Class Test-3
	Lec-33	Modular sequential logic circuit design: shift registers	Class Test-5
	Lec-34	Parallel I/O shift registers	
12	Lec-35	Series I/O shift registers	
	Lec-36	Universal shift register	
	Lec-37	Counters: Introduction	
13	Lec-38	Asynchronous counters: up and down	
	Lec-39	Synchronous counters: up and down	
	Lec-40	BCD counters and other modulo counters	
14	Lec-40 Lec-41		
14		Ring counter, Johnson counter	
	Lec-42	Applications of registers and counters	

			CO	Blooms Taxonomy
Comp	onents	Grading	60	Dioonis Taxonomy
	Test 1-3	20%	C01	C1,C2
Continuous	Test 1-5	20%	CO2	C6
Continuous Assessment	Assignment	5%	CO1	C1,C2
(40%)	Assignment	5%	CO2	C6
(40/0)	Mid term	15%	CO2	C6
	Mid term	13%	CO3	C4
			CO1	C1,C2
Final	Exam	60%	CO2	C6
			CO3	C4
Total	Marks	100%		

(CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

REFERENCE BOOKS

- 1. Digital Logic and Computer Design- M Morris Mano; Prentice Hall of India Private Ltd.
- 2. Digital Fundamentals Thomas L Floyd; Prentice Hall International, Inc.
- 3. Pulse, Digital and Switching waveforms Jacob Millman & Herbert Taub, Tata McGraw- Hill.

EECE-280: Digital Electronics and Pulse Technique Sessional

Cours	e Code	: EECE-280	Lecture Co	ontact H	ours	: 3.00 hrs	s in
	e Title	: Digital Electronics and Pulse Technique Sessional	Credit Hou			alternativ : 0.75	/e wk
PRE-	REQUIS	SITE					
		EECE 279 Digital Electronics and Pulse Technique					
CUR	RICULU	M STRUCTURE					
Outco	me Base	d Education (OBE)					
RATI	IONALE	2					
a firm areas are fin paves for the aim of	n grasp o like Boo rst taught the way e design f the cour	a good understanding of basic concept f the modern design approach that reli lean algebra, combinational circuits, se about the number system and logic ga of exposure to CAD tools like Schem of logic circuits. It will be followed by rse is to familiarize students with mode a practice today.	es on computer equential circuit tes before intro atic Capture ar implementation	-aided of ts and n oduction nd Verilo n of Ver	design nemory to dig og cor rilog c	(CAD) too y elements. gital IC tech nstructs whit ode in FPG	Is. It exploi The studen mology. The ich are usefu A board. The
_	ECTIVE						
	'o develo	Schematic Capture and Verilog HDL. n students' analytical skills to build co	mplex digital c	ircuit ar	nd imr	part the kno	wledge abou
3. T '(4. T 5. T	Green Te 'o enhanc ounters fe 'o develo	p students' analytical skills to build co chnology' to integrate it in their project e skill set of students in designing var ollowed by implementation in FPGA bo p communication and project manage	s. ious memory d oards.	evices s	such as	s flip flops,	registers an
3. T (4. T 5. T <u>p</u>	Green Te 'o enhanc ounters fe 'o develo roject.	p students' analytical skills to build co chnology' to integrate it in their project e skill set of students in designing var followed by implementation in FPGA bo	s. ious memory d oards.	evices s	such as	s flip flops,	registers an
3. T (0 4. T 5. T <u>p</u> COU	Green Te 'o enhanc ounters fo 'o develo roject. RSE OU	p students' analytical skills to build co chnology' to integrate it in their project e skill set of students in designing var ollowed by implementation in FPGA bo p communication and project manage	s. ious memory d oards.	evices s	such as	s flip flops,	registers an
3. T 'C 4. T 5. T <u>p</u> COUI No.	Green Te 'o enhance ounters fe 'o develou roject. RSE OU (Upon Follow combine basic 1 using C	p students' analytical skills to build co chnology' to integrate it in their project be skill set of students in designing var bllowed by implementation in FPGA bo p communication and project manage TCOMES & GENERIC SKILLS Course Outcome completion of the course, the students will be able to) instructions on building of ational and sequential circuits using ogic gates and computer simulation CAD tools.	s. ious memory d pards. ment skills in Bloom's Taxonomy P3	the stuc	such as	s flip flops, hrough pres	registers an sentation ar Assessmen
3. T (4. T 5. T <u>p</u>	Green Te o enhance o develor roject. RSE OU (Upon Follow combine basic 1 using C Apply reprodu	p students' analytical skills to build co chnology' to integrate it in their project e skill set of students in designing var ollowed by implementation in FPGA bo p communication and project manage TCOMES & GENERIC SKILLS Course Outcome completion of the course, the students will be able to) instructions on building of ational and sequential circuits using ogic gates and computer simulation AD tools. basic Boolean laws and K-map to ace a simplified and efficient version e scale complex circuits meeting the ed requirements using minimum	s. ious memory d pards. ment skills in Bloom's Taxonomy P3 P3	the stuc	such as	s flip flops, hrough pres KP	registers an sentation an Assessmen Methods
3. T 4. T 5. T <u>p</u> COU	Green Te o enhance o unters for o develor roject. RSE OU (Upon Follow combine basic 1 using C Apply reprodu of larg specifie hardwa Proficie demon circuit.	p students' analytical skills to build co chnology' to integrate it in their project e skill set of students in designing var ollowed by implementation in FPGA bo p communication and project manage TCOMES & GENERIC SKILLS Course Outcome completion of the course, the students will be able to) instructions on building of ational and sequential circuits using ogic gates and computer simulation AD tools. basic Boolean laws and K-map to ace a simplified and efficient version e scale complex circuits meeting the ed requirements using minimum	s. ious memory doards. ment skills in Bloom's Taxonomy P3 P3 P3 A3	cP	such as	s flip flops, hrough pres KP 3	registers an sentation ar Assessmer Methods R,Q,T

COURSE CONTENT

In this course, students will perform experiments to practically verify the theories and concepts learned in EECE 279 using different hardware equipment and simulation software.

SKILL MAPPING PROGRAM OUTCOMES (PO) No. Course Learning Outcome 2 12 1 3 4 5 6 7 8 9 10 11 Follow instructions on building of combinational and sequential circuits CO1 Η using basic logic gates and computer simulation using CAD tools. Apply basic Boolean laws and K-map to reproduce a simplified and efficient CO2 version of large scale complex circuits L meeting the specified requirements using minimum hardware. Proficient to deconstruct a device and CO3 demonstrate skills to troubleshoot a Η digital circuit. Construct different types of digital electronic circuits with or without memory elements for particular operation, within the realm of economic, performance, efficiency, CO4 Μ user friendly and environmental constraints.

(H-High, M-Medium, L-low)

JUSTIFICATION FOR CO-PO MAPPING

		T	
Mapping	Level		Justifications
CO1-PO9	High	simulating tool	of digital circuits on hardware level require teamwork and on s require individual work. Ability to work as an individual or as a reflected through one's work.
CO2-PO10	Low	Also while wo must be comp reports and pre	nication has to establish with teacher for having a clear concept. rking in teams, communication has no alternatives, the problems rehended properly and worked on effectively. Besides, effective sentations have to be produced.
CO3-PO5	High	Techniques and digital circuit.	d skills are required for determining a troubleshooting a problem in
CO4-PO10	Medium	for projects. comprehended	nunication has to establish with teammates while working in teams The problems faced during building the project must be properly and worked on effectively. Besides, effective reports and ave to be produced.
TEACHING	LEARNI	NG STRATEGY	Y
Teaching and	Learning	Activities	Engagement (hours)
Face-to-Face	Learning		
Lec	ture		21
		orial / Studio	21
	dent-Centre	d Learning	-
Self-Directed			
	n-face-to-fa	ce learning	
110 /	rision _		-
	essment Pre	eparations	-
Formal Asses			_
	tinuous As		5
	al Examinat	ion	3
Total			50

TEACHING METHODOLOGY

Lecture and Discussion, Co-operative and Collaborative Method, Problem Based Method

COURSE SCHEDULE

	Lab			Торіс	
1+2	Lab-	1 subtractor a using two 2 gates, Scher	nd multiplier, 2-to-1 multiple natic Capture ar	4-to-1 multiplexer, 16-to-1 xer, crossbar switch and de nd Verilog followed by imple	
3+4	Lab-	2 decoder usin multiplexer	ng two 2-to-4 c built using a c	lecoders, 4-to-16 decoder bu	ncoder, 2-to-4 decoder, 3-to- ailt using a decoder tree, 4-to- schematic Capture and Verile
5+6	Lab-	3 subtractor a using two 2 gates, Scher	nd multiplier, 2-to-1 multiple natic Capture ar	4-to-1 multiplexer, 16-to-1 xer, crossbar switch and de nd Verilog followed by imple	
7+8	Lab-	4 decoder usin multiplexer	ng two 2-to-4 c built using a c	lecoders, 4-to-16 decoder bu	ncoder, 2-to-4 decoder, 3-to- ailt using a decoder tree, 4-to- schematic Capture and Verile
9+10	Lab-	5 subtractor a using two 2 gates, Scher	nd multiplier, 2-to-1 multiple natic Capture ar	4-to-1 multiplexer, 16-to-1 xer, crossbar switch and de nd Verilog followed by imple	
11+12	Lab-	6 decoder usin multiplexer followed by	ng two 2-to-4 c built using a c implementation	lecoders, 4-to-16 decoder bu decoder using logic gates, S n in FPGA board.	ncoder, 2-to-4 decoder, 3-to- nilt using a decoder tree, 4-to- schematic Capture and Verile
13+14	Lab-	, subtractor a		half adder, full adder, ripj 4-to-1 multiplexer, 16-to-1	ple adder, half subtractor, fu
	MENT	gates, Scher	2-to-1 multiple		multiplexers using basic log
		gates, Scher	2-to-1 multiple: natic Capture and	xer, crossbar switch and de nd Verilog followed by imple	multiplexers using basic log mentation in FPGA board.
	MENT Compo	gates, Scher	2-to-1 multiple	xer, crossbar switch and de nd Verilog followed by imple CO	emultiplexers using basic log ementation in FPGA board. Bloom's Taxonomy
		gates, Scher	2-to-1 multiple: natic Capture and	xer, crossbar switch and de nd Verilog followed by imple	multiplexers using basic log mentation in FPGA board.
		gates, Scher STRATEGY onents Lab Participation	2-to-1 multiple: natic Capture and	xer, crossbar switch and de nd Verilog followed by imple CO CO1	emultiplexers using basic log ementation in FPGA board. Bloom's Taxonomy P3
		gates, Scher STRATEGY onents Lab	2-to-1 multiple: natic Capture an Grading	xer, crossbar switch and de nd Verilog followed by imple CO CO1 CO2 CO 3	multiplexers using basic log mentation in FPGA board. Bloom's Taxonomy P3 P3
	Compo	gates, Scher STRATEGY onents Lab Participation	2-to-1 multiple: natic Capture an Grading	xer, crossbar switch and de nd Verilog followed by imple CO CO1 CO2	multiplexers using basic log mentation in FPGA board. Bloom's Taxonomy P3 P3 A3
SSESS Contin Assess	Compo uous ment	strig two 2 gates, Scher STRATEGY onents Lab Participation and Report	2-to-1 multiple. natic Capture an Grading 20%	xer, crossbar switch and de nd Verilog followed by imple CO CO1 CO2 CO 3 CO4	multiplexers using basic log ementation in FPGA board. Bloom's Taxonomy P3 P3 A3 P7
SSESS	Compo uous ment	gates, Scher STRATEGY onents Lab Participation	2-to-1 multiple: natic Capture an Grading	xer, crossbar switch and de nd Verilog followed by imple CO CO1 CO2 CO 3 CO4 CO1	multiplexers using basic log mentation in FPGA board. Bloom's Taxonomy P3 P3 A3 P7 P3 P3
SSESS Contin Assess	Compo uous ment	strig two 2 gates, Scher STRATEGY onents Lab Participation and Report	2-to-1 multiple. natic Capture an Grading 20%	xer, crossbar switch and de nd Verilog followed by imple CO CO1 CO2 CO3 CO4 CO1 CO2	multiplexers using basic log mentation in FPGA board. Bloom's Taxonomy P3 P3 A3 P7 P3 P3 P3 P3 P3 P3
SSESS Contin Assess	Compo uous ment	sing two z gates, Scher STRATEGY onents Lab Participation and Report Labtest Project and	2-to-1 multiple. natic Capture an Grading 20%	xer, crossbar switch and de nd Verilog followed by imple CO CO1 CO2 CO3 CO4 CO1 CO2 CO2 CO3	multiplexers using basic log mentation in FPGA board. Bloom's Taxonomy P3 P3 A3 P7 P3 P3 P3 P3 P3 A3
SSESS Contin Assess	Compo uous ment	sing two z gates, Scher STRATEGY onents Lab Participation and Report Labtest	2-to-1 multiple: natic Capture an Grading 20% 30%	xer, crossbar switch and de nd Verilog followed by imple CO CO1 CO2 CO3 CO4 CO1 CO2 CO2 CO3 CO4 CO4 CO4 CO4 CO4	multiplexers using basic log mentation in FPGA board. Bloom's Taxonomy P3 P3 A3 P7 P3 P3 P3 P3 P3 A3 P7 P3 P3 P3 P3 P3 P3 P3 P3 P3 P3 P3 P3 P3
SSESS Contin Assess	Compo uous ment %)	STRATEGY STRATEGY onents Lab Participation and Report Labtest Project and Presentation	2-to-1 multiple. natic Capture and Grading 20% 30% 25%	xer, crossbar switch and de nd Verilog followed by imple CO CO1 CO2 CO3 CO4 CO1 CO2 CO3 CO4 CO2 CO3 CO4 CO4 CO4 CO4 CO4 CO4	multiplexers using basic log mentation in FPGA board. Bloom's Taxonomy P3 P3 A3 P7 P3 P3 P3 P3 P3 A3 P7 P3 P3 P3 P3 P3 P3 P3 P3 P3
SSESS Contin Assess	Compo uous ment	STRATEGY STRATEGY onents Lab Participation and Report Labtest Project and Presentation	2-to-1 multiple: natic Capture an Grading 20% 30%	xer, crossbar switch and de nd Verilog followed by imple CO CO1 CO2 CO3 CO4 CO1 CO2 CO2 CO3 CO4 CO4 CO4 CO4 CO4	multiplexers using basic log mentation in FPGA board. Bloom's Taxonomy P3 P3 A3 P7 P3 P3 P3 P3 A3 P7 P3 A3 P7 P7 P7 P7 P7 P3
SSESS Contin Assess	Compo uous ment %)	STRATEGY STRATEGY onents Lab Participation and Report Labtest Project and Presentation	2-to-1 multiple. natic Capture and Grading 20% 30% 25%	xer, crossbar switch and de nd Verilog followed by imple CO CO1 CO2 CO3 CO4 CO1 CO2 CO3 CO4 CO4 CO4 CO4 CO4 CO4 CO4 CO4 CO4 CO4	multiplexers using basic log mentation in FPGA board. Bloom's Taxonomy P3 P3 A3 P7 P3 P3 P3 A3 P7 P3 A3 P7 P7 P7 P7 P7 P3 P3 P3 P3 P3 P3

REFERENCE BOOKS

- Stephen Brown and Zvonko Vranesic, Fundamentals of Digital Logic with Verilog Design, 3rd edition 2014.
- 2. Ronald J Tocci, Digital Systems, Pearson Education, 10th edition 2009.
- 3. Moris mano, Digital Design, Prentice Hall of India, 3rd edition, 2002.

REFERENCE SITE

GELM-275: Leadership and Management

	RSE INFO	ORMATION										
	e Code	: GELM-275	Lecture Contact Hours		.00							
Course	e Title	: Leadership and Management	Credit Hours	: 2.00								
PRE-I	REQUISI	ТЕ										
	e Code: N e Title: N											
CURF	RICULUN	I STRUCTURE										
Outco	me Based	Education (OBE)										
RATI	ONALE											
The course is designed to make students understand the overlapping connection between engineering and management in an organization through the study of varied management practices and leadership traits as an engineer.												
OBJE	CTIVE											
1. To	o introduc	e different management functions a	and approaches.									
2. To												
3. To		nd how an organization functions c	collaboratively with ma				5.					
3. То 4. То	o understa	nd how an organization functions c nd various personality traits and its	collaboratively with ma				5.					
3. To 4. To 5. To s	o understa solve real-	nd how an organization functions of nd various personality traits and its world management problems as an	collaboratively with ma impact on leadership a engineer.				5.					
3. To 4. To 5. To s	o understa solve real-	nd how an organization functions of nd various personality traits and its world management problems as an UTCOMES & GENERIC SKILL	collaboratively with ma impact on leadership a engineer.				5.					
3. To 4. To 5. To s	o understa solve real- RNING O	nd how an organization functions of nd various personality traits and its world management problems as an	collaboratively with ma s impact on leadership a engineer.									
3. To 4. To 5. To s	o understa solve real- NING O (Upon c Familia	nd how an organization functions of nd various personality traits and its world management problems as an UTCOMES & GENERIC SKILI Course Learning Outcome ompletion of the course, the students v	collaboratively with ma s impact on leadership a engineer. LS vill be Bloom's Taxonomy	and ma	nageme	ent.	Assessment					
3. To 4. To <u>5. To s</u> LEAR No.	o understa solve real- NING O (Upon c Familiat leadersh Understa	nd how an organization functions of nd various personality traits and its world management problems as an UTCOMES & GENERIC SKILI Course Learning Outcome ompletion of the course, the students v able to) ize with the fundamental conce	collaboratively with ma s impact on leadership a engineer. LS vill be Bloom's Taxonomy pts of C1-C2	and ma	nageme	KP	Assessment Methods					

Quiz; ASG – Assignment; Pr – Presentation; R - Report; F – Final Exam, MT- Mid Term Exam)

COURSE CONTENT

Introduction to Leadership and Management: Definition of leadership and management, basic difference between a leader and a manager, relation of leaders and managers with respect to efficiency and effectiveness, qualities of leader and managers with examples from history; **Management Fundamentals:** Definition of management & manager, levels of management, management functions and skills, Mintzberg's managerial roles, Henri Fayol's management principles, strategic management; **Leadership & Motivation**: Motivation, Maslow's hierarchy needs, theory of X & Y, motivators and hygiene factors, goal setting theory, reinforcement theory, equity theory, expectancy theory, Leadership styles, leadership trait

theory, managerial grid, contemporary leadership, conflicts negotiation, leadership issues in 21st century, cross cultural leadership, engineer as a leader and some simple case discussions on leadership (positive and toxic leadership) in the class (Interactive Learning); Organizational Management: Organization, departmentalization, chain of command, unity of command, cross functional area, authority, centralization and decentralization, traditional & contemporary organization, matrix project structure, learning structure, organizing collaboration; Planning and goal setting: Foundation of planning; goals of plan, types of goal, types of goal & plan, goal setting, MBO, well written goal; Control: Controlling process, controlling for organizational performance, types of control: (feed-forward, feedback & concurrent), balanced scorecard, contemporary issues in control, workplace concern & workplace violence, Change and Innovation: Change and innovation, internal and external for change, changing process, creativity vs innovation; Attitude: Components of Attitude, behaviour model and characteristics model; behaviour vs. attitude, job attitude, job involvement, job satisfaction and customer satisfaction; Personality: Personality determinants: heredity and environment, Myers-Briggs Type Indicator, Big five personality model, personality traits (core self-evaluation, Machiavellianism, narcissism, self-monitoring, risk taking, proactive personality); Perception and Individual Decision Making: Factors influencing perception, attribution theory, errors/biases in attribution, Factors of individual decision making, rational decision making, bounded rationality, satisfice, common errors in decision making, creativity in decision making; Understanding Work Team: Work group, work team, problem solving team, self-managed work team, cross functional team, virtual team, team effectiveness, team challenges; HR Management: Process of Human Resource Planning, forecasting demand for labour, staffing, internal supply of labour, performance appraisal; Operations Management: Project managing basics, goals and boundary of project, WBS, scheduling a project, Demand and supply forecasting, inventory control; Information Technology and Management: Management Information System (MIS), Enterprise Resource Planning (ERP) - For introductory knowledge;

SKILL MAPPING

				•											
No.		ourse Learn	ing Outcome				ROG						· /	-	
110.			0	1	2	3	4	5	6	7	8	9	10	11	12
	Familiar		the fundamental												
CO1	-	of leadersh	ip and management	Η											
	skills	1.1 1	1												
CO2			and contribution of ving organizational											н	
02	goals	i ili acilie											п		
	Understa	and the	contribution of												
	leadership traits and management skills														
CO3			and solving real life												Н
	problems														
(H – Hi	igh, M- Me	edium, L-lov	w)												
JUSTI	FICATIO	N FOR CO	-PO MAPPING												
Maj	pping	Level				Ju	stific	ation	ıs						
CO1-P	01	High	By knowing the engineering knowle												skills,
CO2-P	011	High	Management of an targets	organisation and cost will be learned to achieve leader's									ader's		
CO3-P	012	High	Decision making sk	till w	ill he	elp to	gain	a lif	elon	g le	arni	ng			
TEAC	HING LE	ARNING S	TRATEGY												
Teachir	ng and Lea	rning Activi	ities	_							1	Enga	igeme	ent (ho	ours)
Face-to	-Face Lear	rning													
	Lecture												2	8	
		/ Tutorial /		-								-			
G 10 E .		Centred Lea	rning										-	-	
Self-Di	rected Lea														
	Non-tace Revisior	e-to-face lea	rning										2	-	
	Kevision	l									I		1	4	

Assessment Preparations	14
Formal Assessment	
Continuous Assessment	2
Final Examination	3
Total	89

TEACHING METHODOLOGY

Lecture and Discussion, Co-operative and Collaborative Method, Problem Based Method

COURSE SCHEDULE

Week	Lecture	Topics	Assessment Methods
1	Lec 1	Introduction to Leadership and Management: Definition of leadership and management; basic difference between a leader and a manager; relation of leaders and managers with respect to efficiency and effectiveness; qualities of leader and managers with examples from history.	
	Lec 2	Management Fundamentals: Definition of management & manager; levels of management; management functions and skills; Mintzberg's managerial roles; Henri Fayol's management principles; strategic management.	
2	Lec 3	Leadership & Motivation: Motivation, Maslow's hierarchy	
	Lec 4	needs; theory of X & Y; motivators and hygiene factors; goal setting theory; reinforcement theory; equity theory; expectancy theory	
3	Lec 5	Leadership: Leadership styles; leadership trait theory;	
	Lec 6	managerial grid; contemporary leadership; conflicts negotiation; leadership issues in 21st century; cross cultural leadership; engineer as a leader and some simple case discussions on leadership (positive and toxic leadership) in the class (Interactive Learning).	
4	Lec 7		
-	Lec 8	Case Study – I : Engineer as Great Leaders	Class Test 1
5	Lec 9	Organizational Management: Organization; departmentalization; chain of command; unity of command; cross functional area; authority; centralization and decentralization; traditional & contemporary organization; matrix project structure; learning structure; organizing collaboration.	
	Lec 10	Planning and goal setting: Foundation of planning; goals of plan; types of goal; types of goal & plan; goal setting; MBO; well written goal.	
6	Lec 11	Control: Controlling process; controlling for organizational performance; types of control: (feed-forward, feedback & concurrent); balanced scorecard; contemporary issues in control; workplace concern & workplace violence.	
	Lec 12	Change and Innovation: Change and innovation; internal and external for change; changing process; creativity vs innovation.	
7	Lec 13	Case Study – II : Planning and Goal Setting; A Managerial Approach: Engineer as Great Managers (Interactive Discussions in the Class)	
	Lec 14	Attitude: Components of Attitude; behavior model and characteristics model; behavior vs. attitude; job attitude; job involvement; job satisfaction and customer satisfaction.	
8	Lec 15	Personality: Personality determinants: heredity and environment; Myers-Briggs Type Indicator; Big five personality model; personality traits (core self-evaluation, Machiavellianism, narcissism, self-monitoring, risk taking, proactive personality).	Mid Term Exam / Project
	Lec 16	Perception and Individual Decision Making: Factors	FIOJECI

		attribution	
9	Lec 17	Perception and Individual Decision Making : Factors of individual decision making; rational decision making; bounded rationality; satisfice; common errors in decision making; creativity in decision making.	
	Lec 18	Case Study – III : A Case on Decision Making – Involves both leadership and managerial skills (Interactive Discussion in the Class)	
10	Lec 19	Understanding Work Team: Work group; work team; problem solving team; self-managed work team; cross functional team; virtual team; team effectiveness; team challenges.	
	Lec 20	HR Management: Process of Human Resource Planning; forecasting demand for labor; staffing.	
11	Lec 21	HR Management: Internal supply of labor; performance appraisal.	
	Lec 22	Operations Management: Project managing basics; goals and boundary of project; WBS; scheduling a project.	
12	Lec 23	Operations Management: Demand and supply forecasting; inventory control.	Class Test 2
	Lec 24	Exercise – Use of Microsoft Project (MSP) for scheduling a project at student level	
13	Lec 25 Lec 26	Case Study – IV: A case that covers all relevant theories taught throughout the course and involves both leadership and management issues, e.g., Columbia's Final Mission. (This may be given as group assignment followed by in class short presentations/discussions)	
14	Lec 27	Information Technology and Management: Management Information System (MIS); Enterprise Resource Planning (ERP) - For introductory knowledge.	
	Lec 28	Revision	

			CO	Blooms Taxonomy
Comp	oonents	Grading	60	BIODIIIS T axonomy
	Test 1-2	20%	CO 1	C1-C2, P1
Continuous	Test 1-2	20%	CO 2	C1-C2
Continuous Assessment	Presentation	5%	CO 1	C1-C2, P1, A1
(40%)	Mid term	15%	CO 1	C1-C2, P1, A1
(40%)			CO 2	C1-C2, P1-P2, A1-A2
			CO 3	C1-C2, P1-P2, A1-A2
Einal	Exam	60%	CO 1	C1-C2, P1, A1
Final	Exam	00%	CO 2	C1-C2, P1-P2, A1-A2
			CO 3	C1-C2, P1-P2, A1-A2
Total	Total Marks 100%			

(CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain) REFERENCE BOOKS

1. Gupta, A. K. Engineering Management. India, S. Chand Publishing, 2014.

- 2. Telsang, Martand. Industrial Engineering and Production Management: For Undergraduate, Postgraduate Courses and Diploma Programmes in Mechanical, Production and Industrial Engineering Students. A Useful Guide for HE, Management Courses, Professional Engineers and Competitive Examinations for GATE and UPSC and Engineering Services Examinations. S. Chand, 2006.
- 3. Yukl, Gary. Leadership in Organizations, 9/e. Pearson Education India, 1981.
- **4.** Whetten, David Allred, Kim S. Cameron, and Mike Woods. Developing management skills. Upper Saddle River, NJ: Prentice Hall, 2007.

MATH-207: Complex Variable and Statistics

COU													
	RSE INFORMATION			_									
	e Code : MATH-207 : Complex Variable and Statistics					ire C it Ho		et Ho	ours			: 3.0 : 3.0	
	e Title : Complex Variable and Statistics REQUISITE				cieu	ппо	uis					. 5.0	0
	e Code: MATH 101, MATH 103												
	e Title: Differential and Integral Calculus, D	ifferei	ntia	l Eq	uatic	ons ai	nd M	atrix					
CUR	RICULUM STRUCTURE												
Outco	ome Based Education (OBE)												
	IONALE												
statist group	course is designed to teach the students the ics. It is targeted to provide a basic found ed sample data hypothesis etc. Finally, this of	lation course	for	m	ather	natic	s are	eas (Com	plex	num	ber sy	stem,
	oblems through complex variable and statistic	ics.											
	ECTIVE understand basic knowledge of Complex N												
mome 2. To 3. To data,	t in recognizing about frequency distributents, Skewness, Kurtosis, grouped sampled da familiarize the students with the principal ter provide a physical interpretation of our real skewness, kurtosis and related hypothesis to ics and their methods of solution in solving c	ata, Es ms su -life p est. A	stim Ich a proł Ind	ationationationationationationationation	on, T ompl n, Co o be	ests o ex va mple expe	of hyj ariab ex Va	pothe les ar ariab	esis. nd st le ar	atisti nd ca	ics. lcula	ting sa	umple
	RNING OUTCOMES & GENERIC SKIL	- î											
No.	Course Learning Outcome (Upon completion of the course, the students able to)	will be	e		Bloor axon		CI	2	CA	K	P [·]	Assess Meth	
CO1	Recognize and define complex number sy complex variable and express the definition use of the statistical properties.				C1-0	22	1			1		T, F, 2	ASG
CO2	Interpret the complex function, the integra complex functions and explain the concept frequency distribution, moments, Skewness Kurtosis, grouped sampled data etc.	pt of a C2 1 1				1,	2	Τ, Μ΄	Т, F				
Quiz;	Complex Problems, CA-Complex Activities, ASG – Assignment; Pr – Presentation; R - R												_
	RSE CONTENT	~								<u> </u>			
	plex Variables: Complex number system, nuity of a function of complex variable and Cauchy-Riemann Equations. Line integral rille's Theorem, Taylor's and Laurent's Theo	relate of a	ed tl cc Sing	neon mpl jular	rems lex r Res Che	, Cor funct idues bych	nplez ion, s, Ca ev's	x fur Cau uchy theo	nctio ichy [?] 's R rem,	n, dii 's In esidu z-sc	fferei itegra ie Th cores, ients,	ntiation I For eorem Frequ Skew	n and mula, uency
the C Liouv Statis distrib Kurto	stics: Measures of central tendency, standar bution, Graphical representation of data ind sis. Elementary sampling theory, Treatment of sion and correlation.	cludin	g s							, Tes	sts of	hypot	
the C Liouv Statis distrib Kurto regres	stics: Measures of central tendency, standar pution, Graphical representation of data industry sis. Elementary sampling theory, Treatment	cludin	g s							, Tes	sts of	hypot	
the C Liouv Statis distrib Kurto regres	stics: Measures of central tendency, standar bution, Graphical representation of data ind sis. Elementary sampling theory, Treatment of sion and correlation.	cludin of gro	g s upe	d sa	mple PRO	ed da GRA	ta, E	stim: OUTC	ation	IES (PO)		hesis,
the C Liouv Statis distrib Kurto regres SKIL	atics: Measures of central tendency, standar bution, Graphical representation of data indisis. Elementary sampling theory, Treatment of assion and correlation. L MAPPING Course Learning Outcome Recognize and define complex number system, complex variable and express the definition and use of the statistical	cludin	g s	d sa	imple	ed da	ta, E	stima	ation			11	
the C Liouv Statis distrib Kurto regres SKIL No.	stics: Measures of central tendency, standar pution, Graphical representation of data indication sis. Elementary sampling theory, Treatment of data indication L MAPPING Course Learning Outcome Recognize and define complex number system, complex variable and express the definition and use of the statistical properties.	cludin of gro	g s upe	d sa	mple PRO	ed da GRA	ta, E	stim: OUTC	ation	IES (9	PO)		hesis,

into	anala of		law functions and						1	1		r –	1		T
			lex functions and pt of a frequency												
	ribution,		nents, Skewness,												
	,		ampled data etc.												
Ku	tosis, grot	iped se	impled data etc.												
(H– High, M	I- Medium	n, L-Lo	ow)												
)-PO MAPPING												
Mapping	Level			_		Just	ifica	tions	,	_	_	_	_	_	_
CO1-PO1	High		knowledge of mathe										to be	appli	ied t
	- mgm		ribe the operation of d e basic knowledge of										-5 511	hmiss	ion a
CO1-PO9	Low		p assignments the prac									1,01,	00 50	011135	
CO2-PO1	High		nterpret the average, vledge of sciences is n			und	stan	dard	dev	viatio	on o	f an	expe	rimen	t, th
TEACHING	G LEARN	ING S	STRATEGY												
	Teaching and Learning Activities									Eng	agem	ent (ł	nours)		
	Face-to-Face Learning Lecture										10				
	cture	torial	Studio									4	42 		
	dent-Cent														
Self-Directed			0												
	Non-face-to-face learning											42			
	vision												21		
Ass Formal Asse	sessment F	repara	tions										21		
	ntinuous A	ssessr	nent										2		
	al Examin												3		
Total												1	31		
TEACHING	G METHO	ODOL	OGY												
Lecture and	Discussion	n, Co-o	operative and Collabor	rative	Me	tho	d, Pr	obleı	m Ba	ased	Met	hod			
COURSE S	CHEDUI	LE													
Week	Lect		Topics								A	ssess	ment	Meth	ods
	-	c 1	Complex number sy												
1		xc 2 xc 3	complex variable, B numbers and variabl		pera	atio	ns or	1 con	nple	X					
		$\frac{x - 3}{x - 4}$	Absolute value prop		nd a	om	nlex	coni	11091	e	-				
		e 5	Limits of a function							,		С	lass T	est 1	
2		c 6	related theorems		r										
	Le	ec 7	Continuity of a func												
3		ec 8	related theorems, Co	mple	x fu	ncti	on, I	Polar	for	n of					
		x 9	complex numbers			. 1	6				_				
		c 10 c 11	Graphical representation and t		-										
4		c 12	Equations		luci	ly-IN	.101116	1111							
		c 13	1				_								
_		c 14	Line integral of a co	mpley	k fu	ncti	on, L	.10UV	'ille'	S					
5		c 15	Theorem									С	lass T	Test 2	
		c 16	Cauchy's Integral Fo	ormul	а. Т	avla	or's '	Theo	rem						
6		c 17	Laurent's Theorem		, 1				11	,					
-		c 18									-				
		c 19 c 20	Singular Residues, C	anch	v' °	Rec	idua	The)ron	,					
7		c 20 c 21	Singulai Residues, C	auch	y S	res	uue	1 1100	Jien	1					
		c 22	Introduction to Stati	stics.	Me	asur	es of	cent	tral		+				
1											1				

	Lec 24		
9	Lec 25 Lec 26 Lec 27	Chebychev"s theorem z- cores, Frequency di tribution	Mid Term Exam
10	Lec 28 Lec 29 Lec 30	Graphica representation of data including stem, Leaf and Box Plot, moments	
11	Lec 31 Lec-32 Lec-33	Treatment of grouped s mpled data, Estimation	
12	Lec-34 Lec-35 Lec-26	Skewnes, Elementary sampling theory	
13	Lec-37 Lec-38 Lec-39	Kurtosis, Regression and correlation	Class Test 3
14	Lec-40 Lec-41 Lec-42	Tests of hypothesis	

Com	oonents	Grading	СО	Blooms Taxonomy
Continuous	Test 1-3	20%	CO1, CO2	C1, C2
Assessment (40%)	Class Participation	5%	CO1	C1, C2
	Mid term	15%	CO2	C2
			CO1	C1, C2
Final	Final Exam		CO2	C2
Total	Marks	100%		

(CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

REFERENCE BOOKS

 Complex variable (2nd) – Schaum's Out-line Series by Spiegel (2009).
 Statistics and Random Processes(2nd)- B. Praba, Aruna Chalam and Sujatha.
 Probability and Statistics for Engineers(9th)- Scheaffer & McClave.
 Schaum's Outline of Probability and Statistics (4th)-John J. Schiller Jr, John J. Schiller Jr and Murray R. Spiegel.

LEVEL-3 SPRING TERM

CSE-301: Database Management Systems

COURSE INFORMATION									
Course Code	: CSE 301	Lecture Contact Hours	: 3.00						
Course Title	: Database Management Systems	ystems Credit Hours : 3.00							
PRE-REQUISITE									
Course Code: Nil									
Course Title: Nil									
CURRICULU	M STRUCTURE								
Outcome Based	Education (OBE)								
RATIONALE									
This course is designed to introduce the basic concepts of database, learn the foundations of database systems, focusing on basics such as the relational algebra and data model, schema normalization, query optimization, and transactions.									

OBJECTIVE

1. Understand the basic concepts and appreciate the applications of database systems.

2. Know the basics of SQL and construct queries using SQL.

3. Be familiar with a commercial relational database system (Oracle) by writing SQL using the system.

4. Be familiar with the relational database theory, and be able to write relational algebra expressions for queries.

LEARNI	NG OUTCOMES & GENERIC SKILLS	5				
No.	Course Learning Outcome (Upon completion of the course, the students will be able to)	Bloom's Taxonomy	СР	CA	KP	Assessment Methods
CO1	Describe the basic concepts and appreciate the applications of database systems.	C1-C2, P1	1		1	T, F
CO2	Illustrate the basics of SQL and construct queries using SQL	C2-C3, P3	1,3		1, 3	MT, F
CO3	Be familiar with a commercial relational database system (Oracle) by writing SQL using the system.	C3, C5	1,3		5,6	T, F
CO4	Be familiar with the relational database theory and be able to write relational algebra expressions for queries.	C1-C4, A5	1,3		1-3	T, F
CO5	Develop the communication skill by presenting topics on database management system.	A2		1		Pr

(CP- Complex Problems, CA-Complex Activities, KP-Knowledge Profile, T – Test; PR – Project; Q – Quiz; ASG – Assignment; Pr – Presentation; R - Report; F – Final Exam, MT- Mid Term Exam)

COURSE CONTENT

Introduction of database systems: Concepts, Applications and Objective; **Models**: Entity-Relationship model, Relational model; **Relational algebra**: SQL; Advanced SQL; Some applications using SQL. Integrity constraint; Relational database design; **File organization and retrieval**: file indexing and hashing; Transaction manager; Concurrency controller; Recovery manager; Security system; Database administration; **Introduction to advanced database management systems**: distributed database, parallel database, data mining and warehousing, multimedia, **object oriented**: object-relational, real-time database.

SKILL MAPPING PROGRAM OUTCOMES (PO) No. Course Learning Outcome 2 1 3 4 5 6 7 8 9 10 11 12 Describe the basic concepts and CO1 appreciate the applications of database Н systems. Illustrate the basics of SQL and CO2 Н construct queries using SQL Be familiar with a commercial relational CO3 database system (Oracle) by writing Η SQL using the system. Be familiar with the relational database CO4 theory and be able to write relational Η algebra expressions for queries. Develop the communication skill by CO5 topics database presenting on L management system (H – High, M- Medium, L-low) JUSTIFICATION FOR CO-PO MAPPING Mapping Level Justification CO1-PO1 High Able to understand the basic concept and application of database systems. CO2-PO2 Apply the SQL concept to solve complex queries using database project. High Understand the basic concept of commercial project with the help of SQL CO3-PO3 High queries and comparison technique to evaluate the working performance. Able to understand and translate the SQL queries in relational algebra CO4-PO2 High expression. Develop communication skills through participating in quiz, presentation CO5-PO10 Low etc. TEACHING LEARNING STRATEGY Teaching and Learning Activities Engagement (hours) Face-to-Face Learning Lecture 42 Practical / Tutorial / Studio _ Student-Centred Learning Self-Directed Learning Non-face-to-face learning 42 21 Revision Assessment Preparations 21 Formal Assessment 2 Continuous Assessment **Final Examination** 3 Total 131 **TEACHING METHODOLOGY** Lecture and Discussion, Problem Based Method, Co-operative and Collaborative Method. **COURSE SCHEDULE** Week Lecture Topics Assessment Methods 1 Lec 1 Introduction of database systems Lec 2 Lec 3 2 Models: Entity-Relationship model, Relational Lec 4 Class Test 1 Lec 5 model

	Lec 6		
3	Lec 7	Relational algebra	-
5	Lec 8	Relational algebra	
	Lec 8 Lec 9		
4	Lec 10	SQL	
4	Lec 10 Lec 11	SQL	
5	Lec 12 Lec 13	Advanced SQL Same analizations using SQL	-
5	Lec 13 Lec 14	Advanced SQL, Some applications using SQL	
			Class Test 2
	Lec 15	T , 1 , 1 ,	Class Test 2
6	Lec 16	Integrity constraint	
	Lec 17		
	Lec 18		-
7	Lec 19	Relational database design	
	Lec 20		
	Lec 21		
8	Lec 22	File organization and retrieval, file indexing and	
	Lec 23	hashing	
	Lec 24		-
9	Lec 25	Transaction manager	
	Lec 26		Mid Term Exam
	Lec 27		
10	Lec 31	Concurrency controller, Recovery manager	
	Lec 32		
	Lec 33		
11	Lec 28	Security system, Database administration	
	Lec 29		
	Lec 30		
12	Lec 34		Class Test 3
	Lec 35	Introduction to advanced database management	
	Lec 36	systems: distributed database, parallel database	
13	Lec 37	Data mining and warehousing, multimedia	
	Lec 38		
	Lec 39		
14	Lec 40	Object-oriented, object-relational, real-time]
	Lec 41	database	
	Lec 42		

Comp	onents	Grading	СО	Blooms Taxonomy
			CO 1	C1-C2, P1
Continuous	Test 1-3	20%	CO 3	C3, C5
Assessment			CO 4	C1-C4, A5
(40%)	Class Participation	5%	CO5	A2
	Mid term	15%	CO 2	C2-C3, P3
			CO 1	C1-C2, P1
F '1	F	6004	CO 2	C2-C3, P3
Final	Exam	60%	CO 3	C3, C5
			CO 4	C1-C4, A5
Total	Marks	100%		•

(CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

REFERENCE BOOKS

- 1. Database System Concept, Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Fourth edition
- 2. Files and Databases- An Introduction, Peter D. Smith and G.M. Barnes, AddisonWesley
- 3. Database Management Systems, Raghu Ramakrishnan and Johannes Gehrke, Third edition

REFERENCE SITE

CSE-302: Database Management Systems Sessional

COU	RSE INFORM	ATION					
Cours	e Code	: CSE 302		Lecture Con	tact Hou	ırs	: 3.00
Cours	e Title	: Database Management Systems	s Sessional	Credit Hour	s		: 1.50
PRE-	REQUISITE						
	e Code: Nil						
Cours	e Title: Nil						
CUR	RICULUM S	FRUCTURE					
Outco	ome Based Edu	ication (OBE)					
RATI	IONALE						
		ned to introduce the basic concepts					
		e through developing a real-world					
		sign of a database starting from the user interfaces to a database.	e conceptual	design to the	impieme	entatic	on of
	ECTIVE						
1. To	introduce the l	pasic concepts of database.					
		-world database application.					
		gn of a database starting from the	conceptual of	lesign to the	impleme	ntatio	n of database
		terfaces to a database.	Ĩ	C	1		
LEAP	RNING OUT	COMES & GENERIC SKILLS					
No.		urse Learning Outcome etion of the course, the students will be able to)	Bloom's Taxonomy	, CP	CA	KP	Assessment Methods
		the knowledge in projects with					
CO1		ial relational database system	C2-C3, C6	5 1	1,3	5	
		design a team-based project.					PR
CO2		latabase design principles, SQL	C2, P6	1	5	6	тсе
	and PL SQL	the relational database theory					T, CE
CO3		to develop and write relational	C1-C3, P4	3	2	1	
005		essions for queries.	CI-CJ, I 4	. 5	2	1	Q
	<u> </u>	ne communication skill by					
CO4	presenting to	opics on database management	A2		1		Pr
	system.	_					
	Complay De-1	lama CA Complex Activities KD	Vnowladza	Drofilo T T	ost · DD	Dar	iaat : O

(CP- Complex Problems, CA-Complex Activities, KP-Knowledge Profile, T – Test; PR – Project; Q – Quiz; ASG – Assignment; Pr – Presentation; R - Report; V - Viva; F – Final Exam, CE- Class Evaluation)

COURSE CONTENT

Introduction: Oracle Installation, Authentication, Security, Table Creation, **SQL:** Simple Query, Data Expressions, Join, Constraints, Advanced Query (GROUP Function etc.), Subqueries, Single-row function, Numeric function, Manipulation function, Conversion function, Nesting of function, Abstract data type, **PL/SQL:** Introduction to PL/SQL, Database Trigger/ Procedure, Packages, Indexing, View.

SKILL MAPPING

No.	Course Learning Outcome			PI	ROG	RAM	1 Ol	JTC	OM	ES (I	20)		
INO.		1	2	3	4	5	6	7	8	9	10	11	12
CO1	Demonstrate the knowledge in projects with a commercial relational database system (Oracle) and design a team-based project.									Н			
CO2	Utilize the database design principles, SQL and PL SQL.					Н							
CO3	Demonstrate the relational database theory and be able to develop and write relational algebra expressions for queries.			Н									
CO4	Develop the communication skill by presenting topics on database management system.										Н		

(H-High, M-Medium, L-low)

JUSTIFICATION FOR CO-PO MAPPING

Mapping	Level	Justification					
CO1-PO9	High	Build database project using the basic concept of commercial project, SQL queries and system's performance testing technique.					
CO2-PO5	High	Demonstrate the whole project by illustrating with E-R diagram, schema diagram with related PL SQL and SQL queries.					
CO3-PO3	High	Apply and relate the relational algebra expression with related SQL queries.					
CO4- PO10	High	Develop communication skills through participating in quiz, presentation etc.					
TEACHING LEARNING STRATEGY							

Teaching and Learning Activities Engagement (hours) Face-to-Face Learning Practical / Tutorial / Studio 42 Self-Directed Learning **Project Preparations** 21 Assessment Preparations 12 Formal Assessment 05 Continuous Assessment Final Exam 01 Project Assessment 02 Total 83 **TEACHING METHODOLOGY** Lecture and Discussion, Co-operative and Collaborative Method, Problem Based Method **COURSE SCHEDULE** Week Lab Topics Remarks 1 Lab 1 Introduction, Oracle Installation

	2	Lab 2	Table C	reation, SQL						
	3	Lab 3	Sim	ple Query						
	4	Lab 4	Data H	Expressions						
	5	Lab 5		Join						
	6	Lab 6		Join						
	7	Lab 7	Co	nstraints						
	8	Lab 8	Advanced Query (GROU	JP Function etc.)), Sub-queries					
	9	Lab 9		meric function, l	Manipulation					
	10	Lab 1	0 Conversion function, Nes		Abstract data					
	11	Lab 1	1	Database Trigger/ Procedure						
	12	Lab 1	2 PL/SQL Packa	ges, Indexing, V	iew					
	13	Lab 1	3 Introduct	ion to PL/SQL						
	14	Lab 1	4 P.	L/SQL						
SSES	SSMEN	T STRA	TEGY							
		~			СО	Blooms				
		Co	mponents	Grading		Taxonomy				
		Class	Performance & Observation	10%	CO2	C2, P6				
			Project Proposal (15%)		CO1	C2-C3, C6				
		Project	Drojost Undets and	(50%)	CO2	C2, P6				
Continuous Project Update and Submission (35%)				CO3	C1-C3, P4					
Assessment Submission (35%)		ļ[CO4	A2						
(100%) Viva/ Quiz		10%	CO2	C2, P6						
····· 2012		<u> </u>	CO3	C1-C3, P4						
			Online		CO1	C2-C3, C6				
			Online	30%	CO2	C2, P6				
				<u> </u>	CO3	C1-C3, P4				
	-	Тс	tal Marks	100%						

(CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

REFERENCE BOOKS

- Database System Concept, Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Fifth Edition
 Oracle Database 11g The Complete Reference, Kevin Loney

CSE-303: Compiler

COU	RSE INFORMATION						
	e Code : CSE 303	Lecture Contact H	ours		: 3.00		
	e Title : Compiler	Credit Hours	ours		: 3.00		
	REQUISITE						
	e Code: CSE-217						
Cours	e Title: Theory of Computation						
CUR	RICULUM STRUCTURE						
Outco	ome Based Education (OBE)						
RATI	IONALE						
	Compiler course is designed t ents the basic techniques that und						
OBJE	ECTIVE						
1. T	o introduce the theory and tools	that can be employed	l in order to p	erform	syntax	-directe	ed translation
0	f a high-level programming langu	age into an executab	le code.				
2. T	o understand the role of compiler	rs in programming la	nguages.				
3. T	o understand various stages in co	mpilation process.					
4. T	o provide knowledge on designin	g scanner and parser	using tools.				
LEAI	RNING OUTCOMES & GENE	RIC SKILLS					
No.	Course Learning O (Upon completion of the course, able to)		Bloom's Taxonomy	СР	CA	KP	Assessment Methods
CO1	Remember and understand the of compilers in programming la		C1, C2			1	Т
CO2	Remember, understand and ap from one phase to another in co	mpilation process.	C1,C2,C3			1	T, MT
CO3	Understand and apply the separating lexical, syntactic and into meaningful phases for a co		C2, C3, P4	1	3	2, 3, 4	T, F
CO4	Apply the design procedure parsers using tools and build a in connection with this.		C3	1	3, 5	2, 5, 6	MT, F
CO5	Develop the communication s tools on Compilers.	skill by presenting	A2		1		Pr
Quiz;	Complex Problems, CA-Complex ASG – Assignment; Pr – Present RSE CONTENT			, T – T	est; PR	– Proje	ect; Q –
					~		

Introduction: Introduction to compiling; Basic issues; Lexical analysis and Scanning; Syntax analysis; Syntax directed translation; Attribute Grammars and Semantic Analysis; Type-checking; Issues with run-time environments – source language issues; Issues in the design of code generation, Intermediate code generation; Error management; Storage organization-storage allocation strategies, target machine runtime storage management; Code optimization: The principle sources of optimization, Peephole optimization, Optimization of basic blocks-Loops in flow graphs; Introduction to global data-flow analysis, Code improving transformations.

SKILL	MAF	PPING													
No.		Course Le	earning Outcome				1		1	JTC		ES (P	· .		
-	Don		-	1	2	3	4	5	6	7	8	9	10	11	12
CO1	the translation from one phas another in compilation process.Remember, understand and a the mechanisms of separa lexical, syntactic and sema analysis into meaningful phases compiler to undertake lang translation and specify and ana the lexical, syntactic and sema structures of advanced lang features.Remember, understand and a the design procedure of scanners parsers using tools and build abs syntax trees in connection with th Develop the communication ski presenting tools on Compilers.ingLevelPO1HighPO3HighPO3HighPO3HighPO3HighPO3HighPO3HighPO3High		of compilers in anguages.	Н											
CO2	programming languages.Remember, understand and appCO2the translation from one phase another in compilation process.Remember, understand and app the mechanisms of separatin lexical, syntactic and semant analysis into meaningful phases for compiler to undertake languag translation and specify and analy- the lexical, syntactic and semant structures of advanced languag features.Remember, understand and app														
CO3 lexical, syntactic and semantic analysis into meaningful phases for a compiler to undertake language translation and specify and analyse the lexical, syntactic and semantic structures of advanced language features. Remember, understand and apply the design procedure of scanners and						Н									
CO4	the pars	design proc sers using to	edure of scanners and pols and build abstract			Н									
CO5													М		
$(\mathbf{H} - \mathbf{H})$	ah M	- Medium	I -low)												
	*														
Mappi	ng	Level				Jus	stifica	ation	s						
CO1-P	01	High	Enlarge depth of kn compilers in program	nowledge through understanding the role and purposes nming languages.										ses of	
CO2-P	02	High	Apply the translation	from one phase to another in compilation process.											
CO3-P	03	High	semantic analysis inter translation and specif of advanced language	bly the mechanisms of separating lexical, syntactic to meaningful phases for a compiler to undertake lan ify and analyse the lexical, syntactic and semantic stru- e features								guage ctures			
CO4-P	03	High	Design scanners and connection with this	l par	sers	using	g too	ls ai	nd b	uild	abs	tract	synta	ax tre	es in
CO5-PO	D10	Medium	Develop communication	ion sl	cills t	hroug	gh pa	rticip	atin	g in o	quiz,	, pres	entati	on etc	2.
	<u> </u>	U	Activities									Enga	igeme	ent (ho	ours)
Face-to-													4	2	
			rial / Studio											-	
												-	-		
Self-Dir														•	
			e learning										4	2	
			parations										2		
Formal	Asses	sment													
														<u>2</u> 3	
Total													13		

TEACHING METHODOLOGY

Lecture and Discussion, Co-operative and Collaborative Method, Problem Based Method.

COURSE SCHEDULE

1				Topics	A	Assessment Methods
	Lec 1	Introdu	ction, Languag	e Processors, The Structure of	of a	
	Lec 2	Compil	er			
	Lec 3					
2	Lec 4	The Ro	le of the Lexica	al Analyzer, Input Buffering,		
	Lec 5	Recogn	ition of Tokens	s, Transition Diagram		Class Test 1
	Lec 6	C C		Č.		
3	Lec 7	Recogn	ition of Reserv	ed Words and Identifiers,		
	Lec 8	-		sition Diagram-Based Lexica	ıl	
	Lec 9			-Analyzer Generator Lex		
4	Lec 10			edictive Parsing		
	Lec 11	1	8,	6		
	Lec 12					
5	Lec 13	Designi	ng a Predictive	Parser, Left Recursion, The		
C	Lec 14			presentative Grammars, Synt		
	Lec 15		andling, Writir		un	
6	Lec 16	1		-		Class Test 2
0	Lec 10 Lec 17			cursion, Left Factoring, Top	-	
	Lec 18	Down F	Parsing, First ar	nd Follow		
7	Lec 19	LL (1)	Grammars Co	nstruction of Predictive Parsi	nσ	
/	Lec 1) Lec 20			Predictive Parsing, Parsers	115	
	Lec 21 Generators					
8	Lec 21 Lec 22					
0	Lec 22 Lec 23			itions, Inherited and Evaluating an SDD at the		
	Lec 23 Lec 24	-		Dependency Graph		
9	Lec 24 Lec 25			on of Attributes, S Attributed		
9	Lec 25 Lec 26			ted Definitions, Semantic Ru		
	Lec 20 Lec 27					Mid Term Exam
	Let 27		d Translation	Effect, Applications of Syntax	x	
10	Lec 31			e, Directed Acyclic Graphs	or	
10	Lec 31 Lec 32				.01	
	Lec 32 Lec 33			e Number Method for		
	Lec 55		ructions	Three Address Code, Addres	ses	
11	L 29			tatis Single Assignment Fam		
11	Lec 28			tatic Single Assignment For	n,	
	Lec 29	I ypes a	nd Declaration	S		
10	Lec 30	<i>a</i>	<u> </u>	<u> </u>		
12	Lec 34			Static VS Dynamic Storage		
	Lec 35			cation of Space, Activation		Class Test 3
	Lec 36		Activation Reco			
13	Lec 37			a Code Generator, The Targ	get	
	Lec 38			n the Target Code, Static		
	Lec 39			on of Basic Blocks		
14	Lec 40			n, Optimization of basic bloc		
	Lec 41			Introduction to global data-f	low	
	Lec 42	analysis	s, Code improv	ing transformations		
	MENT STR	ATEGY				
SSESSI						
SSESS1						
	Components	5	Grading	СО	Bl	ooms Taxonomy

CO 2

CO 3

Test 1-3

Assessment (40%)

20%

C1,C2,C3

C2,C3,P4

	Class Participation	5%	CO5	A2
	Mid term	15%	CO 4	C3
Einal	Exam	60%	CO 2	C1,C2,C3
Fillal	Exam	00%	CO 3	C2,C3,P4
Total	Marks	100%		

(CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

REFERENCE BOOKS

- 1. Compilers: Principles, Techniques & Tools (2nd ed)- Alfred V Aho, Monica S Lam, Ravi Sethi, and Jeffrey D Ullman, Pearson/Addison Wesley (2006).
- 2. Engineering A Compiler (2nd Ed) Linda Torczon and Keith Cooper, Morgan Kaufmann Publishers Inc (2011).

REFERENCE SITE

CSE-304: Compiler Sessional

COUR	RSE INFO	ORMATION						
Course	e Code	: CSE 304	Lecture Con	tact Hours	: 3.00 hr	s in alter	rnative	wk
Course	e Title	: Compiler Sessional	Credit Hour	s	: 0.75			
PRE-H	REQUIS	ITE						
	e Code: N							
Course	e Title: Ni	1						
CURR	RICULUN	M STRUCTURE						
Outcon	me Based	Education (OBE)						
RATI	ONALE							
	ourse is d Flex and I	lesigned To implement to Bison.	kenizer, arith	metic calculato	r and to a	ble to v	write th	e code by
OBJE	CTIVE							
1. To 1	earn to in	nplement different phases	of a compiler					
		se of Flex and Bison tool		0 0 1				
3. To t	inderstan	d the different types of pa	rsing techniqu	es and to solve	the probl	em.		
LEAR	NING O	UTCOMES & GENERI	C SKILLS					
No.	(Upon c	Course Learning Outco completion of the course, the be able to)		Bloom's Taxonomy	СР	CA	KP	Assessment Methods
CO1	technique tools to of a high an exec	ber, understand and app ues of compiler constr perform syntax-directed gh-level programming la utable code.	ruction and l translation nguage into	C1, C2, C3	1	5	5, 6	ASG, CE
CO2		and the working mechar acc compiler for deb ns.		C2, P4	1, 5	2	1	T, Q
CO3		e and adapt the new ogies used for designing a		C4, P6,A2	1	2	6	ASG, Q

(CP- Complex Problems, CA-Complex Activities, KP-Knowledge Profile, T – Test; PR – Project; Q – Quiz; ASG – Assignment; Pr – Presentation; R - Report; V - Viva; F – Final Exam; CE-Class Evaluation)

COURSE CONTENT

Symbol Table: Introduction to symbol table, **Tokenizer:** Tokenizer using Flex, Arithmetic Calculator Using Bison, **Intermediate Code Generator**: (Flex + Bison).

SKILL MAPPING

No.	Course Learning Outcome			Р	ROG	RAN	1 OL	JTC	OMI	ES (P	0)		
INO.	Course Learning Outcome	1	2	3	4	5	6	7	8	9	10	11	12
CO1	Remember, understand and apply the basic techniques of compiler construction and tools to perform syntax-directed translation of a high- level programming language into an executable code.						Н						
CO2	Understand the working mechanisms of lex and yacc compiler for debugging of programs.									Н			
CO3	Analyze and adapt the new tools and technologies used for designing a compiler.											Н	

(H – High, M- Medium, L-low)

JUSTIFICATION FOR CO-PO MAPPING

Mapping	Level	Justifications					
CO1-PO6	High	Apply the basic techniques of compiler construction and tools to perform syntax-directed translation of a high-level programming language into an executable code.					
CO2-PO9	High	Use the working mechanisms of lex and yacc compiler for debugging of programs					
CO3-PO11	High	Adapt the new tools and design a compiler using new technologies					

TEACHING LEARNING STRATEGY

Teaching and Learning Activities	Engagement (hours)				
Face-to-Face Learning					
Lecture	-				
Practical / Tutorial / Studio	21				
Student-Centred Learning	-				
Self-Directed Learning					
Non-face-to-face learning in (Lab)	-				
Assessment Preparations	-				
Formal Assessment	-				
Continuous Assessment	2				
Final Exam	3				
Total	26				
TEACHING METHODOLOGY					

Lecture and Discussion, Co-operative and Collaborative Method, Problem Based Method

COURSE SCHEDULE

Week	Lecture	Topics	Remarks
1	Lab-1, 2	Symbol Table	3:00 hrs in
		Symbol Table	alternate week

3	Lab-3, 4	Tokenizer	
5	Lab-5, 6	Tokenizer Using Flex	
7	Lab-7, 8	Arithmetic Calculator Using Bison	
9	Lab-9, 10	Arithmetic Calculator Using Bison continued	
11	Lab-11, 12	Intermediate Code Generator (Flex)	
13	Lab-13, 14	Intermediate Code Generator (Bison)	

			СО	Blooms Taxonomy
Comp	oonents	Grading		BIOOIIIS LAXOIIOIIIY
	Online	20%	CO2	C2, P4
	Oniz	20%	CO2	C2, P4
	Quiz	20%	CO3	C4, P6, A2
Continuous	Class	10%		
Assessmen	Participation	10%		
t (100%)	Offline/		CO1	C1-C3
	Assignment	30%	CO3	C4, P6
	Class	20%	CO1	C1-C3
	Evaluation	20%	01	01-03
Total	Total Marks			

(CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

REFERENCE BOOKS

- 1. Compilers: Principles, Techniques & Tools (2nd ed)- Alfred V Aho, Monica S Lam, Ravi Sethi, and Jeffrey D Ullman, Pearson/Addison Wesley (2006).
- 2. Engineering A Compiler (2nd Ed) Linda Torczon and Keith Cooper, Morgan Kaufmann Publishers Inc (2011).

CSE-305: Microprocessors, Micro-controllers and Assembly Language

COURSE	INFORMATION						
Course Course Ti							
PRE-RE	QUISITE						
Course Co	ode: CSE-201						
Course Ti	tle: Digital Logic Design						
CURRIC	ULUM STRUCTURE						
Outcome	Based Education (OBE)						
RATION	ALE						
assembly	rollers and assembly language. The language, microprocessor architectur nicroprocessors and microcontrollers.	e, and discusses differ					
OBJECT	IVE provide an understanding of micropr						
 To min To min To min To log To log To 	rumentation, control and communicat familiarize students with the arcl crocontrollers and impart knowledge of teach the basics of programmi crocontrollers. investigate in depth the microproces ic controllers. provide strong foundation for being a microcontrollers.	nitecture and operati n the low-level langua ng and interfacing sor-based systems and	ge of micro of comm d understan	oproce ion m nd usa	ssor. nicroproo ge of pr	cessors an ogrammab	
	NG OUTCOMES & GENERIC SK	птс					
No.	Course Learning Outcome (Upon completion of the course, the stud able to)	Bloom		CA	KP	Assessmer Methods	
	nterpret microprocessor's and micro nternal architecture and their operation	n. CI-C	2 1		1,3,6	T, MT, F	
CO2	Analyse how the high-level language converted to low level languages processor executes a program line by l	and how a C4 ine.	1		3	T, F	
CO3 6	Design programs to interface microprocessor to						
CO4	4 Apply knowledge and programming proficiency using various addressing modes and data transfer instructions of the target microprocessor and solve assembly language programs. C3, C5 1, 7 3 T, MT,						
	Develop communication skills by					-	

(CP- Complex Problems, CA-Complex Activities, KP-Knowledge Profile, T – Test; PR – Project; Q – Quiz; ASG – Assignment; Pr – Presentation; R - Report; F – Final Exam, MT- Mid Term Exam)

COURSE CONTENT

Assembly Language: Basic Concepts; System/Processor Architecture; Assembly Language Fundamentals; Memory Segments, Registers, Addressing-modes; Assembly instruction types and their formats: Arithmetic, Logical, Transfer control and Conditional processing, String processing, Arrays, Procedures, Stacks, branches, Subroutine and parameter passing, Input/output and Interrupts.

Microprocessors and Micro-controllers: Introduction to Microprocessor and Microcontrollers, Architectural overview of Microprocessor and its operation, Common instruction types, Addressing modes. **Intel 8086 Microprocessor:** internal architecture, register structure, programming model, addressing modes, instruction set; I/O pin diagram and control signals; I/O port organization and accessing; Cache Memory, TLB Structure; **Memory management in Intel 80X86 family:** Segmentation and Real Mode Memory Management.; Intel 80186, 80386 and 80486 segments register formats; Interrupts and Exception in Intel 80X86 families of processors, type of interrupts, interrupts in real mode and protected mode, interrupts priorities; **Input and Output :** I/O address spaces, Port organization, Memory mapped I/O, Hand-shaking I/O instruction, Keyboard-Display interface Timer handler, **Microcontrollers:** Architecture of 8051, memory organization, special function registers, I/O ports.

SKILL MAPPING

N			PROGRAM OUTCOMES (PO)										
No.	Course Learning Outcome	1	2	3	4	5	6	7	8	9	10	11	12
CO1	Interpret microprocessor's and microcontroller's internal architecture and their operation.					Н							
CO2	Analyse how the high-level language structure is converted to low level languages and how a processor executes a program line by line.		М										
CO3	Design programs to interface microprocessor to external devices and design 8051 microcontroller-based system.	М	М		L								
CO4	Apply knowledge and programming proficiency using the various addressing modes and data transfer instructions of the target microprocessor and solve assembly language programs.	Н	М										
CO5	Develop communication skill by presenting topics on microprocessors, micro-controllers and assembly Language.										L		

(H – High, M- Medium, L-low)

JUSTIFICATION FOR CO-PO MAPPING								
Mapping	Level	Justifications						
CO1-PO1	High	Interpret microprocessor's and microcontroller's internal architecture and their operation by developing breadth and depth of knowledge and understanding in the respective areas.						
CO1- PO5	High	Understand the level of appropriateness and wide usage of microprocessors and microcontrollers in computing systems.						
CO2 - PO1 High		Gain depth of knowledge for analysing low level language structure and their execution process.						
CO2 – PO2 Medium		Do analysis of how high-level language is converted to low level language and do complex analysis of low-level programs.						

CO3 – PO1	Medium	external devices and design 8051 microcontroller-based system.						
CO3 – PO2	Medium	Gain preliminary experience in complex problem analysis while designing programs to interface devices to microprocessor and microcontroller-based system.						
CO3 – PO4	Low	Preliminary level investigation and experimentation to interface devices to microprocessor and microcontra						
CO4 - PO1	High	Gain depth of knowledge in programming for the targ	et microprocessor.					
CO4 – PO2	Medium	Do problem analysis for the target microprocessor and applying the gained knowledge.	d assembly programs while					
CO5- PO10	Low	Demonstrate communication skills by presenting on micro-controllers and assembly language.	topics as microprocessors,					
TEACHING	LEARNIN	G STRATEGY						
Teaching and	Learning A	ctivities	Engagement (hours)					
Face-to-Face I	Learning							
Lectu	ire		42					
	ical / Tutor		-					
	ent-Centred	Learning	-					
Self-Directed	e							
	face-to-face	e learning	42					
Revis			21					
Asse	ssment Prep	parations	21					
Formal Assess	ment							
Conti	Continuous Assessment 2							
Final Examination 3								
Total	Total 131							
TEACHING	TEACHING METHODOLOGY							

Lecture and Discussion, Co-operative and Collaborative Method, Problem Based Method

COURSE SCHEDULE

Week	Lecture	Topics	Assessment Methods
1	Lec 1	System Architecture for Assembly language,	
	Lec 2	Assembly programming basics	
	Lec 3		
2	Lec 4	Assembly Addressing modes, Assembly	
	Lec 5	instruction types and their formats:	
	Lec 6	Arithmetic and Logical processing	Class Test 1
3	Lec 7	Transfer control and conditional-processing,	
	Lec 8	Stacks, Branches, Procedures	
	Lec 9		
4	Lec 10	String processing, Subroutine and parameter	
	Lec 11	passing, Input/output, Interrupts	
	Lec 12		
5	Lec 13	Intro to Microprocessor and Microcontroller.	
	Lec 14	Architectural overview of Microprocessor	
	Lec 15	and its operation, Common instruction types	
		and addressing modes	
6	Lec 16	Intel 8086 Microprocessor: Internal	
	Lec 17	architecture, Register structure, Programming	Class Test 2
	Lec 18	model	
7	Lec 19	Addressing modes, Instruction set;	
	Lec 20	I/O Pin diagram and Control signals;	
	Lec 21	I/O port organization and accessing	

 r	1			
8	Lec 22	Cache Memory, TLB Structure;		
	Lec 23	Memory Management in Intel 80X86		
	Lec 24	Family: Segmentation and Real Mode		
		Memory Management.		
9	Lec 25	Intel 80186, 80386 and 80486 segments		
	Lec 26	register formats		
	Lec 27		Mid Term Exam	
10	Lec 28	Interrupts and Exception in Intel 80X86		
	Lec 29	families of processors, type of Interrupts		
	Lec 30			
11	Lec 31	Interrupts in real mode and protected mode,		
	Lec 32	Interrupts Priorities		
	Lec 33			
12	Lec 34	Input and Output: IO address spaces, Port		
	Lec 35	organization, Memory mapped IO		
	Lec 36			
13	Lec 37	Hand-shaking IO instruction, Keyboard-		
	Lec 38	Display interface Timer handler		
	Lec 39		Class Test 3	
14	Lec 40	Microcontrollers: Architecture of 8051,		
	Lec 41	memory organization, I/O ports, Special		
	Lec 42	function registers.		

ASSESSMENT STRATEGY

	Components Grading		СО	Blooms Taxonomy
Comp			0	Dioonis Taxonomy
			CO1	C1, C2
	Test 1-3,	20%	CO2	C4
<u>Carrie</u>	Assignment	20%	CO3	C3, C6
Continuous			CO4	C3, C5
Assessment (40%)	Class Participation	5%	CO5	A2
	Mid term	15%	CO1	C1, C2
	wha term	13%	CO4	C3, C5
			CO1	C1, C2
Einal	Exam	60%	CO2	C4
Fillal	Exam	00%	CO3	C3,C6
			CO4	C3, C5
Total Marks		100%		

(CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

REFERENCE BOOKS

- 1. Assembly Language Programming and Organization of the IBM PC--Ytha Yu, Charles Marut
- 2. The Intel Microprocessors Barry B Brey
- 3. Microprocessors and Interfacing Douglas V. Hall
- 4. Microprocessors and Microcomputer- based system design -Mohamed Rafiquzzaman.
- 5. 8051 Microcontroller-Internals, Instructions, Programming& Interfacing by Subrata Ghoshal

REFERENCE SITE

CSE-306: Microprocessors, Micro-controllers and Assembly Language Sessional

	SE INFOR	MATION							
Course Course		: CSE 306 : Microprocessors, Micro-controllers and Assembly Language Sessional	Lecture Cont Credit Hours		: 3.00 : 1.50				
PRE-REQUISITE									
	Code: Nil Fitle: Ni								
CURRI	CULUM S	STRUCTURE							
Outcom	e Based Ed	lucation (OBE)							
RATIO	NALE								
		duces basics of assembly language p interfaces and design of systems based of							
OBJEC	TIVE								
 communication systems. 3. Investigate microprocessor and microcontroller-based systems and produce software for a microprocessor-based system, interface microprocessor-based systems and understand usage of programmable logic controllers. 									
3. Inve mic prog	estigate mi roprocesso grammable	croprocessor and microcontroller-based r-based system, interface microprocesso logic controllers.	systems and pr	oduce s	softwar	e for a			
3. Inve mic prog	estigate mi roprocesso grammable	croprocessor and microcontroller-based r-based system, interface microprocesso logic controllers. COMES & GENERIC SKILLS	systems and pr	oduce s	softwar	e for a			
3. Inve mic prog	estigate mi roprocesso grammable IING OUT	croprocessor and microcontroller-based r-based system, interface microprocesso logic controllers.	systems and pr	oduce s	softwar	e for a			
3. Inve mic prog	estigate mi roprocesso grammable IING OUT (Upon co Understa impleme	croprocessor and microcontroller-based r-based system, interface microprocesso logic controllers. COMES & GENERIC SKILLS Course Learning Outcome mpletion of the course, the students will be	systems and pr r-based system Bloom's	oduce s s and u	softwar ndersta	re for a and usa	ge of Assessmen		
 Inversion mic prog LEARN No. 	estigate mi roprocesso grammable IING OUT (Upon co Understa impleme program	croprocessor and microcontroller-based r-based system, interface microprocesso logic controllers. COMES & GENERIC SKILLS Course Learning Outcome mpletion of the course, the students will be able to) able to) able to) and how low-level languages are nted and how a processor executes a line by line. basic assembly programs and define	systems and pr- r-based system Bloom's Taxonomy	oduce s s and u	softwar ndersta CA	re for a and usa	ge of Assessmen Methods		
3. Inve mic prog LEARN No.	estigate mi roprocesso grammable (Upon co Understa impleme program Design where us Interpret	croprocessor and microcontroller-based r-based system, interface microprocesso logic controllers. COMES & GENERIC SKILLS Course Learning Outcome mpletion of the course, the students will be able to) able to) able to) and how low-level languages are nted and how a processor executes a line by line. basic assembly programs and define	Bloom's Taxonomy	oduce s s and u	cA	e for a and usa	age of Assessmen Methods E, O, L		

– Quiz; ASG – Assignment; Pr – Presentation; R - Report; L- Lab Test; O – Online; V - Viva)

COURSE CONTENT

Basics of Assembly Language: Compilation, input, output, variables, basic instructions, memory model, data segment, stack segment, code segment, Input Output Instruction;

Flow Control Instruction: Conditional and unconditional jump instructions, If-then-else, case, for loop, while loop, repeat loop;

Logic, Shift and Rotate Instructions: AND, OR, XOR, complement, shift left, shift right, rotate left, rotate carry left, rotate carry right, Binary, Hexa Input Output;

Stack and Procedure: Push, Pushf, Pop, Popf;

Multiplication and Division: Mul, IMul, Div, IDiv;

Array and Addressing modes: 1D Array, DUP operator, Addressing-mode, register indirect mode,

String Instructions: Moving string, load string, scan string, compare string;

File Operations: File errors, opening and closing a file, reading a file, writing a file.

Basic Idea of MDA 8086: LED, Seven Segment display, LCD, Keyboard, Motor, Dot matrix Interface with 8086; Basic idea of ATMEGA 16 microcontroller and simulation.

SKILL	MAPI	PING														
				PROGRAM OUTCOMES (PO)												
No.		Course Learni	ng Outcome	1	2	3	4	5	6	7	8	9	10	11	12	
			level languages are			_		_			_	-				
CO1		mented and hov		Μ			М									
		tes a program li														
CO2		e where used.	y programs and		Н	М										
002	uenne	where used.														
CO3		ret how a basic	Н				М									
			ated components.													
CO4		assembly langu	sic microprocessor	М		Н						Н				
04	projec		age in a group	111		11						11				
	1 5			1												
(H – Hi	gh, M-	Medium, L-low	7)													
JUSTII	FICAT	ION FOR CO-	PO MAPPING													
Mapp	oing	Level				Ju	istifio	catio	ıs							
	-		Will be able to ga	ain de	epth	of kı	nowle	edge	on	now	a lo	ow-le	evel la	angua	ige	
CO1 – I	POI	Medium	implemented and i	its ex	ecuti	on li	ne by	line	by a	a pro	oces	sor.		-	-	
CO1 – 1	PO4	Medium	Will be able to in	ivest	igate	and	expe	erime	nt v	vith	low	/-leve	el lan	guage	es l	
			writing programs.	1	1		1			1	1			1 1	C	
CO2 – 1	PO2	High	will be able to c where used.	10 CC	mple	ex ar	alysi	s of	ass	emb	mbly programs and define					
	000		Will be able to design solutions to a variety of problems using assembly													
CO2 – 1	PO3	Medium	language.	U					5	1			C	,		
CO3 -P	01	High	Will gain breadth									tratin	ting how a basic			
000 1	01		microcomputer we													
CO3 - I	PO5	Medium		ain a level of understanding of the appropriateness on associated devices.												
<u> </u>	0.01			adth and depth of knowledge while experimenting with												
CO4 – 1	POI	Medium	basic microproces	sor u	or using assembly language in a group project.											
CO4 – 1	PO3	High	Will be able to					ive s	solu	tion	s w	hile	worl	king	in	
			microprocessor-ba Will gain experier	ised g	group	o proj	ect.	. 1	11.1.	4	•	1.11	1			
CO4 – 1	PO9	High	group project.	ice of	f tea	m wo	ork ai	nd co	llab	orat	ion	while	e worl	king i	n ti	
TEACI	HINCI	LEARNING ST														
		Learning Activit								1	Er	00000	ement	(hou	ra)	
		earning Activity	105							_	La	igage	mem	(IIOU	(5)	
	Lectu												7			
		cal / Tutorial / S											42			
0.16 D'		nt-Centred Lean	ning							_			-			
Self-Di		Learning Face-to-face lear	ning										-			
Non-face-to-face learning Revision													-			
Assessment Preparations										14						
Formal Assessment																
Continuous Assessment Online Exam										8						
Lab Test 1																
Quiz/Viva 1																
Total													74			
TEACI	HING I	METHODOLO	OGY													
Lecture	and I	Discussion, Co-	operative and Colla	abora	tive	Metl	nod,	Prob	lem	Ba	sed	Met	hod,	Hand	ls-C	
Learnin	g															

OURSE SO	CHEDULE		
Week	Lab	Topics	Remarks
Week	Lab	Topics	Remarks
1	Lab 1	Basic of Assembly Language - Compilation, input, output,	
		variables, basic instructions, memory model, data segment,	
		stack segment, code segment, Input Output Instruction	
2	Lab 2	Flow Control Instruction - Conditional and unconditional	
		jump instructions, If-then-else, case, for loop, while loop	
3	Lab 3	Logic, Shift and Rotate Instructions - AND, OR, XOR,	
		complement, shift left, shift right	
4	Lab 4	Rotate left, rotate right, rotate carry left, rotate carry right,	
		Binary, Hexa Input Output	
5	Lab 5	Stack and Procedure - Push, Pushf, Pop, Popf	
6	Lab 6	Multiplication and Division – Mul, IMul, Div, IDiv	
7	Lab 7	Array and Addressing modes – 1D Array, DUP operator,	
		Addressing-mode, register indirect mode	
8	Lab 8	String Instructions - Moving string, load string, scan string	
9	Lab 9	Compare string File Operations – File errors, opening and	
		closing a file, r/w a file	
10	Lab 10	Basic Idea of MDA 8086 LED	
11	Lab 11	Seven Segment display interface	
12	Lab 12	Operation of DOT matrix using 8086 kit LCD interface	
		with 8086	
13	Lab 13	Keyboard interface with 8086	
14	Lab 14	Motor interface with 8086	

ASSESSMENT STRATEGY

Comp	oonents	Grading	СО	Blooms Taxonomy
1	C1	0	C01	C1-C3
<i>a</i>	Class	20%	CO2	C3, C4, C6
Continuous	Evaluation		CO3	C1, C2, C4
Assessment	Class		CO1	C1-C3
(25%)	Class Participation	5%	CO2	C3, C4, C6
	Farticipation		CO3	C1, C2, C4
Onlir	ne Test	20%	CO1, CO2	C1-C4, C6
Lab	Test	20%	CO1, CO3	C1-C4
Project S	Project Submission		CO4	C2-C4, C6, A4
Quiz	/ Viva	10%	CO2, CO3	C1-C4, C6
Total	Total Marks			

(CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

REFERENCE BOOKS

1. Assembly Language Programming and Organization of the IBM PC--Ytha Yu, Charles Marut

- 2. The Intel Microprocessors Barry B Brey
- 3. Microprocessors and Interfacing Douglas V. Hall

REFERENCE SITE

CSE-307: Operating Systems

COU	RSE INFORMA	TION								
	e Code	: CSE 307		Contact Hours		: 3.00				
	e Title	: Operating System	Credit H	ours		: 3.00				
PRE-	REQUISITE									
Course	e Code: CSE-323	3								
Cours	e Title: Compute	r Architecture								
CURI	RICULUM STR	UCTURE								
Outco	me Based Educat	tion (OBE)								
RATI	ONALE									
Opera hardw manag	ting Systems. T are and concentr	(OS) course is designed the course begins with the rates on operating system tem and related securi ad service.	he history n concepts	of operating s	ystem a ture, pr	and the cocess a	reviev and thr	w of compute eads, memory		
OBJE	CTIVE									
		idea about internals and ues for achieving protection						nment.		
	-	MES& GENERIC SKI				<u> </u>				
No.		on of the course, the student able to)	ts will be	Bloom's Taxonomy	СР	CA	KP	Assessment Methods		
CO1		ify and analyse modern c ept for virtualization, cl ssor systems.		C1-C4	1		3	T, MT, F		
CO2	memory and fil	and analyse process, le management systems.	thread,	C2, C4	1		3	T, MT		
CO3	Understand a process, thre management.	nd implement algorith ead, deadlock and	nms for memory	C2, C3	2		5	F		
CO4		ommunication skill by prating systems.	resenting	A2		1		Pr		
	Complex Problem	ns, CA-Complex Activitie ent; Pr – Presentation; R -								
COU	RSE CONTENT	1								
OS in proces	ntroduction: In ss states, job an	ntroduction of Operating d process scheduling, C	CPU scheo	luling algorith	ms, pr	ocess (coordir	nation, critic		

process states, job and process scheduling, CPU scheduling algorithms, process coordination, critical section problems, semaphores, Inter-Process Communication (IPC), classical IPC problems, multiprocessing and time sharing; **Memory management:** swapping, memory allocation schemes, Paging and segmentation, virtual memory, page replacement strategies, working sets, demand paging; **Input/output:** hardware/software, disk, disk scheduling algorithms, Secondary storage management, terminals, clocks; **Deadlock:** resource allocation, detection, prevention, avoidance and recovery; File management; **Virtualization :** Types and techniques for efficient virtualization, memory and i/o virtualizations, virtual appliances; **Cloud :** clouds as a service, virtual machine migration, Check pointing; **Multiple Processor Systems:** Multiprocessor, Multicomputer, Distributed Systems, Research on Multiple Processor Systems; Operating system security and protection; case study of some operating systems.

SKILL MAPPING

No	Course Learning Outcome	PROGRAM OUTCOMES (PO)											
No.	Course Learning Outcome	1	2	3	4	5	6	7	8	9	10	11	12
CO1	Classify, identify and analyse modern operating systems; concept for virtualization, cloud and multiple processor systems.	Н											
CO2	Understand and analyse process, thread, memory and file management systems.		Н										
CO3	Understand and implement algorithms for process, thread, deadlock and memory management.			Н									
CO4	Develop the communication skill by presenting topics on operating systems.										L		

(H – High, M- Medium, L-low)

JUSTIFICATION FOR CO-PO MAPPING

Mapping	Level	Justifications
CO1-PO1	High	Increase breadth & depth of knowledge through Classifying, identifying and analysing various aspect of modern operating systems.
CO2-PO2	High	Understand and solve various complex problems by analysing process, thread, memory and file management system.
CO3-PO3	High	Understand and implement algorithms for process, thread, deadlock and memory management which solutions have previously been identified and coded.
CO4-PO10	Low	Develop communication skills through participating in quiz, presentation etc.

TEACHING LEARNING STRATEGY

Teaching and Learning Activities	Engagement (hours)
Face-to-Face Learning	
Lecture	42
Practical / Tutorial / Studio	-
Student-Centred Learning	-
Self-Directed Learning	
Non-face-to-face learning	42
Revision	21
Assessment Preparations	21
Formal Assessment	
Continuous Assessment	2
Final Examination	3
Total	131

TEACHING METHODOLOGY

Lecture and Discussion, Co-operative and Collaborative Method, Problem Based Method

COURSE SCHEDULE

Week	Lecture	Topics	Assessment Methods
1	Lec 1	Introduction evolution, goals and Components of	
	Lec 2	OS, types of OS	
	Lec 3		
2	Lec 4	Process managements, process states and state	1
	Lec 5	transition, process control blocks	
	Lec 6		Class Test 1
3	Lec 7	Job and process scheduling, scheduling levels,	Class Test I
	Lec 8	objective and criteria CPU scheduling algorithms	

	Lec 9				
4	Lec 10	Process coordin	nation, critical section problem	ms,	
	Lec 11	semaphores,	1	,	
	Lec 12				
5	Lec 13	Language const	tructs, classical problems of		
	Lec 14		nation, Inter-process		
	Lec 15		, message and mailbox etc.		
6	Lec 16	Memory manag	gement memory allocation		Class Test 2
	Lec 17	schemes, Pagin	g and segmentation, virtual		
	Lec 18	memory			
7	Lec 19	Page replaceme	ent strategies, working sets,		
	Lec 20	demand paging			
	Lec 21				
8	Lec 22	File system fun	ctions file organization logic	al and	
	Lec 23	physical file ma	aps, tree structure filesystems	5	
	Lec 24				
9	Lec 25	1 0	ng Device management techr	niques.	
	Lec 26	Interrupts proce	essing parallel processing.		Mid Term Exam
	Lec 27				
10	Lec 31		age management, disk schedu	uling	
	Lec 32	algorithms			
	Lec 33				
11	Lec 28		n, catalogs, file access control	1	
	Lec 29	mechanism			
	Lec 30				
12	Lec 34		lock prevention. avoidance		
	Lec 35	direction and re	ecovery		
	Lec 36				
13	Lec 37		em security, timesharing, Type		
	Lec 38		efficient virtualization, memo	ory and	
	Lec 39		ns, virtual appliances		Class Test 3
14	Lec 40		vice, virtual machine migration	on,	Ciubb 1000 5
	Lec 41		; Multiple Processor		
	Lec 42		processor, Multicomputer,		
		•	tems, Research on Multiple	_	
			ems; Operating system securi	-	
		protection; case	e study of some operating sys	tems.	
SESSMEN	T STRATEG	Y			
			СО	ם	looms Taxonomy
Comp	onents	Grading			-
	Test 1-3	20%	CO 1		C1-C4
Continuous	1081 1-3	20%	CO 2		C2, C4
Assessment	Class	504	<u> </u>		1.0

Class Participation	5%	CO4	A2
Mid term	15%	CO 3	C2, C3
		CO 1	C1-C4
Exam	60%	CO 2	C2, C4
		CO 3	C2, C3
Marks	100%		
-	Participation Mid term Exam	Participation5%Mid term15%Exam60%	Participation5%CO4Mid term15%CO 3Exam60%CO 2CO 3CO 3

(CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

REFERENCE BOOKS

Modern Operating Systems (4th) - Andrew S. Tanenbaum; Prentice Hall
 Operating Systems: Internals and Design Principles – (9th) -William Stallings

3. Operating System concepts - A. Silberschatz, P.B. Galvin, Greg Gagne

REFERENCE SITE

CSE-308: Operating Systems Sessional

~ ~ ~ ~ ~ ~								
COURS	E INFOI	RMATION						
Course C		: CSE 308	Lecture Con				in alter	rnative wk
Course T	Title	: Operating System Sessional	Credit Hour	rs	: 0.	75		
PRE-RE	EQUISIT	E						
Course C Course T								
CURRI	CULUM	STRUCTURE						
Outcome	e Based E	ducation (OBE)						
RATIO	NALE							
systems compone memory	like UND ents of Op managen	erating Systems. The lab begins X and WINDOWS. Subsequently perating System e.g. kernel comp nent, synchronization and system	the course d thation, proce	leals with vi	rtualiz	ation a	nd dif	ferent key
OBJEC								
		e OS concepts and to be familiar internal and design principles of			s of O	peratin	ıg Syst	tem.
LEARN	ING OU	TCOMES & GENERIC SKIL	LS					
No.	(Upon co	Course Learning Outcome ompletion of the course, the students to)	will be able	Bloom's Taxono my	СР	CA	KP	Assessment Methods
CO1		and and respond to major like Windows, Linux etc.	operating	C2, A2		1	8	T, Q
CO2	and me	and modify algorithms for proc mory management through gro		C3, A5		2	6	ASG, Q
002	work							
CO2	Develop topics o	o the communication skill by n operating systems e security of Windows and	1 0	P3, A4		2	2	R,Q

(CP- Complex Problems, CA-Complex Activities, KP-Knowledge Profile, T – Test ; PR – Project ; Q – Quiz; ASG – Assignment; Pr – Presentation; R - Report; F – Final Exam, MT- Mid Term Exam)

COURSE CONTENT

Introduction: Development of Linux Operating System, Installation of Linux in various modes, Installation of windows application programs on Linux, Basic Linux Command; **Linux Kernels and Office Environments:** Compilation; **Shell Programing:** variables, statements, loop, array, functions etc; **Memory management:** preemptive and non- preemptive algorithms and implementation; **Inter process communication and Process scheduling:** algorithms and implementation; **Mutual exclusion and deadlock:** algorithms and implementation; **Security of Windows and UNIX like OS:** hardening and security issues.

SKILL	MAP	PPING													
No.	Cou	rse Learning Ou	itcome				1	RAN				`	·		
				1	2	3	4	5	6	7	8	9	10	11	12
CO1		erstand and responses	ke Windows, Linux				Н								
COI	etc.	ating systems in	ke windows, Linux				11								
	App	ly and modify a	lgorithms for												
CO2	proc	ess, thread and	memory									н			
002			h group project												
	worl		inication skill by											-	-
CO3			operating systems										Η		
CO4			Windows and Unix												Н
04	like	operating system	ms												п
(H – Hi	gh, M	- Medium, L-lo	w)												
JUSTI	FICA'	TION FOR CO	D-PO MAPPING												
Mappi	ing	Level				Jus	tifica	ation	s						
CO1 D(24	Uich	Understand and res	pond	maj	or op	erati	ng s	yste	ms 1	ike	Win	dows	and	Unix
CO1-PO	J 4	High	like OS through inv	estig	ation	and	expe	rimei	ntati	on					
CO2-PO) 9	High	Apply and modify a	<u> </u>	ithms	for j	proc	ess, t	hrea	d ar	nd m	nemo	ry m	anage	ment
~~~~			as a group project w												
CO3-PO	D10	High	Develop the commu						-	-		-	-	-	
CO4-PO	D12	High	Enhance security of of continuing learning		dows	s and	Uni	x like	e op	erati	ing s	syste	ms as	s a pro	ocess
TEACH	HING	LEARNING S	· •	0											
Teachin	ng and	Learning Activ	vities								]	Enga	geme	nt (ho	ours)
Face-to-		Learning													
	Lect												-	1	
		tical / Tutorial / ent-Centred Le											2	1	
Self-Di		Learning	aming												
	Non	-face-to-face lea	arning										-		
		ision											-		
Formal		essment Prepara	tions										-	•	
Formal		sment tinuous Assessr	nent										2	,	
		1 Examination	iioiit										3		
Total													2	6	
TEACH	HING	METHODOL	OGY												
Lecture	and I	Discussion, Co-	operative and Collabor	ative	e Met	hod,	Prob	lem	Base	ed M	letho	od			
COUR	SE SC	CHEDULE													
Wee	ek	Lab	Topics										Rei	narks	5
1		Lab-1,2	Introduction of Lin								n of				
			Linux in various m								or 1				
3		Lab-3,4	application program Compilation of Lin												
5		Lab-5,4 Lab-5,6	Variables, statemen												.
			Programing	- , -	r, ,									)0 hrs ternat	
7		Lab-7,8	Preemptive and not						s and	1				ternai week	-
		L.1.0.10	implementation in						.1.	1 1.					
9		Lab-9,10	Inter process comm algorithms and imp				Proc	ess s	cnec	lulin	g				
11		Lab-11,12	Mutual exclusion a				gorit	hms	and						
		, –	implementation						-						

13		rity of Windov rity issues	ws and UNIX like OS, har	dening and
ASSESSMEN	NT STRATEGY			
			[	[
C	Components		СО	Blooms Taxonomy
	Test and		CO1	C2, A2
Continuous	Test and	30%	CO2	C3, A5
Assessment	Assignment		CO4	C4, A3
(40%)	Class Participation	20%	CO3	P3, A4
	Presentation	10%	CO3	P3, A4

### (CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

CO1, CO2, CO4

C2, C3, C4, A2, A5

#### **REFERENCE BOOKS**

1. Modern Operating Systems (4th) - Andrew S. Tanenbaum; Prentice Hall

Final Exam (Quiz + Online Test)

Total Marks

UNIX Shell Programming - Kanetkar
 Nachos Beginner's Guide - Saman Hadiani, Niklas Dahlbäck, and Uwe Assmann

40%

100%

### **REFERENCE SITE**

#### **CSE-317: Data Communication**

COU	RSE INFO	ORMATION						
	e Code e Title	: CSE-317 : Data Communication	Lecture Contact Credit Hours	Hours	: 3.0 : 3.0	•		
PRE-	REQUIS	ITE						
	e Code: N e Title: Ni							
CURI	RICULU	M STRUCTURE						
Outco	me Based	Education (OBE)						
RATI	IONALE							
sharin OBJE 1. T 2. T al 3. T	ig and also ECTIVE To familiar To impart Igorithms To familiar	is to infer the working known is to understand the operation ize with modern telecommuni knowledge on protocol layer to optimize network bandwidth rize with the use reliability, rformance criteria.	a of compression of compression of compression of cations and the aring and different h.	chitecture of a multiplexing	ta tran	ber of	gorith differe data	ms. ent networks. compression
LEAF	RNING O	UTCOMES& GENERIC SI	KILLS					
No.		Course Learning Outcom mpletion of the course, the studen		Bloom's Taxonomy	СР	CA	KP	Assessment Methods
CO1	compone	ents.	stem and its	C1-C2	1	-	1,3	T, Mid Term, F
CO2		the digital and analogue re and analyze the mechanis		C4, P1	3	2	3	Mid Term Exam, F

CO3	Identify and analyze principles of security, performance and reliability of different networks.	C1, C4	2,3	5	2,6	Mid Term Exam, F
CO4	Develop the communication skill by presenting topics on data communication	A2	-	-	5	Pr, Q

(CP- Complex Problems, CA-Complex Activities, KP-Knowledge Profile, T – Test; PR – Project; Q – Quiz; ASG – Assignment; Pr – Presentation; R - Report; F – Final Exam, MT- Mid Term Exam)

#### COURSE CONTENT

Introduction: Communication Models, Communication Network Standards and Organization, Introduction to TCP/IP Models. Data Transmission Basics: Analog and Digital Data, Spectrum and Bandwidth, Transmission Impairments, Data Rate, and Channel Capacity. Data Encoding: NRZI, Manchester and Differential Manchester Encoding, ASK, FSK, PSK, QPSK, QAM Encoding, Pulse Code Modulation, Delta Modulation. Data Transmission: Asynchronous and Synchronous Data Transmission Techniques. Analog Transmission: Digital-To-Analog Conversion, Amplitude/Frequency/Phase Shift Keying, Ouadrature Modulation, Analog-to-Analog Conversion, Amplitude/Frequency/Phase Amplitude Modulation. Multiplexing: Frequency-Division Multiplexing, Wavelength-Division Multiplexing, Synchronous Time-Division Multiplexing, Statistical Time-Division Multiplexing, Frequency Hopping Spread Spectrum, Direct Sequence Spread Spectrum. Transmission Media: Twisted-Pair Cable, Coaxial Cable, Fiber-Optic Cable, Radio Waves, Microwaves, Infrared. Error Detection and Correction: Redundancy, Parity Cheeks, Hamming Distance, CRC Error Correction, Checksum. Multiple Access: ALOHA, CSMA, CSMALCD, CSMALCA, FDMA, TDMA, CDMA. Wired LANs: Ethernet, IEEE Standards, Standard Ethernet, IEEE 802.11, Bluetooth. Connecting Devices: Passive Hubs, Repeaters, Active Hubs, Bridges, Two-Layer Switches, Routers, Three-Layer Switches, Gateway, Backbone Networks, Virtual LANs,

#### SKILL MAPPING

No		Course La	amina Outaama			Р	ROG	RAN	<i>A</i> OI	UTC	OM	ES (F	<b>PO</b> )		
No.		Course Le	arning Outcome	1	2	3	4	5	6	7	8	9	10	11	12
CO1	-	lain data co its compone	ommunication system ents.	Н											
CO2	repr anal	resentations	igital and analogue of signals and chanism of encoding		н										
CO3	secu of c	rity, perfor lifferent net			Н										
CO4	pres		mmunication skill by erent topics on data										L		
		- Medium, 1	L-low) CO-PO MAPPING												
Mappi	ng	Level				Ju	stific	ation	.S						
CO1-PO	D1	High	Depth of engineering transmission system											ng the	e data
CO2-PC	02	High	Complex problem as encoding techniques.		is ski	ill ca	n be	deve	elope	ed by	y an	alyziı	ng dif	feren	t data
CO3-PO	02	High	Evaluation of engine security and perform										alyzir	ng dif	ferent
CO4-PO	D10	Low	Communication skil and presenting differ								dev	elope	ed by	discu	issing

TEACHING LEARNING STRATEGY	
Teaching and Learning Activities	Engagement (hours)
Face-to-Face Learning	
Lecture	42
Practical / Tutorial / Studio	-
Student-Centered Learning	-
Self-Directed Learning	
Non-face-to-face learning	42
Revision	21
Assessment Preparations	21
Formal Assessment	
Continuous Assessment	2
Final Examination	3
Total	131

#### **TEACHING METHODOLOGY**

Lecture and Discussion, Co-operative and Collaborative Method, Problem Based Method

### COURSE SCHEDULE

Week	Lecture	Topics	Assessment Methods
1	Lec 1 Lec 2 Lec 3	Introduction to the course, Introduction to data communication and networks, The Internet, Network protocols and standards.	
2	Lec 4 Lec 5 Lec 6	Network models, Layered tasks, OSI Model, Layers in the OSI model, TCP/IP protocol suite, Network addressing	Class Test-
3	Lec 7 Lec 8 Lec 9	Analog and digital data, Periodic analog signals. Digital signals, Transmission impairment, Data rate limits, Networks Performance measurement.	
4	Lec 10 Lec 11 Lec 12	Introduction to digital transmission, Digital-to-Digital conversion (Line coding), Digital-to-Digital conversion (Block coding, Scrambling), Analog-to-Digital conversion (Pulse Code Modulation, Delta Modulation)	
5	Lec 13 Lec 14 Lec 15	Transmission modes, Parallel transmission, Serial transmission, Aspects of Digital-to-Analog conversion, Amplitude Shift Keying, Frequency Shift Keying,	Class Test-2
6	Lec 16 Lec 17 Lec 18	Phase Shift Keying, Quadrature Amplitude Modulation, Analog- to-Analog Conversion, Amplitude Modulation, Frequency Modulation, Phase Modulation	
7	Lec 19 Lec 20 Lec 21	Frequency-Division Multiplexing, Wavelength-Division Multiplexing, Synchronous Time-Division Multiplexing, Statistical Time-Division Multiplexing, Frequency Hopping Spread Spectrum (FHSS), Direct Sequence Spread Spectrum	
8	Lec 22 Lec 23 Lec 24	Introduction to Error Detection and Correction, Error detection and correction in block coding, Linear Block Codes and Checksum	Mid Term Exam
9	Lec 25 Lec 26 Lec 27	Transmission media, Guided and unguided media, Twisted-Pair Cable, Coaxial Cable, Fiber-Optic Cable, Radio Waves, Microwaves, Infrared	
10	Lec 28 Lec 29 Lec 30	Introduction to Multiple Access, Random access. ALOHA, Carrier Sense Multiple Access (CSMA), Carrier Sense Multiple Access with Collision Detection (CSMAlCD), and Carrier Sense Multiple Access with Collision Avoidance (CSMAlCA)	Class Test-
11	Lec 31 Lec 32	Channelization, Frequency-Division Multiple Access (FDMA), Time-Division Multiple Access (TDMA), Code-Division	

	Lec 33	Multiple Access (CDMA)
12	Lec 34 Lec 35 Lec 36	Wired LANs: Ethernet, IEEE Standards (Physical and Data Link Layer), Standard Ethernet (Physical layer and MAC sublayer)
13	Lec 37 Lec 38 Lec 39	IEEE 802.11, Bluetooth, Connecting devices (Passive Hubs, Repeaters, Active Hubs)
14	Lec 40 Lec 41 Lec 42	Bridges, Two-Layer Switches, Routers, Three-Layer Switches, Backbone networks (Bus Backbone, Star Backbone, Connecting Remote LANs), Virtual LANs

#### ASSESSMENT STRATEGY

			СО	Blooms Taxonomy
Comp	oonents	Grading	0	Dioonis Taxonomy
	Test 1-3	20%	CO1	C1, C2
Continuous	Test 1-5	20%	CO3	C1, C4
Assessment (40%)	Class Participation	5%	CO4	A2
	Mid term	15%	CO2	C4, P1
			CO1	C1, C2
Final	Exam	60%	CO2	C4, P1
			CO3	C1, C4
Total	Marks	100%		

### (CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

#### **REFERENCE BOOKS**

1. Data Communication and Networking (4th ed) - Behrouz A Forouzan (2017)

2. Data and Computer Communication - William Stallings

3. Data Communication & Networks – R L Brewster

### **REFERENCE SITE**

### **CSE-318: Data Communication Sessional**

COURSE INFO	ORMATION		
Course Code Course Title	: CSE-318 : Data Communication Sessional	Lecture Contact Hours Credit Hours	: 3.00 hrs in alternative wk : 0.75
PRE-REQUIS	ITE		
Course Code: N Course Title: Ni			
CURRICULU	M STRUCTURE		
Outcome Based	Education (OBE)		
RATIONALE			
1 1	this sessional course is to impart emp mmunication based on CSE-317.	pirical knowledge and hand	d-on experience on different
OBJECTIVE			
	ize students with different network sir practical knowledge on different	•	odulation and multiplexing

3. To bestow the quality of each data transmission methods using both signal processing devices and lab

software.

4. To impart the empirical knowledge on data link layer fundamentals, e.g., error detection, correction and flow control techniques.

LEAI	RNING OUTCOMES & GENERIC SKILLS					
No.	Course Learning Outcome (Upon completion of the course, the students will be able to)	Bloom's Taxonomy	СР	CA	KP	Assessment Methods
CO1	Adopt data communication simulation technologies.	C3, C6, P6	3	1	2,4	Class Assessment, Online, Q
CO2	Compare each data transmission methods using both signal processing devices and lab software.	C2, C5, P7	3	2	2	Class Assessment, Viva, Q
CO3	Apply amplitude, frequency and time division multiplexing techniques to share network bandwidth among multiple users.	C2-C4	1, 2	3	3	Online, Viva, Q
CO4	Develop the empirical knowledge on data link layer fundamentals, e.g., error detection, correction and flow control techniques.	P4, C5, C6	2	5	5,6	Class Assessment, Online, Viva, Q

(CP- Complex Problems, CA-Complex Activities, KP-Knowledge Profile, T – Test; PR – Project; Q – Quiz; ASG – Assignment; Pr – Presentation; R - Report; F – Final Exam, MT- Mid Term Exam)

#### COURSE CONTENT

**Introduction to MATLAB:** Amplitude Modulation, Frequency Modulation, Delta Modulation & Demodulation, **Digital to digital Conversion:** Line Coding / DSB-SC and SSB Demodulators, ASK/PSK/FSK, CDMA, Error Detection and Correction (Checksum).

#### SKILL MAPPING

	Course Learning Outcome			]	PRO	GRAN	M OL	JTC	OME	S (PC	))	
).	Course Learning Outcome	1	2	3	4	5	6	7	8	9	10	11
1	Adopt data communication simulation technologies.					Н						
2	Compare each data transmission methods using both signal processing devices and lab software.							Н				
3	Apply amplitude, frequency and time division multiplexing techniques to share network bandwidth among multiple users.						М					
4	Develop the empirical knowledge on data link layer fundamentals, e.g., error detection, correction and flow control techniques.											

(H – High, M- Medium, L-low)

### JUSTIFICATION FOR CO-PO MAPPING

Mapping	Level	Justifications
CO1-PO5	High	Use of modern tools can be accomplished by adopting simulating technologies like MATLAB to network simulation.
CO2-PO7	High	Sustainability of a solution can be realized through comparing them by both physical lab experiment and software simulation.
CO3-PO6	Medium	Exercising engineering knowledge and responsibility could be made by applying different multiplexing technique in the computer networks to optimize the resources.
CO4-PO12	Medium	Communication skill on engineering problem can be developed by discussing and presenting different topic on data communication.

TEACHING LEARNING STRATEGY	
Teaching and Learning Activities	Engagement (hours)
Face-to-Face Learning	
Lecture	-
Practical / Tutorial / Studio	21
Student-Centered Learning	-
Self-Directed Learning	
Non-face-to-face learning	-
Revision	-
Assessment Preparations	10
Formal Assessment	
Continuous Assessment	2
Final Examination	3
Total	36

#### TEACHING METHODOLOGY

Lecture and Discussion, Co-operative and Collaborative Method, Problem Based Method

#### COURSE SCHEDULE

Week	Lab	Topics	Remarks
1	Lab - 1, 2	Introduction to MATLAB and signal processing libraries.	
3	Lab - 3, 4	Amplitude Modulation, Frequency Modulation	
5	Lab - 5, 6	Delta Modulation and Demodulation.	3:00 hrs in
7	Lab - 7, 8	Line Coding: DSB-SC and SSB Demodulators	alternate
9	Lab - 9, 10	ASK, PSK, FSK	week
11	Lab - 11, 12	Code-division multiple access (CDMA)	7
13	Lab - 13, 14	Error Detection and Correction	

#### ASSESSMENT STRATEGY

		~ "	СО	Blooms Taxonomy
Comp	onents	Grading		
	Class		CO1	C3, C6, P6
	Assessment	30%	CO2	C2, C5, P7
	Assessment		CO4	P4, C5, C6
Continuous			CO1	C3, C6, P6
Assessment	Online	30%	CO3	C2-C4
(40%)			CO4	P4, C5, C6
			CO2	C4, P1
	Viva	10%	CO3	C2-C4
			CO4	P4, C5, C6
Q	uiz	30%	CO1-CO4	C2-C6, P4, P7
Total	Marks	100%		·

### (CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

#### **REFERENCE BOOKS**

1. Data Communication and Networking (4th ed) - Behrouz A Forouzan (2017)

2. Introduction to MATLAB – zyBook

### **REFERENCE SITE**

### LEVEL-3 FALL TERM

#### **CSE-309: Computer Network**

COU	RSE INF	ORMATION						
	e Code	: CSE 309	Lecture Conta	ct Hours	: 3.00			
Cours	e Title	: Computer Network	Credit Hours		: 3.00			
PRE-	REQUIS	ITE						
	e Code: C							
Cours	e Title: D	ata Communication						
CURI	RICULUI	M STRUCTURE						
Outco	me Based	Education (OBE)						
RATI	ONALE							
netwo	rk develo	esigned to understand the orga pment and the reasons for hav	ving variety of c	lifferent ty	pes of ne	etwork	s. Resc	ource sharing,
-	CTIVE	, increase in system performan	ce, and security	III network	are the	main c	objectiv	es.
3. D	esign a ne	transmission. etwork routing for IP networks						
No.		Course Learning Outcom ompletion of the course, the stude to)	e	Bloom's Taxonom		CA	KP	Assessment Methods
CO1	organiza placeme	anding different types of a tion of computer netwo nt of different layers of IS nfluencing network developme	orks, proper O model and	C1-C2	1		1, 3	T, F
CO2	detection	e knowledge of different techr n and correction to detect and ata transmission.		P4	1		2	МТ
CO3	different	network routing for IP net routing protocol.	_	C3-C6	5		6	F
CO4		the communication skill Computer networking.	by presenting	A2		1		Pr
	-	Problems, CA-Complex Activi – Presentation; R - Report; F -		-			R – Proj	ject ; ASG –

#### COURSE CONTENT

**Introduction**, What Is **Network**, Delay, Loss, and Throughput in Packet Switched Networks, **Protocol Layers**, Protocol hierarchies; **Application Layer** Principles of Network Applications, The Web and HTTP, File Transfer, **Data link control**: HLDC; DLL in Internet; DLL of ATM; LAN Protocols: Standards IEEE 802; Hubs, Bridges, and Switches, FDDI, Fast Ethernet; **Routing** Algorithm; Internetworking, WAN; Fragmentation; Firewalls; IPV4, IPV6, ARP, RARP, Mobile IP, Network layer of ATM; **Transport Protocols**; **Transmission Control Protocol**: Connection Management, Transmission Policy, **Congestion Control**, Timer Management; **UDP**; AAL of ATM; wireless networks, mobile computing, and high speed networks; Gigabit Ethernet; Domain Name System: Name servers; Email and Its privacy; SNMP; HTTP; World Wide Web; **Network security**: Cryptography, DES, IDEA, public key algorithm; Authentication; Digital signatures, Principles of Reliable Data Transfer, FTP.

SKILL	MAPPI	ING													
				•											
No.	C	'ourse Lear	ning Outcome		1	-		BRAN				· ·	- ´		
110.			ifferent types of	1	2	3	4	5	6	7	8	9	10	11	12
CO1	networ comput placem model networ	ks, the ter net ent of diffe and fa k developm	organization of tworks, proper erent layers of ISO ctors influencing nent.	Н											
CO2	technic correct	ues of er	edge of different ror detection and ect and solve error nsmission.		М										
CO3	networ protoco	ol.	different routing			Н									
CO4	present networ	ing topic king.	L										L		
(H – Hig	gh, M- N	Aedium, L-	low)												
JUSTIF	TICATI	ON FOR (	CO-PO MAPPING												
Mappi	ng	Level				Ju	istifi	catio	ns						
CO1-P	01	High	Able to understand different layers of I	SO n	nodel	and f	acto	rs inf	luen	cing	netw	vork	develo	opmei	nt.
CO2-P	02	Medium	Apply the knowled to detect and solve	error	bit d	uring	data	trans	miss	sion.					
CO3-P		High	Able to design n protocol.									-			-
CO4-PO	D10	Low	Develop communic	ation	ı skill	s thro	ugh	parti	cipat	ing i	in qu	iz, pı	esent	ation	etc.
TEACH	IING L	EARNING	STRATEGY												
		earning Act	ivities									Enga	geme	nt (ho	urs)
Face-to-	Lecture	U	1 / Studio										42	2	
		t-Centred I	earning										-		
Self-Dir	Non-fa	ce-to-face	learning										42		
	Revisio	on ment Prepa	rations										2 2		
Formal		<b>*</b>	14110115								+		Δ.	1	
	Contin	uous Asses											2		
Total	Final E	Examination	1								+		3		
	IING M	IETHODO	LOGY										15		
			o-operative and Colla	borat	ive N	letho	d, Pr	obler	n Ba	sed	Meth	od			
		EDULE	•												
Weel				T	opics	5						Т		ssmer thods	
1	Leo Leo Leo	e 2 Wha c 3 Loss Laye	oduction t Is the Internet, N , and Throughput in ers and Their Servi ory of Computer Net	n Pac	ket S Iodel	witch s, Ne	ned l etwo	Netw rks J	orks	, Pro	otoco	ol		Test	

2	Tee	4 Amelian		sinter of Network Application	ma Tha Wah	
2	Lec		TP, File Transf	ciples of Network Applicatio	ons, The web	
	Lec		II, The ITalish			
3	Lec		vic Mail in the	Internet, DNS, Peer-to-Peer	Applications	
5	Lec		Programming		Applications,	
	Lec		Togramming			
4	Lec 1		dia Digitizing	Audio And Video, Audio	And Video	
-	Lec 1			ng Stored Audio/Video, Str		
	Lec 1			ne Interactive Audio video,		
			Ver IP Review		KII, KICI,	
5	Lec 1			ss to Process Delivery: UDP,	ТСР СТР	
5	Lec 1		It Layer 110cc.	ss to Hotess Derivery. ODI,	101,5011	Class Test 2
	Lec 1					
6	Lec 1		ion Control and	d Quality of Service		
Ū	Lec 1	0	ion control un	a Quanty of Service		
	Lec 1					
7	Lec 1		k Layer I	Pv4 Addresses, Internet	Protocol,	
	Lec 2		working, IPv4	,		
	Lec 2		0, 1			
8	Lec 2		ldress, Transiti	on from IPv4 to IPv6, Addre	ess Mapping.	
	Lec 2			,	II 0,	
	Lec 2	24				
9	Lec 2	25 Networ	k Layer IGMP	P, ICMPV6, Delivering, For	warding and	
	Lec 2	26 Routing	Delivery, Forv	warding	-	
	Lec 2	27				Mid Term
10	Lec 3	31 Unicast	Routing Protoc	cols		Exam
	Lec 3	32 Multica	st Routing Prot	ocols		
	Lec 3	33				
11	Lec 2	28 Data L	ink Layer Ser	rvices, Error-Detection and	Correction,	
	Lec 2		hecks, Check s	summing Methods, CRC		
	Lec 3					
12	Lec 3	-		as and Protocols, Switched		
	Lec 3			ualization, Data Center	Networking,	
	Lec 3					
13	Lec 3			Networks Wireless Links a		
	Lec 3			ar Internet Access, Mobility N	-	
	Lec 3	1		Managing Mobility in Cellul		
	Ŧ			Impact on Higher Layer Pro		
14	Lec 4			ptography, Message Integrity		Class Test 3
	Lec 4			nt Authentication, Securi		
	Lec 4			ections: SSL, Network-Lay vate Networks, Firewalls a		
			nd virtual Pri	ivate metworks, rifewalls a	na marusion	
aanaan						
SSESSN	IENT S	STRATEGY				
				СО	Rloom	s Taxonomy
C	Compon		Grading			-
Continuo		Test 1-3	20%	CO 1	C	C1, C2
Assessm		Class	504	CO4		A2
Assessm (40%)		articipation	5%	004		n2
(40%)	,	Mid term	15%	CO 2		P4
т	Zinal E		600/	CO 1	0	C1, C2
F	Final Ex	alli	60%	CO 3		C3-C6

(CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

#### **REFERENCE BOOKS**

- 1. Data Communications and Networking Behrouz Forouzan
- 2. Computer Networks Andrew S. Tanenbaum
- 3. Complete Networking : A Top Down Approach Featuring the Internet James F. Kurose, Keith W. Ross

#### **REFERENCE SITE**

#### **CSE-310: Computer Network Sessional**

	RSE INFORM	: CSE 310	Lecture Conta	a t Uar	120	: 3.00	
Course		: Computer Network Sessional	Credit Hours	act Ho		: 1.50	
	REQUISITE	Ĩ			1		
	e Code: Nil e Title: Nil						
CURF	RICULUM ST	RUCTURE					
Outcon	me Based Educ	ation (OBE)					
RATI	ONALE						
		lyze different network infrastructures, communication and resource-sharing an					of computer
OBIE	CTIVE						
1. U: ne	ew protocols of	analyze different types of computer ne computer networks. lity of network by capturing and analyzi		-	oresent	conte	mporary and
1. U: ne 2. D 3. A	ew protocols of etect vulnerabil chieve a basic i	computer networks. lity of network by capturing and analyzi dea about Cisco Packet tracer, Wire Sha	ng real-time pa	-	present	conte	mporary and
1. U: ne 2. D 3. A	ew protocols of etect vulnerabil chieve a basic i RNING OUTC	computer networks. lity of network by capturing and analyzi	ng real-time pa	-	CA	conte	mporary and Assessment Methods
1. U ne 2. D 3. A <b>LEAR</b>	ew protocols of etect vulnerabil chieve a basic i <b>RNING OUTC</b> (Upon comple Understand a networks and	computer networks. lity of network by capturing and analyzi dea about Cisco Packet tracer, Wire Sha <b>OMES &amp; GENERIC SKILLS</b> Course Learning Outcome tion of the course, the students will be able to) nd analyze different types of computer create server client communication.	ng real-time pa ırk, Ns2. Bloom's	ackets.			Assessment
1. U: ne 2. D 3. A <b>LEAR</b> No.	ew protocols of etect vulnerabil chieve a basic i <b>RNING OUTC</b> (Upon comple Understand a networks and Design and s	computer networks. lity of network by capturing and analyzi dea about Cisco Packet tracer, Wire Sha <b>OMES &amp; GENERIC SKILLS</b> Course Learning Outcome tion of the course, the students will be able to) nd analyze different types of computer create server client communication. imulate present contemporary and new computer networks in Cisco Packet	ng real-time pa urk, Ns2. Bloom's Taxonomy	CP		KP	Assessment Methods
1. U: ne 2. Do 3. Ad LEAR No.	ew protocols of etect vulnerabil chieve a basic i <b>ENING OUTC</b> (Upon comple Understand a networks and Design and s protocols of Tracer and N Applying and of computer r	computer networks. lity of network by capturing and analyzi dea about Cisco Packet tracer, Wire Sha <b>OMES &amp; GENERIC SKILLS</b> Course Learning Outcome tion of the course, the students will be able to) nd analyze different types of computer create server client communication. imulate present contemporary and new computer networks in Cisco Packet	ng real-time pa irk, Ns2. Bloom's Taxonomy C2, C4	CP		КР 1	Assessment Methods Q

#### COURSE CONTENT

**IP** Addressing, Basic Configuration of Cisco Packet Tracer, **Socket Programing**, Basic Network Configuration (**Static Routing**), **Variable Length Subnet Mask** (**VLSM**), **RIP**, **EIGRP**, Dynamic Host Configuration Protocol (**DHCP**), Open Shortest Path First (**OSPF**), Physical Network Interface Connection/ Router & Switch Configuration, Access Control List (**ACL**), **VLAN**, **InterVLAN**, **VTP**, Information Gathering using **Wire shark**, Introduction to **NS2**.

SKILL N	IAPPING													
No.	Course	Learning Outcome		1	1							(PO)		
CO1 0	Understand and	analyze different types of rks and create server client	1 H	2	3	4	5	6	7	8	9	10	11	12
CO2 8		ulate present contemporary ols of computer networks in acer and NS2.			Н									
CO3	protocols of con levices.	analyzing different routing nputer networks in physical		Н										
CO4 t		analyzing real-time packets erability of network using					Н							
	n, M- Medium, I	· ·				_			_		_			
JUSTIFI	CATION FOR	CO-PO MAPPING												
Mapping	g Level			Jus	stific	atio	ns							
CO1-PO1	High	Understand and analyze di client communication.		•	-		-							
CO2-PO3	B High	Simulate present contemp Cisco Packet Tracer and NS	S2			-					•			
CO3-PO2	e High	Apply and analyze different devices.	it rou	iting	prot	oco	ls of	com	nput	er n	etwo	orks i	n ph	ysica
CO4-PO5	5 High	Analyze real-time packets t	o de	tect v	vulne	erabi	ility (	of ne	etwo	ork u	ising	g Wir	e Sha	ark.
TEACH	NG LEARNIN	IG STRATEGY												
	and Learning A	ctivities				]	Enga	.gem	lent	(hou	urs)			
	ace Learning													
	Lecture Practical / Tutor	ial / Studio							42					
Self-Dire	cted Learning													
	Non-face-to-fac	e learning							-					
	Revision	nonotiona							-					
	Assessment Pressessment	parations							-					
	Continuous Ass	essment							4					
	Final Examinati	on							<u> 3</u> =	6				
Total TEACH	NG METHOD	OLOGY							52					
		Co-operative and Collaborativ	ve M	etho	d, Pr	oble	em B	ased	l Me	etho	d			
COURSI	E SCHEDULE													
Week		Topics	5								Τ	Re	marl	<b>KS</b>
1	IP Addressin	ng, Basic Configuration of Ci		Packe	et Tr	acer	•							
2	Socket Prog	ramming												
3	Basic Netwo	ork Configuration (Static) Da	ta											
4	Variable Le	ngth Subnet Mask (VLSM)												
4	1													
5	RIP, EIGRP													
	-	est Path First (OSPF)												

8	Physical Network Interface Connection/ Router	
9	Switch Configuration	
10	Access Control List (ACL)	
11	VLAN	
12	Inter-VLAN, VTP	
13	Information Gathering using Wire shark	
14	Introduction to NS2	

### ASSESSMENT STRATEGY

Cor	nponents	Grading	СО	Bloom's Taxonomy
	Final Exam Online Test		2	C6, P3
Final Exam	Online Test	25%	3	C3, C4
	Quiz		1,4	C2, C4, A2
Continuous Assessment	Class Performance	10%	2	C6, P3
(40%)			2	C6, P3
То	tal Marks	100%		

### (CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

#### **REFERENCE BOOKS**

1. Computer Networks - Andrew S. Tanenbaum

2. Complete Networking: A Top Down Approach Featuring the Internet – James F. Kurose, Keith W. Ross **REFERENCE SITE** 

### CSE-315: Digital System Design

COUR	RSE INFO	ORMATION							
Course	e Code	: CSE-315			Lecture (	Contac	t Hours	:2	2.00
Course	e Title	: Digital System	n Design		Credit H	ours		:2	2.00
PRE-I	REQUISI	TE							
Course	e Code: C	SE-305							
Course	e Title: Mi	icroprocessors, 1	Micro-controllers	s and Ass	embly La	nguage	e		
CURF	RICULUN	A STRUCTUR	Е						
Outcon	me Based	Education (OB)	E)						
RATI	ONALE								
0		0	leals with design		rent com	ponents	s of bas	sic com	puter and applying
OBJE	CTIVE								
System 2. To c	ns. design diff	ferent componer	the structure and the structure and the structure of basic comp proprocessor of b	uter.		ferent	compon	ents of	Digital Computer
LEAR	RNING O	UTCOMES &	GENERIC SKI	LLS					
		ourse Learning		210	om's	CP	CA	KP	Assessment
No.	(Upo	n completion of the students will be		Тахо	nomy				Methods
CO1	Design microco		ponents of a Accumulator,	C4	-C6	3	1	5	T, F

	Shifter, ALU, RAM, Scratchpad Memory, 2-port Memory.					
CO2	Design a fully customized microprocessor with special features.	C4-C6, P3	3	1	5	MT, F
CO3	Understand and describe how to design a digital system using various methods.	C2, C5			1, 2, 3, 4	T, ASG, F
CO4	Develop the communication skill by presenting topics on digital system design.	A2		1		Pr

(CP- Complex Problems, CA-Complex Activities, KP-Knowledge Profile, T – Test ; PR – Project ; Q – Quiz; ASG – Assignment; Pr – Presentation; R - Report; F – Final Exam, MT- Mid Term Exam)

#### COURSE CONTENT

**Design** using MSI and LSI components; Combinational and sequential circuit design with PLA's, Design of memory subsystem using SRAM and DRAM; Design of various **components of a computer**: Accumulator design, Shifter design, ALU, **memory** and control unit – hardwired and **micro-programmed**, Microprocessor based designs; Design using special purpose controllers. Introduction to **Simple As Possible** (Microprocessor)- Architecture, Instruction Set, Design, Microprogramming, SAP-1, SAP-2; Introduction to Embedded Systems.

#### SKILL MAPPING

No.	Course Learning Outcome			PI	ROG	RAM	101	JTC	OM	ES (I	<b>PO</b> )		
INO.	Course Learning Outcome	1	2	3	4	5	6	7	8	9	10	11	12
CO1	Design different components of a microcomputer like Accumulator, Shifter, ALU, RAM, Scratchpad Memory, 2-port Memory.			Н									
CO2	Design a fully customized microprocessor with special features.			Н									
CO3	Understand and describe how to design a digital system using various methods.		Н										
CO4	Develop the communication skill by presenting topics on digital system design.										L		

#### (H – High, M- Medium, L-low)

JUSTIFICA	TION FOR	CO-PO MAPPING:	
Mapping	Level	Justifications	
CO1-PO3	High	Analyse, evaluate and design complex component desired specifications and needs.	ts of a microcomputer to meet
CO2-PO3	High	Analyse and design a fully customized microproc need the ability to design a complex comput specifications.	
CO3-PO2	High	Understand and describe how to design a digital s we need the ability to design and conduct experim interpret data including hardware and software cor	ents, as well as to analyse and
CO4-PO10	Low	Develop strong communication skills through topics from the course taught.	presentation on the selective
TEACHING	LEARNIN	G STRATEGY	
Teaching and	<u> </u>	ctivities	Engagement (hours)
<b>T T</b>	<b>.</b> .		

Face-to-Face Learning28Lecture28Practical / Tutorial / Studio-Student-Centred Learning-Self-Directed Learning28

	evision ssessment P	reparations	14 14
	essment ontinuous A nal Examina		2 2
Total			88
		DDOLOGY	
		, Co-operative and Collaborative Method, Problem Base	ed Method
	SCHEDUL		
Week 1	Lecture Lec 1 Lec 2	Topics Design using MSI and LSI components	Assessment Methods
2	Lec 3 Lec 4	Combinational and sequential circuit design with PLA	
3	Lec 5 Lec 6	Design of memory subsystem using SRAM and DRAM	Class Test 1
4	Lec 7 Lec 8	Design of various components of a computer: Accumulator design	
5	Lec 9 Lec 10	Design ALU	
6	Lec 11 Lec 12	Shifter design, memory	Class Test 2
7	Lec 13 Lec 14	Control unit - hardwired and micro-programmed, Microprocessor based designs	
8	Lec 15 Lec 16	Design using special purpose controllers	
9	Lec 17 Lec 18	Introduction to Simple As Possible (Microprocessor)- Architecture, Instruction Set	
10	Lec 19 Lec 20	Simple As Possible-1: Design	
11	Lec 21 Lec 22	Simple As Possible-1: Microprogramming	Mid Term Exam
12	Lec 23 Lec 24	Simple as Possible-2: Architecture, Instruction Set, Design	
13	Lec 25 Lec 26	Simple as Possible-2: Microprogramming	
14	Lec 27 Lec 28	Introduction to Embedded Systems	

			СО	Blooms Taxonomy
Comp	onents	Grading	00	Dioonis Taxonomy
	Test 1-2	20%	CO1	C4, C6
Continuous	1051 1-2	2070	CO3	C2
Continuous Assessment (40%)	Class Participation	5%	CO4	A2
	Mid term	15%	CO2	C4-C6
			CO1	C4-C6
Final	Exam	60%	CO2	C4-C6, P3
			CO3	C2, C5
Total	Marks	100%		

#### (CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

#### **REFERENCE BOOKS**

1. Digital Logic and Computer Design - M. Morris Manno

- 2. Digital Computer Architecture Malvino, Brown
- 3. Digital Design and Computer Architecture David Harris and Sarah Harris

#### **REFERENCE SITE**

### CSE-316: Digital System Design Sessional

COU	RSE INFO	ORMATION					
	se Code se Title	: CSE-316 : Digital System Design Sessional	Lecture Contact H Credit Hours	ours	: 3.00	hrs in a	lternative wk
			Credit Hours		. 0.75		
Cours	e Code: N	il					
Cours	se Title: Ni	1					
CUR	RICULUN	A STRUCTURE					
Outco	ome Based	Education (OBE)					
RATI	IONALE						
		Design Sessional course deals with des l microprocessor of basic computer.	sign of different con	nponen	ts of ba	isic cor	nputer and
OBJE	ECTIVE						
		ferent components of basic computer and design microprocessor of basic of	computer.				
LEAI	RNING O	UTCOMES & GENERIC SKILLS					
No.	(Upon c	Course Learning Outcome completion of the course, the students will able to)	be Bloom's Taxonomy	СР	CA	KP	Assessment Methods
CO1	Design micropro system d	different components of cessor using the concept of comp esign.	the outer C4-C6	1, 3	1	5	PR, Q, R, T, V
CO2	Impleme	nt combinatorial and sequential sy nulation software.	stem C6	1, 3		6	PR, V
CO3	Design micropro	and implement a custom cessor with special features and sim-		2, 3	2		PR, Q, R, V, Pr

it	using	simulation	software	with	team			
pre		1.						

(CP- Complex Problems, CA-Complex Activities, KP-Knowledge Profile, T – Test; PR – Project; Q – Quiz; ASG – Assignment; Pr – Presentation; R - Report; V - Viva; F – Final Exam, MT- Mid Term Exam)

**COURSE CONTENT** 

**Design of various components of a computer:** Accumulator design, Shifter design, ALU, memory and control unit - hardwired and micro-programmed, **Design fully customized Simple As Possible** (**Microprocessor):** Architecture, Instruction Set, and Control Unit.

SKILL MAPPING

No.	Course Learning Outcome			PI	ROG	RAM	101	JTC	OM	ES (I	20)		
INO.	Course Learning Outcome	1	2	3	4	5	6	7	8	9	10	11	12
CO1	Design different components of the microprocessor using the concept of computer system design.			Н									
CO2	Implement combinatorial and sequential system using simulation software.					Н							
CO3	Design and implement a customized microprocessor with special features and simulate it using simulation software with team presentation.									Н			

(H-High, M-Medium, L-low)

#### JUSTIFICATION FOR CO-PO MAPPING:

	•							
Mapping	Level	Justifications	Justifications					
CO1 DO2	<b>TT</b> ¹	Analyse, evaluate and design different complex componen	ts of a microcomputer to					
CO1-PO3	High	meet desired specifications and needs.	-					
		Implementing combinatorial and sequential system using	simulation software we					
CO2-PO5	High	need the ability to use the techniques, skills, and modern en						
	6 6							
		necessary for engineering practice. Practice to work in teams if the designing and impleme	entation of a customized					
CO3-PO9 High microprocessor with special features involves submission as group assign								
TEACHING	LEARN	ING STRATEGY	<u> </u>					
Teaching and	Learning	Activities	Engagement (hours)					
Face-to-Face								
Lect	-		-					
		torial / Studio	21					
Stud	ent-Cent	red Learning	-					
Self-Directed	Learning							
Non-	face-to-f	ace learning	-					
Revi	sion		-					
Proje	ect Prepa	arations	21					
Formal Assess	sment							
Cont	inuous A	ssessment	2					
Final	Exam		3					
Total			47					
TEACHING	METHO	DDOLOGY						
Lecture and D	iscussion	n, Co-operative and Collaborative Method, Problem Based M	lethod					

**COURSE SCHEDULE** 

Week	Lab	Topics	Remarks
1	Lab-1,2	Introduction to digital system and software simulation, Problem definition of Project: Design of a Shifter	
3	Lab-3,4	Submission of Shifter (Software Simulation and Hardware Implementation), Problem definition of Project: Design of an ALU	
5	Lab-5,6	Design submission and software simulation of ALU	
7	Lab-7,8	Final project submission of ALU with report, Problem definition of Project: Design of a 4-bit microprocessor	3:00 hrs in alternate week
9	Lab-9,10	Design submission of 4-bit microprocessor	WEEK
11	Lab-11,12	Hardware implementation submission of 4-bit microprocessor without control unit, Full software simulation of 4-bit microprocessor	
13	Lab-13,14	Final project submission of 4-bit microprocessor with report	

### ASSESSMENT STRATEGY

Compon	ents		Grading	CO	Blooms Taxonomy		
•		Desian	1.00/	CO 1	C4-C6		
	Design	Design	10%	CO 2	C6		
	Design	Simulation	10%	CO 2	C6		
		Simulation	1070	CO 3	C4-C6, P4		
	Implementation		20%	CO 1	C4-C6		
	Implementation	-	2070	CO 3	C4-C6, P4		
Continuous Assessment	Viva/ Presentation		10%	CO 1	C4-C6		
(80%)		-		CO 2	C6		
				CO 3	C4-C6		
	Class Assessment	-	10%	CO 1	1 C6		
	Class Participation	_	10%	CO 1	C4-C6		
	Class I articipation	_	1070	CO 3	C4-C6		
	Report	_	10%	CO 1	C4-C6		
	Кероп	_	1070	CO 3	C4-C6		
				CO 1	C4-C6		
	Quiz	20%	CO 2	C6			
				CO 3	C4-C6		
Т	'otal Marks		100%				

### (CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

#### **REFERENCE BOOKS**

- Digital Logic and Computer Design M. Morris Manno
   Digital Computer Architecture Malvino, Brown

### **REFERENCE SITE**

### **CSE-319: Software Engineering**

COURSE INFORMATION											
	e Code	: CSE-319	Lecture Con	ntact Hours	: 3.00						
Cours	e Title	: Software Engineering	Credit Hour	rs	: 3.00						
PRE-REQUISITE											
Course Code: Nil											
Course Title: Nil											
CURRICULUM STRUCTURE											
Outcome Based Education (OBE)											
RATI	IONALE										
essent Apart	tial softwa	arse will introduce the import re development activities from e, this course will also introdu- ment.	n initial soft	ware specification	ation th	rough t	to syste	em evolution.			
OBJF	ECTIVE										
3. T st	o understa tandard/pro	he skill of software project ma nd software evolution, testing ofessional software.	approaches a	and quality ass	surance	to ensu	re high				
		Course Learning Outcome				1					
No.	(Upon c	Course Learning Outcome ompletion of the course, the stude able to)	ents will be	Bloom's Taxonomy	СР	CA	KP	Assessment			
	Understa							Methods			
CO1		nd and applying the fundamen development process.		C1- C3	1		3	T, F			
CO1 CO2	Analyse different for build	development process. the user requirements, and des kind of system and architectur ng software systems.	igning ral models	C1- C3 C4, C6	1		3 4, 5				
	Analyse different for build Develop software availabil	development process. the user requirements, and deskind of system and architecturing software systems. testing mechanisms for assuring quality including the dependation	igning ral models ng bility and				-	T, F			

#### COURSE CONTENT

Concepts of software engineering: different phases of software; Professional software development ethics: software development ethics; Software processes: software process models, process activities; Agile software development: agile methods, plan-driven and agile development; Requirements engineering: functional and non-functional requirements, software requirements document, requirement specification, requirement elicitation and analysis; System modeling: context model, interaction models, structural models, behavioural models, model-driven engineering; Architectural design: architectural views and patterns, application architectures; Design and implementation: object oriented design, design patterns; Software testing: development testing, test-driven development, release testing, user testing; Software quality: quality attributes, software quality assurance, product metrics; System dependability and reliability engineering: dependability properties, availability and reliability, dependability

engineering; Introduction to project management: risk management, managing people, teamwork.

### SKILL MAPPING

No.		Course Lea	urning Outcome				ROG		ΛOU				<u> </u>		
CO1	Unde		applying the	1 H	2	3	4	5	6	7	8	9	10	11	12
		opment pro	r requirements, and												
CO2	and a build	rchitectural			М	М									
CO3	assur	ing softwar	mechanisms for re quality including y and availability.				М								
CO4	prese		nmunication skill by s on software										L		
		Medium, L													
JUSTIF	FICAT	ION FOR	CO-PO MAPPING												
Mappi	ng	Level				Ju	stific	ation	IS						
CO1-PC	01	High	Acquire a strong understanding the fi engineering principl development process	unda es, s	menta	al con	ncept	of s	oftw	are	engi	neeri	ng lik	e sof	tware
CO2-PC PO3	<i>,</i>	Medium, Medium	Understand the ana development funda designing the softw. knowledge regarding system to design the	ment are a g the	als t rchite abili	o re ecture ity to	veal and desig	the syst gn, a	use em i inaly	r re mod sis a	equir el; a and i	emen s we interp	ts fo ll as a pret a	llowe acquii softw	d by re the
CO3-PC	03	Medium	Develop complex s order to assure the c an in-depth knowled	oftwa Jualit	are sy y, dej	ysten penda	ns in ability	acco and	ordar l ava	ice ilabi	with ility	the	specif	icatio	
CO5-PC	010	Low	Develop communica	tion	skills	throu	igh pa	artici	patiı	ng in	pres	sentat	ion.		
TEACH	HING I	LEARNIN	G STRATEGY												
Teachin	g and I	Learning A	ctivities									Enga	igeme	nt (ho	ours)
Face-to-		-											4	-	
	Lectu Practi	re cal / Tutori	ial / Studio										4	2	
		nt-Centred											-		
Self-Dir	rected I	Learning													
		face-to-face	elearning									42			
Revision Assessment Preparations								2 2							
Formal			arations								+		2	1	
Formal Assessment Continuous Assessment Final Examination													2		

**TEACHING METHODOLOGY** 

Lecture and Discussion, Co-operative and Collaborative Method, Problem Based Method

Week	Lecture	Topics	Assessment Methods				
	1	Introduction to software engineering					
1	2	Introduction to software engineering (Contd.)					
	3	Introduction to software engineering (Contd.)					
	4	Professional SW development ethics					
2	5	Professional SW development ethics (Contd.)	Class Test 1				
-	6	Professional SW development ethics (Contd.)					
	7	Software processes					
3	8	Software processes (Contd.)					
0	9	Software processes (Contd.)					
	10	Agile software development					
4	10						
4	11						
	12	Agile software development (Contd.) Requirements engineering					
-	13	Requirements engineering (Contd.)	Class Test 2				
5			Class Test 2				
	15	Requirements engineering (Contd.)					
	16	Requirements engineering					
6	17	Requirements engineering (Contd.) Requirements engineering (Contd.)					
	18						
	19	System modeling					
7	20	System modeling (Contd.)					
	21	System modeling (Contd.) System modeling					
	22						
8	23						
	24	System modeling (Contd.)	Mid Term Exam				
-	25	Architectural design					
9	26	Architectural design (Contd.)					
	27	Architectural design (Contd.)					
4.0	28	Design and implementation					
10	29	Design and implementation (Contd.)					
	30	Design and implementation (Contd.)					
11	31	Software testing					
11	32	Software testing (Contd.)					
	33	Software testing (Contd.)					
10	34	Software quality					
12	35 36	Software quality (Contd.) Software quality (Contd.)					
	36						
	37	System dependability and reliability engineering	Class Test 3				
13	38	System dependability and reliability engineering (Contd.)					
13	39	System dependability and reliability engineering					
	37	(Contd.)					
	40	Introduction to project management					
14	40	Introduction to project management (Contd.)					
14	41	Introduction to project management (Contd.)					
SESSMI	ENT STRAT						
		СО	Blooms Taxonomy				

	Test 1-3	20%	CO1	C1-C3
Continuous	Test 1-5	20%	CO2	C4, C6
Assessment (40%)	Class Participation	5%	CO4	A2
	Mid term	15%	CO2	C4, C6
Final	Even	60%	CO1	C1-C3
ГШа	Final Exam		CO3	C4
Total	Marks	100%		

# (CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

#### **REFERENCE BOOKS**

1. Software Engineering (10th Edition) by Ian Sommerville

- 2. Software Engineering a practitioner's Approach (7th Edition) by Roger S. Pressman
- 3. Software Engineering: Principles and Practice (3rd Edition) by Hans van Vliet

#### **REFERENCE SITE**

### CSE-320: Software Engineering Sessional

COURSE INF	ORMATION		
Course Code	: CSE-320	Lecture Contact Hours	: 3.00 hrs in alternative wk
Course Title	: Software Engineering Sessional	Credit Hours	: 0.75
DDE DEOLUG			

#### PRE-REQUISITE

Course Code: CSE 319

Course Title: Software Engineering

#### **CURRICULUM STRUCTURE**

Outcome Based Education (OBE)

#### RATIONALE

The Software Engineering Sessional course provides a practical experience on developing innovative solutions for real life problems by applying software engineering fundamentals which involve understanding the applicability of different software process models for different context, performing requirement analysis, designing system architecture as well as system models using unified modelling language, developing prototypes using prototyping tools and evaluating the prototype using test cases.

#### **OBJECTIVE**

- 1. To learn software engineering fundamentals through a practical approach by having experience on developing software systems for solving real-life problems innovatively.
- 2. To get familiar with documenting software process model, requirement analysis, system architecture, system models formally for a software system.
- 3. To get oriented with using prototyping tools to develop prototypes for a software system and evaluating those using test cases.

LEAF	RNING OUTCOMES& GENERIC SKILLS					
No.	Course Learning Outcome (Upon completion of the course, the students will be able to)	Bloom's Taxonomy	СР	CA	KP	Assessment Methods
CO1	Understand and apply software development process.	C3, P4	1	3	6	PR, Pr, R, Viva
CO2	Analyse the user requirements and design the system models.	C4, P1	2	1	5	PR, Pr, R, Viva

CO3	Use software prototyping tool and develop system prototypes and test cases to evaluate the prototypes.	C5, C6, P4	1	1	4	PR, Pr, R, Viva
CO4	Develop the communication skill by presenting topics on software engineering sessional.	A2		1		Pr

(CP- Complex Problems, CA-Complex Activities, KP-Knowledge Profile, T – Test ; PR – Project ; Q – Quiz; ASG – Assignment; Pr – Presentation; R - Report; F – Final Exam, MT- Mid Term Exam)

#### COURSE CONTENT

**Concepts of software engineering:** different phases of software; **Software processes:** software process models, process activities; **Requirements engineering:** functional and non-functional requirements, software requirements document, requirement specification, requirement elicitation and analysis; **System modelling:** context model, interaction models,; **Prototyping tools:** orientation with modern prototyping tools; **Architectural design:** architectural views and patterns; **Design and implementation:** object oriented design, design patterns; **Software testing an prototype evaluation:** development testing, release testing, user testing.

#### SKILL MAPPING

No.	Course Learning Outcome	PROGRAM OUTCOMES (PO)											
INO.		1	2	3	4	5	6	7	8	9	10	11	12
CO1	Understand and apply software development process.	Н											
CO2	Analyse the user requirements and design the system models.		Н	М									
CO3	Use software prototyping tool and develop system prototypes and test cases to evaluate the prototypes.			М	L	L							
CO4	Develop the communication skill by presenting topics on software engineering sessional.										L		

#### (H-High, M-Medium, L-low)

JUSTIFICATION FOR CO-PO MAPPING							
Mapping	Level	Justifications					
CO1-PO1	High	Acquire a strong level of knowledge regarding the applicability of software development process through the fundamental concept of software engineering.					
CO2-PO2,	High,	Analyse and interpret user needs as well as develop sys	tem models accordingly				
PO3	Medium	for complex computing systems for requirement analysi	S.				
CO3-PO2, PO3, PO4	Medium, Low, Low	Conduct experiments to understand whether the prototypes are able to meet users' desired specifications for developing system prototypes and evaluating those by creating appropriate test cases using modern engineering and IT tools for prototyping.					
CO4-PO10	Low	Develop communication skills through participating in p	presentation.				
TEACHING	LEARNING	STRATEGY					
Teaching and	Learning Ac	tivities	Engagement (hours)				
Face-to-Face	Learning						
Lect	ture		-				
Prac	ctical / Tutoria	ıl / Studio	21				
Stuc	lent-Centred I	Learning	-				
Self-Directed	0						
Non	Non-face-to-face learning -						
Rev	Revision -						
Asse	essment Prepa	arations	-				

ormal Assessm			
Contin Einel P	23		
Fillal F	IOJECT ASSESSI	nent and Viva	26
TEACHING M	ETHODOLO	OGY	20
Lecture and Disc	cussion, Co-oj	perative and Collaborative Method, Problem Based N	lethod
COURSE SCH	EDULE		
Week	Lab	Topics	Remarks
1	Lab-1,2	Introducing software development process and models and discussion on possible innovative project ideas	
3	Lab-3,4	Conducting the requirements engineering following the information gathering techniques on the selected projects	
5	Lab-5,6	Designing the system architecture and context diagram for the selected projects [Using the Microsoft Visio tool]	
7	Lab-7,8	Designing the system models using unified modelling language for the selected projects [Using the Microsoft Visio tool]	
9	Lab-9,10	Developing prototypes for the selected projects and design implementation using [Using the Balsamiq tool]	
11	Lab-11,12	Developing the test cases and evaluating the prototypes	
13	Lab-13,14	Final documentation and project submission	

## ASSESSMENT STRATEG

	Components	Grading	СО	Blooms Taxonomy
`		20%	CO1	C3, P4
	Report/Documentation		CO2	C4, P1
Continuous			CO3	C5, C6, P4
Assessment	<b>Class Participation</b>	5%	CO4	A2
(40%)	Presentation	15%	CO1	C3, P4
			CO2	C4, P1
			CO3	C5, C6, P4
			CO1	C3, P4
Final Project Assessment and Viva 609			CO2	C4, P1
			CO3	C5, C6, P4
Total Marks 100%				

### (CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

### **REFERENCE BOOKS**

1. Software Engineering (10th Edition) by Ian Sommerville

- Software Engineering a practitioner's Approach (7th Edition) by Roger S. Pressman
   Software Engineering: Principles and Practice (3rd Edition) by Hans van Vliet

### **REFERENCE SITE**

### **CSE-364: Software Development Project-I**

COURS	COURSE INFORMATION									
Course C	Code	: CSE-364	Lecture Con	tact Ho	urs	: 3.00				
Course 7	Title	: Software Development Project-I	Credit Hours	5		: 1.50				
PRE-RE	PRE-REQUISITE									
	Code: Nil									
	Course Title: Nil									
CURRI	CURRICULUM STRUCTURE									
Outcome	e Based Educ	cation (OBE)								
RATIO	NALE									
		vare Development Project - I course			e its le	arners	able to solve			
		try problems and develop real time pro-	ojects professio	onally.			_			
OBJEC										
		ut programming related to software de								
		nts for the advanced level works of in me projects in web platform.	dustry							
		actical knowledge to identify the	relative meri	ts of	differe	nt nro	iect designs			
		nstructs and data structures	ionali ve men	01	annere	in pro	jeet designs,			
LEARN	ING OUTC	OMES & GENERIC SKILLS								
		Course Learning Outcome	Bloom's			[	Assessment			
No.	(Upon comp	bletion of the course, the students will be	Taxonomy	CP	CA	KP	Methods			
	Identify ac	able to) lvance programming language and								
<b>GO1</b>		to solve complex problems, to	C3-C4, C6,		1	_				
CO1		l time projects and to increase the	P7	1	1	5	PR, Q			
		nowledge in programming.								
		ood programming style and identify		_	_	-				
CO2		to the changes in style of developing	C2, C5, P6	5	5	6	PR			
	Illustrate r	ining systems. practical knowledge to identify the								
<b>G</b> 0-5	relative r	merits of different information	C2-C4, C6,	~	3 2					
CO3		al designs, programming constructs	A5	3		2				
	and data st						PR, Q			
CO4		levelop industry level web based	C1-C6	1		5				
	application	s individually.					PR			
(CP- Co	mnlex Proble	ems, CA-Complex Activities, KP-Kno	wledge Profile	· Т _ Те	st · PR	– Proje	$ect \cdot 0 =$			
		nent; Pr – Presentation; R - Report; F								
COURSE CONTENT										
Intro to	Intro to Web development: Information about architectural design of web systems, Show Sample									
Projects;	Projects; Frontend: Front end development of Web based Systems using HTML & CSS, Frontend									
	development with frameworks and project version control with git, Intro to Bootstrap; Frontend-backend									
platforn	platform: Intro to Codeigniter, Laravel; Intro to java script: Dynamic web front end programming,									

concurrent and asynchronous JS programming, debugging a web system with JavaScript; **Database:** Intro to NoSQL Databases, User access control using Firebase. Project integration, Intro to collection, Data store, Retrieval and hosting using Firebase and JavaScript.

SKILL MAPPING

		~ .				Р	ROC	RAN		UTC	COM	1ES	(PO)		
No.			earning Outcome	1	2	3	4	5	6	7	8	9	10	11	12
CO1	and proble and to	Identify advance programming language and technique to solve complex problems, to design real time projects and to increase the depth of knowledge in programming.				Н									
CO2	Praction identification style system	Practice good programming style and identify and adapt to the changes in style of developing and maintaining						Н							
CO3	Illustra the inform progra structu	Н													
CO4			p industry level web- ns individually.									Η			
(H – Hi	gh, M-	Medium, I	L-low)												
JUSTI	FICAT	ION FOR	CO-PO MAPPING												
Mapp	oing	Level				Ju	stifi	catio	ns						
CO1 – I	PO3	High	In order to design s one needs to know				•					<u> </u>			
CO2 – 1	PO5	High	changes in style of	To apply modern engineering and IT tools one needs to know to adapt to the changes in style of developing and maintaining systems.											
CO3 – 1	PO1	High	know how to ill architectural design	To apply the engineering knowledge to solve complex problems one need know how to illustrate practical knowledge of different informati architectural designs, programming constructs and data structures.							natior				
CO4-PO	D10	High	In order to function develop industry le											now h	ow to
TEACH	HING I	<b>EARNIN</b>	G STRATEGY									v			
		earning A	ctivities								]	Enga	igeme	nt (ho	urs)
Face-to	Lectur Practi	re	al / Studio Learning										-42	2	
Self-Di	rected L	earning													
	Non-f Revisi	ace-to-face	e learning								-				
		t Preparat	ions								21				
Formal	Assessi	nent													
		nuous Asse Examinatio									4 3				
Total										70					
TEACI	HING N	<b>METHOD</b>	OLOGY												
Lecture	and Di	scussion, C	Co-operative and Collabor	rative	e Me	thod,	Pro	blem	Bas	ed N	Meth	nod			
COUR	SE SCH	IEDULE													
We	eek	Lab			Тор							<u>C1</u>		Rema	rks
	1	Lab 1	Information about arch Sample Projects			-			-						
	2	Lab 2	Front end development CSS					stems	s usi	ng ]	HTN	AL 8	¥.		
	3	Lab 3	-	ontend development with frameworks											
4	4	Lab 4	Project version control v	ject version control with git.											

5	Lab 5	Intro to Bootstrap, Codeigniter, Laravel					
6	Lab 6	Dynamic web front end programming, concurrent and asynchronous JS programming					
7	Lab 7	Debugging a web system with JavaScript					
8	Lab 8	Intro to NoSQL Databases	Intro to NoSQL Databases				
9	Lab 9	Intro to collections, Data store, Retrieval using Firebase and JavaScript.					
10	Lab 10	Intro to hosting using Firebase and JavaScript.					
11	Lab 11	User access control using Firebase.					
12	Lab 12	Deployment of web apps					
13	Lab 13	Project integration.					
14	Lab 14	Project Testing.					

### ASSESSMENT STRATEGY

	Comp	onents	СО	Blooms Taxonomy	
	Cla	ss Performance & Observation	10%	C01	C3-C4, C6, P7
Continuous Assessment	Project	Project Proposal (10%) Project update- 1(20%)	70%	C01	C3-C4, C6, P7
(100%)		Project Final Submission (40%)		CO2 CO3 CO4	C2, C5, P6 C2-C4, C6, A5 C1-C6
		Quiz	20%	CO1 CO3	C3-C4, C6, P7 C2-C4, C6, A5
	Total Marks 1				

### (CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

### **REFERENCE BOOKS**

- 1. Learning Web App Development: Build Quickly with Proven JavaScript Techniques by Semmy Purewal
- 2. Go Web Programming by Chang Sau Sheong

### **REFERENCE SITE**

### **GERM-352:** Fundamentals of Research Methodology

COURSE INFORMATION								
Course Code	: GERM-352 Lecture Contact Hours : 4.00							
Course Title	: Fundamentals of Research Methodology	Credit Hours	: 2.00					
PRE-REQUISITE								
Course Code: Nil	Course Code: Nil							
Course Title: Nil	Course Title: Nil							
CURRICULUM STRUCTURE								
Outcome Based Education (OBE)								

#### RATIONALE

The Fundamentals of Research Methodology is a hands-on course designed to impart education in the foundational methods and techniques of academic research in Science and Engineering context. UG students would examine and be practically exposed to the main components of a research framework i.e., problem definition, research design, data collection, ethical issues in research, time management, report writing, and presentation. Once equipped with this knowledge, participants would be well-placed to conduct disciplined research under supervision in an area of their choosing. In addition to their application in an academic setting, many of the methodologies discussed in this course would be similar to those deployed in professional research environments.

## **OBJECTIVE**

The primary objective of this course is to develop a research orientation among the UG students and to acquaint them with fundamentals of research methods. Some other objectives of the course are:

- 1. To evaluate/review related extant literature, form a variety of sources, pertinent to the research objectives/questions.
- 2. To expose students to various research methodologies (design), relevant to the research problem needing to be addressed.
- 3. To explain and justify how researchers will collect and analyse research data.
- 4. To educate students in the common mistakes, research misconduct, and ethical considerations in the field of research methodology.

LEARNI	LEARNING OUTCOMES & GENERIC SKILLS											
No.	Course Learning Outcome (Upon completion of the course, the students will be able to)	Bloom's Taxonomy	СР	CA	KP	Assessment Methods						
CO1	Understand the research fundamentals and formulate problem statement and research questions/objectives.	C2	-			Assignment/Quiz						
CO2	Formulate and compose a research proposal considering research activities/design, background studies, and following standard guidelines.	C3	-			Report/Presentation/ Assignment/Quiz						
CO3	Develop writing and presentation skill, and demonstrate ethical considerations in conducting research.	C3	-			Report/Presentation/ Assignment						

(CP- Complex Problems, CA-Complex Activities, KP-Knowledge Profile,T – Test ; PR – Project ; Q – Quiz; ASG – Assignment; Pr – Presentation; R - Report; F – Final Exam, MT- Mid Term Exam)

#### **COURSE CONTENT**

Foundations of Research: Meaning of Research, Definitions of Research, Objectives of Research, Motivation in Research, General Characteristics of Research, Criteria of Good Research, Types of Research, Concept of theory, empiricism, deductive and inductive theory, Characteristics of scientific method. Problem Identification and Formulation: Meaning and need of Review of Literature, How to Conduct the Review of literature, Research Question - Investigation Question - Measurement Issues -Hypothesis - Qualities of a good Hypothesis -Null Hypothesis & Alternative Hypothesis. Hypothesis Testing - Logic & Importance. Research Design: Concept and Importance in Research - Features of a good research design - Exploratory Research Design - concept, types and uses, Descriptive Research Designs - concept, types and uses. Experimental/Computational Design: Concept of Independent & Dependent variables. Data Analysis: Data Preparation – Univariate analysis (frequency tables, bar charts, pie charts, percentages), Bivariate analysis - Cross tabulations and Chi-square test including testing hypothesis of association. Research Misconduct and Ethics: Understand the research misconduct, type of research misconduct, Ethical issues in conducting research, Ethical issues related to publishing, Plagiarism and Self-Plagiarism. Use of Tools / Techniques for Research: Layout of a Research Paper, Methods to search required information effectively, Reference Management Software like Zotero/ Mendeley, Software for paper formatting like LaTeX/ MS Office, Software for detection of Plagiarism. Time management and developing Gantt Charts.

## SKILL MAPPING

No.	Course Learning Outcome		PROGRAM OUTCOMES (PO)										
INO.	Course Learning Outcome	1	2	3	4	5	6	7	8	9	10	11	12
CO1	Understand the research fundamentals and formulate problem statement and research questions/objectives.	Н											
CO2	Formulate and compose a Research proposal considering research activities, background studies, and following standard guidelines.		L									М	
CO3	Develop writing and presentation skill, and demonstrate ethical considerations in conducting research.								Н	М			

(H – High, M- Medium, L-low)

JUSTIFICAT	JUSTIFICATION FOR CO-PO MAPPING								
Mapping	Level	Justifications							
CO1-PO1	High	Increase breadth & depth of knowledge through understanding the research fundamentals and formulating research objectives.							
CO2-PO2	Low	Understand complex problems by doing back standard guidelines.	Understand complex problems by doing background studies and following standard guidelines.						
CO2-PO11	Medium	Understand level of management required for a Research proposal considering research activities.							
CO3-PO7	High	Exercise ethical practice while conducting research and writing reports.							
CO3-PO9	Medium	Recognize role in and diversity of a team by co	nducting research in a group.						
TEACHING	LEARNING	STRATEGY							
Teaching and		vities	Engagement (hours)						
Face-to-Face I	Learning								
Lectu	ire		-						
Pract	ical / Tutorial	56							
Stude	Student-Centred Learning -								

Self-Directed Learning	
Non-face-to-face learning	-
Revision	-
Assessment Preparations	-
Formal Assessment	-
Continuous Assessment	4
Final Examination	4
Total	64

## TEACHING METHODOLOGY

Lecture and Discussion, Mini-Seminars by Experts, Co-operative and Collaborative Method, Problem Based Method

## COURSE SCHEDULE

Week	Lecture	Topics	Assessment Methods
1	Lec 1 Lec 2 Lec 3 Lec 4	Foundations of Research: Meaning of Research; Definitions of Research; Objectives of Research; Motivation in Research; General Characteristics of Research; Criteria of Good Research; Types of Research; Concept of theory, empiricism, deductive and inductive theory; Characteristics of scientific method.	Continuous Assessment
2	Lec 5-8	Practice session on Foundations of Research	(presentation/
3	Lec 9 Lec 10 Lec 11 Lec 12	Problem Identification & Formulation: Meaning & need of Review of Literature; How to Conduct the Review of literature; Research Question – Investigation Question – Measurement Issues – Hypothesis – Qualities of a good Hypothesis –Null Hypothesis & Alternative Hypothesis. Hypothesis Testing – Logic & Importance.	quiz/other assignment)
4	Lec 13-16	Practice session on Problem Identification & Formulation	
5	Lec 17 Lec 18 Lec 19 Lec 20	Research Design: Concept and Importance in Research – Features of a good research design – Exploratory Research Design – concept, types and uses, Descriptive Research Designs – concept, types and uses. Experimental Design: Concept of Independent & Dependent variables.	Assignment 1 Assignment has to provide before, here students will
6	Lec 21-24	Practice session on Research Design	submit report and
7	Lec 25 Lec 26 Lec 27 Lec 28	Data Analysis: Data Preparation – Univariate analysis (frequency tables, bar charts, pie charts, percentages), Bivariate analysis – Cross tabulations and Chi-square test including testing hypothesis of association.	give PPT
8	Lec 29-32	Practice session on Data Analysis	Continuous
9	Lec 33 Lec 34 Lec 35 Lec 36	Research Misconduct and Ethics: Understand the research misconduct; type of research misconduct; Ethical issues in conducting research; Ethical issues related to publishing, Plagiarism and Self-Plagiarism.	Assessment (presentation/ quiz/other assignment)
10	Lec 37-40	Practice session on Research misconduct and Ethics	
11	Lec 41 Lec 42 Lec 43 Lec 44	Use of Tools / Techniques for Research: Layout of a Research Paper; Methods to search required information effectively; Reference Management Software like Zotero/Mendeley; Software for paper formatting like LaTeX/MS Office; Software for detection of Plagiarism. Time management and developing Gantt Charts.	Assignment 2 Assignment has to provide before,
12	Lec 45-48	Practice session on Use of tools / techniques for Research	here students will
13	Lec 49-52	Review Session (Theory) – I /Final Presentation	submit report and give PPT
14	Lec 53-56	Review Session (Practice) – II /Final Presentation	

Components	Grading	СО	Blooms Taxonomy
Continuous Assessment	30%	CO1 and CO3	C2-C3
Assignment I	20%	CO1 and CO3	C2-C3
Assignment II	50%	CO2 and CO3	C2-C3
Total Marks	100%		

#### (CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

#### **REFERENCE BOOKS**

- 1. Engineering Research Methodology: A Practical Insight for Researchers. Springer, by Deb, Dipankar, Dey, Rajeeb, Balas, Valentina E.
- 2. Research Methods for Engineers, 1st Edition, by David V. Thiel.
- 3. Handbook of Research Methodology by Talati, J.K.
- 4. Introducing Research Methodology: A Beginner's Guide to Doing a Research Project by Uwe Flick
- 5. DRM, a Design Research Methodology by Lucienne T.M. Blessing and Amaresh Chakrabarti
- 6. Research Methods: Information, Systems, and Contexts by Kirsty Williamson, Graeme Johanson
- 7. Zelkowitz, M. V. and Wallace, D. R. (1998), Experimental models for validating technology, *Computer*, vol. 31, no. 5, pp. 23-31.
- 8. Internet, mail, and mixed-mode surveys : the tailored design method (3rd ed.) by Dillman, D. A., Smyth, J. D., & Christian, L. M.
- 9. Improving survey questions: design and evaluation. Sage Publications, by Fowler, F. J.
- 10. Applied multiple regression/correlation analysis for the behavioral sciences (3rd ed.). Mahwah, NJ: Lawrence Erlbaum Associates, by Cohen, J., Cohen, P., West, S., & Aiken, L.
- 11. Experimental and Quasi-Experimental Design for Generalized Causal Inference. Boston, Mass: Houghton Mifflin, by Shadish W.R., Cook T.D. & Campbell P.T.
- 12. Computational handbook of statistics (4th ed.). New York: Longman, by Bruning, J. L. & Kintz, B. L.

## **REFERENCE SITE**

## **GES-301: Fundamentals of Sociology**

COURSE INFORMATION									
Course Code	: GES -301	Lecture Contact Hours	: 2.00						
Course Title	: Fundamentals of Sociology	Credit Hours	: 2.00						
PRE-REQUISIT	PRE-REQUISITE								
Course Code: Nil									
Course Title: Nil									
CURRICULUM	STRUCTURE								
Outcome Based E	ducation (OBE)								
RATIONALE									
This course has be	en designed to understand the hu	man inter-personal relatio	nship and human psychology						

This course has been designed to understand the human inter-personal relationship and human psychology in the society and to apply this knowledge in the practical field as an engineer through the study of varied societies and cultures.

## **OBJECTIVE**

- 1. To learn basics, scopes and perspectives of sociology.
- 2. To understand societal and cultural issues in national, global and environmental context.
- 3. To synthesis between social problem and social satisfaction in real life.

LEAF	LEARNING OUTCOMES & GENERIC SKILLS											
No.	Course Learning Outcome (Upon completion of the course, the students will be able to)	Bloom's Taxonomy	СР	CA	KP	Assessment Methods						
CO1	Understand the basic nature, scope and perspective of sociology and the criteria of social research process andb methodologies	C1		-	1	T, ASG, F						
CO2	Apply contextual knowledge to assess societal and cultural issues in national and global context and also environmental context for sustainable development.	C2		-	1	Q, F						
CO3	Analyze social problem, social stratifications, socialism, capitalism and economic life and political issues	C2		-	2	MT, F						

(CP- Complex Problems, CA-Complex Activities, KP-Knowledge Profile, T – Test ; PR – Project ; Q – Quiz; ASG – Assignment; Pr – Presentation; R - Report; F – Final Exam, MT- Mid Term Exam)

## COURSE CONTENT

**Understanding Society:** Nature and scope Sociological imagination, Perspectives of sociology, Stages of social research and research method; **Social Phenomena:** Culture and civilization, Socialization and self - development, Globalization and social changes, Media and individual, Social organizations and social problems, social stratification, industrial revolution, Capitalism and socialism, Work and economic life, Environment and human activities; **Social Change:** Climate change and global risk, Population and human society, Urbanization and city development, Social changes and technology;

#### SKILL MAPPING

No.	Course Learning Outcome		PROGRAM OUTCOMES (PO)										
INO.			2	3	4	5	6	7	8	9	10	11	12
CO1	Understand the basic nature, scope and perspective of sociology and the criteria of social research process and methodologies										Н		
CO2	Apply contextual knowledge to assess societal and cultural issues in national and global context and also environmental context for sustainable development.						М						
CO3	Analyze social problem, social stratifications, socialism, capitalism and economic life and political issues						Н				М		

#### (H – High, M- Medium, L-low)

#### JUSTIFICATION FOR CO-PO MAPPING

Mapping	Level	Justifications
CO1-PO10	High	In order to understand the basic nature, scope and perspective of sociology and the criteria of social research process and methodologies, it is required to communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions
CO2-PO6	Medium	In order to apply contextual knowledge to assess societal and cultural issues in national and global context and also environmental context for sustainable development, application of reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice and solutions to complex engineering problems is required.

CO3-PO6	6 High	In order to analyze Social problem, social stratifications, s economic life and political issues, application of r contextual knowledge to assess societal, health, safety, l and the consequent responsibilities relevant to profession and solutions to complex engineering problems is required	reasoning legal and nal engin 1	informed by cultural issues eering practice
CO3-CO1	0 Medium	In order to analyze Social problem, social stratifications, s economic life and political issues, it is required to com complex engineering activities with the engineering com at large, such as being able to comprehend and write effe documentation, make effective presentations, and g instructions.	municate munity ar ective repo	effectively on nd with society orts and design
TEACHIN	NG LEARNI	NG STRATEGY		
Teaching a	Ind Learning	Activities	Engag	ement (hours)
Face-to-Fa	ce Learning			
	ecture			28
	ractical / Tuto			-
	tudent-Centre ted Learning	d Learning		-
	lon-face-to-fa	ce learning		28
	evision			14
А	ssessment Pre	eparations		14
Formal As				
	ontinuous As			2
Total	inal Examinat	101		<u>3</u> 89
				89
TEACHIN	NG METHO	DOLOGY		
Lecture an	d Discussion,	Co-operative and Collaborative Method, Problem Based M	ethod	
	d Discussion, SCHEDULE	•	ethod	
COURSE	SCHEDULE		ethod	
		•	ethod	Assessment
COURSE	SCHEDULE Lectures	Lecture/Tutorial/Assignment Topic	ethod	Assessment Method
COURSE	SCHEDULE Lectures Lec-1	Lecture/Tutorial/Assignment Topic           Definition, nature and scope of sociology	ethod	
COURSE Week	SCHEDULE Lectures Lec-1 Lec-2	Lecture/Tutorial/Assignment Topic           Definition, nature and scope of sociology           Sociological imagination		
COURSE Week	SCHEDULE Lectures Lec-1 Lec-2 Lec-3	Lecture/Tutorial/Assignment Topic           Definition, nature and scope of sociology           Sociological imagination           Perspectives of sociology		
COURSE Week 1 2	SCHEDULE Lectures Lec-1 Lec-2 Lec-3 Lec-4	Lecture/Tutorial/Assignment Topic           Definition, nature and scope of sociology           Sociological imagination           Perspectives of sociology           Orientation of sociological theories		
COURSE Week	SCHEDULE Lectures Lec-1 Lec-2 Lec-3	Lecture/Tutorial/Assignment Topic         Definition, nature and scope of sociology         Sociological imagination         Perspectives of sociology         Orientation of sociological theories         Social research and its process		
COURSE Week 1 2 3	SCHEDULE Lectures Lec-1 Lec-2 Lec-3 Lec-4 Lec-5	Lecture/Tutorial/Assignment Topic           Definition, nature and scope of sociology           Sociological imagination           Perspectives of sociology           Orientation of sociological theories		
COURSE Week 1 2	SCHEDULE Lec-1 Lec-2 Lec-3 Lec-4 Lec-5 Lec-6 Lec-7 Lec-8	Lecture/Tutorial/Assignment Topic         Definition, nature and scope of sociology         Sociological imagination         Perspectives of sociology         Orientation of sociological theories         Social research and its process         Research designs and techniques.         Introducing culture and its variations         civilization		Method
COURSE Week 1 2 3 4	SCHEDULE Lectures Lec-1 Lec-2 Lec-3 Lec-4 Lec-5 Lec-6 Lec-7 Lec-8 Lec-9	Lecture/Tutorial/Assignment Topic         Definition, nature and scope of sociology         Sociological imagination         Perspectives of sociology         Orientation of sociological theories         Social research and its process         Research designs and techniques.         Introducing culture and its variations		Method
COURSE Week 1 2 3	SCHEDULE Lec-1 Lec-2 Lec-3 Lec-4 Lec-5 Lec-6 Lec-7 Lec-8 Lec-9 Lec-10	Lecture/Tutorial/Assignment Topic         Definition, nature and scope of sociology         Sociological imagination         Perspectives of sociology         Orientation of sociological theories         Social research and its process         Research designs and techniques.         Introducing culture and its variations         civilization         Defining family and its changes         Socialization process and development of self		Method
Week           1           2           3           4           5	SCHEDULE           Lec-1           Lec-2           Lec-3           Lec-4           Lec-5           Lec-6           Lec-7           Lec-8           Lec-10           Lec-11	Lecture/Tutorial/Assignment Topic         Definition, nature and scope of sociology         Sociological imagination         Perspectives of sociology         Orientation of sociological theories         Social research and its process         Research designs and techniques.         Introducing culture and its variations         civilization         Defining family and its changes         Socialization process and development of self         Introducing globalization and its impact on human life		Method
COURSE Week 1 2 3 4	SCHEDULE           Lec-1           Lec-2           Lec-3           Lec-4           Lec-5           Lec-6           Lec-7           Lec-8           Lec-9           Lec-10           Lec-11           Lec-12	Lecture/Tutorial/Assignment Topic         Definition, nature and scope of sociology         Sociological imagination         Perspectives of sociology         Orientation of sociological theories         Social research and its process         Research designs and techniques.         Introducing culture and its variations         civilization         Defining family and its changes         Socialization process and development of self         Introducing globalization and its impact on human life         Factors responsible to globalization		Method
Week           1           2           3           4           5           6	SCHEDULE           Lec-1           Lec-2           Lec-3           Lec-4           Lec-5           Lec-6           Lec-7           Lec-8           Lec-10           Lec-111           Lec-12           Lec-13	Lecture/Tutorial/Assignment Topic         Definition, nature and scope of sociology         Sociological imagination         Perspectives of sociology         Orientation of sociological theories         Social research and its process         Research designs and techniques.         Introducing culture and its variations         civilization         Defining family and its changes         Socialization process and development of self         Introducing globalization and its impact on human life         Factors responsible to globalization         Media and its impact in modern society		Method
Week           1           2           3           4           5	SCHEDULE           Lec-1           Lec-2           Lec-3           Lec-4           Lec-5           Lec-6           Lec-7           Lec-8           Lec-10           Lec-11           Lec-12           Lec-13	Lecture/Tutorial/Assignment Topic         Definition, nature and scope of sociology         Sociological imagination         Perspectives of sociology         Orientation of sociological theories         Social research and its process         Research designs and techniques.         Introducing culture and its variations         civilization         Defining family and its changes         Socialization process and development of self         Introducing globalization and its impact on human life         Factors responsible to globalization         Media and its impact in modern society         Addressing social problems of Bangladesh		Method
Week           1           2           3           4           5           6	SCHEDULE           Lec-1           Lec-2           Lec-3           Lec-4           Lec-5           Lec-6           Lec-7           Lec-8           Lec-10           Lec-11           Lec-12           Lec-13           Lec-14	Lecture/Tutorial/Assignment Topic         Definition, nature and scope of sociology         Sociological imagination         Perspectives of sociology         Orientation of sociological theories         Social research and its process         Research designs and techniques.         Introducing culture and its variations         civilization         Defining family and its changes         Socialization process and development of self         Introducing globalization and its impact on human life         Factors responsible to globalization         Media and its impact in modern society         Addressing social problems of Bangladesh         Introducing social groups and organizations		Method
Week           1           2           3           4           5           6           7	SCHEDULE           Lec-1           Lec-2           Lec-3           Lec-4           Lec-5           Lec-6           Lec-7           Lec-8           Lec-9           Lec-11           Lec-12           Lec-13           Lec-14	Lecture/Tutorial/Assignment Topic           Definition, nature and scope of sociology           Sociological imagination           Perspectives of sociology           Orientation of sociological theories           Social research and its process           Research designs and techniques.           Introducing culture and its variations           civilization           Defining family and its changes           Socialization process and development of self           Introducing globalization and its impact on human life           Factors responsible to globalization           Media and its impact in modern society           Addressing social problems of Bangladesh           Introducing bureaucracy and good governance		Method Class test-1
Week           1           2           3           4           5           6           7	SCHEDULE Lec-1 Lec-2 Lec-3 Lec-3 Lec-4 Lec-5 Lec-6 Lec-7 Lec-8 Lec-9 Lec-10 Lec-11 Lec-12 Lec-13 Lec-14 Lec-15 Lec-16 Lec-17	Lecture/Tutorial/Assignment Topic           Definition, nature and scope of sociology           Sociological imagination           Perspectives of sociology           Orientation of sociological theories           Social research and its process           Research designs and techniques.           Introducing culture and its variations           civilization           Defining family and its changes           Socialization process and development of self           Introducing globalization and its impact on human life           Factors responsible to globalization           Media and its impact in modern society           Addressing social problems of Bangladesh           Introducing social groups and organizations           Introducing social stratifications and social inequality		Method Class test-1 Midterm
Week           1           2           3           4           5           6           7           8	SCHEDULE           Lec-1           Lec-2           Lec-3           Lec-4           Lec-5           Lec-6           Lec-7           Lec-8           Lec-9           Lec-11           Lec-12           Lec-13           Lec-14           Lec-15           Lec-16           Lec-17	Lecture/Tutorial/Assignment Topic         Definition, nature and scope of sociology         Sociological imagination         Perspectives of sociology         Orientation of sociological theories         Social research and its process         Research designs and techniques.         Introducing culture and its variations         civilization         Defining family and its changes         Socialization process and development of self         Introducing globalization and its impact on human life         Factors responsible to globalization         Media and its impact in modern society         Addressing social problems of Bangladesh         Introducing bureaucracy and good governance         Introducing social stratifications and social inequality         Poverty and its types and dimensions		Method Class test-1
Week           1           2           3           4           5           6           7           8	SCHEDULE           Lec-1           Lec-2           Lec-3           Lec-4           Lec-5           Lec-6           Lec-7           Lec-8           Lec-9           Lec-10           Lec-11           Lec-12           Lec-13           Lec-14           Lec-15           Lec-16           Lec-17           Lec-18           Lec-19	Lecture/Tutorial/Assignment Topic         Definition, nature and scope of sociology         Sociological imagination         Perspectives of sociology         Orientation of sociological theories         Social research and its process         Research designs and techniques.         Introducing culture and its variations         civilization         Defining family and its changes         Socialization process and development of self         Introducing globalization and its impact on human life         Factors responsible to globalization         Media and its impact in modern society         Addressing social problems of Bangladesh         Introducing bureaucracy and good governance         Introducing social stratifications and social inequality         Poverty and its types and dimensions         Industrial revolution and aftermath		Method Class test-1 Midterm
Week           1           2           3           4           5           6           7           8           9	SCHEDULE           Lec-1           Lec-2           Lec-3           Lec-4           Lec-5           Lec-6           Lec-7           Lec-8           Lec-9           Lec-10           Lec-11           Lec-12           Lec-13           Lec-14           Lec-15           Lec-16           Lec-17           Lec-18           Lec-20	Lecture/Tutorial/Assignment Topic         Definition, nature and scope of sociology         Sociological imagination         Perspectives of sociology         Orientation of sociological theories         Social research and its process         Research designs and techniques.         Introducing culture and its variations         civilization         Defining family and its changes         Socialization process and development of self         Introducing globalization and its impact on human life         Factors responsible to globalization         Media and its impact in modern society         Addressing social problems of Bangladesh         Introducing social stratifications and social inequality         Poverty and its types and dimensions         Industrial revolution and aftermath         Urbanization and city development		Method Class test-1 Midterm
Week           1           2           3           4           5           6           7           8           9	SCHEDULE           Lec-1           Lec-2           Lec-3           Lec-4           Lec-5           Lec-6           Lec-7           Lec-8           Lec-9           Lec-10           Lec-11           Lec-12           Lec-13           Lec-14           Lec-15           Lec-16           Lec-17           Lec-18           Lec-19           Lec-20           Lec-21	Lecture/Tutorial/Assignment Topic           Definition, nature and scope of sociology           Sociological imagination           Perspectives of sociology           Orientation of sociological theories           Social research and its process           Research designs and techniques.           Introducing culture and its variations           civilization           Defining family and its changes           Socialization process and development of self           Introducing globalization and its impact on human life           Factors responsible to globalization           Media and its impact in modern society           Addressing social groups and organizations           Introducing social stratifications and social inequality           Poverty and its types and dimensions           Industrial revolution and aftermath           Urbanization and city development		Method Class test-1 Midterm
Week           1           2           3           4           5           6           7           8           9           10	SCHEDULE           Lec-1           Lec-2           Lec-3           Lec-4           Lec-5           Lec-6           Lec-7           Lec-8           Lec-9           Lec-10           Lec-11           Lec-12           Lec-13           Lec-14           Lec-15           Lec-16           Lec-17           Lec-18           Lec-20	Lecture/Tutorial/Assignment Topic         Definition, nature and scope of sociology         Sociological imagination         Perspectives of sociology         Orientation of sociological theories         Social research and its process         Research designs and techniques.         Introducing culture and its variations         civilization         Defining family and its changes         Socialization process and development of self         Introducing globalization and its impact on human life         Factors responsible to globalization         Media and its impact in modern society         Addressing social problems of Bangladesh         Introducing social stratifications and social inequality         Poverty and its types and dimensions         Industrial revolution and aftermath         Urbanization and city development		Method Class test-1 Midterm

13	Lec-25	Population of Bangladesh: problem or prospect	
15	Lec-26	Crime and deviance: a brief analysis	
14	Lec-27	Review 1	
14	Lec-28	Review 2	

Com	ponents	Grading	СО	Blooms Taxonomy
Continuous	Class Test/ Assignment	20%	CO1	C1
Assessment (40%)	Class Participation	5%	CO2	C2
	Mid term	15%	CO3	C2
Final E	xamination	60%	CO1-CO3	C2-C4
Tota	l Marks	100%		

## (CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

#### **REFERENCE BOOKS**

1. Brinkerhoff, David B., Suzanne T. Ortega, and Rose Weitz. Essentials of sociology. Cengage Learning, 2013.

- 2. Rao, CN Shankar. "Sociology: Primary Principles." New Delhi: S. Chand and Company Ltd (2002).
- Giddens, Anthony, ed. Human societies: an introductory reader in sociology. Cambridge, Eng.: Polity Press, 1992.

## **REFERENCE SITE**

## **GESL-303: Environment, Sustainability and Law**

COURSE INFOR	MATION					
Course Code	Course Code : GEN-303 Lecture Contac					
Course Title	: Environment, Sustainability and Law	Credit Hours	: 2.00			
PRE-REQUISITI	£					
Course Code: Nil						
Course Title: Nil						
CURRICULUM S	STRUCTURE					
Outcome Based Ed	lucation (OBE)					
RATIONALE						
	signed to provide a basic idea about enviro environmental sustainability and also famili ironment.		0.			
OBJECTIVE						
1 To develop a k	acter understanding of human paraantian and	policies towards the anyironn	aant			

- 1. To develop a better understanding of human perception and policies towards the environment.
- 2. To recognize and analyse different environmental problems and focus on design for sustainable development and technology for improving environmental quality.

3. To ha	ave a sound knowledge on environmental law.					
LEARNI	NG OUTCOMES & GENERIC SKILLS					
No.	Course Learning Outcome (Upon completion of the course, the students will be able to)	Bloom's Taxonomy	СР	CA	KP	Assessment Methods
CO1	Develop better understanding of environmental systems and impact of technology on the environment	C1-C2	-	1	1	T, F
CO2	Analyse different environmental problems and apply technologies for sustainable environment.	C3-C4	1	2,4	7	T, MT, F, ASG
CO3	Understand the laws related to environment and sustainability and apply those law whenever required.	C2-C3	4, EP1	4	7	T, MT, F
CO4	Develop the communication skill by presenting topics on computer graphics.	A2	-	1	-	Pr

(CP- Complex Problems, CA-Complex Activities, KP-Knowledge Profile, T – Test; PR – Project; Q – Quiz; ASG – Assignment; Pr – Presentation; R - Report; F – Final Exam, MT- Mid Term Exam)

## **COURSE CONTENT**

**Introduction:** Environment and its components, Biodiversity at global, national and local levels; **Social Issues and Environment:** Problems relating to urban environment- Population pressure, water scarcity, industrialization; land use & degradation, climate change; **Impact of Technology on the Environment:** how digital technology impacts upon the environment, Toxic Techno-trash; Efficient and eco-friendly use of technology.

**Environmental Sustainability:** Principles of Environmental Sustainability, Importance of sustainable practices; **Technologies for environment:** Environmental Biotechnology-Biological indicators, biosensors; **Green Computing:** Green Technologies and Environmental Sustainability, Technologies for reducing greenhouse gases and for biofuel production; Recycling techno-trash, E-waste management; Models and Frameworks for Sustainability; **IT for Sustainable Environment:** Natural resource protection and environmental enhancement using IT; Use and impact of IT within communities, IT and sustainability development

**Environmental Law:** Nature and Origin of International Environmental Organizations (IEOs), Common-Law Approaches to Environmental Problems, Impact of environmental laws in solving environmental problems, Environmental legislation and its importance, Environmental ethics and social responsibility, Importance of sustainability assessment tools and institutions before and after laws are adopted.

## SKILL MAPPING

				Р	ROC	GRA	M OI	UTC	OM	ES (	PO)		
No.	Course Learning Outcome	1	2	3	4	5	6	7	8	9	10	11	12
C01	Develop better understanding of environmental systems and impact of technology on the environment	Н											
CO2	Analyse different environmental problems and apply technologies for sustainable environment.						Н	Н					
CO3	Understand the laws related to environment and sustainability and apply those law whenever required.						М		Н				
CO4	Develop the communication skill by presenting topics on computer graphics.										L		
(H – Hi	gh, M- Medium, L-low)												
JUSTI	FICATION FOR CO-PO MAPPING												

Mapping	Level	Justifications			
CO1-PO1	High	solutions applicable for solving the problems.	etermine appropria		
CO2-PO7	High	Develop eco-friendly technological solutions for enha sustainability and explain the impacts of those on envir	ronment.		
CO2-PO6	High	Develop strong sense of responsibility to protect the de and apply knowledge of green technologies for sustain			
CO3-PO6	Medium				
CO3-PO8	High	Develop the understanding of implementing the laws v country and globally.	-		
CO4-PO10	) Low	Develop communication skills through participating in	presentation.		
TEACHING	LEARNING	STRATEGY			
-	Learning Activ	vities	Engagement (hours)		
ace-to-Face			28		
Lect Prac	ture ctical / Tutorial	/ Studio	28		
	lent-Centred Le				
elf-Directed	Learning				
	-face-to-face le	arning	28		
	ision	ations	14		
Asse ormal Asses	essment Prepara	auons	14		
	tinuous Assessi	ment	2		
Fina	l Examination		3		
<b>EACHING</b> ecture and I	Il Examination <b>METHODOL</b> Discussion, Co-		89		
EACHING ecture and I COURSE SC	METHODOL Discussion, Co-4	OGY operative and Collaborative Method, Problem Based Meth	Assessment		
<b>EACHING</b> ecture and I	METHODOL Discussion, Co- CHEDULE Lecture	OGY operative and Collaborative Method, Problem Based Meth Topics	nod		
EACHING ecture and I COURSE SC	METHODOL Discussion, Co-4	OGY operative and Collaborative Method, Problem Based Meth Topics Environment and its components, Biodiversity at global, national and local levels	Assessment		
TEACHING ecture and E COURSE SC Week 1	METHODOL Discussion, Co-4 CHEDULE Lecture Lec 1	OGY operative and Collaborative Method, Problem Based Meth Topics Environment and its components, Biodiversity at global, national and local levels Problems relating to urban environment- Population	Assessment		
EACHING ecture and E COURSE SC Week	METHODOL Discussion, Co CHEDULE Lecture Lec 1 Lec 2	OGY operative and Collaborative Method, Problem Based Meth Topics Environment and its components, Biodiversity at global, national and local levels Problems relating to urban environment- Population pressure, water scarcity, industrialization; land use &	Assessment Methods		
TEACHING ecture and E COURSE SC Week 1	METHODOL Discussion, Co CHEDULE Lecture Lec 1 Lec 2 Lec 3 Lec 4	Dependence of the second secon	Assessment		
TEACHING ecture and E COURSE SC Week 1	METHODOL Discussion, Co- CHEDULE Lec 1 Lec 2 Lec 3 Lec 4 Lec 5	OGY operative and Collaborative Method, Problem Based Meth Topics Environment and its components, Biodiversity at global, national and local levels Problems relating to urban environment- Population pressure, water scarcity, industrialization; land use &	Assessment Methods		
TEACHING ecture and E COURSE SC Week 1 2	METHODOL Discussion, Co- CHEDULE Lec 1 Lec 2 Lec 3 Lec 4 Lec 5 Lec 6	OGY operative and Collaborative Method, Problem Based Meth Topics Environment and its components, Biodiversity at global, national and local levels Problems relating to urban environment- Population pressure, water scarcity, industrialization; land use & degradation, climate change How digital technology impacts upon the environment	Assessment Methods		
TEACHING ecture and E COURSE SC Week 1 2	METHODOL Discussion, Co- CHEDULE Lec 1 Lec 2 Lec 3 Lec 4 Lec 5 Lec 6 Lec 7	Dependence of the second secon	Assessment Methods		
TEACHING ecture and E COURSE SC Week 1 2 3 4	METHODOL Discussion, Co- CHEDULE Lec 1 Lec 2 Lec 3 Lec 4 Lec 5 Lec 6	COGY         operative and Collaborative Method, Problem Based Method         Topics         Environment and its components, Biodiversity at global, national and local levels         Problems relating to urban environment- Population pressure, water scarcity, industrialization; land use & degradation, climate change         How digital technology impacts upon the environment         Toxic Techno-trash; Efficient and eco-friendly use of technology	Assessment Methods		
TEACHING ecture and E COURSE SC Week 1 2 3	METHODOL Discussion, Co CHEDULE Lec 1 Lec 2 Lec 3 Lec 4 Lec 5 Lec 6 Lec 7 Lec 8	OGY operative and Collaborative Method, Problem Based Meth Topics Environment and its components, Biodiversity at global, national and local levels Problems relating to urban environment- Population pressure, water scarcity, industrialization; land use & degradation, climate change How digital technology impacts upon the environment Toxic Techno-trash; Efficient and eco-friendly use of	Assessment Methods		
TEACHING eecture and E COURSE SC Week 1 2 3 4 5	METHODOL Discussion, Co- CHEDULE Lec 1 Lec 2 Lec 3 Lec 4 Lec 5 Lec 6 Lec 7 Lec 8 Lec 9	JOGY         operative and Collaborative Method, Problem Based Method         Topics         Environment and its components, Biodiversity at global, national and local levels         Problems relating to urban environment- Population pressure, water scarcity, industrialization; land use & degradation, climate change         How digital technology impacts upon the environment         Toxic Techno-trash; Efficient and eco-friendly use of technology         Principles of Environmental Sustainability, Importance	Assessment Methods		
TEACHING ecture and E COURSE SC Week 1 2 3 4	METHODOL Discussion, Co- CHEDULE Lec 1 Lec 2 Lec 3 Lec 4 Lec 5 Lec 6 Lec 7 Lec 8 Lec 9 Lec 10	JOGY         operative and Collaborative Method, Problem Based Method         Topics         Environment and its components, Biodiversity at global, national and local levels         Problems relating to urban environment- Population pressure, water scarcity, industrialization; land use & degradation, climate change         How digital technology impacts upon the environment         Toxic Techno-trash; Efficient and eco-friendly use of technology         Principles of Environmental Sustainability, Importance of sustainable practices	Assessment Methods		
TEACHING eecture and E COURSE SC Week 1 2 3 4 5	METHODOL Discussion, Co CHEDULE Lec 1 Lec 2 Lec 3 Lec 4 Lec 5 Lec 6 Lec 7 Lec 8 Lec 9 Lec 10 Lec 11 Lec 12	JOGY         operative and Collaborative Method, Problem Based Method         Topics         Environment and its components, Biodiversity at global, national and local levels         Problems relating to urban environment- Population pressure, water scarcity, industrialization; land use & degradation, climate change         How digital technology impacts upon the environment         Toxic Techno-trash; Efficient and eco-friendly use of technology         Principles of Environmental Sustainability, Importance of sustainable practices         Environmental Biotechnology Biological indicators, bio-sensors         Green Technologies and Environmental Sustainability,	Assessment Methods		
TEACHING eecture and E COURSE SC Week 1 2 3 4 5	METHODOL Discussion, Co CHEDULE Lecture Lec 1 Lec 2 Lec 3 Lec 4 Lec 5 Lec 6 Lec 7 Lec 8 Lec 9 Lec 10 Lec 11 Lec 12 Lec 13	JOGY         operative and Collaborative Method, Problem Based Method         Topics         Environment and its components, Biodiversity at global, national and local levels         Problems relating to urban environment- Population pressure, water scarcity, industrialization; land use & degradation, climate change         How digital technology impacts upon the environment         Toxic Techno-trash; Efficient and eco-friendly use of technology         Principles of Environmental Sustainability, Importance of sustainable practices         Environmental Biotechnology Biological indicators, bio-sensors         Green Technologies and Environmental Sustainability, Technologies for reducing greenhouse gases and for	Assessment Methods		
TEACHING eecture and E COURSE SC Week 1 2 3 4 5 6	METHODOL Discussion, Co- CHEDULE Lec 1 Lec 2 Lec 3 Lec 4 Lec 5 Lec 6 Lec 7 Lec 8 Lec 9 Lec 10 Lec 11 Lec 12 Lec 13 Lec 14	JOGY         operative and Collaborative Method, Problem Based Method         Topics         Environment and its components, Biodiversity at global, national and local levels         Problems relating to urban environment- Population pressure, water scarcity, industrialization; land use & degradation, climate change         How digital technology impacts upon the environment         Toxic Techno-trash; Efficient and eco-friendly use of technology         Principles of Environmental Sustainability, Importance of sustainable practices         Environmental Biotechnology Biological indicators, bio-sensors         Green Technologies and Environmental Sustainability, Technologies for reducing greenhouse gases and for biofuel production	Assessment Methods Class Test 1		
TEACHING eecture and E COURSE SC Week 1 2 3 4 5 6	METHODOL Discussion, Co CHEDULE Lec 1 Lec 2 Lec 3 Lec 4 Lec 5 Lec 6 Lec 7 Lec 8 Lec 9 Lec 10 Lec 11 Lec 12 Lec 13 Lec 14 Lec 15	JOGY         operative and Collaborative Method, Problem Based Method         Topics         Environment and its components, Biodiversity at global, national and local levels         Problems relating to urban environment- Population pressure, water scarcity, industrialization; land use & degradation, climate change         How digital technology impacts upon the environment         Toxic Techno-trash; Efficient and eco-friendly use of technology         Principles of Environmental Sustainability, Importance of sustainable practices         Environmental Biotechnology Biological indicators, bio-sensors         Green Technologies and Environmental Sustainability, Technologies for reducing greenhouse gases and for	Assessment Methods		
TEACHING eecture and E COURSE SC Week 1 2 3 4 5 6 7	METHODOL Discussion, Co- CHEDULE Lec 1 Lec 2 Lec 3 Lec 4 Lec 5 Lec 6 Lec 7 Lec 8 Lec 9 Lec 10 Lec 11 Lec 12 Lec 13 Lec 14	COGY         operative and Collaborative Method, Problem Based Meth         Topics         Environment and its components, Biodiversity at global, national and local levels         Problems relating to urban environment- Population pressure, water scarcity, industrialization; land use & degradation, climate change         How digital technology impacts upon the environment         Toxic Techno-trash; Efficient and eco-friendly use of technology         Principles of Environmental Sustainability, Importance of sustainable practices         Environmental Biotechnology Biological indicators, bio-sensors         Green Technologies and Environmental Sustainability, Technologies for reducing greenhouse gases and for biofuel production         Recycling techno-trash, E-waste management,	Assessment Methods Class Test 1		
TEACHING eecture and E COURSE SC Week 1 2 3 4 5 6 7 8	METHODOL Discussion, Co CHEDULE Lec 1 Lec 2 Lec 3 Lec 4 Lec 5 Lec 6 Lec 7 Lec 8 Lec 9 Lec 10 Lec 11 Lec 12 Lec 13 Lec 14 Lec 15	JOGY         operative and Collaborative Method, Problem Based Method         Topics         Environment and its components, Biodiversity at global, national and local levels         Problems relating to urban environment- Population pressure, water scarcity, industrialization; land use & degradation, climate change         How digital technology impacts upon the environment         Toxic Techno-trash; Efficient and eco-friendly use of technology         Principles of Environmental Sustainability, Importance of sustainable practices         Environmental Biotechnology Biological indicators, bio-sensors         Green Technologies and Environmental Sustainability, Technologies for reducing greenhouse gases and for biofuel production         Recycling techno-trash, E-waste management,         Models and Frameworks for Sustainability, Natural	Assessment Methods Class Test 1		
TEACHING eecture and E COURSE SC Week 1 2 3 4 5 6 7	METHODOL Discussion, Co- CHEDULE Lec 1 Lec 2 Lec 3 Lec 4 Lec 5 Lec 6 Lec 7 Lec 8 Lec 9 Lec 10 Lec 11 Lec 12 Lec 13 Lec 14 Lec 15 Lec 15 Lec 16	COGY         operative and Collaborative Method, Problem Based Meth         Topics         Environment and its components, Biodiversity at global, national and local levels         Problems relating to urban environment- Population pressure, water scarcity, industrialization; land use & degradation, climate change         How digital technology impacts upon the environment         Toxic Techno-trash; Efficient and eco-friendly use of technology         Principles of Environmental Sustainability, Importance of sustainable practices         Environmental Biotechnology Biological indicators, bio-sensors         Green Technologies and Environmental Sustainability, Technologies for reducing greenhouse gases and for biofuel production         Recycling techno-trash, E-waste management,	Assessment Methods Class Test 1		

	Lec 20		
11	Lec 21 Lec 22	Nature and Origin of International Environmental Organizations (IEOs), Common-Law Approaches to Environmental Problems,	
12	Lec 23 Lec 24	Impact of environmental laws in solving environmental problems, Environmental legislation and its importance	Class Test 2
13	Lec 25 Lec 26	Environmental ethics and social responsibility, Importance of sustainability assessment tools and institutions before and after laws are adopted.	
14	Lec 27 Lec 28	Importance of sustainability assessment tools and institutions before and after laws are adopted.	

Comp	oonents	Grading	СО	Blooms Taxonomy
			CO1	C1-C2
	Test 1-2	20%	CO2	C3-C4
Continuous			CO3	C2-C3
Assessment (40%)	Class Participation	5%	CO4	A2
	Mid term	15%	CO2	C3-C4
	Mid term	13%	CO3	C2-C3
			CO1	C1-C2
Final	Exam	60%	CO2	C3-C4
			CO3	C2-C3
Total	Marks	100%		

## (CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

## **REFERENCE BOOKS**

Environmental Technology and Sustainability: Physical, Chemical and Biological Technologies for 1. Clean Environmental Management (1st)- Basanta Kumara Behera (Author), Ram Prasad (Author)
 Environmental Studies (2nd)- Dr. B. S. Chauhan
 A Textbook of Environmental Studies (Revised) D K Asthana & Meera Asthana

- Understanding environmental law (3rd) Philip Weinberg 4.

## **REFERENCE SITE**

## **CSE-350: Industrial Training**

COURSE INFORMATION					
Course Code	: CSE-350	Lecture Contact Hours	:-		
Course Title	: Industrial Training	Credit Hours	: 1.00		
PRE-REQUISITE					
	Course Code: Nil Course Title: Nil				
CURRICULUM STRUCTURE					
Outcome Based Education (OBE)					

## RATIONALE

This course has been designed for the students to have real life experiences to help them prepare for their career.

## **OBJECTIVE**

- 1. To expose student to work responsibility and ethics in working environment.
- 2. To develop communication skill effectively within the working environment.
- 3. To apply theoretical and academic knowledge for solving the industrial problem.
- 4. To acquire the knowledge on preparation of training report and presentation.

#### LEARNING OUTCOMES & GENERIC SKILLS

No.	Course Learning Outcome (Upon completion of the course, the students will be able to)	Bloom's Taxonomy	СР	CA	KP	Assessment Methods
CO1	Develop work responsibility and ethics in working environment	C2,P1		4	7	Pr, R
CO2	Communicate effectively within the working environment	P6		5	6	Pr
CO3	Apply theoretical and academic knowledge for solving the industrial problem.	C3, P4		3	5	ASG
CO4	Prepare training report and presentation	A4	1	1	3	R
	Complex Problems, CA-Complex Activities, KP-Knowl ASG – Assignment; Pr – Presentation; R - Report; F – I					

## COURSE CONTENT

As designed by the respective industry.

## SKILL MAPPING

No.	No. Course Learning Outcome		PROGRAM OUTCOMES (PO)										
INO.	Course Learning Outcome	1	2	3	4	5	6	7	8	9	10	11	12
CO1	Develop work responsibility and ethics in working environment						Н		Н	М			
CO2	Communicate effectively within the working environment										Н		
CO3	Apply theoretical and academic knowledge for solving the industrial problem												М
CO4	Preparation of training report and presentation					М							

## (H – High, M- Medium, L-low)

JUSTIFICAT	FION FOR	CO-PO MAPPING			
Mapping	Level	Justifications			
CO1-PO6	High	Exposure in working environment enhances the level of knowledge and responsibility			
CO1-PO8	High	Developing ethics in working environment helps uunderstanding and level of practice			
CO1-PO9	Medium	Responsibility and ethics in working environment helps uunderstanding role in and diversity of team			
CO2-PO10	High	Communicate effectively within the working environment according to type of activities performed			
CO3-PO12	Medium	Apply theoretical and academic knowledge for solving the industrial problem enhances the depth of continuing learning			

CO4-PO5			raining report and he appropriateness of		increase the level of
TEACHING	<b>G LEARNING S</b>	STRATEGY			
Teaching and	l Learning Activ	vities			Engagement (hours)
Face-to-Face	Learning				
	ture				-
	ctical / Tutorial /				24
	dent-Centred Le	arning			-
Self-Directed					
	n-face-to-face les	arning			-
	vision				-
	ignment Prepara	ations			6
Formal Asse	ssment itinuous Assessr	mont			24
	z/ test	lient			24
	1-Term				
	al Examination				_
					54
Total					
TEACHING	<b>METHODOL</b>	OGY			
COURSE S		operative and Coll	aborative Method, P	roblem Based N	1ethod
Week	Topics			Assess	sment Methods
1	As per indu	-			
2	As per indu	-		Р	resentation
3	As per indu	strial plan			and Report
4	As per indu	strial plan			1
ASSESSME	NT STRATEG	Y			
[			~~~		
Con	nponents	Grading	СО		Blooms Taxonomy
	us Assessment	50%	CO1, CO2, CO2	3	C2,P1, P6, C3,
	Report	50%	CO4		A4
	al Marks	100%			
Tota			main D - Develom	otor Domain, A	A = Affective Domain)
		C = Cognitive Do		·	
(CO = Cou REFERENC		-	man, 1 – 1 sychom		
(CO = Cou REFERENC	<b>CE BOOKS</b> the respective i	-			

## **LEVEL-4 SPRING TERM**

## CSE-400: Final Year Research & Design Project

COU	RSE INFORMATION					
	e Code : CSE 400	Lecture Conta	ct Hou	'S	: 3.00	
Course	e Title : Final Year Research & Design Project	Credit Hours			: 6.00	
PRE-I	REQUISITE					
Minim	num earned credit: 108					
CURF	RICULUM STRUCTURE					
Outco	me Based Education (OBE)					
RATI	ONALE					
	nating demonstration of skills and knowledge achie	ved to date to a	pply an	d solve	real lif	fe problems
solvab	le through computer technology.					
OBJE	CTIVE					
	o apply technical knowledge and skills for further re-	esearch and des	ign of c	compute	er syste	m at
pr	ofessional engineering scale.					
LEAR	NING OUTCOMES & GENERIC SKILLS					
No.	Course Outcomes (Upon completion of the course, students will be able to)	Bloom's Taxonomy	СР	CA	KP	Assessment Methods
CO1	Identify a real-life problem that can be translated to an engineering and/or computing solution through design, development and validation	C2, A2	1		8	R
CO2	Identify outcomes and functional requirements of the proposed solution considering software and/or hardware specification and standards	C3, A5	1,2	2	6	R
CO3	Identify sub-components of a complex problem, prepare timeline and appropriate budget using the project management skill	P3, A4	7	2	2	R
CO4	Analyze, design, build, and evaluate engineering/computing system/subsystem with given specifications and requirements	C3	1, 2, 3		4	PR, R

(CP- Complex Problems, CA-Complex Activities, KP-Knowledge Profile,T – Test ; PR – Project ; Q – Quiz; ASG – Assignment; Pr – Presentation; R - Report; F – Final Exam, MT- Mid Term Exam)

## **COURSE CONTENT**

Previous course knowledge, Literature review, Self-learning, Interdisciplinary cooperation

## SKILL MAPPING

No.	Course Learning Outcome			]	PRO	GRA	MO	UTC	OME	S (F	PO)		
INO.	Course Learning Outcome	1	2	3	4	5	6	7	8	9	10	11	12
CO1	Identify a real-life problem that can be translated to an engineering and/or computing solution through design, development and validation												Н
CO2	Identify outcomes and functional requirements of the proposed solution considering software and/or hardware specification and		Н	Н									

·	stand	lards.												
			ponents of a											
			prepare timeline											
CO3			budget using the										Н	
		ect managemei								1				
			uild, and evaluate											
		neering/compu												
CO4		m/subsystem	with given		Η	Η								
		ifications and	U											
	spee	incations and	requirements											
(H – Hi	gh, M-	Medium, L-lo	ow)											
JUSTIF	ICAT	ION FOR CO	-PO MAPPING											
Mappi	ng	Level			J	usti	ficati	ons						
			Able to increase	breadth an	nd d	epth	of	know	ledge	e thro	ough	iden	ntifying	g and
CO1 – P	<b>PO12</b>		analysing various											
	-	-	solution	I I I I I	0		0	I ···				0	TT 1	
CO2 1		TT: 1	Able to analyse ar	nd impleme	ent so	oluti	on co	onsid	ering	softv	vare	and/	or hare	lware
CO2 – I	PO3	High	specification and s	standards										
CO3-PO	211	High	Identify sub-comp	onents, pr	epar	e tir	nelin	e an	d app	ropri	ate	budge	et usin	g the
C03-FC	511	-	project manageme											
CO4-P	04		Design, build, an				ering	/com	putin	g sys	stem	ı/subs	ystem	with
	04	Ingn	given specification	ns and requ	irem	ents								
TEACH	ING I	<b>LEARNING S</b>	STRATEGY											
Teaching	and I	earning Activ	ities			-				F	Enga	ageme	ent (ho	urs)
Face-to-l											0	0		
	Lectu	-										8	34	
l	Practi	cal / Tutorial /	Studio -											
l	Stude	nt-Centred Lea	arning										-	
Self-Dire														
1		ace-to-face lea	arning							-				
1	Revis									-				
		sment Prepara	tions							_			-	
Formal A														
1		nuous Assessn	nent										2	
T-4-1	Final	Examination								_			3 39	
												c	9	
Total			O CIV			-								
TEACH		METHODOL												
<b>TEACH</b> Previous	course	e knowledge, l	OGY Literature review, S	Self learnin	ng, Ir	terd	iscip	linar	у соо	perati	ion			
<b>TEACH</b> Previous	course			Self learnir	ıg, Ir	terd	iscip	linar	у соо	perati	ion			
TEACH Previous COURS	course	e knowledge, l IEDULE		Self learnir	ng, Ir	iterd	iscip	linar	-	-				
TEACH Previous COURS	E SCI	e knowledge, l HEDULE Topics	Literature review, S		ng, Ir	iterd	iscip	linar	-	perati				
TEACH Previous COURS Week 1-2	E SCH	e knowledge, l HEDULE Topics Discussion wi	Literature review, S		ng, Ir	iterd	iscip	linar	-	-				
TEACH Previous COURS Week 1-2 3-4	E SCH	e knowledge, l HEDULE Topics Discussion wi Analysis of th	Literature review, s th students, Topics e selected topics		ng, Ir	iterd	iscip	linar	-	-				
TEACH Previous COURS Week 1-2 3-4 5-6		e knowledge, l HEDULE Topics Discussion wi Analysis of th Review of Lite	Literature review, S th students, Topics e selected topics erature (I)		ng, Ir	iterd	iscip	linar	-	Remai	rks	in		
Week           1-2           3-4           5-6           7-8		e knowledge, l HEDULE Topics Discussion wi Analysis of the Review of Lite Review of Lite	Literature review, S th students, Topics e selected topics erature (I) erature (II)		ng, Ir	iterd	iscip	linar	F	<b>Rema</b> 6.00	rks hrs			
Week           1-2           3-4           5-6           7-8           9-10		e knowledge, l HEDULE Topics Discussion wi Analysis of the Review of Lite Review of Lite Work on meth	Literature review, S th students, Topics e selected topics erature (I) erature (II) odology section	Selection	ng, Ir	iterd	iscip	linar	F	Remai	rks hrs			
Week           1-2           3-4           5-6           7-8           9-10           11-12		e knowledge, l HEDULE Topics Discussion wi Analysis of the Review of Lite Review of Lite Work on meth Presentation o	Literature review, S th students, Topics e selected topics erature (I) erature (II) odology section n proposed researc	Selection				linar	F	<b>Rema</b> 6.00	rks hrs		_	
Week           1-2           3-4           5-6           7-8           9-10		e knowledge, l HEDULE Topics Discussion wi Analysis of the Review of Lite Review of Lite Work on meth Presentation o	Literature review, S th students, Topics e selected topics erature (I) erature (II) odology section	Selection				linar	F	<b>Rema</b> 6.00	rks hrs			
Week           1-2           3-4           5-6           7-8           9-10           11-12           13-14		e knowledge, l HEDULE Topics Discussion wi Analysis of the Review of Lite Review of Lite Work on meth Presentation o Work on prop	Literature review, s th students, Topics e selected topics erature (I) erature (II) odology section n proposed researc osal: Introduction,	Selection					F	<b>Rema</b> 6.00	rks hrs			
Week           1-2           3-4           5-6           7-8           9-10           11-12           13-14		e knowledge, l HEDULE Topics Discussion wi Analysis of the Review of Lite Review of Lite Work on meth Presentation o Work on prop methodology	Literature review, s th students, Topics e selected topics erature (I) erature (II) odology section n proposed researc osal: Introduction,	Selection					F	<b>Rema</b> 6.00	rks hrs			
Week           1-2           3-4           5-6           7-8           9-10           11-12           13-14	SMEN	e knowledge, l HEDULE Topics Discussion wi Analysis of the Review of Lite Review of Lite Work on meth Presentation o Work on prop methodology T STRATEG	Literature review, S th students, Topics e selected topics erature (I) erature (II) odology section n proposed researc osal: Introduction, Y	Selection h work Literature						6.00 every	rks hrs we			
Week           1-2           3-4           5-6           7-8           9-10           11-12           13-14	SMEN	e knowledge, l HEDULE Topics Discussion wi Analysis of the Review of Lite Review of Lite Work on meth Presentation o Work on prop methodology	Literature review, s th students, Topics e selected topics erature (I) erature (II) odology section n proposed researc osal: Introduction,	Selection h work Literature	revie	wa	nd			6.00 every	rks hrs we	ek	omy	

<b>F</b>	Project	20%	CO3	P3, A4,P3,A4
En	gagement			
Final Presentation Presentation + H		50%	CO1, CO2, CO3, CO4	C2, C3, C4, A2, A5
Total Marl	ks	100%		

# (CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

## **REFERENCE BOOKS**

# **REFERENCE SITE**

# **CSE-405: Computer Interfacing**

COU	RSE INFO	ORMATION						
Cours	e Code	: CSE-405	Lecture Co	ntact Hours	: 3.00			
Cours	e Title	: Computer Interfacing	Credit Hou	rs	: 3.00			
PRE-	REQUISI	TE						
	e Code: C e Title: Mi	SE-305 croprocessors, Micro-controll	ers and Asse	mbly Langua	ge			
		I STRUCTURE			-			
Outco	me Based	Education (OBE)						
RATI	IONALE							
device	es and con	oduces basic concepts and to nponents. Its aim is to give s ing principle and apply this kr	sufficient kn	owledge of c	omputer	hardw		
OBJE	ECTIVE							
with c 2. To and m 3. To input/	computer s enhance the icrocontro enable the output to a	e knowledge on basic workin	g principle a ning and co	nd different a	pplication	ons of t	oasic m	icrocomputer
No.	(Upon co	Course Learning Outcome ompletion of the course, students	will able to)	Bloom's Taxonomy	СР	CA	KP	Assessment Methods
CO1	Classify, interface work and	identify and analyse that how different types of external cor l communicate (Peripherals, se Cs etc.) with computer system	the mponents	C1-C3, P4	1		3	T, F
CO2	real life a	d implement the external com application and improve the re- ical analysis.		C3-C4, A2	3		5	Mid Term Exam,F
CO3	Analyze hardware problem.	and evaluate abstract problem and software components to a	address the	C5-C6, P5	7	2	2,6	Final Exam
		roblems, CA-Complex Activitients, Proceedings			e – Test	t ; PR –	Projec	t; $\overline{Q-Quiz}$ ;
ASU-	– Assignm	ent; Pr – Presentation; R - Rep	port; r - rina	n Exam)				

#### **COURSE CONTENT**

**Serial and parallel communication interface:** I/O devices, Interfacing with different peripheral devices (Keyboard, Alphanumeric Display, LED), **Interfacing Microcomputers**: ports to high power devices, Interfacing to AC power devices, Interfacing microcomputer to motor, Embedded Systems, Different types Sensors and Transducers and its applications, Interface to A/D and D/A converters, Microcomputer based industrial process control system, DMA controller, Printer Interface, Disk and Tape Storage, Barcode Reader, USB interface, Sound Card.

SKILL MAPPING

No.	Course Learning Outcome			PI	ROG	RAM	101	JTC	OM	ES (I	20)		
INO.	Course Learning Outcome	1	2	3	4	5	6	7	8	9	10	11	12
CO1	Classify, identify and analyse that how the interface different types of external components work and communicate (Peripherals, sensors, PPIs, PICs etc.) with computer system	Н											
CO2	Apply and implement the external components in real life application and improve the results based on statistical analysis.			Н									
CO3	Analyze and evaluate abstract problems and apply hardware and software components to address the problem.		Н										

## (H – High, M- Medium, L-low)

Revision

Formal Assessment

Assessment Preparations

Continuous Assessment

JUSTIFICA	TION FO	R CO-PO MAPPING				
Mapping	Level	Justifications				
CO1 – PO1	High	In order to describe how to interface different types of ex- computer system to user requirements, one need the l interfacing.				
CO2 - PO3	improve the results					
CO1-PO2	High	Analyze and evaluate abstract problems and apply hardwa components to address the problem one need to analyse th principles, typical characteristics and mechanisms of requ tools, hardware and software.	analyse the fundamental			
TEACHING	LEARNI	NG STRATEGY				
Teaching and	Learning	Activities	Engagement (hours)			
Face-to-Face	Learning					
Lect	ture		42			
Prac	-					
Student-Centred Learning -						
Self-Directed Learning						
Non	-face-to-fa	ce learning	42			

21

21

2

3

131

# Final Examination Total TEACHING METHODOLOGY Lecture and Discussion, Co-operative and Collaborative Method, Problem Based Method

Lecture and Discussion, Co operative and Condorative Method, Problem Dased Meth

***	<b>T</b> ·			-	A
Week	Lecture	D	Topics		Assessment Method
1	Lec 1		ansfer, parallel printer interfac		
	Lec 2		face, Display Interface, I/0 sy	stem;	
•	Lec 3		signing I/O systems		
2	Lec 4		, Computer I/O Operations,		
	Lec 5		O, Interrupts, Vectored Interr		Class Test 1
	Lec 6		pts using Priority Encoder, Pr	riority	
		Interrupt using			
3	Lec 7		nsfer, DMA, Parallel Interfac	ce,	
	Lec 8		terfaceSynchronous and		
	Lec 9	Asynchronous			
4	Lec 10		igh power devices, Interface	to AC	
	Lec 11	power devices,	interfacing to stepper motor		
	Lec 12				
5	Lec 13		tems, Different types of Sense		
	Lec 14	and Transducer	s: Light Sensors, Temperatur	re	
	Lec 15				Class Test 2
6	Lec 16	Different types	of Sensors and Transducers:	Force	Class Test 2
	Lec 17	and Pressure Tr			
	Lec 18				
7	Lec 19	Microcomputer	s based Scale, Microcompute	ers	
	Lec 20		l Process Control System, PI		
	Lec 21	Controller			
8	Lec 22		grammable DMA Controller)	)	
-	Lec 23				
	Lec 24				
9	Lec 25	Disc and tape s	torage, Recording on a Magn	etic	
-	Lec 26	surface, Magne		Mid Term Exam	
	Lec 27		agnetic recording Code, Rec	ording	The Point Exam
			igth limited (RLL),	0	
10	Lec 31		g, Track seeking, Sector Loca	tion.	
	Lec 32		e, Forms of Optical Disc stora		
	Lec 33	Optical Readin		<u> </u>	
11	Lec 28	CD POM Ort	on Dieke WODM Ontion		
11	Lec 28 Lec 29		cal Disks, WORM, Optical	ance	
	Lec 29 Lec 30	Enhancers	agneto Optical Disk, Perform		
12	Lec 30	Printer Interfac	2		
12	Lec 34 Lec 35	Finter Interfac	e		
	Lec 35 Lec 36				
10		Interferie	no computor to motor		Class Test 3
13	Lec 37	interfacing mic	rocomputer to motor		
	Lec 38				
	Lec 39	<b>D</b> 1 <b>D</b> 1	a 10 1775 -		
14	Lec 40	Barcode Reade	r, Sound Card, USB Interface	e	
	Lec 41				
	Lec 42				
SESSMEN	T STRATEG	Y			
Comr	onents	Grading	CO	В	looms Taxonomy
Comp		Sinding	CO 1		C1-C3, P4
	Test 1-3	20%	CO 2		C3-C4, A2
ontinuous	1051 1-5	2070	CO 2 CO 3		C5-C6, P5
ssessment	Class	+			
(40%)	Class	5%	CO 1		C1-C3, P4
	Participation		CO 2		C3-C4, A2
	Mid term	15%	CO 2	1	C3-C4, A2

		CO 3	C5-C6, P5
		CO 1	C1-C3, P4
Final Exam	60%	CO 2	C3-C4, A2
		CO 3	C5-C6, P5
Total Marks	100%		

## (CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

## **REFERENCE BOOKS**

- 1. The Intel Microprocessors (8th Edition) Barry B Brey; Pearson (2008)
- 2. Microprocessors and Interfacing (2nd Edition) Douglas V Hall; McGraw Hill (2005)
- 3. Computer Peripherals (3rd Edition) Cook and White; Butterworth-Heinemann (1995)

#### **REFERENCE SITE**

## **CSE-406: Computer Interfacing Sessional**

COURS	SE INFORMATION						
Course Course	Code : CSE-406	Lecture Credit H	Contact Hours		3.00 hi 0.75	rs in alt	ernative wk
PRE-RI	EQUISITE						
	Code: Nil Title: Nil						
CURRI	CULUM STRUCTURE						
Outcom	e Based Education (OBE)						
RATIO	NALE						
	ating demonstration of skills and knowledge			•			e IT
depende	nt problems using micro-controller, external	devices a	nd related req	uired	softwa	are.	
OBJEC	TIVE						
	urse is designed to introduce the basic conce devices for data collection and process contr						
LEARN	ING OUTCOMES & GENERIC SKILLS	S					
No.	Course Learning Outcome (Upon completion of the course, students will	able to)	Bloom's Taxonomy	СР	CA	KP	Assessment Methods
CO1	Develop systems' requirement specification top-level customer requirements		C3, C6, P4	3	2	1	R, Pr
CO2	Analyse and compare design alternatives system and subsystem levels, and use mea performance or other criteria to rank altern	sures of	C2-C4, P1	2	1	5	R, Pr
CO3	including milestones, and estimate effort a incorporating the ethical, financia environmental issues.	a work schedule and costs al and	C3,C6, A4	2	1	7	R, Pr
CO4	Develop and design concept and elab through to a detailed design by decomp system concept into component subsidentifying the subsystem requirement	oosing a systems,	C3-C6, P4	1	3	6	R, Pr

	applicable standards, and defining interfaces between the subsystems.					
CO5	Develop full-functional prototype integrating Hardware and Software	C3, C6, P4	1	1	4	
CO6	Test to measure and evaluate the prototype to determine whether they meet performance and interface requirements considering ethical, financial and environmental issues and recommend changes.	C3, C6, P4	3	2	1	R, Pr

(CP- Complex Problems, CA-Complex Activities, KP-Knowledge Profile, R-Report, Pr - Presentation, T-Test (Online)

## COURSE CONTENT

**Knowledge Acquisition:** Information gathering techniques, Design of an information system; Hardware components, pin configurations of microcontroller, peripherals, Sensors, PPIs, PICs, Use of Arduino, Raspberry Pi.

**Implementation:** Concept development, prototype enhancement, complete implementation, unit testing and integration testing with verification, feedback and improvement, result analysis and performance evaluation, report writing, paper submission, presentation and final evaluation.

## SKILL MAPPING

							M OI			`	PO)		r –
No.	Course Learning Outcome	1	2	3	4	5	6	7	8	9	1 0	1 1	1
CO 1	Develop systems' requirement specification from top level customer requirements	Н	Н				Н						
CO 2	Analyse and compare design alternatives, at the system and subsystem levels, and use measures of performance or other criteria to rank alternatives.		Н	Н	Н								
CO 3	Plan and organize an engineering design project using tools such as Gantt charts to develop a work breakdown structure, develop a schedule including milestones, and estimate effort and costs incorporating the ethical, financial and environmental issues.					Н	Н						
CO 4	Develop a design concept and elaborate it through to a detailed design by decomposing a system concept into component subsystems, identifying the subsystem requirements and applicable standards, and defining interfaces between the subsystems.			Н	Н						Н		
CO 5	Build full-functional prototype integrating Hardware and Software					Н				Н		Н	
CO 6	Test to measure and evaluate the prototype to determine whether they meet performance and interface requirements considering ethical, financial and environmental issues and recommend changes.				Н			Н				Н	

Mapping         Level         Justifications           C01 – P01         High Norder to solve complex engineering problems according to user requirements, knowledge of microcontroller, hardware and software useg is very important.           C01 – P02         High         To develop the system requirements of complex engineering problems according to user requirements or couplex for required microcontroller tools, hardware and software.           C01-P02         High         In order to serve the society is an engineer it's necessary to know the problem of the society from the customer requirements.           C02-P03         High         To compare the system alternative one need to analyse the fundamental principles, typical characteristics and mechanisms of required microcontroller tools, hardware and software.           C02-P03         High         To compare the system alternatives one has to design the alternative systems with integration of hardware and software.           C03 - P05         High         To compare the system alternatives one has to investigate all pros and cons of those systems.           C03 - P06         High         To restimate the effort and costs of the project one needs to incorporate the society's chical, financial and environmental issues.           C04 - P04         High         In order to identify the subsystem requirements and applicable standards one has to investigate the system alternative store macro in needs to use modern tools like: Android studio. Bluetooth connection, Wi-Fi Communication, Sensors ect.           C05 - P05         High         In orde	JUSTIFICA	TION FOR	CO-PO MAPPING						
COL = POI         High         knowledge of microcontroller, hardware and software usage is very important.           CO1 = PO2         High         To develop the system requirements of complex engineering problems according to user requirements on exect to analyse the fundamental principles, typical characteristics and mechanisms of required microcontroller tools, hardware and software.           CO1-PO6         High         In order to serve the society as an engineer it's necessary to know the problem of the society from the customer requirements.           CO2-PO2         High         To compare the system alternatives one has to design the alternative systems with integration of hardware and software.           CO2-PO3         High         To compare the system alternatives one has to design the alternative systems with integration of hardware and software.           CO2-PO4         High         To compare the system alternatives one has to investigate all pros and cons of those systems.           CO3-PO6         High         To compare the system alternatives one has to use modern tools such as: Gantt charts.           CO3-PO6         High         To estimate the effort and costs of the project one needs to incorporate the society's clickal, financial and environmental issues.           CO4-PO4         High         In order to identify the subsystem requirements and applicable standards one has to investigate the system alternative one in eeds to investigate the system in the ustomer.           CO5-PO5         High         In order to identify the subsystem requirements and a	Mapping	Level	Justifications						
COI – PO2         High High High According to user requirements one need to analyse the fundamental principles, hardware and software.         Coil-PO6         High High High To analyse and compare the system alternative one need to analyse the fundamental principles, typical characteristics and mechanisms of required microcontroller tools, hardware and software.           C02–PO3         High High To compare the system alternatives one has to design the alternative systems with integration of hardware and software.           C02–PO3         High High To compare the system alternatives one has to investigate all pros and cons of hose systems.           C02–PO4         High High To compare the system alternatives one has to investigate all pros and cons of hose systems.           C03–PO6         High High To estimate the effort and costs of the project one needs to incorporate the society's ethical, financial and environmental issues.           C04–PO4         High High In order to identify the subsystem requirements and applicable standards one has to investigate the system and its outcome properly.           C05–PO5         High In order to identify the subsystem requirements and applicable standards, and to investigate the system and its outcomer.           C05–PO9         High High In order to develop the prototype with the hardware and software on it needs to use modern tools like: Android studio, Bluetooth connection, Wi-Fi Communication, Sensors ect.           C05–PO7         High High In order to test to measure and evaluate the prototype accumulating the engineering skill the one needs to perform their individual task and also maintain the team work.	CO1 – PO1	High	knowledge of microcontroller, hardware and software usage is very important.						
C01-P06       High       of the society from the customer requirements.         C02-P02       High       To analyse and compare the system alternative one need to analyse the fundamental principles, typical characteristics and mechanisms of required microcontroller tools, hardware and software.         C02-P03       High       To compare the system alternatives one has to design the alternative systems with integration of hardware and software.         C02-P04       High       To compare the system alternatives one has to investigate all pros and cons of those systems.         C03-P05       High       To estimate the effort and costs of the project one needs to incorporate the society's ethical, financial and environmental issues.         C04-P04       High       To oretro tidentify the subsystem requirements and applicable standards one has to investigate the system and its outcome properly.         C04-P04       High       In order to identify the subsystem requirements and applicable standards, and define interfaces between the subsystems the group mates need to communicate among themselves and also with the customer.         C05-P05       High       In order to idevelop the whole workable prototype accumulating the engineering skill the one needs to perform their individual task and also maintain the tam work.         C05 - P09       High       In order to idevelop the whole workable prototype accumulating the engineering skill the one needs to perform their individual task and also maintain the tam work.         C05 - P09       High       In order to to evelop the succe	CO1 – PO2	High	according to user requirements one need to analyse the typical characteristics and mechanisms of require hardware and software.	he fundamental principles, ed microcontroller tools,					
C02-P02       High       fundamental principles, typical characteristics and mechanisms of required microcontroller tools, hardware and software.         C02-P03       High       To compare the system alternatives one has to design the alternative systems with integration of hardware and software.         C02-P04       High       To compare the system alternatives one has to investigate all pros and cons of those systems.         C03-P05       High       To estimate the effort and costs of the project one has to use modern tools such as: Gant charts.         C04-P04       High       To restimate the effort and costs of the project one needs to incorporate the society's ethical, financial and environmental issues.         C04-P04       High       In order to identify the subsystem requirements and applicable standards one has among themselves and also with the customer.         C05-P05       High       In order to tools like: Android studio, Bluetooth connection, Wi-Fi Communication, Sensors ect.         C05-P09       High       In order to tevelop the whole workable prototype accumulating the engineering work.         C06-P04       High       In order to tevelop the successful prototype to determine whether they meet performance and interface requirements, it's neacesary to investigate the whole workable prototype to determine whether they meet performance and interface requirements, it's neacesary to investigate the whole workable prototype to determine whether they meet performance and interface requirements, it's neacesary to investigate the whole workable prototype to determine whether they meet performance and in	CO1-PO6	High	of the society from the customer requirements.	· ·					
C02-PO3       High       with integration of hardware and software.       Image: Compare the system alternatives one has to investigate all pros and cons of those systems.         C03 - PO5       High       To plan and organize an engineering design project one has to use modern tools such as: Gantt charts.         C03 - PO6       High       To estimate the effort and costs of the project one needs to incorporate the society's ethical, financial and environmental issues.         C04 - PO4       High       In order to identify the subsystem requirements and applicable standards one has to investigate the system and its outcome properly.         C04-PO4       High       In order to identify the subsystem requirements and applicable standards, and define interfaces between the subsystems the group mates need to communicate among themselves and also with the customer.         C05-PO5       High       In order to develop the prototype with the hardware and software on it needs to use modern tools like: Android studio, Bluetooth connection, Wi-Fi Communication, Sensors ect.         C05 - PO9       High       In order to develop the whole workable prototype accumulating the engineering skill the one needs to perform their individual task and also maintain the team work.         C06-PO4       High       In order to test to measure and evaluate the prototype to determine whether they meet performance and interface requirements, it's necessary to investigate the whole system properly.         C06-PO4       High       In order to test the system one needs to find out the Sustainability of the system to the environment.<	CO2- PO2	High	fundamental principles, typical characteristics and	•					
CO2 - PO4       High       those systems.         CO3 - PO5       High       To plan and organize an engineering design project one has to use modern tools such as: Gant charts.         CO3 - PO6       High       To estimate the effort and costs of the project one needs to incorporate the society's ethical, financial and environmental issues.         CO4 - PO4       High       To order to identify the subsystem requirements and applicable standards one has to investigate the system the group mates need to communicate among themselves and also with the customer.         CO5-PO5       High       In order to identify the subsystem requirements and applicable standards, and define interfaces between the subsystems the group mates need to communicate among themselves and also with the customer.         CO5-PO5       High       In order to develop the prototype with the hardware and software on it needs to use modern tools like: Android studio, Bluetooth connection, Wi-Fi Communication, Sensors ect.         CO5 -       High       In order to develop the whole workable prototype accumulating the engineering skill the one needs to perform their individual task and also maintain the team work.         CO5 -       High       In order to test to measure and evaluate the prototype to determine whether they meet performance and interface requirements, it's necessary to investigate the whole system properly.         CO6-PO4       High       In order to test to measure and evaluate the prototype to determine whether they meet performance and interface requirements, it's necessary to investigate the whole system properly. </td <td>CO2 –PO3</td> <td>High</td> <td>with integration of hardware and software.</td> <td>-</td>	CO2 –PO3	High	with integration of hardware and software.	-					
C03 - PO5       High       such as: Gantt charts.       Correction         C03 - PO6       High       To estimate the effort and costs of the project one needs to incorporate the society's ethical, financial and environmental issues.         C04 - PO4       High       In order to identify the subsystem requirements and applicable standards one has to investigate the system and its outcome properly.         C04-PO10       High       In order to identify the subsystem requirements and applicable standards, and define interfaces between the subsystems the group mates need to communicate among themselves and also with the customer.         C05-PO5       High       In order to develop the prototype with the hardware and software on it needs to use moder to ols like: Android studio, Bluetooth connection, Wi-Fi Communication, Sensors ect.         C05 - PO9       High       In order to develop the whole workable prototype accumulating the engineering skill the one needs to perform their individual task and also maintain the team work.         C06 - D       High       In order to test to measure and evaluate the prototype to determine whether they meet performance and interface requirements, it's necessary to investigate the whole system properly.         C06 - PO4       High       In order to pass the test, it's mandatory to meet the financial parameter.         C06 - PO1       High       In order to pass the test, it's mandatory to meet the financial parameter.         C06 - PO1       High       In order to pass the test, it's mandatory to meet the financial parameter. <td>CO2 - PO4</td> <td>High</td> <td>those systems.</td> <td></td>	CO2 - PO4	High	those systems.						
C03 - PO4       High       society's ethical, financial and environmental issues.         C04 - PO4       High       In order to identify the subsystem requirements and applicable standards one has to investigate the system and its outcome properly.         C04-PO10       High       In order to identify the subsystem requirements and applicable standards, and define interfaces between the subsystems the group mates need to communicate among themselves and also with the customer.         C05-PO5       High       In order to develop the prototype with the hardware and software on it needs to use modern tools like: Android studio, Bluetooth connection, Wi-Fi Communication, Sensors ect.         C05 - PO9       High       In order to develop the whole workable prototype accumulating the engineering skill the one needs to perform their individual task and also maintain the team work.         C05 -       High       In order to test to measure and evaluate the prototype to manage the project and maintain the financial aspects.         C06 - PO4       High       In order to test to measure and evaluate the prototype to determine whether they meet performance and interface requirements, it's necessary to investigate the whole system properly.         C06 - PO1       High       In order to pass the test, it's mandatory to meet the financial parameter.         C06 - PO11       High       In order to pass the test, it's mandatory to meet the financial parameter.         C06 - PO11       High       In order to pass the test, it's mandatory to meet the financial parameter.	CO3 – PO5	High	such as: Gantt charts.						
C04 - P04       High       to investigate the system and its outcome properly.         C04-P010       High       In order to identify the subsystem requirements and applicable standards, and define interfaces between the subsystems the group mates need to communicate among themselves and also with the customer.         C05 - P05       High       In order to develop the prototype with the hardware and software on it needs to use modern tools like: Android studio, Blueto-th connection, Wi-Fi Communication, Sensors ect.         C05 - P09       High       In order to develop the whole workable prototype accumulating the engineering skill the one needs to perform their individual task and also maintain the team work.         C05 -       High       In order to test to measure and evaluate the prototype to determine whether they meet performance and interface requirements, it's necessary to investigate the whole system properly.         C06 - P04       High       In order to test to system one needs to find out the Sustainability of the system to the environment.         C06-P07       High       In order to pass the test, it's mandatory to meet the financial parameter.         TEACHING LEARNING STRATEGY       Engagement (hours)         Face-to-Face Learning       21         Self-Directed Learning       -         Non-face-to-face learning (Lab)       -         Project Preparation       21         Student-Centred Learning       21         Formal Assessment       2	CO3 – PO6	High	society's ethical, financial and environmental issues.						
C04-P010HighIn order to identify the subsystem requirements and applicable standards, and define interfaces between the subsystems the group mates need to communicate among themselves and also with the customer.C05-P05HighIn order to develop the prototype with the hardware and software on it needs to use modern tools like: Android studio, Blueton connection, Wi-Fi Communication, Sensors ect.C05-P09HighIn order to develop the whole workable prototype accumulating the engineering skill the one needs to perform their individual task and also maintain the team work.C05 -HighIn order to test to measure and evaluate the prototype its manage the project and maintain the financial aspects.C06-P04HighIn order to test to measure and evaluate the prototype to determine whether they meet performance and interface requirements, it's necessary to investigate the whole system properly.C06-P07HighIn order to test the system one needs to find out the Sustainability of the system to the environment.C06-P01HighIn order to pass the test, it's mandatory to meet the financial parameter.C06-P01HighIn order to pass the test, it's mandatory to meet the financial parameter.C06-P01JubIs order to pass the test, it's mandatory to meet the financial parameter.C06-P01JubIs order to pass the test, it's mandatory to meet the financial parameter.C06-P01JubIn order to pass the test, it's mandatory to meet the financial parameter.Self-Directed Learning ActivitiesEngagement (hours)Face-to-Face Learning Non-face-to-face- 21Self-Directed Learni	CO4 - PO4	High		pplicable standards one has					
CO5- PO5       High       In order to develop the prototype with the hardware and software on it needs to use modern tools like: Android studio, Bluetooth connection, Wi-Fi Communication, Sensors ect.         CO5 - PO9       High       In order to develop the whole workable prototype accumulating the engineering skill the one needs to perform their individual task and also maintain the team work.         CO5 -       High       In order to develop the successful prototype its mandatory to manage the project and maintain the financial aspects.         CO6 - PO4       High       In order to test to measure and evaluate the prototype to determine whether they meet performance and interface requirements, it's necessary to investigate the whole system properly.         CO6- PO1       High       In order to test the system one needs to find out the Sustainability of the system to the environment.         CO6- PO11       High       In order to pass the test, it's mandatory to meet the financial parameter.         TEACHING LEARNING STRATEGY       Engagement (hours)         Face-to-Face Learning       21         Self-Directed Learning       21         Self-Directed Learning       -         Non-face-to-face learning (Lab)       -         Project Preparation       21         Formal Assessment       2         Continuous Assessment       2         Continuous Assessment       2         Final Examination       3	CO4-PO10	High	In order to identify the subsystem requirements and define interfaces between the subsystems the group m						
CO5 -PO9       High       In order to develop the whole workable prototype accumulating the engineering skill the one needs to perform their individual task and also maintain the team work.         CO5 -       High       In order to develop the successful prototype its mandatory to manage the project and maintain the financial aspects.         CO6-PO4       High       In order to test to measure and evaluate the prototype to determine whether they meet performance and interface requirements, it's necessary to investigate the whole system properly.         CO6-PO7       High       In order to test the system one needs to find out the Sustainability of the system to the environment.         CO6-PO11       High       In order to pass the test, it's mandatory to meet the financial parameter.         TEACHING LEARNING STRATEGY       Engagement (hours)         Face-to-Face Learning Lecture Practical / Tutorial / Studio Student-Centred Learning       21         Self-Directed Learning Non-face-to-face learning (Lab) Project Preparation       -         Project Preparation       21         Formal Assessment Continuous Assessment       2         Final Examination       3	CO5- PO5	High	In order to develop the prototype with the hardware a use modern tools like: Android studio, Bluet						
CO5 -       High       In order to develop the successful prototype its mandatory to manage the project and maintain the financial aspects.         CO6- PO4       High       In order to test to measure and evaluate the prototype to determine whether they meet performance and interface requirements, it's necessary to investigate the whole system properly.         CO6- PO7       High       In order to test the system one needs to find out the Sustainability of the system to the environment.         CO6- PO11       High       In order to pass the test, it's mandatory to meet the financial parameter.         TEACHING LEARNING STRATEGY       Engagement (hours)         Face-to-Face Learning       Lecture         Practical / Tutorial / Studio       21         Self-Directed Learning       -         Non-face-to-face learning (Lab)       -         Project Preparation       21         Formal Assessment       2         Continuous Assessment       2         Gontinuous Assessment       2         Gontinuous Assessment       3	CO5 –PO9	High	In order to develop the whole workable prototype acc skill the one needs to perform their individual task a						
Image: Continuous Assessment Continuous Assessment		High		tory to manage the project					
CO6-PO7       High       In order to test the system one needs to find out the Sustainability of the system to the environment.         CO6- PO11       High       In order to pass the test, it's mandatory to meet the financial parameter.         TEACHING LEARNING STRATEGY       Engagement (hours)         Face-to-Face Learning Lecture Practical / Tutorial / Studio Student-Centred Learning       Engagement (hours)         Self-Directed Learning Non-face-to-face learning (Lab) Project Preparation       -         Formal Assessment Continuous Assessment Final Examination       2         Self-Directed Learning       2         Formal Assessment Final Examination       3	CO6- PO4	High	meet performance and interface requirements, it's ne						
TEACHING LEARNING STRATEGY         Teaching and Learning Activities       Engagement (hours)         Face-to-Face Learning Lecture Practical / Tutorial / Studio Student-Centred Learning       21         Self-Directed Learning Non-face-to-face learning (Lab) Project Preparation       -         Formal Assessment Continuous Assessment Final Examination       2         Self-Directed Learning       3	CO6-PO7	High	•	ustainability of the system					
Teaching and Learning ActivitiesEngagement (hours)Face-to-Face Learning Lecture Practical / Tutorial / Studio Student-Centred Learning21Self-Directed Learning Non-face-to-face learning (Lab) Project Preparation-Formal Assessment Continuous Assessment Final Examination2Self -Directed Learning3	CO6- PO11	High	In order to pass the test, it's mandatory to meet the fin	ancial parameter.					
Face-to-Face Learning Lecture Practical / Tutorial / Studio Student-Centred Learning21Self-Directed Learning Non-face-to-face learning (Lab) Project Preparation-Formal Assessment Continuous Assessment Final Examination2Self-Directed Learning 33									
Lecture Practical / Tutorial / Studio Student-Centred Learning21Self-Directed Learning Non-face-to-face learning (Lab) Project Preparation- - 21Formal Assessment Continuous Assessment Final Examination2 3	Teaching and	Learning A	ctivities	Engagement (hours)					
Student-Centred LearningSelf-Directed Learning Non-face-to-face learning (Lab)-Project Preparation21Formal Assessment Continuous Assessment Final Examination233		U							
Non-face-to-face learning (Lab)-Project Preparation21Formal Assessment2Continuous Assessment2Final Examination3									
Project Preparation21Formal Assessment2Continuous Assessment2Final Examination3			a lagming (Lab)						
Continuous Assessment2Final Examination3				21					
Final Examination 3				-					
Total 47									
	Total			47					

## **TEACHING METHODOLOGY**

Lectures, class performances, assignments, rubrics on problem analysis, literature review and designing prototype.

## COURSE SCHEDULE

Week	Торіс	Remarks
1	Project Proposal, Total Project Plan, Project Selection	
2	Requirement Analysis, Scheduling, Orientation with System	
	Requirements	
3	Submission of System requirement report draft-01, Development of	
	Prototype Subsystem	3.00 hrs in alternative
4	Final System requirement report, Development of Prototype	weeks
	Subsystem	
5	Full Functional Prototype V.1 Submission	
6	Full Functional Prototype Final Submission	
7	Testing and testing results submission	

## ASSESSMENT STRATEGY

	Components	Grading	СО	Blooms Taxonomy
	Idea Submission	15%	CO 1-CO5	C2-C6, P1, P4, A4
Report (45%)	Project Plan/ Scheduling	10%	CO1-CO5	C2-C6, P1, P4, A4
	System requirement report	10%	CO1-CO5	C2-C6, P1, P4, A4
	Testing	10%	CO2, CO3, CO4	C2-C6, P1, P4, A4
Project (35%)	Functional Prototype	35%	CO1-CO5	C2-C6, P1, P4, A4
Final Presentation (10%)	Final Presentation	10%	CO1-CO5	C2-C6, P1, P4, A4
Cl	ass Observation	10%		
	Total Marks	100%		

## (CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

#### **REFERENCE BOOKS**

- 1. The Intel Microprocessors (8th Edition) Barry B Brey; Pearson (2008)
- 2. Microprocessors and Interfacing (2nd Edition) Douglas V Hall; McGraw Hill (2005)
- 3. Computer Peripherals (3rd Edition) Cook and White; Butterworth-Heinemann (1995)
- 4. Software Engineering BY Ian Sommerville
- 5. Android Programming: The Big Nerd Ranch Guide (3rd Edition) (Big Nerd Ranch Guides) 3rd Edition Data and Computer Communication - William Stallings
- 6. Professional Android, Reto Meier, Ian Lake; 4th Edition

## **REFERENCE SITE**

# **CSE-415: Human Computer Interaction**

COU	RSE INFORMATION							
	e Code	: CSE-415			ire Cont			3.00
Course		: Human Computer Inte	eraction	Credi	it Hours			3.00
	REQUISITE							
	e Code: Nil e Title: Nil							
CURF	RICULUM STRUCTUR	Е						
Outco	me Based Education (OBI	Ε)						
	ONALE							
	uman Computer Interaction line concerned with the de							
	i use and with the study of				Interact	Ive con	nputing	systems for
	CTIVE	J F	8					
1. To u	understand the definitions	and foundations of the H	HCI dom	ain.				
	design interfaces and inter							
	apply evaluation methods, explore research frontie					nsive (	design	and pervasive
compu	-				, <b>10</b> 5P0			Por fubric
LEAR	RNING OUTCOMES &	GENERIC SKILLS						
	Course Learni		Bloo	n's				Assessment
No.	(Upon completion of the be abl	e to)	Taxon		СР	CA	KP	Methods
CO1	Understand and applyin HCI and Interaction des	ign.	C1- 0	C3	1		3	T, F
	Analyse the focused requirements, and to de							
CO2	UIs and Interaction		C4, 0	C6	2		4, 5	T, MT
	intuitive usable software	e solutions.						
002		uation methods for			1		0	
CO3	assuring the enhanced effectiveness, efficiency		C4	ł	1		8	F
CO4		unication skill by	A2	2		1		Pr
	Complex Problems, CA-Co ASG – Assignment; Pr – I	omplex Activities, KP-K						
COU	RSE CONTENT							
Scenar process Design patterr evalua evalua Obser presen Intervi multi-r other t Source analys augmon	Iuction to HCI and Inter- rios, Navigation design, S ss: The software life cycle n rules: Principles to su hs. Evaluation technique ation, Evaluation through tion method. Evaluation program ving users: Participant of ting data, Qualitative and iews, Questionnaires, Inse modal interaction, design techniques, Task decompo- es of information and data is, Rich contexts, Low ented realities: Ubiquita- nation and data visualiza	Screen design and layou e, Usability engineering, pport usability, Standar es: What is evaluation a expert analysis, Eva baradigms and technique observation, ethnography alysis, Feeding the findi- spections, walkthroughs ing for diversity. Task position, Knowledge-base a collection, Uses of task intention and sensor cous computing applic	it, Iterative rds, Guid n? What luation it s, The D 7, Data c ings back <b>Univer</b> <b>analysi</b> ed technic analysis -based i ations re	on and e desig lelines, , why, through E C I ollection c into c into c seal do s: Diff ques, E S. Mod nteract esearch	prototy n and pro- Golde and v D E fra on, and design. U ferences Entity-re eling ri ion. U n, virtu	yping. rototyp n rules vhen to partici mewor Analy: <b>Askin</b> Univers betwe elations <b>ch inte</b> <b>biquito</b> al and	HCI in ing, De and he o evalu pation, k to gui zing, in g users sal desi even task hip-base eraction pus con l augm	the software sign rationale. euristics, HCI ate, Goals of Choosing an de evaluation. terpreting and <b>and experts</b> : gn principles, analysis and ed techniques, st Status-event <b>mputing and</b> ented reality,

hypertext, Finding things, Web technology and issues, Static web content, Dynamic web content

# SKILL MAPPING

No.	Course Learning Outcome			PI	ROG	RAM	1 O L	JTC	OM	ES	(PO)		
INO.	Course Learning Outcome	1	2	3	4	5	6	7	8	9	10	11	12
CO1	Understand and applying the fundamentals of HCI and Interaction design.	Н											
CO2	Analyse the focused users and system requirements, and to design different kind of UIs and Interaction systems for building intuitive usable software solutions.		М	Н									
CO3	Apply (design) evaluation methods for assuring the enhanced usability including effectiveness, efficiency and satisfaction				Н								
CO4	Develop the communication skill by presenting topics on HCI.										L		

(H – High, M- Medium, L-low)

JUSTIFICATION FOR CO-PO MAPPING

0001111011		
Mapping	Level	Justifications
CO1-PO1	High	Acquire a good level of knowledge regarding HCI, especially on interaction design and evaluation through the fundamental concept of HCI like interaction design, design process, design principles, universal design, rich interaction, etc.
CO2-PO2, PO3	Medium, High	Understand how to profile the focused users and reveal the user requirements from usability perspective; as well as the interaction design techniques, rules, and principles for design the software systems including the ubiquitous computing, augmented realities and rich interfaces, by acquiring the knowledge regarding the ability to understand user-profile and design any usable information systems.
CO3-PO3	High	Conduct an in-depth usability/ design evaluation to (re)design any information system in order to assure the enhanced usability and user-experience by having a good level of familiarity with different evaluation methodologies.
CO5-PO10	Low	Develop communication skills through participating in presentation.

# TEACHING LEARNING STRATEGY

Teaching and Learning Activities	Engagement (hours)
Face-to-Face Learning	
Lecture	42
Practical / Tutorial / Studio	-
Student-Centred Learning	-
Self-Directed Learning	
Non-face-to-face learning	42
Revision	21
Assessment Preparations	21
Formal Assessment	
Continuous Assessment	2
Final Examination	3
Total	131
TEACHING METHODOLOGY	
Lacture and Discussion, Co. operative and Collaborative Method, Problem Resed Method	24

Lecture and Discussion, Co-operative and Collaborative Method, Problem Based Method

OURSE S	CHEDULE		
Week	Lecture	Topics	Assessment Methods
	1	Introduction to HCI and Interaction design: HCI,	
1		Interaction design, The process of design	
1	2	User focus, Scenarios, Navigation design	
	3	Screen design and layout, Iteration and prototyping.	
	4	HCI in the software process: The software life cycle,	Class Test 1
2	5	Usability engineering	
	6	Iterative design and prototyping, Design rationale.	
	7	Design rules: Principles to support usability, Standards	
3	8	Guidelines, Golden rules and heuristics	
	9	HCI patterns	
	10	Evaluation techniques: What is evaluation? What, why,	
		and when to evaluate, Goals of evaluation	
4	11	Evaluation through expert analysis	
	12	Evaluation through user participation, Choosing an	
	10	evaluation method.	
_	13	Evaluation paradigms and techniques,	~ ~ ~
5	14	The D E C I D E framework to guide evaluation.	Class Test 2
	15	The D E C I D E framework to guide evaluation. (Contd.)	
	16	Observing users: Participant observation, ethnography,	
		Data collection	
6	17	Analyzing, interpreting and presenting data	
	18	Qualitative analysis, Feeding the findings back into	
	10	design	
_	19	Asking users and experts: Interviews	
7	20	Asking users and experts: Questionnaires,	
	21	Asking users and experts: Inspections	
0	22	Asking users and experts: Inspections (Contd.)	
8	23	Asking users and experts: walkthroughs.	
	24	Asking users and experts: walkthroughs (Contd.)	
0	25	Universal design: Universal design principles	Mid Term Exam
9	26	Multi-modal interaction	
	27	Designing for diversity	
	28	Task analysis: Differences between task analysis and	
	29	other techniques, Task decomposition Knowledge-based techniques, Entity-relationship-based	
10	29		
	30	techniques Sources of information and data collection, Uses of task	
	50	analysis.	
	31	Modeling rich interaction: Status-event analysis, Rich	
	51	contexts	
11	32	Low intention and sensor	
	33	Low intention and sensor (Contd.)	
	34	Ubiquitous computing and augmented realities:	
		Ubiquitous computing applications research.	
12	35	virtual and augmented reality	
	36	Information and data visualization	Class Test 3
	37	Hypertext, multimedia and the world wide web:	
		Understanding hypertext,	
13	38	Understanding hypertext(Contd.)	
	39	Finding things	
	40	Web technology and issues	
14	41	Static web content	
14	41		

Comr	ponents	Grading	СО	Blooms Taxonomy
Continuous	Test 1-2	20%	CO1 CO2	C1-C3 C4, C6
Assessmen t (40%)	Class Participation	5%	CO4	A2
	Mid term	15%	CO2	C4, C6
Final	Exam	60%	C01 C03	C1-C3 C4
Total	Marks	100%		·

## (CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

## **REFERENCE BOOKS**

1. Julie A. Jacko (Ed.). (2012). Human-Computer Interaction Handbook (3rd Edition). CRC Press. ISBN 1-43 2. Alan Dix, Janet Finlay, Gregory Abowd, and Russell Beale (2003): Human–Computer Interaction. 3rd Edit Prentice Hall, 2003. http://hcibook.com/e3/ ISBN 0-13- 046109-1

3. Yvonne Rogers, Helen Sharp, Jenny Preece (2019): Interaction Design: Beyond Human Computer Interacti Edition), John Wiley & Sons.

4. Schneiderman B. and Plaisant, C.: Designing the User Interface (5th Edition), Addison-Wesley. Jonathan Lazar, Jinjuan Heidi Feng, & Harry Hochheiser Research Methods in Human-Computer Interaction, Wiley, 2010. ISBN 0-470-72337-8, 978-0-470-72337-1

#### **REFERENCE SITE**

## **CSE-429:** Computer Security

COURSE INFO	ORMATION		
Course Code	: CSE-429	Lecture Contact Hours	: 3.00
Course Title	: Computer Security	Credit Hours	: 3.00
PRE-REQUISI	ТЕ		
Course Code: N	il		
Course Title: Ni	1		
CURRICULUN	A STRUCTURE		

Outcome Based Education (OBE)

#### RATIONALE

The Computer Security course is designed to provide a comprehensive understanding to the modern security system in computer science. The course begins with the history and development of security. Then it deals with various security models, cryptography, security attacks and the fundamental security objectives. This course also motivates to gather brief review of computer crimes and causes, internet, strategies, crime prevention, etc.

#### **OBJECTIVE**

1. To understand the development of security, traditional encryption, security attacks and the fundamental security objectives.

2. To determine and analyse the security objectives, attacks, and models, so is able to recognize the security requirements in real-life cases.

LEAR	RNING OUTCOMES & GENERIC SKILLS					
No.	Course Learning Outcome (Upon completion of the course, the students will be able to)	Bloom's Taxonomy	СР	CA	KP	Assessment Methods
CO1	Understand the development of security, traditional encryption, security attacks and the fundamental security objectives	C2	1		3	T, F
CO2	Evaluate the security objectives, attacks, and models, so is able to recognize the security requirements in real-life cases	C5	2		5	M, T, F
CO3	Analyze the design and implementation issues of a real-life security solution.	C4	1		3	T, F
CO4	Able to develop the communication skill by presenting topics on operating systems	A2		1	5	Q, Pr

(CP- Complex Problems, CA-Complex Activities, KP-Knowledge Profile,T – Test; PR – Project; Q – Quiz; ASG – Assignment; Pr – Presentation; R - Report; F – Final Exam, MT- Mid Term Exam)

## **COURSE CONTENT**

Security : The Security Environment, Threats, Attackers; Operating Systems Security : Secure Systems, Trusted Computing Base; Controlling Access to Resources: Protection Domains, Access Control Lists, Capabilities; Formal Models of Secure Systems: Multilevel Security, Covert Channels; Cryptography: Overview, Symmetric cipher, Classical encryption technique, Block cipher and the data encryption standard (DES), Triple DES, Introduction to finite fields, Advanced Encryption Standard, Contemporary Symmetric Ciphers, confidentiality using symmetric encryption public, Key encryption and Hash functions, Public-key Cryptography, RSA algorithm, Key management, Diffie-Hellman key exchange, Other Public Key Cryptosystem, Message Authentication and Hash function, Hash Algorithm, Digital Signatures, Trusted Platform Modules; Authentication: Authentication using a physical object, Authentication using biometrics; Exploiting Software: Buffer Overflow Attacks, Format String Attacks, Dangling Pointers, Null Pointer Dereference Attacks, Integer Overflow Attacks, Command Injection Attacks, Time of Check to Time of Use Attacks; Insider Attacks: Logic Bombs, Back Doors, Login Spoofing ; Malware: Trojan Horses, Viruses, Worms, Spyware, Rootkits; Defences: Firewalls, Antivirus and Anti-Antivirus Techniques, Code Signing, Jailing, Model-Based Intrusion Detection, Encapsulating Mobile Code, Java Security; Network Security: Network Security practice, Authentication application, Wireless Network Security, Electrical Mail security, IP security and Web security; Research on Security and Case Study.

## SKILL MAPPING

No.	Course Learning Outcome	PROGRAM OUTCOMES (PO)											
INO.		1	2	3	4	5	6	7	8	9	10	11	12
CO1	Understand the development of security, traditional encryption, security attacks and the fundamental security objectives	Н											
CO2	Determine the security objectives, attacks, and models, so is able to recognize the security requirements in real-life cases		Н										
CO3	Analyze the design and implementation issues of a real-life security solution.			Н									
CO4	Able to develop the communication skill by presenting topics on operating systems.										L		

(H – High, M- Medium, L-low)

JUSTIFICAT	TION FOR C	O-PO MAPPING	
Mapping	Level	Justifications	
CO1-PO1	High	Increase breadth & depth of knowledge throu development of security, traditional encryption, se fundamental security objectives.	ecurity attacks and the
CO2-PO2	High	Understand and solve various complex problems objectives, attacks, and models.	
CO3-PO3	High	Understand and implement the design issues of rea which have previously been identified and coded.	al-life security solutions
CO4-PO10	Low	Develop communication skills through participating in	quiz, presentation etc.
TEACHING	LEARNING	STRATEGY	
Teaching and	Learning Act	ivities	Engagement (hours)
Face-to-Face I			6.6
Lectu	-		42
Pract	ical / Tutorial	/ Studio	-
	ent-Centred L	earning	-
Self-Directed			
	face-to-face l	earning	42
Revis			21
	ssment Prepar	rations	21
Formal Assess			
	inuous Assess		2
Total	Examination		3 131
			151
TEACHING	METHODO	LOGY	
Lecture and D	iscussion, Co	-operative and Collaborative Method, Problem Based M	lethod
		-	
COURSE SC	HEDULE		
COURSE SC Week	HEDULE Lecture	Topics	Assessment Methods
	Lec 1	The Security Environment,	Assessment Methods
Week	Lec 1 Lec 2	The Security Environment, Threats, Attackers	Assessment Methods
Week 1	Lec 1 Lec 2 Lec 3	The Security Environment, Threats, Attackers Secure Systems, Trusted Computing Base	Assessment Methods
Week	Lecture Lec 1 Lec 2 Lec 3 Lec 4	The Security Environment, Threats, Attackers Secure Systems, Trusted Computing Base Protection Domains, Access Control Lists	Assessment Methods
Week 1	Lec 1 Lec 2 Lec 3 Lec 4 Lec 5	The Security Environment, Threats, Attackers Secure Systems, Trusted Computing Base Protection Domains, Access Control Lists Capabilities	Assessment Methods
Week           1           2	Lec 1 Lec 2 Lec 3 Lec 4 Lec 5 Lec 6	The Security Environment, Threats, Attackers Secure Systems, Trusted Computing Base Protection Domains, Access Control Lists Capabilities Multilevel Security, Covert Channels	
Week 1	Lecture           Lec 1           Lec 2           Lec 3           Lec 4           Lec 5           Lec 6           Lec 7	The Security Environment, Threats, Attackers Secure Systems, Trusted Computing Base Protection Domains, Access Control Lists Capabilities Multilevel Security, Covert Channels Introduction to cipher	Assessment Methods Class Test 1
Week           1           2	Lecture           Lec 1           Lec 2           Lec 3           Lec 4           Lec 5           Lec 6           Lec 7           Lec 8	The Security Environment,Threats, AttackersSecure Systems, Trusted Computing BaseProtection Domains, Access Control ListsCapabilitiesMultilevel Security, Covert ChannelsIntroduction to cipherSymmetric cipher	
Week           1           2           3	Lecture           Lec 1           Lec 2           Lec 3           Lec 4           Lec 5           Lec 6           Lec 7           Lec 8           Lec 9	The Security Environment, Threats, Attackers Secure Systems, Trusted Computing BaseProtection Domains, Access Control Lists Capabilities Multilevel Security, Covert ChannelsIntroduction to cipher Symmetric cipher Classical encryption technique	
Week           1           2	Lecture           Lec 1           Lec 2           Lec 3           Lec 4           Lec 5           Lec 6           Lec 7           Lec 8           Lec 9           Lec 10	The Security Environment, Threats, Attackers Secure Systems, Trusted Computing BaseProtection Domains, Access Control Lists Capabilities Multilevel Security, Covert ChannelsIntroduction to cipher Symmetric cipher Classical encryption techniqueBlock cipher	
Week           1           2           3	Lecture           Lec 1           Lec 2           Lec 3           Lec 4           Lec 5           Lec 6           Lec 7           Lec 8           Lec 9           Lec 10           Lec 11	The Security Environment, Threats, Attackers Secure Systems, Trusted Computing BaseProtection Domains, Access Control Lists Capabilities Multilevel Security, Covert ChannelsIntroduction to cipher Symmetric cipher Classical encryption techniqueBlock cipher Data Encryption Standard (DES)	
Week           1           2           3           4	Lecture           Lec 1           Lec 2           Lec 3           Lec 4           Lec 5           Lec 6           Lec 7           Lec 8           Lec 10           Lec 11           Lec 12	The Security Environment, Threats, Attackers Secure Systems, Trusted Computing Base Protection Domains, Access Control Lists Capabilities Multilevel Security, Covert Channels Introduction to cipher Symmetric cipher Classical encryption technique Block cipher Data Encryption Standard (DES) Triple DES	
Week           1           2           3	Lecture           Lec 1           Lec 2           Lec 3           Lec 4           Lec 5           Lec 6           Lec 7           Lec 8           Lec 9           Lec 11           Lec 12           Lec 13	The Security Environment, Threats, Attackers Secure Systems, Trusted Computing BaseProtection Domains, Access Control Lists Capabilities Multilevel Security, Covert ChannelsIntroduction to cipher Symmetric cipher Classical encryption techniqueBlock cipher Data Encryption Standard (DES) Triple DESIntroduction to finite fields	
Week           1           2           3           4	Lecture           Lec 1           Lec 2           Lec 3           Lec 4           Lec 5           Lec 6           Lec 7           Lec 8           Lec 9           Lec 10           Lec 12           Lec 13           Lec 14	The Security Environment,Threats, AttackersSecure Systems, Trusted Computing BaseProtection Domains, Access Control ListsCapabilitiesMultilevel Security, Covert ChannelsIntroduction to cipherSymmetric cipherClassical encryption techniqueBlock cipherData Encryption Standard (DES)Triple DESIntroduction to finite fieldsAdvanced Encryption Standard	Class Test 1
Week           1           2           3           4	Lecture           Lec 1           Lec 2           Lec 3           Lec 4           Lec 5           Lec 6           Lec 7           Lec 8           Lec 9           Lec 11           Lec 12           Lec 13	The Security Environment,Threats, AttackersSecure Systems, Trusted Computing BaseProtection Domains, Access Control ListsCapabilitiesMultilevel Security, Covert ChannelsIntroduction to cipherSymmetric cipherClassical encryption techniqueBlock cipherData Encryption Standard (DES)Triple DESIntroduction to finite fieldsAdvanced Encryption StandardContemporary Symmetric Ciphers	
Week           1           2           3           4           5	Lecture           Lec 1           Lec 2           Lec 3           Lec 4           Lec 5           Lec 6           Lec 7           Lec 8           Lec 9           Lec 11           Lec 12           Lec 13           Lec 14           Lec 15	The Security Environment,Threats, AttackersSecure Systems, Trusted Computing BaseProtection Domains, Access Control ListsCapabilitiesMultilevel Security, Covert ChannelsIntroduction to cipherSymmetric cipherClassical encryption techniqueBlock cipherData Encryption Standard (DES)Triple DESIntroduction to finite fieldsAdvanced Encryption Standard	Class Test 1
Week           1           2           3           4           5	Lecture           Lec 1           Lec 2           Lec 3           Lec 4           Lec 5           Lec 6           Lec 7           Lec 8           Lec 9           Lec 11           Lec 12           Lec 13           Lec 15           Lec 16	The Security Environment,Threats, AttackersSecure Systems, Trusted Computing BaseProtection Domains, Access Control ListsCapabilitiesMultilevel Security, Covert ChannelsIntroduction to cipherSymmetric cipherClassical encryption techniqueBlock cipherData Encryption Standard (DES)Triple DESIntroduction to finite fieldsAdvanced Encryption StandardContemporary Symmetric CiphersSymmetric Encryption	Class Test 1
Week           1           2           3           4           5	Lecture           Lec 1           Lec 2           Lec 3           Lec 4           Lec 5           Lec 6           Lec 7           Lec 8           Lec 9           Lec 10           Lec 12           Lec 13           Lec 15           Lec 16           Lec 17           Lec 18           Lec 19	The Security Environment, Threats, Attackers Secure Systems, Trusted Computing BaseProtection Domains, Access Control Lists Capabilities Multilevel Security, Covert ChannelsIntroduction to cipher Symmetric cipher Classical encryption techniqueBlock cipher Data Encryption Standard (DES) Triple DESIntroduction to finite fields Advanced Encryption Standard Contemporary Symmetric CiphersSymmetric Encryption Key Encryption	Class Test 1
Week           1           2           3           4           5           6	Lecture           Lec 1           Lec 2           Lec 3           Lec 4           Lec 5           Lec 6           Lec 7           Lec 8           Lec 9           Lec 10           Lec 12           Lec 13           Lec 14           Lec 15           Lec 16           Lec 17           Lec 18           Lec 19           Lec 20	The Security Environment, Threats, Attackers Secure Systems, Trusted Computing BaseProtection Domains, Access Control Lists Capabilities Multilevel Security, Covert ChannelsIntroduction to cipher Symmetric cipher Classical encryption techniqueBlock cipher Data Encryption Standard (DES) Triple DESIntroduction to finite fields Advanced Encryption Standard Contemporary Symmetric CiphersSymmetric Encryption Key Encryption Hash FunctionsPublic-key Cryptography RSA Algorithm	Class Test 1
Week           1           2           3           4           5           6           7	Lecture           Lec 1           Lec 2           Lec 3           Lec 4           Lec 5           Lec 6           Lec 7           Lec 8           Lec 9           Lec 10           Lec 12           Lec 13           Lec 15           Lec 16           Lec 17           Lec 18           Lec 2	The Security Environment,Threats, AttackersSecure Systems, Trusted Computing BaseProtection Domains, Access Control ListsCapabilitiesMultilevel Security, Covert ChannelsIntroduction to cipherSymmetric cipherClassical encryption techniqueBlock cipherData Encryption Standard (DES)Triple DESIntroduction to finite fieldsAdvanced Encryption StandardContemporary Symmetric CiphersSymmetric EncryptionKey EncryptionHash FunctionsPublic-key CryptographyRSA AlgorithmKey Management	Class Test 1
Week           1           2           3           4           5           6	Lecture           Lec 1           Lec 2           Lec 3           Lec 4           Lec 5           Lec 6           Lec 7           Lec 8           Lec 9           Lec 10           Lec 12           Lec 13           Lec 14           Lec 15           Lec 16           Lec 19           Lec 20           Lec 21	The Security Environment, Threats, Attackers Secure Systems, Trusted Computing BaseProtection Domains, Access Control Lists Capabilities Multilevel Security, Covert ChannelsIntroduction to cipher Symmetric cipher Classical encryption techniqueBlock cipher Data Encryption Standard (DES) Triple DESIntroduction to finite fields Advanced Encryption Standard Contemporary Symmetric CiphersSymmetric Encryption Hash FunctionsPublic-key Cryptography RSA Algorithm Key ManagementDiffie-Hellman key exchange	Class Test 1
Week           1           2           3           4           5           6           7	Lecture           Lec 1           Lec 2           Lec 3           Lec 4           Lec 5           Lec 6           Lec 7           Lec 8           Lec 9           Lec 10           Lec 12           Lec 13           Lec 14           Lec 15           Lec 16           Lec 20           Lec 21	The Security Environment,Threats, AttackersSecure Systems, Trusted Computing BaseProtection Domains, Access Control ListsCapabilitiesMultilevel Security, Covert ChannelsIntroduction to cipherSymmetric cipherClassical encryption techniqueBlock cipherData Encryption Standard (DES)Triple DESIntroduction to finite fieldsAdvanced Encryption StandardContemporary Symmetric CiphersSymmetric EncryptionKey EncryptionHash FunctionsPublic-key CryptographyRSA AlgorithmKey ManagementDiffie-Hellman key exchangePublic Key Cryptosystem	Class Test 1
Week           1           2           3           4           5           6           7           8	Lecture           Lec 1           Lec 2           Lec 3           Lec 4           Lec 5           Lec 6           Lec 7           Lec 8           Lec 9           Lec 10           Lec 12           Lec 13           Lec 15           Lec 16           Lec 17           Lec 20           Lec 21           Lec 20           Lec 21	The Security Environment, Threats, Attackers Secure Systems, Trusted Computing BaseProtection Domains, Access Control Lists Capabilities Multilevel Security, Covert ChannelsIntroduction to cipher Symmetric cipher Classical encryption techniqueBlock cipher Data Encryption Standard (DES) Triple DESIntroduction to finite fields Advanced Encryption Standard Contemporary Symmetric CiphersSymmetric Encryption Key Encryption Hash FunctionsPublic-key Cryptography RSA Algorithm Key ManagementDiffie-Hellman key exchange Public Key Cryptosystem Message Authentication and Hash function	Class Test 1
Week           1           2           3           4           5           6           7	Lecture           Lec 1           Lec 2           Lec 3           Lec 4           Lec 5           Lec 6           Lec 7           Lec 8           Lec 9           Lec 10           Lec 12           Lec 13           Lec 14           Lec 15           Lec 16           Lec 19           Lec 20           Lec 21           Lec 22           Lec 23           Lec 24	The Security Environment, Threats, Attackers Secure Systems, Trusted Computing BaseProtection Domains, Access Control Lists Capabilities Multilevel Security, Covert ChannelsIntroduction to cipher Symmetric cipher Classical encryption techniqueBlock cipher Data Encryption Standard (DES) Triple DESIntroduction to finite fields Advanced Encryption Standard Contemporary Symmetric CiphersSymmetric Encryption Key Encryption Hash FunctionsPublic-key Cryptography RSA Algorithm Key Cryptosystem Message Authentication and Hash functionHash Algorithm	Class Test 1
Week           1           2           3           4           5           6           7           8	Lecture           Lec 1           Lec 2           Lec 3           Lec 4           Lec 5           Lec 6           Lec 7           Lec 8           Lec 9           Lec 10           Lec 12           Lec 13           Lec 15           Lec 16           Lec 17           Lec 20           Lec 21           Lec 20           Lec 21	The Security Environment, Threats, Attackers Secure Systems, Trusted Computing BaseProtection Domains, Access Control Lists Capabilities Multilevel Security, Covert ChannelsIntroduction to cipher Symmetric cipher Classical encryption techniqueBlock cipher Data Encryption Standard (DES) Triple DESIntroduction to finite fields Advanced Encryption Standard Contemporary Symmetric CiphersSymmetric Encryption Key Encryption Hash FunctionsPublic-key Cryptography RSA Algorithm Key ManagementDiffie-Hellman key exchange Public Key Cryptosystem Message Authentication and Hash function	Class Test 1

10	Lec 31 Lec 32 Lec 33	Authentication using a physical object Authentication using biometrics Buffer Overflow Attacks	
11	Lec 28	Format String Attacks Dangling Pointers, Null	
	Lec 29	Pointer Dereference Attacks Integer Overflow	
	Lec 30	Attacks, Command Injection Attacks Time of Check to Time of Use Attacks	
12	Lec 34	Logic Bombs, Back Doors, Login Spoofing	
	Lec 35	Trojan Horses, Viruses, Worms, Spyware,	
	Lec 36	Rootkits Firewalls, Antivirus and Anti-Antivirus	
		Techniques	
<b>13</b> Lec 37		Code Signing, Jailing, Model-Based Intrusion	Class Test 3
	Lec 38	Detection, Encapsulating Mobile Code, Java	Class Test 5
	Lec 39	Security Network Security practice,	
		Authentication application	
14	Lec 40	Wireless Network Security, Electrical Mail	
	Lec 41	security, IP security and Web security, Research	
	Lec 42	on Security and Case Study	

Com	oonents	Grading	СО	Blooms Taxonomy
1			CO 1	C2
Continuous	Test 1-3	20%	CO 2	C5
Continuous Assessment			CO 3	C4
(40%)	Class Participation	5%	CO4	A2
	Mid term	15%	CO 2	C5
			CO 1	C2
Final	Exam	60%	CO 2	C5
			CO 3	C4
Total	Marks	100%		•

(CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

## **REFERENCE BOOKS**

Cryptography and Network Security - William Stallings
 Cryptography and Network Security- Behrouz A. Forouzan

## **REFERENCE SITE**

# CSE-464: Software Development Project-II

COU	RSE INFORMATION												
	e Code : CSE-464	r				ture			Hou		: 3.0		
Course		L			Cre	dit H	ours				: 1.5	)	
	REQUISITE e Code: CSE-364												
	e Code: CSE-364 e Title: Software Development Project-I												
	RICULUM STRUCTURE												
Outco	me Based Education (OBE)												
RATI	ONALE												
To be	able to solve advanced level industry problem	ns ar	nd de	velop	o real	l time	e Mo	bile	e app	licati	on/sı	nart	
applic	ation professionally.												
OBJE	CTIVE												
	o give idea about android programming.												
	o prepare students for the advanced level wor o design real time projects.	ks o	f indu	istry	•								
	o design real time projects. o increase practical knowledge to identi	fy t	he r	elati	ve r	nerit	s of	di	ffere	ent p	rojec	t des	signs.
	rogramming constructs and data structures.									r	5		<u> </u>
LEAF	RNING OUTCOMES & GENERIC SKILI	LS											
Ne	Course Learning Outcome		-1-1	E	Bloon	n's	CF		CA	KP	A	Assess	ment
No.	(Upon completion of the course, the students with to)	II be	able	Тε	axono	omy	CF		_A	KP		Meth	ods
	Learn the fundamentals of programming												
CO1	real time projects and to increase the	deptl	h of	C	C1,C2,A2				1.2	1		Q,Viva	
	knowledge in programming. Demonstrate the skill to develop and	desig	m a		C2-								
CO2	professional android app using Android			C	4,C6				1-4	5,6,	7 I	PR,Q,	Viva
	development tools.			_	P6,P	7							
CO3	Demonstrate the ability to deploy softw mobile devices and debug programs runni	are 1	t0 m	C	4-C5	P6			_	6,7	1	PR,Q,	Viva
005	mobile devices and debug programs runn mobile devices.	ing 0	11		- CJ	,10				0,7		ι <b>κ</b> , γ,	viva
			7	1 1	D	C'1 /	т <b>л</b>	<b>.</b> .	DD		•	0	
	Complex Problems, CA-Complex Activities, ASG – Assignment; Pr – Presentation; R - R											;Q-	
Quiz,		opon	, 1	1 1114	1 12/1	, 1		, inc		in Ex	uiii)		
COU	RSE CONTENT												
Labora	atory works based on current industry require	emen	t of a	dvar	ced	level	prog	ran	nmin	g lan	guag	e.	_
	L MAPPING						1 0						
				P	ROG	RAN	<u>1 OI</u>	ITC	'OM	ES (F	20)		
No.	Course Learning Outcome	1	2	3	4	5	6	7	8	9	10	11	12
	Learn the fundamentals of programming												
CO1	to design real time projects and to	Н											
	increase the depth of knowledge in programming.												
	Demonstrate the skill to develop and												
CO2				Η					Н		Η		
	Android software development tools.Demonstrate the ability to deploy												
CO3						Н					Н		Н
	programs running on mobile devices.										_		
/m			_	_			_	_	_		_		
(H – F	ligh, M- Medium, L-low)												

JUSTIFICATION FOR CO-PO MAPPING											
Mapping	Level	Justifications									
CO1-PO1HighAble to learn the basics of Android programming to develop simple applications that can run on Android phones and tablets.											
CO2-PO3	Able to design and develop a complete real time project to solve the problem										
CO2-PO8	High	Must keep in mind the ethical values while designing an android app.									
CO2-PO10	High	Able to do all the individual and group work properly by communicating with the respected persons.									
CO3-PO5	High	Able to change the design of the app depending on the user requirement or to fix any bug by using appropriate of the tool									
CO3-PO10	High	Able to develop communication skills through group work and viva.									
CO3-PO12	High	Able to use the developed app in real life and use the knowledge later in their professional life.									

# (H – High, M- Medium, L-low)

TEACHING LEARNING STRATEGY	
Teaching and Learning Activities	Engagement (hours)
Face-to-Face Learning	
Lecture	-
Practical / Tutorial / Studio	21
Student-Centred Learning	-
Self-Directed Learning	
Preparation of project	21
Assessment Preparations	04
Formal Assessment	
Continuous Assessment	06
Total	52

## **TEACHING METHODOLOGY**

Lecture and Discussion, Co-operative and Collaborative Method, Problem Based Method

## COURSE SCHEDULE

Lecture	- • <b>F</b>						
Lab 1	Course overview, Introduction to Design & Development of Mobile apps, Studying a Domain, Techniques for designing mobile apps, Paper and Interactive Prototyping, Usability Testing, Identifying Themes and Market Gaps						
Lab 2	Getting Started on Android OS, Android Installation, Introduction with UI, life cycle, simple components, xml, Toast, Components input controls and events						
Lab 3	Layout Design (Activity Changing, Layouts- Relative, Constrained, GridView, ListView, Adapter)						
Lab 4	Fragment, Frame, Navigation Drawer, Service						
Lab 5	Update 1						
Lab 6	Cloud Based MySQL Database - Firebase Authentication, Firebase Database						
Lab 7	Cloud Based MySQL Database - Firebase Storage.						
Lab 8	Update 2						
Lab 9	Sensors- Accelerometer, Proximity, Gyroscope & Guestures						
Lab 10	Android Gaming & Animation						
Lab 11	Google API- MAP & Play Store						

Lab 12	Debugging	
Lab 13	Qualitative Methods: Field and Diary Studies	
Lab 14	Analyzing Data: Case Study, Testing APP Performances	

Cont		Components sessment (100%)	СО	Blooms Taxonomy	
	Class	Performance & Observation	10%	CO1	C1,C2, A2
		Project Proposal (10%)		CO1	C1, C2,A2
Continuous Assessment	Project	Project Final Submission		CO2	C2-C4, C6,A3, P6-P7
(100%) Total Marks	5			CO2	C2-C4, C6,A3, P6-P7
		(40%)		CO3	C4-C5, P6
		Quiz		CO1	C1,C2, A2
	•				

(CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

## **REFERENCE BOOKS**

1. Fundamentals of Software Engineering: Designed to Provide an Insight into the Software Engineering Concepts By Amiya Kumar Rath and Hitesh MOHAPATRA

## **REFERENCE SITE**

## **CSE-4XO: Technical Elective-I**

COURSE INFORMATION											
Course Code	: CSE-4XO	Lecture Contact Hours	: 3.00								
Course Title	: Technical Elective-I	Credit Hours	: 3.00								

*Details of all Technical Elective subjects are given later.

## **GEEM-433: Engineering Ethics and Moral Philosophy**

Course												
Course		Lecture Co Credit Hou		lours	: 2. : 2.							
PRE-I	REQUISITE											
	e Code: Nil e Title: Nil											
CURF	CURRICULUM STRUCTURE											
Outcome Based Education (OBE)												
RATIONALE												
adherence to the highest principles of ethical conduct and manage the resources and decisions effectively. Part of professional ethics is the understanding of the ethics of other professions: how they interact and what can be expected from them as correct ethical behavior. It elevates the profession and raises future standards and imprints on individual moral mindsets and behaviors.												
OBJE	CTIVE											
2. To g critic 3. To ic	develop a firm ethical base. gain the ability to continue professional development with cally assess the codes of professional conduct for compu- identify and analyze practical legal problems commonly <b>RNING OUTCOMES &amp; GENERIC SKILLS</b>	ter profession	nals.		•							
LEAK												
No.	Course Learning Outcome (Upon completion of the course, the students will be able to)	Bloom's Taxonomy	СР	CA	KP	Assessment Methods						
CO1	Understand the theoretical aspects of ethics and moral philosophy in professional fields.	C1-C2	1		1	T, F						
CO2	Identify practical and legal problems commonly encountered by engineers in their professional industry.	C3	1		7	MT						
CO3	Develop foundation knowledge of ethics to be and apply them to solve engineering problems.	C3-C6	3, 5		3	F						
CO4Develop communication skills by presenting topics on Engineering Ethics and Moral Philosophy.A21Pr												
	Complex Problems, CA-Complex Activities, KP-Knowle	edge Profile,	Г-Test;	PR –	Projec	et; ASG –						

Engineering Ethics: **Introduction to Ethics**; Theories of Ethics; **Principles of Engineering Ethics**; Ethical expectation: Employers and employees, Inter-professional relationship, **Standards and codes**: Fundamental Canons, NSPE codes, IEEE codes of conduct, ACM codes; Institutionalization of ethical conduct. Ethical Dilemmas, Choices (Whistle Blowing), **Computer Ethics**: Computer Crime and Cyber Security, Privacy and Confidentiality issue in CSE, Legal Framework in CSE-Copyright laws, ICT Act, Right To Information (RTI), Patents, and Royalty etc. Ethical Challenges for CSE Engineers with the advancement of Technology; **Case studies** related to ethical issues in ICT and other Engineering disciplines. Introduction to **Philosophy of Engineering**, metaphysics, epistemology, axiology, and logic.

#### SKILL MAPPING

Ne	No.	Course Learning Outcome		PROGRAM OUTCOMES (PO)										
	INO.			2	3	4	5	6	7	8	9	10	11	12
	CO1	Understand the theoretical aspects of ethics and moral philosophy in	М											

	profession	al fields													
	Identify practical and legal problems														
CO2	commonly encountered by engineers in H												1		
	their profe														
			on knowledge of ethics							М					
CO3															
	engineering problems.													-	
001			nmunication skill by									т			
CO4			on Engineering Ethics									L			
	and Moral Philosophy.														
(H – Hig	gh, M- Meo	tium I	low)												
	-		CO-PO MAPPING												
					T	· C	<i>.</i> •								
Mappi	ing I	Level	The demote red the errot in all a				tions		.11	.:1	1	·			
CO1-P	O1 M	edium	Understand theoretical a fields.	spects (	or et	nics	and	mora	ai pi	niloso	opny	in pi	ores	siona	
<b>C C C</b> =			Analyze & identify pra	ctical a	nd le	egal	proh	lem	s co	mmo	nlv	encoi	inter	ed by	
CO2-P	02	High	engineers in their profess				r - 50		20		- 5				
CO2 P			Build foundation know				s to	be	and	d ap	apply them to solv				
CO3-P	'08 M	edium	engineering problems.	0						1	17				
CO4-P	O10	Low	Develop communication	skills tl	nrou	gh pa	artici	patiı	ng ir	n pres	senta	tion e	etc.		
TEACH	IING LEA	RNING	STRATEGY												
Teachin	g and Lear	ning Act	ivities		_			_	_	E	ngag	gemer	nt (ho	ours)	
	Face Learn														
Lecture									28						
	Practical										-				
Student-Centred Learning									-						
Self-Dir	ected Lear											•			
	Non-face- Revision	-to-face I	learning								28 14				
	Assessme	nt Dropo	rations									14 14			
Formal	Assessmen		Tations									14			
1 Official 2	Continuo		sment									2			
	Final Exa										3				
Total										89					
	IING ME	ГНОDO	LOGY												
Lecture	and Discus	ssion, Co	o-operative and Collaborat	ive Met	hod,	Prot	olem	Bas	ed N	/lethc	od				
	SE SCHEI		1		,										
Week			ics								Δ	ssessi	nent		
WCCK	Lectur	- Tohro										Meth			
1	Lec 1		oduction to Ethics												
	Lec 2		ciples of Engineering Ethio												
2	Lec 4Obligation of an Engineer to Clients3Lec 5Professional Organization: ACM Standards and Codes							)	C	ass T	est 1				
								_			250 1				
3								3							
	Lec 6		tutionalization of Ethical (	onduct						_					
4															
_	Lec 8			iques						_					
	5 Lec 9 Ethical Problem Solving Techniques										Cl	ass T	'est 2		
5	I eo 10														
	Lec 10	Case	study methodology diffe	rent cas	e etr	dies									
5 6	Lec 11	Case	e study methodology, diffe	rent cas	e stu	dies									
			e study methodology, diffe Act Right To Information				d Ro	oyalt	v						

8	Lec 15	Ethical Dilemmas	
	Lec 16	Choices (Whistle Blowing)	
9	Lec 17	Ethical Challenges for CSE Engineers	
	Lec 18		Mid Term Exam
10	Lec 19	The Rights and Responsibilities of Engineers	
	Lec 20	Safety, Risk and Liability	
11	Lec 21	Computer Crime	
	Lec 22	Cyber Security Privacy	
12	Lec 23	Confidentiality Issue in CSE Legal Framework in CSE	
	Lec 24	Copyright laws	
13	Lec 25	Introduction to Philosophy of Engineering	
	Lec 26	Metaphysics	
14	Lec 27	Epistemology, Axiology and logic	
	Lec 28		

Comp	onents	Grading	CO	Blooms Taxonomy
Continuous	Test 1-3		CO 1	C1-C2
Continuous Assessment (40%)	Class Participation	5%	CO 4	A2
(40%)	Mid term	15%	CO 2	C3
Final Exam		60%	CO 1	C1-C2
		00%	CO 3	C3-C6
Total 1	Marks	100%		

## (CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

## **REFERENCE BOOKS**

Engineering Ethics: Concepts and Cases (4th Edition) - Charles E. Harris
 Engineering Ethics (4th Edition) - Charles B. Fleddermann,
 The Elements Of Moral Philosophy – James Rachels & Stuart Rachels

#### **REFERENCE SITE**

# LEVEL-4 FALL TERM

# CSE-400: Final Year Research & Design Project

COURS	SE INFOI	RMATION													
Course Course		: CSE-400 : Final Year Research & De	sign F	Projec	t		ture dit H	Conta lours	ct Ho	urs	: 6.0 : 3.0				
PRE-R	EQUISIT	Е													
Minimu	m earned	credit: 108													
CURRI	ICULUM	STRUCTURE													
Outcom	e Based E	ducation (OBE)													
RATIO	NALE														
	-	onstration of skills and know	ledge	e achi	eved	l to d	late to	o appl	y and	solv	e real	life p	roble	ms	
		computer technology.													
OBJEC To apply		l knowledge and skills for fu	irthar	rasaa	rch	and	locia	n of c	ompu	tor ci	retom	at pr	facci	onal	
	ring scale.	-	ii tiici	resea	uen		uesig		ompu	ici sy	stem	at pro	10351	onai	
LEARN	NING OU	TCOMES & GENERIC S	KILI	LS											
No.		ourse Learning Outcome npletion of the course, the stud will be able to)	ents	Blo Taxo	oom' onor		СР	CA	K	P	Assessment Meth				
CO1	the proce	ern analysis and design tool ess of designing and valida em and subsystem						1	5			PR	Pr,		
CO2		rofessional, ethical, and so and responsibilities	cial of					2	6		R				
CO3	Identify and validate the impact environmental considerations the sustainability of a system/subsy of a complete project							2	2			R	2		
CO4		effectively in a m	ulti-								Peer Evaluation, Journal				
CO5	Present written oral pres	ugh and									R,	Pr			
		oblems, CA-Complex Activi gnment; Pr – Presentation; I											; Q –		
COURS	SE CONT	ENT													
Previou	s course k	nowledge, Literature review	, Self	-learn	ning,	Inte	rdisc	iplina	ry coc	pera	tion				
SKILL	MAPPIN	G													
No.	Cou	rse Learning Outcome	1		OGR 3	$\frac{AM}{4}$	OUT 5	COM 6	IES (F 7	$\frac{POs}{8}$	9	10	11	12	
CO1	tools in	dern analysis and design the process of designing idating of a system and em			Н	Н	Н								
CO2		professional, ethical, and impacts and						Н		Н					

CO3 CO4	of envir and the	onmental c	e the impact												
	of envir and the	onmental c	-												
			Unsiderations												
CO4		e sustainal	oility of a										Н		
CO4	system/s	ubsystem o	f a complete												
CO4	project														
		tion effectively in a multi-													
		esent design project results													
CO5		through written technical										н			
005	documents and oral presentations														
(H – Hig	h, M- Me	dium, L-low	·)												
			PO MAPPING												
Map	ping	Level				Jus	stific	ation	s						
CO1 – P	03-5	High	Able to use mo	dern too	ols in a	inalys	is an	d des	sign						
CO2 – P	02-3	High	Consider ethica	al, societ	al issu	ies in	desi	gn							
CO3-PO	11	High	Consider envir	onmenta	l impa	acts in	n des	ign							
CO4-PO	3-4	High	Able to work in	n teams											
CO5-PO	11	High	Able to demon reports	strate co	ommu	nicatio	on sl	cills t	hrou	ugh project presentation and					
TEACH	ING LEA	RNING ST	FRATEGY												
Teaching	g and Lear	ning Activit	ies							Engagement (hours)					
	Face Leari	ning													
	Lecture									84					
		/ Tutorial / S								-					
		Centred Lear	ning							-					
	ected Lear														
	Revision	-to-face lear	ning							-					
		ent Preparati	ons							-					
	Assessmen	-	0113												
		us Assessme	ent							2					
	Final Exa									3					
Total										89					
TEACH	ING ME	THODOLC	OGY												
Previous	course kn	lowledge, Li	iterature review,	Self lea	rning,	Inter	disci	plina	ry co	opera	tion				
COURS	E SCHEI	DULE													
Week	-	Topics									rks				
1-2		Relevant data collection and data analysis (I)													
3-4		Relevant data collection and data analysis (II)													
5-6		Relevant data collection and data analysis (III)								6.00	hrs i	n			
7-8		Final update on proposed work (I)									y wee				
9-10		Final update on proposed work (II)Research proposal and report evaluation considering rubrics													
11-12				aluatior	n consi	Iderin	g rul	orics							
13-14		posal Defen													
ACCECC	MENT S	TRATEGY													
HODEOO					00					21000		once	21/		
ASSESS				1	CO			1	E	Blooms Taxonomy					
A99F99	Compone	ents	Grading										5		

(40%)	Project Engagement	20%	CO3	P3, A4,P3,A4
	Final Presentation (Project Presentation + Report)		CO1, CO2, CO3, CO4	C2, C3, C4, A2, A5
Total	Marks	100%		
	•		•	

# (CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

# **REFERENCE BOOKS**

# **REFERENCE SITE**

# **CSE-401: Information System Design and Development**

COU	RSE INFOI	RMATION									
Cours	se Code	: CSE-401	esign and Development Credit Hours								
Cours	se Title	: Information System Design a	and Development	Credit	Hours			: 3.00			
PRE-	REQUISIT	E									
	se Code: Nil										
Cours	Course Title: Nil										
CURI	CURRICULUM STRUCTURE										
Outco	Outcome Based Education (OBE)										
RATI	IONALE										
planni skills;	The Information System Design and Development course motivates to perceive information systems planning, analysis, design and implementation; project management, project scheduling and communication skills; as well as the fundamentals of security, disaster/recovery planning and ethics in system development to solve various real-life problems.										
OBJE	OBJECTIVE										
develo 2. To 3. To	oped. conduct the understand t	ts for developing a comprehens structured analysis and cost/ben he importance of project manag <b>FCOMES &amp; GENERIC SKIL</b>	efit analysis for de ement, security and	velopin	g effec	tive in	format	tion systems.			
No	(Upon c	irse Learning Outcome ompletion of the course, the idents will be able to)	Bloom's Taxonomy	СР	CA	KP		ssessment Methods			
CO1	Understand information environme	d fundamental concepts of n system, information system	C1, C2	1		3		T, F			
CO2	Apply th structured developing industries/	e practical approaches of and cost-benefit analysis for information systems for business organizations.	C2, C3 1 4 5					T, MT			
CO3	project m	nd organize a system using aanagement techniques and vareness regarding ethics and a system.	C4, C6	3	3	5		F			

CO4	Develop the communication skill by presenting topics on information system design and development.	A2		1		Pr
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(CP- Complex Problems, CA-Complex Activities, KP-Knowledge Profile,T – Test ; PR – Project ; Q – Quiz; ASG – Assignment; Pr – Presentation; R - Report; F – Final Exam, MT- Mid Term Exam)

#### **COURSE CONTENT**

System concepts: primary characteristics of a system, importance of system concepts for developing information systems; Information systems environment: elements of a system, information system types and features; The system development lifecycle: phases of SDLC, components of a feasibility study, factors to consider in a candidate system; The role of the system analyst: academic and personal qualification of a system analyst, multifaceted role of a system analyst, the analyst/user interface and behavioural issues; Systems planning and the initial investigation: importance and dimensions of planning, determining user's information requirements and prototyping; Information gathering: categories of information, sources of information and information gathering tools; The tools of structured analysis: data flow diagrams, data dictionary, structured English, decision trees, decision tables and their pros/cons; Cost-benefit analysis: classification of costs and benefits, cost-benefit analysis techniques and its advantages/disadvantages; Project management techniques: project attributes, constraints and stakeholders, project management knowledge areas, project management tools - Gantt charts, network diagrams, critical path analysis and estimating cost; System maintenance: primary activities of a maintenance procedure, reducing maintenance cost; Security, disaster/recovery, and ethics in system development: threats to system security and control measures, disaster/recovery planning, ethics codes and standards of behaviour in system development.

#### SKILL MAPPING

No.	Course Learning Outcome			PI	ROG	RAM	1 OI	JTC	OM	ES (I	PO)		
INO.	Course Learning Outcome	1	2	3	4	5	6	7	8	9	10	11	12
CO1	Understand fundamental concepts of information system, information system environment and primary responsibilities of a system analyst.	Н											
CO2	Apply the practical approaches of structured and cost-benefit analysis for developing information systems for industries/ business organizations.			Н									
CO3	Analyse and organize a system using project management techniques and develop awareness regarding ethics and security of a system.			Н					L			М	
CO4	Develop the communication skill by presenting topics on information system design and development.										L		

#### (H – High, M- Medium, L-low)

JUSTIFICATIO	JUSTIFICATION FOR CO-PO MAPPING									
Mapping	Level	Justifications								
CO1-PO1	High	Identify information types, system environment and roles of a system analyst through an in-depth knowledge of information system fundamentals.								
CO2-PO3	High	Understand how to develop information systems by interpreting different types of business requirements and applying practical approaches of structured and cost-benefit analysis.								
CO3-PO3	High	Acquire knowledge for developing a system according to the user needs and specifications to understand the system organization techniques.								
CO3-PO8	Low	Develop a secured and ethical system through the knowledge of system development ethics and security in engineering practice.								

CO3-PO	11	Medium	Develop a system to formally manage projec following different principles and knowled techniques.	
CO4-PO	10	Low	Develop communication skills through partici	pating presentation.
TEACH	ING LEA	RNING STR	RATEGY	
Teaching	g and Lear	ning Activitie	es	Engagement (hours)
	Face Learn			
	Lecture			42
		Tutorial / St		-
		entred Learn	ing	-
Self-Dire	ected Lear			10
	Non-face- Revision	to-face learn	ing	42 21
		nt Preparation	ng	21 21
Formal 4	Assessmen		115	21
		ıs Assessmen	t	2
	Final Exa			3
Fotal				131
	ING MET	THODOLOG	<u></u>	
Lecture a	and Discus	sion, Co-ope	rative and Collaborative Method, Problem Base	d Method
COURS	E SCHED	ULE		
Week	Lecture		Topics	Assessment
				Methods
	1	System con	*	
1	2		ncepts (Contd.)	
	3		ncepts (Contd.)	
	4		n systems environment	
2	5		n systems environment (Contd.)	Class Test 1
	6		n systems environment (Contd.)	
-	7		n development lifecycle	
3	8		n development lifecycle (Contd.)	
	9		n development lifecycle (Contd.)	
	10		the system analyst	
4	11 12		The system analyst (Contd.)	
			E the system analyst (Contd.)	
5	13 14	Systems pl	anning (Contd.)	Class Test 2
5	14		anning (Contd.)	
	15	Initial inve		
6	10		stigation (Contd.)	
U	18		stigation (Contd.)	
	10	Information	· · · · · · · · · · · · · · · · · · ·	
7	20		n gathering (Contd.)	
-	21		n gathering (Contd.)	
	22		of structured analysis	
8	23		of structured analysis (Contd.)	
	24		of structured analysis (Contd.)	Mid Term Exam
	25		of structured analysis (Contd.)	
9	26		of structured analysis (Contd.)	
	27		of structured analysis (Contd.)	
	28	Cost-benef	ït analysis	
10	29	Cost-benef	it analysis (Contd.)	
	30		it analysis (Contd.)	
	31		it analysis (Contd.)	
11	32	Cost-benef	it analysis (Contd.)	Class Test 3
	33	Cont 1 and	it analysis (Contd.)	

	34	Project management techniques
12	35	Project management techniques (Contd.)
	36	Project management techniques (Contd.)
	37	System maintenance
13	38	System maintenance (Contd.)
	39	System maintenance (Contd.)
	40	Security, disaster/recovery, and ethics in system development
	41	Security, disaster/recovery, and ethics in system development
14		(Contd.)
	42	Security, disaster/recovery, and ethics in system development
		(Contd.)

Comp	Components		СО	Blooms Taxonomy
	Test 1-3	20%	CO1	C1, C2
Continuous	1est 1-5	20%	CO2	C2, C3
Assessment (40%)	Class Participation	5%	CO4	A2
	Mid term	15%	CO2	C2, C3
Final	Final Exam		CO1	C1, C2
Fillal			CO3	C4, C6
Total	Marks	100%		

# (CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

#### **REFERENCE BOOKS**

1. System Analysis and Design (2nd Edition) by Elias M. Awad; Galgotia Publications Pvt. Ltd.

2. System Analysis and Design (2nd Edition) by Raja Raman; Prentice Hall

3. System Analysis and Design Methods (7th Edition) by Jeffery L. Whitten; McGraw Hill

4. System Analysis and Design (9th Edition) by Kendel & Kedel; Pearson

# **REFERENCE SITE**

# **CSE-403: Artificial Intelligence**

COURSE INFO	ORMATION								
Course Code	: CSE-403	Lecture Contact Hours	: 3.00						
Course Title	: Artificial Intelligence	Credit Hours	: 3.00						
PRE-REQUISITE									
Course Code: Nil									
Course Title: Ni	Course Title: Nil								
CURRICULU	M STRUCTURE								
Outcome Based	Education (OBE)								
RATIONALE									
Artificial intelli	gence is the beginning of revo	olution for rational behavior	our of intelligent agents along with						
knowledge perc	knowledge perception, representation, planning, reasoning, learning and understanding ideas to solve real								
life complex situ	life complex situations.								
OBJECTIVE	ORIECTIVE								

#### OBJECTIVE

1. To discuss and distinguish the notions of rational behaviour and intelligent agents.

2. To develop a general appreciation of the goals, subareas, achievements and difficulties of AI.

3. To have knowledge of methods of blind as well as informed search in case of knowledge representation, planning, learning, robotics and other AI areas and ability to practically apply the corresponding techniques.

LEAF	RNING OUTCOMES & GENERIC SKILLS					
No.	Course Learning Outcome (Upon completion of the course, the students will be able to)	Bloom's Taxonomy	СР	CA	KP	Assessment Methods
CO1	Remembering and understanding the notions of rational behaviour, goals, subareas, achievements and difficulties of AI agents.	C1, C2	1		1	Т
CO2	Able to apply problem solving methods (informed, uninformed, local search, adversarial search and CSP) of single or multi agents to solve real life problems.	C2, C6	3		5, 6	T, MT, F
CO3	Able to apply major concepts and approaches of knowledge representation, planning and learning for improving machine intelligence.	C6, P3	2, 7		5, 8	T, MT, F
CO4	Able to develop the communication skill by presenting topics on Artificial Intelligent.	A2		1		Pr

(CP- Complex Problems, CA-Complex Activities, KP-Knowledge Profile, T – Test ; PR – Project ; Q – Quiz; ASG – Assignment; Pr – Presentation; R - Report; F – Final Exam, MT- Mid Term Exam)

# COURSE CONTENT

**Introduction:** Overview of AI and intelligent agents; **Problem Solving:** Review of Uninformed Search Strategies and game playing; Informed search Strategies: A*, Heuristic functions, Memory Bounded Search (IDA*, SMA*), Iterative improvement Search, adversarial search, local search Constraint satisfaction problems; **Knowledge representation:** Review of Propositional logic, first order Logic, **Planning:** Introduction to Planning, Partial Order Planning; **Reasoning:** Bayesian Rule and its use in probabilistic reasoning; **Learning:** Belief Networks and Decision Networks; Learning Decision Trees; Learning General Logical descriptions-Hypothesis. Introduction to Natural Language Processing.

# SKILL MAPPING

No.	Course Learning Outcome			PI	ROG	RAN	101	JTC	OM	ES (I	20)		
INO.		1	2	3	4	5	6	7	8	9	10	11	12
CO1	Remembering and understanding the notions of rational behaviour, goals, subareas, achievements and difficulties of AI agents.	Н											
CO2	Able to apply problem solving methods (informed, uninformed, local search, adversarial search and CSP) of single or multi agents to solve real life problems.			Н									
CO3	Able to apply major concepts and approaches of knowledge representation, planning and learning for improving machine intelligence.			Н									
CO4	Able to develop the communication skill by presenting topics on Artificial Intelligent.										L		

(H - High, M- Medium, L-low)

JUSTIFICA	TION FOR	R CO-PO MAPPING				
Mapping	Level	Justifications				
CO1-PO1	High	As graduates will have to acquire knowledge on diarchitecture and working procedure.	fferent types of agent			
CO2-PO3	High	As the graduates will have to design solutions for real lit which can be solved by agent using different search specified needs with appropriate consideration.				
CO3-PO3	High	As the graduates will have to design solutions for real line which can be solved by agent which is capable of r reasoning information, able to plan and learn in different appropriate consideration.	epresenting knowledge,			
CO4-PO10	Low	By presenting on different recent innovation of artifici machine, graduates will have improved communication sk				
TEACHING	LEARNIN	NG STRATEGY				
Teaching and		Activities	Engagement (hours)			
Face-to-Face	-					
Lect		rial / Studio	42			
	-					
Self-Directed	lent-Centred Learning					
	-face-to-fac	e learning	42			
	ision	-	21			
	essment Pre	parations	21			
Formal Asses			2			
	Continuous Assessment Final Examination					
Total	3 131					
TEACHING	METHOI	DOLOGY	151			
			.1 .1			
Lecture and L	Discussion,	Co-operative and Collaborative Method, Problem Based M	ethod			
COURSE SC	CHEDULE					
			Assessment			
Week	Lecture	Topics	Methods			
	Lec 1	Introduction to AI				
1.	Lec 2	Agent Architecture				
	Lec 3	Solving Problems by Searching				
2.	Lec 1	Uninformed Search I				
	Lec 2, 3		Class Test - 1			
3.	Lec 1 Lec 2, 3	Informed Search I Informed Search II				
4.	Lec 2, 3	Memory Bounded Search I				
4.	Lec 2, 3					
5.	Lec 1	Beyond Classical Search I				
	Lec 2, 3					
6.	Lec 1	Adversarial Search I				
	Lec 2, 3					
7.	Lec 1	Constraint Satisfaction Problems I				
	Lec 2, 3		Class Test - 2			
8.	Lec 1 Lec 2	Planning with State Space Search Planning with Partial Order Search				
	Lec 2 Lec 3	Graph Search				
	Lec 1	Uncertainty and Probabilities	—			
9.	Lec 1 Lec 2	Propositional Logic				
	Let 2					
	Lec 3	First Oder Logic				
10.		First Oder Logic	Mid Term Exam			

11.	Lec 1 Lec 2	Bayesian Rule Probabilistic reasoning	
	Lec 3	Bayes Net	
10	Lec 1	Naive Bayes	
12.	Lec 2,3	Belief Networks	
		Decision Networks	
13.	Lec 1	Perceptions	Class Test-3
	Lec 2,3	Kernels and Clustering	
14.	Lec 1-3	Learning General Logical descriptions-Hypothesis.	
		Introduction to Natural Language Processing.	

Comp	Components		СО	Blooms Taxonomy
			CO1	C1, C2
	Test 1-3	20%	CO2	C2, C6
Continuous			CO3	C6, P3
Assessment (40%)	Class Participation	5%	CO4	A2
	Mid tamp	15%	CO2	C2, C6
	Mid term	13%	CO3	C6, P3
Final	Exam	60%	CO2	C2, C6
Fillal	Exam	00%	CO3	C6, P3
Total	Marks	100%		

# (CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

#### **REFERENCE BOOKS**

- Artificial Intelligence: A Modern Approach (4th Edition) Stuart Jonathan Russell, Peter Norvig; Prentice Hall (2020)
- 2. Artificial Intelligence: A New synthesis Nils J. Nilsson; Routledge

#### **REFERENCE SITE**

# **CSE-404: Artificial Intelligence Sessional**

COURSE INFORMATION	
Course Code : CSE-404	Lecture Contact Hours : 3.00 hr, in alternating week
Course Title : Artificial Intelligence Sessional	Credit Hours : 0.75
PRE-REQUISITE	
Course Code: Nil	
Course Title: Nil	
CURRICULUM STRUCTURE	
Outcome Based Education (OBE)	
RATIONALE	
Hands on orientation with AI programming, intel	ligent agents along with how to representation, planning,
learning and perception of knowledge of agents.	
OBJECTIVE	
1. To have general understanding of major of	concepts and approaches in knowledge representation,
planning, learning, robotics and other AI areas	
2. To develop programming skills for AI ap	oplications and explore traditional AI techniques and

alg	gorith	ms.												
LEAR	NIN	G OUTCO	MES & GENERIC SKILI	LS										
No.	(Upo		urse Learning Outcome n of the course, the students wi to)	ll be a	able		oom [*] conor		СР	CA	A	KP	Asses Met	ssmer hods
CO1	and	approache	ating and valuing major of s in knowledge represent ng, robotics and other AI are	entat		C	2, C5 A3	,	1	2		1, 2, 8	AS	G, Q
CO2		ysing and oplications.	evaluating programming s	kills	for	C	4, C5	5	2	5	2	4, 6	AS	G,Q
CO3		ying traditi olving prob	onal AI techniques and alg lem.	goritl	nms		C3		7	5	4	4, 5	AS	G, Q
Quiz; A	ASG - RSE C	- Assignme	s, CA-Complex Activities, nt; Pr – Presentation; R - R ligent Machines: State M	eport	t; F –	Fina	l Exa	ım, N	/T- N	Mid T	'erm	Exar	n)	
deeper Adver neural	ning A sarial netwo	*; Local so Search: m ork.	earch Algorithm: hill clim hinimax, alpha-beta pruning	bing	, firs	t cho	ice h	ill cl	imbi	ng, st	ocha	astic 1	hill cli	mbing
SKILI	L MA	PPING												
		a				P	ROG	RAM	1 OU	TCO	MES	S (PO	))	
No.		Course	Learning Outcome	1	2	3	4	5	6		1	· ·	0 11	12
C01	Applying, evaluating and valuing major concepts and approaches in knowledge representation, planning, learning, robotics and other AI areas.						н							
CO2	An		l evaluating programming					Н						
CO3			itional AI techniques and solving problem.			Н								
(H – H	ligh, N	1- Medium	, L-low)											
JUSTI	IFICA	TION FO	R CO-PO MAPPING											
Mapp	ing	Level			]	Justif	icatio	ons						
CO1-P	<b>PO</b> 4	High	Graduates will conduct representation, planning conclusions.											
CO2-P	205	High	While analysing program will be used including p problems, with an underst	redic	ction	and	mode	elling	g, to	solve	e coi	mpley	c engir	
CO2-P	PO3	High	Traditional AI algorithm graduates considering diff	s wil	ll be	appl								by th
TEAC	HING	G LEARNI	ING STRATEGY											
12.10	ing an	d Learning	Activities							E	ngag	emer	nt (hou	rs)
	o-Face	e Learning												
Teachi		ture	orial / Studio									21		
Teachi	Lec											21 -		
Teachi	Lec Pra													
Teachi Face-te	Lec Pra Stu		ed Learning											
Teachi Face-te	Lec Pra Stu irecteo Not	dent-Centre d Learning n-face-to-fa										-		
Teachi Face-te	Lec Pra Stu irecteo No: Rev	dent-Centre d Learning	ed Learning									-		

Continuous Assessment	5
Final Examination	1
Total	27

**TEACHING METHODOLOGY** 

Lecture and Discussion, Co-operative and Collaborative Method, Problem Based Method.

#### COURSE SCHEDULE

Week	Lab	Topics	Remarks				
1	Lab-1,2	Orientation with AI practical areas					
3	Lab-3,4	State Mapping Problem					
5	Lab-5,6	Informed Search Algorithm implementation	2.00 hm in				
7	Lab-7,8	Local Search implementation	3:00 hrs in alternate week				
9	Lab-9,10	Adversarial Search implementation	alternate week				
11	11 Lab-11,12 Constraint Satisfaction Problem						
13	Lab- 13,14	Learning Algorithm to solve problem					

#### ASSESSMENT STRATEGY

Со	mponents	Grading	СО	Blooms Taxonomy
Continuous	Task 1-3	30	CO3	C3
Continuous Assessment	1 dSK 1-5	30	CO3	C3
(80%)	Task 4-6	50	CO2	C4, C5
(80%)			CO2	C4, C5
Fi	Final Quiz		CO1	C2, C5, A3
То	tal Marks	100%		

#### (CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

#### **REFERENCE BOOKS**

- 1. Artificial Intelligence: A Modern Approach (4th Edition) Stuart Jonathan Russell, Peter Norvig; Prentice Hall (2020)
- 2. Artificial Intelligence: A New synthesis Nils J. Nilsson; Routledge
- 3. Choco Solver Documentation Charles Prud'homme, Jean-Guillaume Fages, Xavier Lorca

#### **REFERENCE SITE**

# **CSE-413: Computer Graphics**

COURSE INFORMATION									
Course Code	: CSE-413 Lecture Contact Hours : 3.00								
Course Title	: Computer Graphics	Credit Hours	: 3.00						
PRE-REQUIS	PRE-REQUISITE								
Course Code: N Course Title: N	Course Code: Nil								
	M STRUCTURE								
Outcome Based	l Education (OBE)								
RATIONALE	RATIONALE								
This course deals with the fundamentals of computer graphics. This will emphasize the most basic algorithms and concepts in computer graphics that form the foundation for most modern graphics									

algorithms and concepts in computer graphics that form the foundation for most modern graphics systems. It also deals with interactive 3D computer graphics, 2D algorithms, rendering, clipping, modelling

and transformation, projection and so many graphics sectors.

#### **OBJECTIVE**

1. To provide a basic idea of computer graphics and their applications for understanding contemporary terminology, progress, issues, and trends.

#### 2. To learn different computer graphics techniques and apply those to different fields. **LEARNING OUTCOMES & GENERIC SKILLS**

No.	Course Learning Outcome (Upon completion of the course, the students will be able to)	Bloom's Taxonomy	СР	CA	KP	Assessment Methods
CO1	Understand the basic concepts of computer graphics, different graphics systems and applications of computer graphics.	C1, C2	1		1,3	T, MT, F
CO2	Interpret the mathematical foundation of the concepts of computer graphics and apply those concepts in different geometric objects.	C3, C5	1		1, 2	T, MT, F
CO3	Analyse different algorithms and techniques of computer graphics and apply those in graphical model.	C3, C4	2	5	5	F
CO4	Develop the communication skill by presenting topics on computer graphics.	A2	-	1	-	Pr

(CP- Complex Problems, CA-Complex Activities, KP-Knowledge Profile, T – Test; PR – Project; Q – Quiz; ASG – Assignment; Pr – Presentation; R - Report; F – Final Exam, MT- Mid Term Exam)

#### COURSE CONTENT

**Introduction:** Computer graphics and its applications, Graphical Devices; **Vector tools for CG:** Basic operations of vectors, different representations of line & plane, line-line, line-plane intersections & plane-plane intersections; **Image representation**: Digital image representation, Raster Graphics representation, Vector Graphics representation, Gray Scale Frame buffer, true colour frame buffer, RGB model, CMY model, Grayscale conversion; **Scan Conversion**: Scan Converting point, Algorithm for scan converting a line, circle, ellipse, Region Filling, Aliasing and Anti-aliasing effect; **Modelling Transformations (2D & 3D)**: Geometric transformation, Coordinate transformation, Composite transformation; **Viewing & Clipping:** Viewing transformations, Window to viewport mapping, Algorithms for Line and polygon clipping; **Projection**: Perspective projection, parallel projection, camera positioning; **Hidden Surface Removal**: Back face culling, painters algorithm, z-buffer algorithm, scanline algorithms, **Curves and Surfaces:** Polygon Mesh representation, plane equations, parametric cubic curves; **Light and Color models**; Color and Shading Model; Ray Tracing.

#### SKILL MAPPING

				PI	ROG	RAM	1 OI	JTC	OM	ES (I	PO)		
No.	o. Course Learning Outcome		2	3	4	5	6	7	8	9	10	11	12
CO1	Understand the basic concepts of computer graphics, different graphics systems and applications of computer graphics.	Н											
CO2	Interpret the mathematical foundation of the concepts of computer graphics and apply those concepts in different geometric objects.		Н										
CO3	Analyse different algorithms and techniques of computer graphics and apply those in graphical model.			Н									
CO4	Develop the communication skill by presenting topics on computer graphics.										L		
(H – Hi	(H – High, M- Medium, L-low)												

JUSTIFICA	TION FO	R CO-PO MAPPING						
Mapping	Level	Justifications						
CO1-PO1	High	Develop breadth & depth of knowledge by understanding the basic concepts of computer graphics like transformation of objects, modelling, projection, rendering, shading etc.						
CO2-PO2	High	Analyse and interpret different mathematical concept methods and techniques of computer graphics.						
CO3-PO3	High	Analyse different computer graphics algorithms to d various engineering problems and apply in a correct way.						
CO4-PO10	Low	Develop communication skills through participating in pr	resentation.					
TEACHING	LEARNI	NG STRATEGY						
Teaching and	Learning	Activities	Engagement (hours)					
Face-to-Face								
Lect			42					
		orial / Studio	-					
		d Learning	-					
Self-Directed			10					
		ce learning	42					
	ision	marations	21 21					
Formal Asses	essment Pro	eparations	21					
	tinuous As	sessment	2					
	ıl Examina		3					
Total	u Examma		131					
TEACHING	METHO	DOLOGY						
			<b>x</b>					
Lecture and L	Discussion,	Co-operative and Collaborative Method, Problem Based M	Aethod					
COURSE SO	CHEDULE							
Week	Lectu	re Topics	Assessment					
1	Lec 1	Introduction: Computer graphics and its applications	Methods					
1	Lec 1 Lec 2	Graphical Devices;	5,					
	Lec 2 Lec 3	Oraphical Devices,						
2	Lec 4	Vector tools for CG: Basic operations of vectors,						
	Lec 5	different representations of line & plane, line-line,	Class Test 1					
	Lec 6	line-plane intersections & plane-plane intersections;						
3	Lec 7	Image representation: Raster & Vector Graphics						
	Lec 8	representation, Gray Scale & true colour frame buffe	er,					
	Lec 9	RGB model, CMY model, Grayscale conversion;						
4	Lec 10		n					
	Lec 11							
-	Lec 12		I					
5	Lec 13		ita					
	Lec 14 Lec 15	· · · · ·	lie					
6	Lec 10		Class Test 2					
	Lec 17		ite					
	Lec 18							
7	Lee 19							
	Lec 20							
	Lec 21							
8	Lec 22							
	Lec 23	projection, camera positioning;						
1 1								
	Lec 24							
9	Lec 24 Lec 25 Lec 26	<ul> <li>Projection: Parallel projection, camera positioning;</li> </ul>	Mid Term Exam					

	Lec 27		
10	Lec 31	Hidden Surface Removal: Back face culling,	
	Lec 32	Painters algorithm	
	Lec 33		
11	Lec 28	Hidden Surface Removal: Z-buffer algorithm,	
	Lec 29	scanline algorithms,	
	Lec 30		
12	Lec 34	Curves and Surfaces: Polygon Mesh representation,	
	Lec 35	plane equations, parametric cubic curves	
	Lec 36		
13	Lec 37	Light and Color models	
	Lec 38		Class Test 3
	Lec 39		
14	Lec 40	Color and Shading Model	
	Lec 41	Ray Tracing.	
	Lec 42		

Comp	oonents	Grading	СО	Blooms Taxonomy
			CO1	C1, C2
Continuous Assessment (40%)	Test 1-3	20%	CO2	C3, C5
			CO3	C3, C4
	Class Participation	5%	CO4	A2
	Mid term	15%	CO2	C3, C5
	who term	1370	CO3	C3, C4
			CO1	C1, C2
Final	Exam	60%	CO2	C3, C5
			CO3	C3, C4
Total	Marks	100%		

# (CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

# **REFERENCE BOOKS**

- Theory and Problems of Computer Graphics (2nd) Zhigang Xiang, Roy A. Plastock
   Computer Graphics Principle and Practice (3rd) James D Foley, Van Dam
   Computer Graphics using OpenGL (2nd) by Francis S Hill, Jr.

# **CSE-414: Computer Graphics Sessional**

COUR	RSE INFO	ORMATION											
Course		: CSE-414			Conta	act Ho	ours		3.00 hrs	s in alt	ernat	ive w	/eek
Course		: Computer Graphics Sessional	Cre	dit F	Iours			:	0.75				
	REQUISI												
	Course Code: Nil Course Title: Nil												
CURRICULUM STRUCTURE													
Outcome Based Education (OBE)													
	ONALE												
This course motivates to develop and modify 2D and 3D visualization and transformation of any geometric object by using graphics library as well as create 3D games and animation using different modern graphics tools and software.													
	CTIVE												
<ol> <li>To learn basic concepts of 2D, 3D and animation graphics project using OpenGL graphics library.</li> <li>To develop 3D games and animation using different software like blender, unity etc.</li> </ol>													
LEAR	NING O	UTCOMES & GENERIC SKILI	LS										
No.	(Upon co	Course Learning Outcome ompletion of the course, the students w to)	ill abl	le		om's nomy		СР	CA	KP		ssess Meth	ment ods
CO1	Apply graphics programming techniques to graphics problem related to mod transformation, rendering, texture mapping				C	23	1	,2	-	5		Q	
CO2	Develop	2D and 3D graphical geometric ob	jects		A	C6, 45	1	,3	1,2	5,7		Q, A	SG
CO3Create animation or real time applications using open-source software.C2, C6, P61,535,6P							PF	٤					
(CP- Complex Problems, CA-Complex Activities, KP-Knowledge Profile, T – Test ; PR – Project ; Q – Quiz; ASG – Assignment; Pr – Presentation; R - Report; F – Final Exam, MT- Mid Term Exam)													
COUR	RSE CON	TENT											
Simple animat Anima blende	2D anim ion in Op ation usi	ng Blender/unity: Introduction turing and coloring, rigging, rende	n usi	ing ( ble	Open( nder/	GL, D unit	rawi	ng 3	D geor	netric	obje	ct an	d 3D
SKILI	J MAPPI	NG											
		a			Pl	ROGI	RAM	OU	TCOM	ES (P	0)		
No.		Course Learning Outcome	1	2	3	4	5	6	7 8	9	10	11	12
CO1	related renderi	graphics programming ues to solve graphics problem to modelling transformation, ng, texture mapping etc.			Н								
CO2	Develo objects	p 2D and 3D graphical geometric			Н					Н			
CO3	Create applica	animation or real time tions using open source software.					Н			Н			
(H – H	ligh, M- N	fedium, L-low)											

Mapping       Level       Justifications         CO1-PO2       Medium       Apply the knowledge acquired in the theory class problems and also provide solutions of graphics processing applies concept.         CO2-PO3       High       Develop 2D and 3D geometric object in OPENC graphics concept.         CO3-PO5       High       Different modern IT tools will be used to create an CO2-PO9, CO3-PO9         High       Group of students will be worked in a particular processing in a group. <b>TEACHING LEARNING STRATEGY</b> Teaching and Learning Activities         Face-to-Face Learning         Lecture         Practical / Tutorial / Studio         Student-Centred Learning         Non-face-to-face learning         Revision         Assessment Preparations         Formal Assessment         Continuous Assessment         Final Examination         Total <b>TEACHING METHODOLOGY</b> Lecture and Discussion, Co-operative and Collaborative Method, Problem E <b>COURSE SCHEDULE</b>	belem. BL platform using the compute imation and games
C01-PO2       Medium       Apply the knowledge acquired in the theory class problems and also provide solutions of graphics problems and also provide solutions of graphics problems and also provide solutions of graphics processes problems and also provide solutions of graphics provide solutions will be used to create an provide solutions of graphics provide solutions of graphics provide solutions of graphics provide solutions and provide s	Step       a         Step       a
CO2-PO3       High       Develop 2D and 3D geometric object in OPENC graphics concept.         CO3-PO5       High       Different modern IT tools will be used to create an Order of students will be worked in a particular part to learn working in a group.         CO2-PO9, CO3-PO9       High       Group of students will be worked in a particular part to learn working in a group.         TEACHING LEARNING STRATEGY       Teaching and Learning Activities         Face-to-Face Learning       Lecture         Practical / Tutorial / Studio       Student-Centred Learning         Self-Directed Learning       Non-face-to-face learning         Revision       Assessment Preparations         Formal Assessment       Continuous Assessment         Final Examination       Total         TEACHING METHODOLOGY       Lecture and Discussion, Co-operative and Collaborative Method, Problem E	AL platform using the compute imation and games roject that will in turn help then Engagement (hours) - 21 - 21 - 21 - 21 - 21 - 21 - 21 - 21 - 21 - 3
CO3-PO5       High       Different modern IT tools will be used to create an         CO2-PO9,       High       Group of students will be worked in a particular protocol to learn working in a group.         TEACHING LEARNING STRATEGY       Teaching and Learning Activities         Face-to-Face Learning       Lecture         Practical / Tutorial / Studio       Student-Centred Learning         Self-Directed Learning       Non-face-to-face learning         Revision       Assessment Preparations         Formal Assessment       Continuous Assessment         Final Examination       Total         TeacHING METHODOLOGY       Lecture and Discussion, Co-operative and Collaborative Method, Problem E	roject that will in turn help then Engagement (hours) - 21 21 2 2 3
CO2-PO9, CO3-PO9       High       Group of students will be worked in a particular protoclear to learn working in a group.         TEACHING LEARNING STRATEGY         Teaching and Learning Activities         Face-to-Face Learning         Lecture         Practical / Tutorial / Studio         Student-Centred Learning         Self-Directed Learning         Non-face-to-face learning         Revision         Assessment Preparations         Formal Assessment         Continuous Assessment         Final Examination         Total         TeacHING METHODOLOGY         Lecture and Discussion, Co-operative and Collaborative Method, Problem E	roject that will in turn help then Engagement (hours) - 21 21 2 2 3
CO3-PO9       Hign       to learn working in a group.         TEACHING LEARNING STRATEGY         Teaching and Learning Activities         Face-to-Face Learning         Lecture         Practical / Tutorial / Studio         Student-Centred Learning         Non-face-to-face learning         Revision         Assessment Preparations         Formal Assessment         Continuous Assessment         Final Examination         Total         TEACHING METHODOLOGY         Lecture and Discussion, Co-operative and Collaborative Method, Problem E	Engagement (hours) 
Teaching and Learning Activities         Face-to-Face Learning         Lecture         Practical / Tutorial / Studio         Student-Centred Learning         Self-Directed Learning         Non-face-to-face learning         Revision         Assessment Preparations         Formal Assessment         Final Examination         Total         TeacHING METHODOLOGY         Lecture and Discussion, Co-operative and Collaborative Method, Problem E         COURSE SCHEDULE	21 
Face-to-Face Learning Lecture Practical / Tutorial / Studio Student-Centred Learning Self-Directed Learning Non-face-to-face learning Revision Assessment Preparations Formal Assessment Continuous Assessment Final Examination Total TEACHING METHODOLOGY Lecture and Discussion, Co-operative and Collaborative Method, Problem E COURSE SCHEDULE	21 
Lecture Practical / Tutorial / Studio Student-Centred Learning Self-Directed Learning Non-face-to-face learning Revision Assessment Preparations Formal Assessment Formal Assessment Continuous Assessment Final Examination Total TEACHING METHODOLOGY Lecture and Discussion, Co-operative and Collaborative Method, Problem E COURSE SCHEDULE	- - - - 2 3
Practical / Tutorial / Studio Student-Centred Learning Self-Directed Learning Non-face-to-face learning Revision Assessment Preparations Formal Assessment Continuous Assessment Final Examination Total TEACHING METHODOLOGY Lecture and Discussion, Co-operative and Collaborative Method, Problem E	- - - - 2 3
Student-Centred Learning Self-Directed Learning Non-face-to-face learning Revision Assessment Preparations Formal Assessment Continuous Assessment Final Examination Total TEACHING METHODOLOGY Lecture and Discussion, Co-operative and Collaborative Method, Problem E COURSE SCHEDULE	- - - - 2 3
Self-Directed Learning Non-face-to-face learning Revision Assessment Preparations Formal Assessment Continuous Assessment Final Examination Total <b>TEACHING METHODOLOGY</b> Lecture and Discussion, Co-operative and Collaborative Method, Problem B COURSE SCHEDULE	3
Non-face-to-face learning Revision Assessment Preparations Formal Assessment Continuous Assessment Final Examination Total TEACHING METHODOLOGY Lecture and Discussion, Co-operative and Collaborative Method, Problem E COURSE SCHEDULE	3
Revision Assessment Preparations Formal Assessment Continuous Assessment Final Examination Total TEACHING METHODOLOGY Lecture and Discussion, Co-operative and Collaborative Method, Problem E COURSE SCHEDULE	3
Assessment Preparations Formal Assessment Continuous Assessment Final Examination Total TEACHING METHODOLOGY Lecture and Discussion, Co-operative and Collaborative Method, Problem E COURSE SCHEDULE	3
Continuous Assessment Final Examination Total TEACHING METHODOLOGY Lecture and Discussion, Co-operative and Collaborative Method, Problem E COURSE SCHEDULE	3
Final Examination Total TEACHING METHODOLOGY Lecture and Discussion, Co-operative and Collaborative Method, Problem E COURSE SCHEDULE	3
Total <b>TEACHING METHODOLOGY</b> Lecture and Discussion, Co-operative and Collaborative Method, Problem B <b>COURSE SCHEDULE</b>	
TEACHING METHODOLOGY Lecture and Discussion, Co-operative and Collaborative Method, Problem E COURSE SCHEDULE	26
Lecture and Discussion, Co-operative and Collaborative Method, Problem B COURSE SCHEDULE	
COURSE SCHEDULE	
	Based Method.
Week Lab Topics	Remarks
1 Lab-1,2 Introduction to 2D Graphics and OpenGL. Drawing 2D geometric object	
3 Lab-3,4 Simple 2D animation and modelling transformation using OpenGL	
5 Lab-5,6 Drawing 3D geometric object and 3D animati OpenGL	on in 3.00 hrs in alternate week
7 Lab-7,8 Introduction to blender/ unity	
9 Lab-9,10 3D modelling and Lighting in blender/unity	
11 Lab-11,12 Texturing and coloring, Rigging	
13 Lab-13,14 Rendering, animation	
ASSESSMENT STRATEGY	
CO Components Grading	Blooms Taxonomy
	C3
Continuous 2D 25% CO1 Assignment 25% CO2	C3, C6, A5
Assessment 3D (80%) Assignment 25% CO2	C3, C6, A5
Project 30% CO3	C2, C6, P6
	C2, C6, P6
C01	C3
Final Quiz 20% CO2 CO3	C3, C6, A5
Total Marks 100%	C2, C6, P6
1000/0	
(CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Doma	ain. A = Affective Domain)

 Theory and Problems of Computer Graphics (2nd) - Zhigang Xiang, Roy A. Plastock
 OpenGL programming guide (The official guide to learning OpenGL, 8th)- Dave Shreiner, Graham Sellers, John Kessenich, Bill Licea-Kane

# **REFERENCE SITE**

# **CSE-4XO:** Technical Elective-II

COURSE INFORMATION									
Course Code	: CSE-4XO	Lecture Contact Hours	: 3.00						
Course Title	: Technical Elective-II	Credit Hours	: 3.00						

*Details of all Technical elective subjects are given later.

# **CSE-4XE: Technical Elective-II Sessional**

COURSE INFORMATION									
Course Code		Lecture Contact Hours	: 3.00 hrs in alternative week						
Course Title		Credit Hours	: 0.75						

*Details of all Technical elective subjects are given later.

# **GEPM-463:** Project Management and Finance

COU	RSE INFO	DRMATION								
	e Code e Title	: GEPM-463 : Project Management and Finance	Lecture Cont Credit Hours		rs	: 2.0 : 2.0	•			
PRE-	REQUISI	TE								
00000	Course Code: Nil Course Title: Nil									
CURRICULUM STRUCTURE										
Outco	Outcome Based Education (OBE)									
RATI	RATIONALE									
Project Management and Finance course has been designed to understand the overlapping connection between engineering and management with financial matters through the study of Smart Technologies, Project Management and financial matters in an organization which will equip with the skills to understand the application of computing technology in real-world situations.										
	ECTIVE									
formu 2. To	<ol> <li>To identify and analyze practical problems commonly encountered in the computing industry and formulate solutions by considering financial aspects to some of the problems.</li> <li>To gain the ability to continue professional development with an understanding of the legal issues, and to critically assess the codes of professional conduct for a computer professionals.</li> </ol>									
LEAF	RNING O	UTCOMES & GENERIC SKILLS								
No.	(Upon c	Course Learning Outcome ompletion of the course, the students will be able to)	Bloom's Taxonomy	СР	CA	KP	Assessment Methods			
CO1	framewo	rate different management and control rks and know their impact on the project nent discipline.	C1-C3, P2			1, 2, 3, 4	T, F			

CO2	Solve and apply cognitive skills and ability to identify, analysis, and articulate the importance of team building, project risk, and financial management.	C3-C4	3		1, 2, 3, 4	MT, F
CO3	Use management software to help plan and manage information technology projects.	C4			6	ASG, F
CO4	Apply modern engineering techniques, skills, and management principles to do work as a member and leader in a team, to manage projects in multidisciplinary environments.	C3-C4	2	2	7	T, F
CO5	Develop communication skills by presenting topics on project management and finance.	A2		1		Pr

(CP- Complex Problems, CA-Complex Activities, KP-Knowledge Profile, T – Test ; PR – Project ; Q – Quiz; ASG – Assignment; Pr – Presentation; R - Report; F – Final Exam, MT- Mid Term Exam)

#### COURSE CONTENT

**Engineering Management:** Principles of management; **Introduction to Project Management**: Project Integration Management, Project Scope Management, Project Time Management, Project Cost Management, Project Quality Management, Project Human Resource Management, Project Risk Management; **MIS**: Introduction, Decision Support Systems, MIS in decision making, Concept of Invention, Innovation, and Entrepreneurship; **Cost Management**: elements of cost of products, allocation of overhead costs, marginal costing, standard costing, cost planning and control, budget and budgetary control; **Development and planning process**: annual development plan, National budget; **Accounting in Action**: Meaning & Definition Of Accounting, Users And Uses Of Accounting, Why Ethics Is A Fundamental Accounting Concept, Accounting Standards And The Measurement Principles- Monetary Unit Assumption And The Economic Entity Assumption, Accounting Equation, The Effects Of Business Transactions On The Accounting Accounting; **Financial management**: objectives, strategy, financing, performance analysis of the enterprise, investment appraisal, criteria of investment; **Marketing Management**: Concepts, strategy, sales promotion, patent laws; **Technology Management**: Management of innovation and changes, technology life cycle, Case studies;

#### SKILL MAPPING

No.         Course Learning Outcome         PROGRAM OUTCO								OM	ES (I	20)			
INO.	Course Learning Outcome		2	3	4	5	6	7	8	9	10	11	12
CO1	Demonstrate different management and control frameworks and know their impact on the project management discipline.	Н											
CO2	Solve and apply cognitive skills and ability to identify, analysis, and articulate the importance of team building, project risk, and financial management.		Н										
CO3	Use management software to help plan and manage information technology projects.					н							
CO4	Apply modern engineering techniques, skills and management principles to do work as a member and leader in a team, to manage projects in multidisciplinary environments.											Н	
CO5	Develop communication skills by presenting topics on project management and finance.										L		
(H – Hi	gh, M- Medium, L-low)	•	•	•	•	•	•			•	•		

JUSTIFICA	<b>ATION FO</b>	PR CO-PO MAPPING:									
Mapping	Level	Justifications									
CO1-PO1	High	impact on the project management discipline, we r and engineering.									
CO2-PO2	High	• • •	Design and conduct experiments to identify, analysis, and articulate the importance of team building, project risk, and financial management.								
CO3-PO5	High	management software to help plan and manage projects.									
CO4- PO11	High	management principles to do work as a member manage projects in multidisciplinary environments									
CO5- PO10	Low	Develop strong communication skills through a protopics from the course taught.	esentation on the selective								
TEACHIN	G LEARN	ING STRATEGY									
Teaching an		Activities	Engagement (hours)								
Face-to-Fac	-										
-	cture		28								
		orial / Studio	-								
		ed Learning	-								
Self-Directe			20								
		ace learning	28								
	vision	reperctions	14 14								
	sessment P	reparations	14								
Formal Assessment 2											
Final Examination 3											
Total 89											
TEACHIN	G METHO	DDOLOGY									
Lecture and	Discussion	, Co-operative and Collaborative Method, Problem Based	Method								
COURSE S	CHEDUL	E									
Week	Lecture	Topics	Assessment Methods								
1	Lec 1 Lec 2	Engineering Management: Principles of management, Introduction to Project Management									
2	Lec 3 Lec 4	Project Integration Management; Project Scope Management; Project Time Management; Project Cost Management									
3	Lec 5 Lec 6	Project Quality Management; Project Human Resource Management; Project Risk Management									
4	Lec 7 Lec 8	MIS: Introduction, Decision Support Systems, MIS in decision making.									
5	Lec 9 Lec 10	Concept of Invention, Innovation, and Entrepreneurship; Cost management elements of cost of products, allocation of overhead costs									
6	Lec 11 Lec 12	Marginal costing, Standard costing; Cost planning and control, budget and budgetary control	- Class Test 2								
7	Lec 13 Lec 14	Development and planning process; annual development plan; National budget	C1055 1 C5t 2								
8	Lec 15 Lec 16	Meaning & Definition Of Accounting, Users And Uses Of Accounting; Accounting Standards And The Measurement Principles									

9	Lec 17 Lec 18	Monetary Unit Assumption And The Economic Entity Assumption, Accounting Equation, The Effects Of Business Transactions On The Accounting Equation	
10	Lec 19 Lec 20		
11	Lec 21 Lec 22	Mid Term Exam	
12	Lec 23 Lec 24	Financial management : investment appraisal, criteria of investment;	
13	Lec 25 Lec 26		
14	Lec 27 Lec 28		

Comp	oonents	Grading	СО	Blooms Taxonomy
	Test 1-2		C01	C1-C3
Continuous	10st 1-2		CO4	C3
Assessment (40%)	Class Participation	5%	CO5	A2
	Mid term	15%	CO2	C3-C4
			CO1	C1-C3, P2
Einel	Exam	(0)/	CO2	C3-C4
Fillal	Exam	60%	CO3	C4
			CO4	C3-C4
Total	Marks	100%		

# (CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

# **REFERENCE BOOKS**

1. Project Management for Engineering, Business and Technology (5th) - John M. Nicholas, Herman Steyn, 2. Principles of Project Finance (1st) - E.R. Yescom

3. The Toyota Way: 14 Management Principles from the World's Greatest Manufacturer (1st, McGraw-Hill Education, 2004) - J. Liker

# **TECHNICAL ELECTIVE - I**

# **CSE-407: Applied Statistics and Queuing Theory**

COU	COURSE INFORMATION										
	e Code : CSE-407	1			re Conta	ict Hoi	ırs	: 3.0			
	e Title   : Applied Statistics and Queuing T REQUISITE	neory	′ <u> </u>	Crean	Hours			: 3.0	0		
	e Code: Nil										
Course Title: Nil											
CURRICULUM STRUCTURE											
Outco	Outcome Based Education (OBE)										
	RATIONALE										
This course provides the deep idea of working with data sets and impacts of data set as well as application											
	of queuing models in computer science context										
	<b>ECTIVE</b> discuss the theories of applied statistics										
2. To	select the practical applications in the fiel ration of statistics.	ld of	Infor	matior	1 Techn	ology	and e	xplain	the real-life		
LEAI	RNING OUTCOMES & GENERIC SKILI	LS									
No.	Course Learning Outcome (Upon completion of the course, the students will be able to)				oom's onomy	СР	CA	KP	Assessment Methods		
CO1	Classify analyze and evaluate the theories of annlied				C3 C6, A3	1		3	T, F		
CO2	Apply and implement the practical ap in the field of Information Technology.	plica	tions		C4,C5, P2	3	2	1,2	MT, F		
CO3	Analyze the real-life applications of statistic	cs.		C	4, P4	3	3	5,6	F		
	(CP- Complex Problems, CA-Complex Activities, KP-Knowledge Profile, T – Test ; PR – Project ; Q – Quiz; ASG – Assignment; Pr – Presentation; R - Report; F – Final Exam, MT- Mid Term Exam)										
COU	RSE CONTENT										
deviat theory regress distrib and ex Marko solutio	<b>Introduction</b> : Frequency distribution, Mean, median, Mode and other measure of central tendency standard deviation and other measure of dispersion, Moments, Skewness and kurtosis, Elementary probability theory, Characteristics of distributions, elementary sampling theory, Estimation, Hypothesis testing and regression analysis; <b>Probability</b> : Probability distribution and expectations, discontinuous probability distribution, e.g. binomial, position and negative binomial. Continuous probability distributions, e.g. normal and exponential; <b>Queuing Theory</b> : Stochastic processes, Discrete time Markov chain and continuous time Markov Chain, birth-death process in queuing; <b>Queuing models</b> : M/M/1, M/M/C, M/G/1, M/D/1, G/M/1 solution of network of queue-closed queuing models and approximate models, Application of queuing models in Computer Science.										
SKIL	L MAPPING										
No	Course Learning Outcome			PRO	GRAM	OUT	COME	S (PO	)		
No.		1	2	3 4	- 5	6 7	8	9 1	0 11 12		
CO1	theories of applied statistics	Н									
CO2	Technology.		Н								
CO3	Analyze the real-life applications of statistics.					Н					
(H – H	High, M- Medium, L-low)										

Justification	n for CO-	PO mapping:	
Mapping	Level	Justifications	
		In order to understand application of the theories of app	lied statistics , one need to
CO1-PO1	High	have the basic knowledge of theories of applied statistic	
		In order to Select the practical applications in the field of	
CO2-PO2	High	one has to analyze the basic principle, theories and fu	
002102	mgn	statistics	indumentalis of the appried
CO3-PO6	High	To be able to apply the basic techniques of statistics in rea	l life.
		NING STRATEGY	
Teaching and			Engagement (hours)
Face-to-Face			
	ture		42
		ttorial / Studio	-
		red Learning	_
Self-Directed			
		face learning	42
	vision		21
		Preparations	21
Formal Asse			21
		Assessment	2
	al Exami		
Total		lation	3 131
TEACHIN	METH		151
			N 4 1
		n, Co-operative and Collaborative Method, Problem Based	Method
COURSE S	CHEDII		
	CHEDU		1
Week	Lec	ture Topics	Assessment Methods
	Lec	ture         Topics           1         Introduction, Frequency distribution	Assessment Methods
Week	Lec Lec Lec	ture         Topics           1         Introduction, Frequency distribution           2	Assessment Methods
Week 1	Lec Lec Lec Lec	ture     Topics       1     Introduction, Frequency distribution       2     3	Assessment Methods
Week	Lec Lec Lec Lec Lec	ture     Topics       1     Introduction, Frequency distribution       2     3       4     Central Tendency, Mean, median, Mode	Assessment Methods
Week 1	Lec Lec Lec Lec Lec Lec	ture     Topics       1     Introduction, Frequency distribution       2     3       3     4       4     Central Tendency, Mean, median, Mode       5     5	Assessment Methods
Week 1	Lec Lec Lec Lec Lec	tureTopics1Introduction, Frequency distribution23344Central Tendency, Mean, median, Mode56	
Week 1	Lec Lec Lec Lec Lec Lec	tureTopics1Introduction, Frequency distribution233	Assessment Methods Class Test 1
Week           1           2	Lec Lec Lec Lec Lec Lec Lec Lec Lec	ture     Topics       1     Introduction, Frequency distribution       2     3       3	
Week           1           2           3	Lec Lec Lec Lec Lec Lec Lec Lec Lec Lec	ture     Topics       1     Introduction, Frequency distribution       2     3       3	
Week           1           2	Lec Lec Lec Lec Lec Lec Lec Lec Lec Lec	tureTopics1Introduction, Frequency distribution23344Central Tendency, Mean, median, Mode56677Standard deviation and other measure of dispersion91010Moments, Skewness and kurtosis	
Week           1           2           3	Lec Lec Lec Lec Lec Lec Lec Lec Lec Lec	tureTopics1Introduction, Frequency distribution23344Central Tendency, Mean, median, Mode56677Standard deviation and other measure of dispersion91010Moments, Skewness and kurtosis	
Week           1           2           3           4	Lec Lec Lec Lec Lec Lec Lec Lec Lec Lec	tureTopics1Introduction, Frequency distribution2	
Week           1           2           3	Lec Lec Lec Lec Lec Lec Lec Lec Lec Lec	Topics           1         Introduction, Frequency distribution           2         3           3	
Week           1           2           3           4	Lec Lec Lec Lec Lec Lec Lec Lec Lec Lec	tureTopics1Introduction, Frequency distribution23344Central Tendency, Mean, median, Mode56677Standard deviation and other measure of dispersion9910Moments, Skewness and kurtosis111213Elementary probability theory, Characteristics of distributions	
Week           1           2           3           4	Lec Lec Lec Lec Lec Lec Lec Lec Lec Lec	tureTopics1Introduction, Frequency distribution213Introduction, Frequency distribution4Central Tendency, Mean, median, Mode5Introduction6Introduction7Standard deviation and other measure of dispersion8dispersion9Introduction10Moments, Skewness and kurtosis11Introduction12Introduction13Elementary probability theory, Characteristics of distributions	Class Test 1
Week           1           2           3           4	Lec Lec Lec Lec Lec Lec Lec Lec Lec Lec	tureTopics1Introduction, Frequency distribution23344Central Tendency, Mean, median, Mode5667657Standard deviation and other measure of8dispersion9910Moments, Skewness and kurtosis111213Elementary probability theory, Characteristics of15distributions	
Week           1           2           3           4           5	Lec Lec Lec Lec Lec Lec Lec Lec Lec Lec	tureTopics1Introduction, Frequency distribution23344Central Tendency, Mean, median, Mode56677Standard deviation and other measure of dispersion9910Moments, Skewness and kurtosis1112121313Elementary probability theory, Characteristics of distributions16Elementary sampling theory, Estimation	Class Test 1
Week         1           2         3           3         4           5         6	Lec Lec Lec Lec Lec Lec Lec Lec Lec Lec	tureTopics1Introduction, Frequency distribution21344Central Tendency, Mean, median, Mode56677Standard deviation and other measure of dispersion9910Moments, Skewness and kurtosis111213Elementary probability theory, Characteristics of distributions16Elementary sampling theory, Estimation1718	Class Test 1
Week           1           2           3           4           5	Lec Lec Lec Lec Lec Lec Lec Lec Lec Lec	tureTopics1Introduction, Frequency distribution213Introduction, Frequency distribution4Central Tendency, Mean, median, Mode56617Standard deviation and other measure of dispersion91010Moments, Skewness and kurtosis111213Elementary probability theory, Characteristics of distributions16Elementary sampling theory, Estimation1718	Class Test 1
Week           1           2           3           4           5           6	Lec Lec Lec Lec Lec Lec Lec Lec Lec Lec	tureTopics1Introduction, Frequency distribution21344Central Tendency, Mean, median, Mode56677Standard deviation and other measure of dispersion9910Moments, Skewness and kurtosis111213Elementary probability theory, Characteristics of distributions16Elementary sampling theory, Estimation171819Hypothesis testing and regression analysis	Class Test 1
Week           1           2           3           4           5           6	Lec Lec Lec Lec Lec Lec Lec Lec Lec Lec	tureTopics1Introduction, Frequency distribution21344Central Tendency, Mean, median, Mode56677Standard deviation and other measure of dispersion91010Moments, Skewness and kurtosis111213Elementary probability theory, Characteristics of distributions16Elementary sampling theory, Estimation171819Hypothesis testing and regression analysis	Class Test 1
Week           1           2           3           4           5           6	Lec Lec Lec Lec Lec Lec Lec Lec Lec Lec	tureTopics1Introduction, Frequency distribution21344Central Tendency, Mean, median, Mode56677Standard deviation and other measure of dispersion8dispersion91010Moments, Skewness and kurtosis111213Elementary probability theory, Characteristics of distributions16Elementary sampling theory, Estimation171819Hypothesis testing and regression analysis2021	Class Test 1
Week           1           2           3           4           5           6           7	Lec Lec Lec Lec Lec Lec Lec Lec Lec Lec	tureTopics1Introduction, Frequency distribution21344Central Tendency, Mean, median, Mode566765667Standard deviation and other measure of dispersion8dispersion91010Moments, Skewness and kurtosis111213Elementary probability theory, Characteristics of distributions16Elementary sampling theory, Estimation171819Hypothesis testing and regression analysis202122Probability distribution, Expectations	Class Test 1
Week           1           2           3           4           5           6           7	Lec Lec Lec Lec Lec Lec Lec Lec Lec Lec	tureTopics1Introduction, Frequency distribution234Central Tendency, Mean, median, Mode566765677Standard deviation and other measure of dispersion9910Moments, Skewness and kurtosis1112121313Elementary probability theory, Characteristics of distributions16Elementary sampling theory, Estimation171819Hypothesis testing and regression analysis202122Probability distribution, Expectations	Class Test 1
Week           1           2           3           4           5           6           7	Lec Lec Lec Lec Lec Lec Lec Lec Lec Lec	tureTopics1Introduction, Frequency distribution234Central Tendency, Mean, median, Mode5667677Standard deviation and other measure of dispersion9910Moments, Skewness and kurtosis111213Elementary probability theory, Characteristics of distributions16Elementary sampling theory, Estimation171819Hypothesis testing and regression analysis202122Probability distribution, Expectations2324	Class Test 1
Week         1           2         3           3         4           5         6           7         8	Lec Lec Lec Lec Lec Lec Lec Lec Lec Lec	tureTopics1Introduction, Frequency distribution21344Central Tendency, Mean, median, Mode56675Standard deviation and other measure of dispersion9910Moments, Skewness and kurtosis111213Elementary probability theory, Characteristics of distributions16Elementary sampling theory, Estimation171819Hypothesis testing and regression analysis202122Probability distribution, Expectations232425Discontinuous probability distribution, Binomial	Class Test 1 Class Test 2
Week         1           2         3           3         4           5         6           7         8	Lec Lec Lec Lec Lec Lec Lec Lec Lec Lec	tureTopics1Introduction, Frequency distribution23344Central Tendency, Mean, median, Mode56675Standard deviation and other measure of dispersion9910Moments, Skewness and kurtosis111213Elementary probability theory, Characteristics of distributions16Elementary sampling theory, Estimation171819Hypothesis testing and regression analysis202122Probability distribution, Expectations232425Discontinuous probability distribution, Binomial distribution, Position and negative binomial	Class Test 1
Week         1           2         3           3         4           5         6           7         8	Lec Lec Lec Lec Lec Lec Lec Lec Lec Lec	tureTopics1Introduction, Frequency distribution2Introduction, Frequency distribution3Central Tendency, Mean, median, Mode5Frequency Mean, median, Mode6Gentral Tendency, Mean, median, Mode7Standard deviation and other measure of8dispersion9Moments, Skewness and kurtosis10Moments, Skewness and kurtosis11Elementary probability theory, Characteristics of15distributions16Elementary sampling theory, Estimation171819Hypothesis testing and regression analysis20Probability distribution, Expectations232425Discontinuous probability distribution, Binomial26distribution27distribution	Class Test 1 Class Test 2

	Lec 33		
11	Lec 28	Queuing Theory: Stochastic processes, Discrete	
	Lec 29	time Markov chain	
	Lec 30		
12	Lec 34	Continuous time Markov Chain, Birth-death	
	Lec 35	process in queuing	
	Lec 36		
13	Lec 37	Queuing models, M/M/1.M/M/C.M/G/1.M/D/1,	Class Test 3
	Lec 38	G/M/1	
	Lec 39	Queue-closed queuing models	
14	Lec 40	Approximate models, Application of queuing	
	Lec 41	models	
	Lec 42		

			60	
Comp	onents	Grading	СО	Blooms Taxonomy
			CO 1	C1-C3, P4
	Test 1-3	20%	CO 2	C3-C4, A2
Continuous			CO 3	C5-C6, P5
Assessment	Class	5%	CO 1	C1-C3, P4
(40%)	Participation	570	CO 2	C3-C4, A2
	Mid term	15%	CO 2	C3-C4, A2
	who term	13%	CO 3	C5-C6, P5
			CO 1	C1-C3, P4
Final	Exam	60%	CO 2	C3-C4, A2
			CO 3	C5-C6, P5
Total	Marks	100%		

# (CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

# **REFERENCE BOOKS**

1. Applied Statistics - Rebecca (Becky) M. (Margaret) Warner

 Applied Statistics for Engineers and Scientists - Jay L. Devore and Nicholas R. Famum
 An Introduction to Queuing Theory - U. Narayan Bhat
 Probability, Markov Chains, Queues, and Simulation: The Mathematical Basis of Performance Modeling – William J. Stewart

# **CSE-417: Blockchain and Cryptocurrency Technology**

COU	RSE INFO	ORMATION					
	e Code	: CSE-417	Lecture	Contac	t Hou	rs	: 3.00
Cours	e Title	: Blockchain and Cryptocurrency Technology	Credit H	ours			: 3.00
PRE-	REQUIS	TE					
	e Code: N						
	e Title: Ni						
		M STRUCTURE					
Outco	ome Based	Education (OBE)					
RATI	IONALE						
		esigned to introduce Blockchain technology a					
		with the Basic Cryptographic primitives us					
		em concepts, Basic Blockchain (Blockchain 1	.0), Blockcha	in 2.0	, Blocl	kchain	3.0, Beyond
	-	Limitations of blockchain as a technology					
	ECTIVE						
		ce Blockchain technology			C	·	C
		tee the application of Blockchain in cyber secu contract enforcement mechanisms	urity, integrity	y of in	Iormai	lion, E	-Governanc
		contract enforcement mechanisms					
LEAI	RNING O	UTCOMES & GENERIC SKILLS					
		Course Learning Outcome	Bloom's	~~~	~ .		Assessmen
No.	(Upon c	ompletion of the course, the students will be able to)	Taxonomy	СР	CA	KP	Methods
CO1		and the basic Cryptographic primitives used	C2-C3,A2	1,2		1	T, ASG,
001	in Block		02 05,112	1,2		1	Viva
CO2		decentralized applications and data storage,	$C^{2}C^{2}$	1		1.2	Т
02		beyond its role as the technology underlying ocurrencies	C2,C3	1		1,2	
		distributed and replicated ledger of events,			<u> </u>		Mid Term,
CO3		ons, and data generated through various IT	C2-C3	1		1-	F
COS		s with strong cryptographic guarantees of	C2-C3	1		3	
		esistance, immutability, and verifiability					
CO4		the communication skills by presenting topics on blockchain	A2		1		Pr
	unierent			1	1		
(CP- 0	Complex I	Problems, CA-Complex Activities, KP-Knowle	dge Profile, 7	– Tes	st : PR	– Proi	ect : 0 –
		ssignment; $Pr - Presentation; R - Report; LT - \Sigma$		100	,	- 19	, .
COU	RSE CON	ITENT					
		Need for Distributed Record Keeping, Modelin			_		

**Introduction:** Need for Distributed Record Keeping, Modeling faults and adversaries, Byzantine Generals problem, Consensus algorithms and their scalability problems, Technologies Borrowed in Blockchain – hash pointers, consensus, byzantine fault-tolerant distributed computing, digital cash; **Basic Distributed Computing:** Atomic Broadcast, Consensus, Byzantine Models of fault tolerance; **Basic Crypto primitives:** Hash functions, Puzzle friendly Hash, Collison resistant hash, digital signatures, public key crypto, verifiable random functions, Zero-knowledge systems; **Blockchain 1.0:** Bitcoin blockchain, the challenges, and solutions, proof of work, Proof of stake, alternatives to Bitcoin consensus, Bitcoin scripting language and their use; **Blockchain 2.0:** Ethereum and Smart Contracts, The Turing Completeness of Smart Contract Languages and verification challenges, Using smart contracts to enforce legal contracts, comparing Bitcoin scripting vs. Ethereum Smart Contracts; **Blockchain 3.0:** Hyperledger fabric, the plug and play platform and mechanisms in permissioned blockchain; Privacy, **Security issues in Blockchain:** Pseudo-anonymity vs. anonymity, Zcash and Zk-SNARKS for anonymity preservation, attacks on Blockchains – such as Sybil attacks, selfish mining, 51% attacks - advent of algorand, and Sharding based consensus algorithms to prevent these

SKILL	MAPPING													
No.	Course Lear	ning Outcome				1		1		1	ES (I			
110.		-	1	2	3	4	5	6	7	8	9	10	11	12
CO1	primitives used in B		н											
CO2		zed applications and nd beyond its role as underlying the		Н										
CO3	ledger of events, tr generated through with strong cryptog	ted and replicated ansactions, and data various IT processes raphic guarantees of immutability, and			н									
CO4	Develop the comm presenting differ blockchain	nunication skills by rent topics on										L		
	gh, M- Medium, L-lo							_		_				
	HING LEARNING S													
	g and Learning Activ	rities				E	ngage	emei	nt (h	ours	5)			
Face-to-	-Face Learning Lecture							42	,					
	Practical / Tutorial /	Studio						-	-					
	Student-Centred Le							-						
Self-Dir	rected Learning													
	Non-face-to-face le	arning						42						
	Revision	(*****						21						
Formal	Assessment Prepara Assessment	tions						21						
r'ormar .	Continuous Assessr	nent						2						
	Final Examination	liont						3						
Total								13	1					
TEACH	HING METHODOL	OGY												
Lectures	s, class performance,	Quiz, Viva, Lab tests	s, Rep	ort										
COURS	SE SCHEDULE													
W	eek Lecture			pics						As	sessn	nent I	Meth	ods
1	Lec 1	Need for Distribute				ng								
	Lec 2 Lec 3	Modeling faults and Byzantine Generals			es									
	Lec 5	Consensus algorithm problems			ir sca	labil	ity							
2	Lec 4	Atomic Broadcast,	Conse	ensus							CL	. <b>.</b>	1	
	Lec 5										Cla	iss Te	est I	
	Lec 6		2.5											
3	Lec 7	Byzantine Models of	of faul	t tole	erance	e								
	Lec 8 Lec 9													
4	Lec 10 Lec 11	Hash functions, Puz resistant hash, digit			-	sh, C	Collis	ion						
L	Lec 12	D 11: 1	. ~	1.1		-					~	_		
5	Lec 13 Lec 14 Lec 15	Public key crypto, v Zero-knowledge sy			ando	m fu	nctio	ns,			Cla	iss Te	est 2	
6	Lec 15	Bitcoin blockchain,	the c	haller	າດອະ	and	solut	ione						
U	LAC 10	Dicom Diockenalli,			igus,	anu	sorul	10115	,					

	Lec 17	proof of work, Proof of stake	
	Lec 18		
7	Lec 19	Alternatives to Bitcoin consensus, Bitcoin	
	Lec 20	scripting language and their use	
	Lec 21		
8	Lec 22	Ethereum and Smart Contracts	
	Lec 23		
	Lec 24		
9	Lec 25	The Turing Completeness of Smart Contract	
	Lec 26	Languages and verification challenges	
	Lec 27		Mid Term Exam
10	Lec 31	Using smart contracts to enforce legal contracts,	
	Lec 32	comparing Bitcoin scripting vs. Ethereum Smart	
	Lec 33	Contracts	
11	Lec 28	Hyperledger fabric, the plug and play platform and	
	Lec 29	mechanisms in permissioned blockchain	
	Lec 30		
12	Lec 34	Pseudo-anonymity and anonymity	
	Lec 35		
	Lec 36		
13	Lec 37	Zcash and Zk-SNARKS for anonymity	
	Lec 38	preservation	C1
	Lec 39	•	Class Test 3
14	Lec 40	Attacks on Blockchains – such as Sybil attacks,	
	Lec 41	selfish mining, 51% attacksadvent of algorand,	
	Lec 42	and Sharding based consensus algorithms to	
		prevent these	

Comp	oonents	Grading	СО	Bloom's Taxonomy
1	Test 1-3	20%	CO1	C1, C2,P3,A1
Continuous	Test 1-5	20%	CO2	C2,C3
Assessment (40%)	Class Participation	5%	CO4	C6,A2
	Mid term	15%	CO3	C2-C4
Final	Exam	60%	CO3	C2-C4
Total	Marks	100%		

#### (CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

#### **REFERENCE BOOKS**

- 1. Draft version of "S. Shukla, M. Dhawan, S. Sharma, S. Venkatesan, 'Blockchain Technology: Cryptocurrency and Applications', Oxford University Press, 2019.
- 2. Josh Thompson, 'Blockchain: The Blockchain for Beginnings, Guild to Blockchain Technology and Blockchain Programming', Create Space Independent Publishing Platform, 2017.

# CSE-419: Advanced Algorithm

COU	RSE INFO	ORMATION												
Cours	e Code	: CSE-419	Lectur	re Co	ntac	t Hou	rs	: 3.	00	_	_	_		
Cours	e Title	: Advanced Algorithm	Credit	t Hou	rs			: 3.	00		_	_		
PRE-	REQUISI	TE												
	e Code: Ni e Title: Ni													
		A STRUCTURE												
Outco	me Based	Education (OBE)		_		_				_		_	_	_
RATI	ONALE													
		ivates to implement advance												
		include amortization, ra												
		etwork flow, linear progra hich algorithm will provide											algor	ithms
	ECTIVE		c enferent	resur	101	a spec		prot	JICH		JIICA			
		anced techniques and recog	mize the r	esou	rce r	equire	emer	nts o	f va	rious	aloo	rithm	is and	their
		olve and approximate real-l			1	equit			- vu		a160		und	
		he complexity and design	necessary	y para	amet	ers of	f dif	ferer	nt te	chniq	ues	and	metho	ds of
	ced algorit													
LEAF	RNING O	UTCOMES & GENERIC			1						1			
No.	(Upon c	Course Learning Outcom ompletion of the course, the str able to)		be		loom' xonor		CI	>	CA	K	P	Assess Meth	
CO1	practical requirem	ents of each.	he reso	urce	F	P2, A2	2	-		1	1	-	Т	,
CO2	given tas	the most suitable algor k and then apply it to the pr	oblem.		(	C2-C4	Ļ	2,3	3	5	2	2	MT	', F
CO3	theory o kinds of	rate adequate compreher f intractability and prove problems are intractable.	when cer	rtain	(	C4, C6	5	1,4	1	2	3-	5	F	7
CO4		the communication skill advanced algorithms.	by presen	ting		A2				1			P	r
Quiz; COU Rand Lists; Trees, Appro Comp	ASG – As <b>RSE CON</b> <b>omized Al</b> Amortized , Informate oximation blexity, Te	<b>gorithms:</b> Las Vegas and I Analysis: Different metho tion Theoretic Lower Bo Schemes, Hardness of Ap schniques of designing Fi	n; R - Repo Monte Ca ods, Applic ounds, Ac pproximat ixed Para	ort; F urlo A catior lversa ion; meter	– Fi Algor ns in ary <b>Fixe</b> r Al	rithms Fibor Argun ed Pa gorith	; <b>Ra</b> acci ment <b>ram</b> ms,	MT ndo Hea ts; A eter Exa	- Mi miz aps; App Tr ampl	ed Da Lowo roxin actab les; (	m E ata S er B natio oility Onlin	struction ound on A : Par ne A	tures: s: Dec lgorit amete	Skip cision thms: erized thms:
Data	Structure	alysis, Online Paging Proble s: Linear and Non-linear Me		er Pr		m; Ex	tern		emo		gorn	inms;	Adva	incea
SKIL	L MAPPI	NG												
	C	ourse Learning Outcome	1	2	Р 3	ROG	RAN 5	1 OU 6	JTC 7	OME	S (P 9	O) 10	11	12
No.			of	4	5		5	-	,		/	10	11	

	Lec 11 Lec 12	Amortized Analysis Amortized Analysis										Class	Test 2	2
											i i	~1	-	~
4		Skip Lists												
	Lec 9	Randomized Data S	Struct	ures										
	Lec 8	Monte Carlo Algori			d.)									
3	Lec 7	Monte Carlo Algori	ithm								]			
	Lec 6	Las Vegas Algorith		ontd.	)									
	Lec 5	Las Vegas Algorith										Class	Test	1
2		Randomized Algori									1			
	Lec 2 Lec 3	Fundamental Algor					Algo	rithn	ns					
	Lec 1 Lec 2	Applications of Adv		<u> </u>										
1	Lec 1	Introduction to Adv	ance	d Ala	orith	me					IVIE	thods		
We	ek Lecture	e Topics										essmo		
	SE SCHEDULE	•						-						
		Co-operative and Colla	borat	ive N	letho	d, Pr	oblei	n Ba	sed	Met	hod			
TEACH	ING METHO	DOLOGY												
Total												13	31	
	Final Examinat											3		
. orman	Continuous As	sessment										2	2	
Formal	Assessment	eparations										2	1	
	Revision Assessment Pro	enarations										2 2		
	Non-face-to-fa	ce learning										4		
Self-Dir	rected Learning	1 .											•	
	Student-Centre	d Learning										-		
	Practical / Tuto											-		
	Lecture											4	2	
	-Face Learning										80		(	
	g and Learning										Enga	igeme	nt (ho	ours)
TEACH	HING LEARNI	NG STRATEGY				-								
CO4-PC	D10 Low	Develop communication	on sk	ills th	iroug	h par	ticip	ating	g in c	quiz,	prese	entatio	on etc	
CO3-PC	D1 High	To prove the theory w	ith pr	oper	logic	, eng	ineer	ing	knov	vled	ge is 1	equir	ed	
CO2-PC	D4 High	Optimized algorithm experimentation	can 1	be se	lecte	d by	brea	ıdth	& ć	lepth	n of i	nvesti	gatio	n and
CO1-PC	D10 Medium	In order to give press needed	entati	ion o	n sel	ectiv	e top	oics,	con	ımuı	nicatio	on sk	ills w	vill b
CO1-PC	D2 High	Complexity of analysi	s will	l be re	equir	ed to	find	suita	able	algo	rithm	and r	esour	ce
Mappi	ng Level				Jus	stifica	tion	5						
JUSTIE	FICATION FO	R CO-PO MAPPING												
(H – Hig	gh, M- Medium,	L-low)												
	algorithms.													
CO4		ommunication skill by opics on advanced										L		
	kinds of proble	ems are intractable.												
CO3	comprehension	n of the theory of nd prove when certain	н											
	Demonstrate a													
	then apply if fo	the problem.												
CO2		any given task and	1	1		Н	l I	1	1	1	1	1	i i	1

5	Lec 13	Amortized Analysis Methods (Contd.)	
5	Lec 13 Lec 14	Applications in Fibonacci Heaps	
	Lec 14 Lec 15	Lower Bounds	
6	Lec 15	Decision Trees	-
U	Lec 10 Lec 17	Decision Trees (Contd.)	
	Lec 17 Lec 18	Information Theoretic Lower Bounds	
7	Lec 18	Adversary Arguments	-
/	Lec 19 Lec 20	Adversary Arguments Approximation Algorithms	
	Lec 20 Lec 21	Approximation Algorithms (Contd.)	
8	Lec 22	Approximation Algorithms (Cond.)	
o	Lec 22 Lec 23	Approximation Schemes (Contd.)	
	Lec 25 Lec 24	Hardness of Approximation	
9	Lec 24		-
9	Lec 25 Lec 26	Fixed Parameter Tractability	Class Test 3
	Lec 26 Lec 27	Parameterized Complexity	Class Test 5
10		Parameterized Complexity (Contd.)	-
10	Lec 28 Lec 29	Fixed Parameter Algorithms	
		Techniques of Designing Fixed Parameter Algorithms	
11	Lec 30	Techniques of Designing Fixed Parameter Algorithms	
11	Lec 31	Online Algorithms	
	Lec 32	Online Algorithms (Contd.)	
10	Lec 33	Online Algorithms (Contd.)	_
12	Lec 34	Competitive Analysis	
	Lec 35	Online Paging Problem	
	Lec 36	k-server Problem	Mid Term Exam
13	Lec 37	External Memory Algorithms	
	Lec 38	External Memory Algorithms (Contd.)	
	Lec 39	External Memory Algorithms (Contd.)	_
14	Lec 40	Advanced Data Structures	
	Lec 41	Linear Models	
	Lec 42	Non-linear Models	

			СО	Blooms Taxonomy
Comp	onents	Grading	60	Bioonis Taxonomy
Continuous	Test 1-3	20%	CO1	P2, A2
Assessment	Presentation	5%	CO4	A2
(40%)	Mid term	15%	CO2	C2-C4
Final	Exam	60%	CO2, CO3	C2-C4, C6
Total	Marks	100%		

# (CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

#### **REFERENCE BOOKS**

- 1. An Introduction to Computational Learning Theory -Michael J. Kearns , Umesh Vazirani; The MIT Press (1994)
- 2. Algorithm Design (1st Edition) -Jon Kleinberg, ÉvaTardos; Pearson (2012)
- 3. Randomized Algorithms (1st Edition) -Rajeev Motwani , Prabhakar Raghavan; Cambridge University Press(1995)
- 4. Probability and Computing: Randomized Algorithms and Probabilistic Analysis -Michael Mitzenmacher, Eli Upfal; Cambridge University Press (2005)

#### **COURSE INFORMATION** : CSE-421 Course Code Lecture Contact Hours : 3.00 Course Title : Basic Graph Theory Credit Hours : 3.00 **PRE-REOUISITE** Course Code: Nil Course Title: Nil **CURRICULUM STRUCTURE** Outcome Based Education (OBE) RATIONALE This corse is designed to provide a framework to model a large set of problems in CS for better mathematical structures and pairwise relations between objects **OBJECTIVE** To learn the standard uses of graphs as models and the fundamental theory about graphs with a sense of 1. some of its modern applications To formulate algorithms to solve problems with graph theories 2 LEARNING OUTCOMES & GENERIC SKILLS Course Learning Outcome Bloom's Assessment CP CA KP No. Methods (Upon completion of the course, the students will be able to) Taxonomy Learn the standard uses of graphs as models and the CO1 fundamental theory about graphs with a sense of some of C1, C2 T, F 1, 2 _ _ its modern applications Explain and discuss mathematical proofs, including an 3, CO₂ C2, C6 1 3 T, F appreciation of why this is important. 4.8 Formulate algorithms to solve problems with graph CO3 C3 3.5 5 Mid, F 1 theories Develop the communication skill by presenting topics on CO4 A2 1 Pr operating systems. (CP- Complex Problems, CA-Complex Activities, KP-Knowledge Profile, T – Test; PR – Project; Q – Quiz; ASG - Assignment; Pr - Presentation; R - Report; F - Final Exam, MT- Mid Term Exam) **COURSE CONTENT** Introduction: Graphs and their applications, Basic graph terminologies, Basic operations on graphs, Graph representations, Degree sequence and graphic sequence; Paths and Cycles: Paths, cycles and connectivity, Network flow, Euler tours, Hamiltonian cycles Ear decomposition; Trees: Trees and counting of trees, Distance in graphs and trees, Graceful labelling, Matching and covering, Planar graphs, Digraphs, Graph coloring, Special classes of graphs. SKILL MAPPING PROGRAM OUTCOMES (PO) No. Course Learning Outcome 2 9 10 11 12 3 4 5 6 7 8 1 Learn the standard uses of graphs as models and the fundamental theory CO1 Η about graphs with a sense of some of its modern applications Explain and discuss mathematical CO2 proofs, including an appreciation of why Η this is important. Formulate algorithms to solve problems Н CO3 with graph theories Develop the communication skill by

# CSE-421: Basic Graph Theory

Μ

CO4

(H – High, M- Medium, L-low)

presenting topics on operating systems.

JUSTIFICAT	<b>FION FO</b>	R CO-PO MAPPING	
Mapping	Level	Justifications	
CO1-PO1	High	Recognize the standard uses of graphs and the fundar with a sense of some of its modern applications	mental theory about graphs
CO2-PO4	High	Understand mathematical proofs and apply them in rea	l research problems.
CO3-PO3	High	Develop algorithms to solve problems with graph theory	ries
CO4-PO10	Medium	Develop communication skills through participating in	quiz, presentation etc.
TEACHING	LEARNI	NG STRATEGY	
Teaching and	Learning A	Activities	Engagement (hours)
Face-to-Face	-		
Lect			42
		rial / Studio	
Self-Directed		d Learning	
	-face-to-fac	ce learning	42
Revi			21
	essment Pre	eparations	21
Formal Assess		1	
Cont	tinuous Ass	sessment	2
Final	l Examinat	ion	3
Total			131
TEACHING	METHO	DOLOGY	
Lecture and Assessment.	Discussion	n, Co-operative and Collaborative Method, Problem	n Based Method, Regular
1 100 000 1110 1101			
COURSE SC	CHEDULE	2	
COURSE SC	CHEDULE		
COURSE SC Week	CHEDULE	-	Assessment Methods
	Lecture		Assessment Methods
	Lecture Lec 1 Lec 2	Topics	Assessment Methods
Week	Lecture Lec 1 Lec 2 Lec 3	Topics       Graphs and their applications	Assessment Methods
Week 1	Lec 1 Lec 2 Lec 3 Lec 4	Topics	_
Week	Lec 1 Lec 2 Lec 3 Lec 4 Lec 5	Topics       Graphs and their applications	Assessment Methods Class Test 1
Week 1	Lec 1 Lec 2 Lec 3 Lec 4 Lec 5 Lec 6	Topics         Graphs and their applications         Basic graph terminologies	_
Week 1 2	Lecture           Lec 1           Lec 2           Lec 3           Lec 4           Lec 5           Lec 6	Topics       Graphs and their applications	_
Week 1	Lecture           Lec 1           Lec 2           Lec 3           Lec 4           Lec 5           Lec 6           Lec 7           Lec 8	Topics         Graphs and their applications         Basic graph terminologies	_
Week 1 2	Lecture           Lec 1           Lec 2           Lec 3           Lec 4           Lec 5           Lec 6           Lec 7           Lec 8           Lec 9	Topics         Graphs and their applications         Basic graph terminologies         Basic operations on graphs	_
Week           1           2           3	Lecture           Lec 1           Lec 2           Lec 3           Lec 4           Lec 5           Lec 6           Lec 7           Lec 8           Lec 9           Lec 10	Topics         Graphs and their applications         Basic graph terminologies	_
Week 1 2	Lecture           Lec 1           Lec 2           Lec 3           Lec 4           Lec 5           Lec 6           Lec 7           Lec 8           Lec 9           Lec 10           Lec 11	Topics         Graphs and their applications         Basic graph terminologies         Basic operations on graphs	_
Week           1           2           3	Lecture           Lec 1           Lec 2           Lec 3           Lec 4           Lec 5           Lec 6           Lec 7           Lec 8           Lec 9           Lec 10           Lec 12	Topics         Graphs and their applications         Basic graph terminologies         Basic operations on graphs         Graph representations	_
Week           1           2           3           4	Lecture           Lec 1           Lec 2           Lec 3           Lec 4           Lec 5           Lec 6           Lec 7           Lec 8           Lec 10           Lec 11           Lec 12           Lec 13	Topics         Graphs and their applications         Basic graph terminologies         Basic operations on graphs	_
Week           1           2           3	Lecture           Lec 1           Lec 2           Lec 3           Lec 4           Lec 5           Lec 6           Lec 7           Lec 8           Lec 10           Lec 11           Lec 12           Lec 13	Topics         Graphs and their applications         Basic graph terminologies         Basic operations on graphs         Graph representations	_
Week           1           2           3           4	Lecture           Lec 1           Lec 2           Lec 3           Lec 4           Lec 5           Lec 6           Lec 7           Lec 8           Lec 10           Lec 11           Lec 12           Lec 13           Lec 14	Topics         Graphs and their applications         Basic graph terminologies         Basic operations on graphs         Graph representations         Degree sequence and graphic sequence	_
Week           1           2           3           4           5	Lecture           Lec 1           Lec 2           Lec 3           Lec 4           Lec 5           Lec 6           Lec 7           Lec 8           Lec 9           Lec 10           Lec 12           Lec 13           Lec 15           Lec 16	Topics         Graphs and their applications         Basic graph terminologies         Basic operations on graphs         Graph representations	Class Test 1
Week           1           2           3           4	Lecture           Lec 1           Lec 2           Lec 3           Lec 4           Lec 5           Lec 6           Lec 7           Lec 8           Lec 9           Lec 11           Lec 12           Lec 13           Lec 15           Lec 16	Topics         Graphs and their applications         Basic graph terminologies         Basic operations on graphs         Graph representations         Degree sequence and graphic sequence	Class Test 1
Week           1           2           3           4           5	Lecture           Lec 1           Lec 2           Lec 3           Lec 4           Lec 5           Lec 6           Lec 7           Lec 8           Lec 9           Lec 10           Lec 12           Lec 13           Lec 14           Lec 15           Lec 16           Lec 17	Topics         Graphs and their applications         Basic graph terminologies         Basic operations on graphs         Graph representations         Oraph representations         Degree sequence and graphic sequence         Paths, Cycles, Connectivity	Class Test 1
Week           1           2           3           4           5           6	Lec 1 Lec 2 Lec 3 Lec 4 Lec 5 Lec 6 Lec 7 Lec 8 Lec 9 Lec 10 Lec 11 Lec 12 Lec 13 Lec 14 Lec 15 Lec 16 Lec 17 Lec 18 Lec 19	Topics         Graphs and their applications         Basic graph terminologies         Basic operations on graphs         Graph representations         Degree sequence and graphic sequence	Class Test 1
Week           1           2           3           4           5	Lecture           Lec 1           Lec 2           Lec 3           Lec 4           Lec 5           Lec 6           Lec 7           Lec 8           Lec 9           Lec 10           Lec 12           Lec 13           Lec 15           Lec 16           Lec 17           Lec 18           Lec 20	Topics         Graphs and their applications         Basic graph terminologies         Basic operations on graphs         Graph representations         Oraph representations         Degree sequence and graphic sequence         Paths, Cycles, Connectivity	Class Test 1
Week           1           2           3           4           5           6	Lecture           Lec 1           Lec 2           Lec 3           Lec 4           Lec 5           Lec 6           Lec 7           Lec 8           Lec 9           Lec 10           Lec 11           Lec 12           Lec 13           Lec 14           Lec 15           Lec 16           Lec 19           Lec 20           Lec 21	Topics         Graphs and their applications         Basic graph terminologies         Basic operations on graphs         Graph representations         Oraph representations         Degree sequence and graphic sequence         Paths, Cycles, Connectivity         Network flow	Class Test 1
Week           1           2           3           4           5           6           7	Lecture           Lec 1           Lec 2           Lec 3           Lec 4           Lec 5           Lec 6           Lec 7           Lec 8           Lec 10           Lec 11           Lec 12           Lec 13           Lec 14           Lec 15           Lec 16           Lec 17           Lec 18           Lec 20           Lec 21	Topics         Graphs and their applications         Basic graph terminologies         Basic operations on graphs         Graph representations         Oraph representations         Degree sequence and graphic sequence         Paths, Cycles, Connectivity	Class Test 1
Week           1           2           3           4           5           6	Lecture           Lec 1           Lec 2           Lec 3           Lec 4           Lec 5           Lec 6           Lec 7           Lec 8           Lec 9           Lec 10           Lec 12           Lec 13           Lec 14           Lec 15           Lec 16           Lec 19           Lec 20           Lec 21	Topics         Graphs and their applications         Basic graph terminologies         Basic operations on graphs         Graph representations         Oraph representations         Degree sequence and graphic sequence         Paths, Cycles, Connectivity         Network flow	Class Test 1
Week           1           2           3           4           5           6           7	Lecture           Lec 1           Lec 2           Lec 3           Lec 4           Lec 5           Lec 6           Lec 7           Lec 8           Lec 9           Lec 10           Lec 12           Lec 13           Lec 14           Lec 15           Lec 16           Lec 19           Lec 20           Lec 21           Lec 23           Lec 24	Topics         Graphs and their applications         Basic graph terminologies         Basic operations on graphs         Graph representations         Graph representations         Degree sequence and graphic sequence         Paths, Cycles, Connectivity         Network flow         Euler tours, Hamiltonian cycles, Ear decomposition	Class Test 1 Class Test 2
Week           1           2           3           4           5           6           7	Lecture           Lec 1           Lec 2           Lec 3           Lec 4           Lec 5           Lec 6           Lec 7           Lec 8           Lec 9           Lec 10           Lec 12           Lec 13           Lec 14           Lec 15           Lec 16           Lec 19           Lec 20           Lec 21	Topics         Graphs and their applications         Basic graph terminologies         Basic operations on graphs         Graph representations         Oraph representations         Degree sequence and graphic sequence         Paths, Cycles, Connectivity         Network flow	Class Test 1
Week           1           2           3           4           5           6           7           8	Lecture           Lec 1           Lec 2           Lec 3           Lec 4           Lec 5           Lec 6           Lec 7           Lec 8           Lec 9           Lec 10           Lec 12           Lec 13           Lec 15           Lec 16           Lec 17           Lec 20           Lec 21           Lec 22           Lec 23           Lec 24	Topics         Graphs and their applications         Basic graph terminologies         Basic operations on graphs         Graph representations         Graph representations         Degree sequence and graphic sequence         Paths, Cycles, Connectivity         Network flow         Euler tours, Hamiltonian cycles, Ear decomposition	Class Test 1 Class Test 2

	Lec 29		
	Lec 30		
	Lec 31	Distance in graphs Distance in trees	
11	Lec 32		
	Lec 33		
	Lec 34	Planar graphs	
12	Lec 35		
	Lec 36		Class Test 3
	Lec 37	Digraphs Graph colouring	Class Test 5
13	Lec 38		
	Lec 39		
	Lec 40	Special classes of graphs	7
14	Lec 41		
	Lec 42		

			СО	Placent Taxonomy
Com	ponents	Grading	0	Blooms Taxonomy
			CO1	C1, C2
	Test 1-3	20%	CO2	C2, C6
Continuous			CO3	C3
Assessment (40%)	Class Participation	5%	CO4	A2
	Mid term	15%	CO2	C2, C6
	wild term	13%	CO3	C3
			CO3	C3
Final	Final Exam		CO2	C2, C6
			CO1	C1, C2
Total	Marks	100%		

# (CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

# **REFERENCE BOOKS**

Introduction to graph theory (4th) - Douglas B West
 Introduction to Graph Theory (5th) - Robin J. Wilson, Pearson Education Asia

# CSE-423: Fault Tolerant System

		ORMATION												
Course	ourse Code: CSE-423Lecture Contact Hours: 3.00ourse Title: Fault Tolerant SystemCredit Hours: 3.00													
PRE-I	REQUIS	TE												
	e Code: N													
	e Title: N													
		M STRUCTURE												
		Education (OBE)												
	ONALE													
		otivates to impleme when there is a fail												
		mechanisms.		purt of the	5950	0111 0	ind ne	1P5 1	iii iuu	10 1501	unor		ough v	
OBJE	CTIVE													
		nd isolate faults on	•	-	iccoi	ding	ly to a	achi	eve a	fault	toleı	ant s	system	usin
		ult tolerance design analyse the faults in	-		ahla	and	hiah m	<b>.</b> f.			atam			
		UTCOMES & GE			able	and	mgn-t	jerio	orma	ice sy	stem	1.		
LEAR		Course Learnir						_			Т			
No.		ompletion of the cours to)	se, the studer	nts will be at			oom's konom	-	СР	C A	K	CP	Assess Meth	
CO1	Explain underlying notions of fault tolerance and various aspect of typical design process.						C2		1		4	, 5	Τ, Μ	IT, F
CO2	Analyse	reliability of differe	ent types of	systems.			C4		2		4	, 5	Τ, Μ	ίΤ, F
CO3	Recogni	ze defect avoidance	and circun	nvention.			C5		2		4	, 5	Τ, Μ	IT, F
CO4	Identify	methodologies of h	ardening sy	stems.			C3		2		4	,5	Т, М	IT, F
	Develop the communication skill by presenting topics on Fault Tolerance.						A2			1			Р	r
CO5	•	Problems CA Com	play Activit	tion VD V	2011	ada	Drofi	ilo T	Т	oct • DI	ΣТ	Droio	$at \cdot 0$	
(CP- C Quiz; COUH Introd Tolera Model sequer Faults burst shield	Complex I ASG – As RSE CON luction: I int compu- lling Usin ntial circu in memo- error corr and harde	Introduction of Fau tting, Fundamental ng Probability The its; <b>Test:</b> Fault test ory, memory test pa rection and triple renting, yields enhance	alt Tolerant Definitions cory; <b>Dete</b> generation attern and 1 modular rea	R - Report; systems s, Design ction: Fau for combi reliability; dundancy,	F – i and techi lt d nati <b>Per</b> <b>Def</b>	arch nique etect onal form	itectures to a and so ance defect	n, M res; achi und eque <b>mo</b>	Goa eve locat ential nitor	lid Te l and fault 7 ion in circu <b>ing:</b> s	App Foler 1 co its; 1 elf-c	Exam licat ance mbin F <b>aul</b> check	ion of ; Relia nationa <b>t mode</b> cing cir	Faul bility l and <b>lling</b> cuits
(CP- C Quiz; COUH Introd Tolera Model sequer Faults burst shield	Complex I ASG – As RSE COM Iuction: I Int compu- lling Usin Intial circu in memo- error com	<b>NTENT</b> Introduction of Fau tting, Fundamental ng Probability The its; <b>Test:</b> Fault test iry, memory test pa rection and triple n ening, yields enhance	alt Tolerant Definitions cory; <b>Dete</b> generation attern and 1 modular rea	R - Report; systems s, Design ction: Fau for combi reliability; dundancy,	F – i and techi lt d nati <b>Per</b> <b>Def</b>	arch nique etect onal form	itectures to a and so ance defect	n, M res; achi und eque <b>mo</b>	Goa eve locat ential nitor	lid Te l and fault 7 ion in circu <b>ing:</b> s	App Foler 1 co its; 1 elf-c	Exam licat ance mbin F <b>aul</b> check	ion of ; Relia nationa <b>t mode</b> cing cir	Faul bilit l an <b>lling</b> cuits
(CP- C Quiz; ) COUH Introd Tolera Model sequer Faults burst o shield SKILJ	Complex I ASG – As RSE CON luction: I int compu- lling Usin ntial circu in memo- error corr and harde	Ssignment; Pr – Pres <b>TENT</b> Introduction of Fau- ting, Fundamental ng Probability The its; <b>Test:</b> Fault test pry, memory test par- rection and triple ne ening, yields enhance <b>ING</b>	It Tolerant Definition cory; <b>Dete</b> generation attern and 1 modular re- cement, deg	R - Report; systems s, Design ction: Fau for combi reliability; dundancy,	F – i and techi lt d nati <b>Per</b> <b>Def</b>	arch nique etect onal form ect:	itectures to a and se defecter;	n, M res; achi ind equa to av	Goa eve f locat ential nitor voida	lid Te l and fault 7 ion in circu <b>ing:</b> s	App Toler 1 co its; 1 elf-c lefec	Exam licat ance mbin F <b>aul</b> check t cir	ion of c; Relianationat t mode cing cin cumve	Faul bilit l an <b>lling</b> cuite
(CP- C Quiz; COUH Introd Tolera Model sequer Faults burst shield	Complex I ASG – As RSE CON Iuction: I int compu- lling Usin ntial circu in memo- error corri- and harde L MAPP	Ssignment; Pr – Pres <b>TENT</b> Introduction of Fau- ting, Fundamental ng Probability The its; <b>Test:</b> Fault test pry, memory test pa rection and triple ne ening, yields enhance <b>ING</b> Course Learning O	alt Tolerant Definition eory; <b>Dete</b> generation attern and r modular re- cement, deg	R - Report; Systems s, Design ction: Fau for combi reliability; dundancy, gradation A	F – i and techi lt d nati <b>Per</b> <b>Def</b>	arch nique etect onal form ect:	itectures to a and se defecter;	n, M res; achi ind equa to av	Goa eve d locat ential nitor voida	fid Te l and fault T circu ing: s nce, c	App Toler 1 co its; 1 elf-c lefec	Exam licat ance mbin F <b>aul</b> check t cir	ion of c; Relianationat t mode cing cin cumve	Faul bilit l an <b>lling</b> cuits
(CP- C Quiz; COUI Introd Tolera Model sequer Faults burst o shield SKIL	Complex I ASG – As RSE CON luction: I int compu- ling Usin ntial circu in memo- error corr and harde L MAPP: Explai toleran	Ssignment; Pr – Pres <b>TENT</b> Introduction of Fau- ting, Fundamental ng Probability The its; <b>Test:</b> Fault test pry, memory test pa- rection and triple re- ening, yields enhance <b>ING</b> Course Learning O n underlying notice ce and various asp	alt Tolerant Definition eory; <b>Deten</b> generation attern and 1 modular re- cement, deg utcome	R - Report; s, Design f ction: Fau for combi reliability; dundancy, gradation A	F – 1 and techi lt d nati <b>Per</b> <b>Def</b> llow	arch nique etect onal form fect: vance	itectures to a and so defects;	n, M res; achi und equa t av	Goa eve d locat ential nitor voida	I and fault T ion in circu <b>ing:</b> s nce, c	App Toler 1 co its; 1 lelf-c lefec	Exam licat cance mbin Fault check t cir	ion of ; Relia hationa <b>t mode</b> king cir cumve	Faul bilit l an <b>lling</b> cuits ntior
(CP- C Quiz; COUI Introd Tolera Model sequer Faults burst of shield SKILD No.	Complex I ASG – As RSE CON Iuction: I int compu- lling Usin ntial circu in memo- error corri and harde L MAPP Explai toleran design	Ssignment; Pr – Pres <b>VTENT</b> Introduction of Fau- ting, Fundamental ng Probability The its; <b>Test:</b> Fault test ory, memory test par- rection and triple in ening, yields enhance <b>ING</b> Course Learning O n underlying notic ce and various asp process. se reliability of diff	It Tolerant Definitions eory; <b>Dete</b> generation attern and n modular re- cement, deg utcome	R - Report; Systems s, Design ction: Fau for combi- reliability; dundancy, gradation A 1 ault ical	F – intervention in the second	arch nique etect onal form fect: vance	itectures to a and so defects;	n, M res; achi und equa t av	Goa eve d locat ential nitor voida	I and fault T ion in circu <b>ing:</b> s nce, c	App Toler 1 co its; 1 lelf-c lefec	Exam licat cance mbin Fault check t cir	ion of ; Relia hationa <b>t mode</b> king cir cumve	Faul bilit l an <b>lling</b> cuits ntior

(04	entify meth stems.	nodologies of hardening H							
CO5 De	CO5Develop the communication skill by presenting topics on Fault Tolerance.L								
(H – High,	(H – High, M- Medium, L-low)								
JUSTIFIC	ATION FO	R CO-PO MAPPING							
Mapping	Level	Justifications							
CO1-PO2	High	In order to explain different fault tolerant system, substantiated conclusions using knowledge of engineeri	ing sciences.						
CO2-PO2	High	By analysing reliability of system, graduates will be complex engineering problems.	1 0						
CO3-PO2	High	To recognize defect of system, graduates will have to formulate it and make conclusion.	o research on the system to						
CO4-PO2	High	In order to identify methodologies to harden a system, formulate, research to get conclusion.							
CO5-PO10	Low	As the graduates will have to present on some topic of help them to improve their communication skill.	fault tolerant system, it will						
TEACHIN	G LEARNI	NG STRATEGY							
	nd Learning	Activities	Engagement (hours)						
Face-to-Fac	U								
	ecture	orial / Studio	42						
	udent-Centre		-						
	ed Learning								
	on-face-to-fa	ice learning	42						
	evision		21						
	ssessment Pr	eparations	21						
Formal Ass	2								
	ontinuous As nal Examina		3						
Total			131						
TEACHIN	G METHO	DOLOGY							
Lecture and	l Discussion,	, Co-operative and Collaborative Method, Problem Based	d Method						
COURSES	SCHEDULI	E							
Week	Lecture	Topics	Assessment						
		· ·	Methods						
1	Lec 1 Lec 2	Introduction to Fault Tolerant Systems Goals of Fault Tolerant Computing							
-	Lec 3	Applications of Fault Tolerant Computing							
	Lec 4	Fundamental Definitions							
2	Lec 5	Design Techniques to Achieve Fault Tolerance	Class Test 1						
	Lec 6	Architecture of Fault Tolerant System							
3	Lec 7 Lec 8	Reliability Modeling using Probability Theory Reliability Modeling using Probability Theory							
5	Lec 8 Lec 9	Fault Detection and Location							
	Lec 10	Fault Detection and Location in Sequential Circuit							
4	Lec 11	Fault Detection and Location in Combinational Circu	iit						
	Lec 12	Fault Modelling							
_	Lec 13	Fault Test							
5	Lec 14 Lec 15	Fault Test Generation for Sequential Circuit Fault Te	Class Test 2						
	Lec 15 Lec 16	Generation for Combinational Circuit           Faults in Memory							
6	Lec 10 Lec 17	Memory Test Pattern							
	Lec 18 Lec 19	Memory Test Reliability							

	Lec 20	Performance Monitoring (Contd.)	
	Lec 21	Self-checking circuits	
	Lec 22	Errors	
8	Lec 23	Error Types	
	Lec 24	Error Types (Contd.)	
	Lec 25	Error Correction	Mid Term
9	Lec 26	Burst Error	Exam
	Lec 27	Burst Error Correction	Exam
	Lec 28	N-modular Redundancy	
10	Lec 29	Triple Modular Redundancy	
	Lec 30	Triple Modular Redundancy (Contd.)	
	Lec 31	Defect	
11	Lec 32	Defect Types	
	Lec 33	Defect Avoidance	
	Lec 34	Defect Avoidance (Contd.)	
12	Lec 35	Defect Circumvention	
	Lec 36	Defect Circumvention (Contd.)	Class Test 3
	Lec 37	Hardening Systems	
13	Lec 38	Methods of Hardening	
	Lec 39	Shield Hardening (Contd.)	
	Lec 40	Yields Enhancement	
14	Lec 41	Yields Enhancement (Contd.)	
	Lec 42	Degradation Allowance	

		Grading	СО	Blooms Taxonomy
Comp	Components		00	Dioonis Tuxonomy
Continuous	Test 1-3	20%	CO1-CO4	C2, C3, C4, C5
Assessmen t (40%)	Class Participation	5%	CO5	A2
t (40%)	Mid term	15%	CO1-CO4	C2, C3, C4, C5
			CO1	C2
Final	Exam	60%	CO2	C4
ГШа	Exam	00%	CO3	C5
			CO4	C3
Total	Marks	100%		

# (CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

# **REFERENCE BOOKS**

- Fault-Tolerant Systems, 2nd Edition Israel Koren, C. Mani Krishna (2020)
   Design and Analysis of Fault Tolerant Digital System (1st Edition) Barry W. Johnson; Addison Wesley (1989)
- Dependable Computing: A Multilevel Approach Behrooz Parhami 3.

# CSE-425: Basic Multimedia Theory

	SE INFORMA	TION							
Course		: CSE-425		Lecture		Hours		: 3.00	
Course									
	EQUISITE								
	Code: Nil Title: Nil								
	ICULUM STR	UCTURE							
Outcon	ne Based Educat	ion (OBE)							
RATIC	ONALE								
docume	ent; database, ne	o study the architecture, dif etwork and operating syste edge to implement different	m issues	, traffic and	service				
OBJE	CTIVE								
applicat 2. To re etc. of r	tions for different ecognize and and multimedia appl	alyse different issues - stori ications.	ng, index	10		U		•	
LEAR		MES & GENERIC SKILI	LS						
No.		ourse Learning Outcome etion of the course, the student able to)	s will be	Bloom's Taxonom	y CP	CA	KP	Asses Met	
CO1		the fundamental concep d storing multimedia d ocument.		C1-C2	1	-	1	T,	F
CO2	Analyse diff multimedia d	erent techniques and problocument.		C2, C4	1,2	-	2,3	T, F,	MT
CO3	developing n	apply the knowledge acq nultimedia applications – au encing, video on demand, au	idio and	C3-C5	1,4	-	5	MT AS	
CO4	Develop the	communication skill by pr nputer graphics.	esenting	A2	-	1	-	F	r
Quiz; A COUR Multim Operat Databa	SG – Assignme SE CONTENT redia systems: I ting systems is use issues in mu- ng for a multim e reservation, tra	s, CA-Complex Activities, ant; Pr – Presentation; R - Ro Introduction, Coding and co sues in multimedia: real altimedia: indexing and sto edia document; Networkir affic specification, shaping, rotocols for controlling se	eport; F - ompressio l-time O oring mu <b>ng issues</b> and mon ssions; <b>S</b>	- Final Exam on standards S issues, sy ltimedia dat <b>in multime</b> itoring, adm Security iss	, MT- N Archita Archroni a, disk j edia: Qu ission co ues in	Aid Ter ecture i zation, placemo ality-o pntrol; <b>multin</b>	m Exa ssues i interr ent, dis f-servio <b>Multic</b> nedia:	m) n multir upt han sk sched ce guara casting i digital	nedia dling uling ntees ssues
Session		ption schemes for video	streams;	Multillicu	a appu				video
Session making confere	, partial encry ncing, video on		streams;	Withthicu					video
Session making confere	, partial encry ncing, video on MAPPING	ption schemes for video demand, voice over IP.	streams;						video
Session making confere	, partial encry ncing, video on <b>MAPPING</b> Course (Upon completi	ption schemes for video	streams;	PROGR			ES (PC		video

	Analyse problems		techniques and dia document.		Н										
CO3	Discover acquired application	and apply in develo ons – au cing, video	w the knowledge ping multimedia dio and video on demand, and			Н									
CO4		the commu	inication skill by										L		
	-	ig topics on c edium, L-low	omputer graphics.										В		
	-		PO MAPPING												
Mapı	ping	Level				Ju	ıstifi	catio	ns						
CO1-	PO1	High	Develop a strong understanding the							a the	eory	and	tech	nolog	y by
CO2-	PO2	High	Analyse different		-						-				
CO3-	PO3	High	Develop multimed techniques.	lia ap	plica	ation	s by	anal	ysin	g di	ffere	ent re	quire	ment	s and
CO4-I	PO10	Low	Develop communi	catior	ı ski	lls th	roug	sh pa	rtici	patir	ıg in	pres	entati	on.	
TEACH	ING LE	ARNING ST	RATEGY												
Teaching	g and Lea	rning Activiti	es											agem ours)	
	Lecture	rning / Tutorial / S	tudio										42		
	Student-	Centred Learn													
Self-Dire		rning e-to-face leari	ning										42		
	Revision		iiig										21		
Formal A		ent Preparation	ons											21	
		nt ous Assessme	nt											2	
	Final Exa	amination												3	
Total	INC ME		CV											131	
		THODOLO			M-4	ار م ما	D1	.1	Daa		<b>F</b> = 41= 1	I			
		-	erative and Collabor		Meu	nou,	PIO	hem	Dase			<u>Ju</u>			
COURS	E SCHE	DULE													
Wee	k Le	cture 7	Fopics								Ass	essm	ent N	Aeth	ods
1	Le Le	$\begin{array}{c c} c 1 \\ c 2 \\ \end{array}$	Introduction to Multion for Multimedia System		a Sy	stem	, Ap	plica	tion						
2	Le Le	Lec 3     Coding and Compression Standards, Architecture       Lec 4     Coding and Compression Standards, Architecture       Lec 5     Issues in Multimedia													
3	Le	c 8 1	Operating System Iss ime OS	sues i	n Mı	ultim	edia	, Rea	ıl-						
4	Le Le	c 11	Synchronization Issu	ies, In	terru	ipt H	and	ing							
5	Le Le	c 14	Database Issues in m Storing multimedia c		edia	, Ind	exin	g and	1			Cla	ss Te	st 2	
6		c 15 c 16	Disk placement and	sched	uling	<b>7</b>									

	Lec 17		
	Lec 18		
7	Lec 19	Searching for a multimedia document,	
	Lec 20	Networking issues in multimedia	
	Lec 21	č	
8	Lec 22	Quality of Service guarantees, Resource	
	Lec 23	reservation, traffic specification	
	Lec 24		Mid Term Exam
9	Lec 25	Shaping, monitoring & admission control	
	Lec 26		
	Lec 27		
10	Lec 28	Multicasting issues, Session directories	
	Lec 29		
	Lec 30		
11	Lec 31	Protocol for controlling sessions, Security issues	
	Lec 32	in multimedia	
	Lec 33		
12	Lec 34	Digital water marking, partial encryption schemes	
	Lec 35	for video streams	
	Lec 36		Class Test 3
13	Lec 37	Multimedia application, audio and video	Class Test 3
	Lec 38	conferencing	
	Lec 39		
14	Lec 40	Video on demand, Voice over IP	
	Lec 41		
	Lec 42		

		Grading	СО	Blooms Taxonomy
Comp	Components		60	Dioonis Taxonomy
			CO1	C1-C2
	Test 1-3	20%	CO2	C2, C4
Continuous			CO3	C3-C5
Assessment (40%)	Class Participation	5%	CO4	A2
	Mid term	15%	CO2	C2, C4
	Wha term	13%	CO3	C3-C5
			CO1	C1-C2
Final	Exam	60%	CO2	C2, C4
			CO3	C3-C5
Total	Marks	100%		

# (CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

# **REFERENCE BOOKS**

1. Multimedia: Computing, Communications & Applications (US Edition) - Ralf Steinmetz, Klara Nahrstedt

# **CSE-427: Digital Image Processing**

Com	SE INFORMATION									
	Code : CSE-427		ontact Hours	: 3.00						
Course	Title   : Digital Image Processing	Credit Hou	irs	: 3.00		_				
	EQUISITE									
	Code: Nil									
	Title: Nil									
	ICULUM STRUCTURE									
	ne Based Education (OBE)									
	DNALE									
manipu	Image Processing course is designed lation of television, medical imagin raphy, security, astronomy and remote s	ng modalit								
OBJE	CTIVE									
	lescribe image formation and the role h	numan visua	al system pla	ys in per	ceptior	n of gra	y and colour			
image c		ng of :	nroassi							
	xplain the basic elements and application elect and analyze image sampling and qu			and imp	lication	S.				
	erform Gray level transformations for Ir			unu nup	neution	5.				
LEAR	NING OUTCOMES & GENERIC SK	KILLS								
	Course Learning Outcome		Bloom's				Assessment			
No.	(Upon completion of the course, the studen able to)		Taxonomy	СР	CA	KP	Methods			
CO1	Understand image formation and the rol human visual system in perception of gr		C2	1		3	T, F			
$CO^{2}$	colour image data Evaluate the basic objectives and applic image processing	cations of	C5	2		5	T, M, F			
CO3	Analyze image sampling and quantizati	on	C4	1		3	T, F, PR			
005	requirements and implications	11 by		1			1,1,11			
	Able to develop the communication skill by									
CO4	presenting topics on operating systems									
CO4 (CP- Co										
CO4 (CP- Co Quiz; A	presenting topics on operating systems omplex Problems, CA-Complex Activit									
CO4 (CP- Co Quiz; A COUR Digital Acquisi Nonline (DCT), enhanc techniq	presenting topics on operating systems omplex Problems, CA-Complex Activit ASG – Assignment; Pr – Presentation; R	n, Light an n, Light an n, Some ba irst Fourier T), Wavelet and image	d Electromag sic relationsh Transform at restoration	n, MT- N netic Sp ips betw (FFT), 1 nd sub-t	Aid Terrest ectrum, geen 24 Discrete band de <b>iques</b> ,	m Exar , Image 5 pixel e Cosir compo image	n) e Sensing and s, Linear and ne Transform sition; <b>image</b> compression			
CO4 (CP- Co Quiz; A COUR Digital Acquisi Nonline (DCT), enhanc techniq Segmen	presenting topics on operating systems omplex Problems, CA-Complex Activit ASG – Assignment; Pr – Presentation; R SE CONTENT image fundamentals: visual perception ition, Image Sampling and Quantization ear operations; image transforms: Fi Karhunen and Loeve Transform (KL7 cement in the frequency domain ues, image compression standards:	n, Light an n, Light an n, Some ba irst Fourier T), Wavelet and image	d Electromag sic relationsh Transform at restoration	n, MT- N netic Sp ips betw (FFT), 1 nd sub-t	Aid Terrest ectrum, geen 24 Discrete band de <b>iques</b> ,	m Exar , Image 5 pixel e Cosir compo image	n) e Sensing and s, Linear and ne Transform sition; <b>image</b> compression			
CO4 (CP- Co Quiz; A COUR Digital Acquisi Nonline (DCT), enhanc techniq Segmen	presenting topics on operating systems omplex Problems, CA-Complex Activit ASG – Assignment; Pr – Presentation; R <b>SE CONTENT</b> image fundamentals: visual perception ition, Image Sampling and Quantization ear operations; image transforms: Fi Karhunen and Loeve Transform (KL cement in the frequency domain a ues, image compression standards: intation.	n, Light an n, Light an n, Some ba irst Fourier T), Wavelet and image	d Electromag sic relationsh Transform at transform at e <b>restoration</b> G, H.261, a	n, MT- N netic Sp ips betw (FFT), 1 nd sub-t <b>techni</b> nd H.2	Aid Ter ectrum, reen 24 Discrete pand de <b>ques</b> , 63, <b>Im</b>	m Exar , Image 5 pixel e Cosir compo image <b>aage F</b>	n) e Sensing and s, Linear and he Transform sition; <b>image</b> compression			
CO4 (CP- Co Quiz; A COUR Digital Acquisi Nonline (DCT), enhanc techniq Segmen	presenting topics on operating systems omplex Problems, CA-Complex Activit ASG – Assignment; Pr – Presentation; R <b>SE CONTENT</b> image fundamentals: visual perception ition, Image Sampling and Quantization ear operations; image transforms: Fi Karhunen and Loeve Transform (KL cement in the frequency domain a ues, image compression standards: intation.	n, Light an n, Light an n, Some ba irst Fourier T), Wavelet and image	d Electromag sic relationsh Transform at restoration	n, MT- N netic Sp ips betw (FFT), 1 nd sub-t <b>techni</b> nd H.2	Aid Ter ectrum, reen 24 Discrete pand de <b>ques</b> , 63, <b>Im</b>	m Exar , Image 5 pixel e Cosir compo image <b>aage F</b>	n) e Sensing and s, Linear and ne Transform sition; <b>image</b> compression <b>ilter, Image</b>			
CO4 (CP- Co Quiz; A COUR Digital Acquisi Nonline (DCT), enhance techniq Segmen SKILL	presenting topics on operating systems omplex Problems, CA-Complex Activit ASG – Assignment; Pr – Presentation; R SE CONTENT image fundamentals: visual perception ition, Image Sampling and Quantization ear operations; image transforms: Fit Karhunen and Loeve Transform (KL7 cement in the frequency domain a ues, image compression standards: intation.	- Report; F on, Light an n, Some ba irst Fourier T), Wavelet and image JPEG,MPE	d Electromag sic relationsh Transform at restoration G, H.261, a PROGRA	n, MT- N netic Sp ips betw (FFT), 1 nd sub-t <b>techni</b> nd H.2 <u>MOUT</u>	Aid Ter ectrum, reen 24 Discrete pand de <b>ques</b> , 63, <b>Im</b>	m Exar , Image 5 pixel e Cosir compo image mage F	n) e Sensing and s, Linear and ne Transform sition; <b>image</b> compression <b>ilter, Image</b>			
CO4 (CP- Co Quiz; A COUR Digital Acquisi Nonline (DCT), enhanc techniq Segmen SKILL No.	presenting topics on operating systems         omplex Problems, CA-Complex Activit         ASSG – Assignment; Pr – Presentation; R         SE CONTENT         image fundamentals: visual perception         ition, Image Sampling and Quantization         ear operations; image transforms: Fickarhunen and Loeve Transform (KL2)         rement in the frequency domain and         ues, image compression standards:         intation.         MAPPING         Course Learning Outcome         Understand image formation and the         role of human visual system in         perception of gray and colour image	- Report; F on, Light an n, Some ba irst Fourier T), Wavelet and image JPEG,MPE	d Electromag sic relationsh Transform at restoration G, H.261, a PROGRA	n, MT- N netic Sp ips betw (FFT), 1 nd sub-t <b>techni</b> nd H.2 <u>MOUT</u>	Aid Ter ectrum, reen 24 Discrete pand de <b>ques</b> , 63, <b>Im</b>	m Exar , Image 5 pixel e Cosir compo image mage F	n) e Sensing and s, Linear and ne Transform sition; <b>image</b> compression <b>ilter, Image</b>			

	lyze image san ntization requir			Н									
	lications	ements and		11									
		e communication											
	by presenting										L		
oper	ating systems												
	- Medium, L-lo				_		_	_					
JUSTIFICAT	FION FOR CO	D-PO MAPPING											
Mapping	Level					catio							
CO1 - P01	CO1 – P01HighAmplify depth of knowledge through understanding the image formation and the role of human visual system in perception of gray and color image data is very important.												
CO2 – PO2	High	Understand and a elements and appli	ications	of imag	e pro	ocessi	ng.		•				
CO3 – PO3	High	Understand and in image sampling ar	nd quant	ization	requi	reme	nts a	nd ir	npli	catio	ns.		2
CO4–PO10	High	Develop communi	cation s	kills thr	ough	parti	cipa	ting i	in qu	uiz, p	resen	tation	etc.
TEACHING	LEARNING	STRATEGY											
Teaching and	Learning Activ	vities								Enga	geme	nt (ho	ours)
Face-to-Face	Learning									Ŭ	-	``	
Lect											42	2	
	tical / Tutorial										-		
Stude Self-Directed	ent-Centred Le	anning									-		
	-face-to-face le	arning								42			
Revi		0									2	_	
	ssment Prepara	ations									2	1	
Formal Assess											~		
	inuous Assessi Term Exam	ment									2 1	-	
	Examination										3		
Total											13		
TEACHING	METHODOI	<b>LOGY</b>											
Lecture and D	viscussion, Co-	operative and Colla	lborative	Metho	d, Pr	obler	n Ba	sed N	Aeth	nod			
COURSE SC	HEDULE												
<b>XX</b> 7 1-	T	Tonica										M-41	oda
Week	Lec 1	<b>Topics</b> Digital image fun	damento	als Vie	1191 r	erca	ntion		AS	ssessi	ment	wieth	ous
1	Lec 2 Lec 3	Light and Electro				,cice]	JUOII						
	Lec 4	Image Sensing an	nd Acqui	sition, l	mag	e Sar	nplir	ıg	1				
2	Lec 5	and Quantization								Cl	lass T	est 1	
	Lec 6	pixels		<u> </u>									
a	Lec 7	Linear and Nonlin											
3	Lec 8 Lec 9	transforms, First	rourier	1 ransfe	orm (	rrl)							
	Lec 10	Discrete Cosine 7	Fransfor	m (DCT	])								
4	Lec 11	Karhunen and Lo				Γ)							
	Lec 12												
_	Lec 13	Wavelet Transform								Cl	ass T	est 2	
5	Lec 14												
	Lec 15 Lec 16	Sub-Band Decom	nosition	1									
6	Lec 10 Lec 17	Suo Dana Decon	POSICIÓL										
	1/	1							1				

	Lec 18		
	Lec 19	Image restoration technique, Properties of Noise	
7	Lec 20	Estimation of Noise Parameters	
	Lec 21		
	Lec 22	Filters, Mean Filter, Bandpass and Band reject	
8	Lec 23	Filter, Notch Filter and Inverse Filter	
	Lec 24		
	Lec 25	Color Image Processing, Fundamentals, Models	
9	Lec 26	Smoothing and Sharpening	Mid Term Exam
	Lec 27		
	Lec 28	Image compression techniques, Coding	
10	Lec 29	Redundancy, Measuring Image Information	
	Lec 30		
	Lec 31	Image compression standards, JPEG, MPEG,	
11	Lec 32	H.261, and H.26	
	Lec 33		
	Lec 34	Image Enhancement in the Frequency Domain	
12	Lec 35		
	Lec 36		Class Test 4
	Lec 37	Image Segmentation, Detection of Discontinuities	
13	Lec 38	Thresholding	
	Lec 39		
	Lec 40	Edge Linking, Boundary Detection	
14	Lec 41		
	Lec 42		

Comr	oonents	Grading	СО	Blooms Taxonomy
Comp	onents	Orading	CO1	C2
	Test 1-3	20%	CO2	C5
Continuous Assessment			CO3	C4
(40%)	Class Participation	5%	CO4	A2
	Mid term	15%	CO2	C5
			CO1	C2
Final	Exam	60%	CO2	C5
			CO3	C4
Total	Marks	100%		

# (CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

#### **REFERENCE BOOKS**

1. Digital Image Processing (3rd/2nd Edition) - R. C. Gonzalez and R.E. Woods; Pearson Prentice Hall (2009)

#### **REFERENCE SITE**

# CSE-431: Object Oriented Software Engineering

COUR																		
	SE INFOI	RMATION																
Course		: CSE 431		Lecture Co		ours		.00										
Course		: Object Oriented Software Engine	eering	Credit Ho	urs		: 3	.00										
	EQUISIT	£																
	Code: Nil Title: Nil																	
		STRUCTURE																
		ducation (OBE)																
RATIC				1 .1			-											
		ed Software Engineering course provide the second sec			cepts, p	ropertie	s, rela	tionships	ot									
<b>OBJECT</b>				y.														
		various O-O concepts, their pro-	onerties	relationet	nine alo	no wit	h mo	del/ rep	resen									
	sidering c		operites	, 101401181	nps a10	ng wit		uen 10p	103011									
2. То	design, de	velop and explain various modeling	g techni	iques to mod	del diffe	rent per	rspecti	ves of O	bject									
		tware Design.																
LEAR	NING OU	<b>FCOMES &amp; GENERIC SKILLS</b>																
No.	(Upon co	Course Learning Outcome mpletion of the course, the students wil	ll be	Bloom's	СР	CA	KP	Assess										
		able to)		Taxonomy				Meth	ods									
CO1		various O-O concepts along with t lity contexts.	heir	C1, C2	1		1	Τ,	F									
002		lomain objects, their properties, and	d .		1		1	3.47	- <b>F</b>									
CO2	relations	nips among them.	(	C1, C2, C4	1		1	MT	, F									
CO3		epresent domain constraints on the		C6	3	3	3	Τ,	F									
		nd (or) on their relationships. design solutions for problems on																
<b>GO 1</b>	Develop design solutions for problems on various O-O concepts.C3, C6336T, F																	
CO4	various (	O-O concepts.		0,00	3	5	0	Develop the communication skill by presenting										
CO4 CO5	various C Develop	O-O concepts. the communication skill by present		A2	3	1	0	P										
	various C Develop	O-O concepts.			5	-	0											
CO5 (CP- Co	various ( Develop topics on	D-O concepts. the communication skill by present object oriented software engineerin oblems, CA-Complex Activities, KI	ng. P-Know	A2 vledge Profil	le,T – T	1 est ; PR	– Pro	P ject ; Q -	r									
CO5 (CP- Co	various ( Develop topics on	D-O concepts. the communication skill by present object oriented software engineering	ng. P-Know	A2 vledge Profil	le,T – T	1 est ; PR	– Pro	P ject ; Q -	r									
CO5 (CP- Co Quiz; A	various C Develop topics on omplex Pro SG – Assi	D-O concepts. the communication skill by present object oriented software engineerin oblems, CA-Complex Activities, KI gnment; Pr – Presentation; R - Rep	ng. P-Know	A2 vledge Profil	le,T – T	1 est ; PR	– Pro	P ject ; Q -	r									
CO5 (CP- Co Quiz; A COUR	various ( Develop topics on omplex Pro SG – Assi SE CONT	D-O concepts. the communication skill by present object oriented software engineerin oblems, CA-Complex Activities, Kl gnment; Pr – Presentation; R - Rep ENT	ng. P-Know ort; F –	A2 vledge Profil Final Exam	le,T – To a, MT- N	1 est ; PR /id Ter	– Pro m Exa	P ject ; Q - m)	r -									
CO5 (CP- Co Quiz; A COUR: The of	various ( Develop topics on Domplex Pro SG – Assi SE CONT Dject-orier	D-O concepts. the communication skill by present object oriented software engineerin oblems, CA-Complex Activities, KI gnment; Pr – Presentation; R - Rep	ng. P-Know ort; F – ext of	A2 vledge Profil Final Exam software	le,T – To a, MT- M	1 est ; PR Aid Ter	– Pro m Exa	p ject ; Q - m) nguage,	r 									
CO5 (CP- Co Quiz; A COUR: The of (proced declare	various ( Develop topics on Domplex Pro SG – Assi SE CONT Dject-orier lural) eler and use er	D-O concepts. the communication skill by present object oriented software engineerin oblems, CA-Complex Activities, KI gnment; Pr – Presentation; R - Rep ENT ted approach within the conten- nents of language: what an Eiffer tities (variables) and routines; The	ng. P-Know ort; F – ext of el progr	A2 Vledge Profil Final Exam software e am is, what pts underly	le,T – To a, MT- N engineer t the ins ing the	1 est ; PR Aid Ter. <b>ing, tl</b> truction <b>object</b> -	– Pro m Exa ne lar n set i orient	p ject ; Q - m) nguage, s, and he ted appr	r 									
CO5 (CP- Cc Quiz; A COUR: The ol (procec declare modula	various ( Develop topics on Omplex Pro SG – Assi SE CONT Dject-orier lural) eler and use er rity, inher	D-O concepts. the communication skill by present object oriented software engineerin oblems, CA-Complex Activities, Kl gnment; Pr – Presentation; R - Rep ENT ted approach within the conten- nents of language: what an Eiffer tities (variables) and routines; The itance, and dynamic binding, ca	ng. P-Know ort; F – ext of ext of e concep se stud	A2 Vledge Profil Final Exam software e am is, what pts underly ly from the	le,T – T a, MT- N engineer t the ins ing the e manag	1 est ; PR Aid Ter ting, tl struction object- gement	– Pro m Exa ne lar n set i orient inform	P ject ; Q - m) nguage, s, and he ted appr mation-s	r 									
CO5 (CP- Cc Quiz; A COUR The of (procec declare modula domain	various C Develop topics on SG – Assi SE CONT Dject-orier lural) eler and use er rity, inher ; Environ	<ul> <li>O concepts.</li> <li>the communication skill by present object oriented software engineering oblems, CA-Complex Activities, KI gnment; Pr – Presentation; R - Rep</li> <li>ENT</li> <li>ted approach within the content nents of language: what an Eiffer titties (variables) and routines; The itance, and dynamic binding, car ment matters: system configuration</li> </ul>	ng. P-Know ort; F – ext of ext of concep se stud ion, int	A2 /ledge Profil Final Exam software e am is, what pts underly ly from the terfacing wi	engineer t the ins ing the e manag ith exter	1 1 Aid Ter. ring, tl struction object- gement rnal sof	– Pro m Exa ne lar n set i orient inform ftware	p ject ; Q - m) nguage, s, and he ted appr mation-s , and ga	r basi ow to oach yster rbag									
CO5 (CP- Cc Quiz; A COUR The ol (procec declare modula domain collectio	various C Develop topics on SG – Assi SE CONT Dject-orier lural) eler and use er rity, inher ; Environ on. Advan	<ul> <li>O concepts.</li> <li>the communication skill by present object oriented software engineering oblems, CA-Complex Activities, KI gnment; Pr – Presentation; R - Rep</li> <li>ENT</li> <li>ted approach within the contonents of language: what an Eiffer tities (variables) and routines; The itance, and dynamic binding, cament matters: system configuration configuration of the system configuration of th</li></ul>	ng. P-Know ort; F – ext of ext of e concep se stud ion, inte peated	A2 /ledge Profil Final Exam software e am is, what pts underly ly from the terfacing wi inheritance	engineer t the ins ing the managith exten , typing	ting, tl struction object- gement rnal soi	ne lar ne lar n set i orient inforn ftware ms, ar	pect ; Q - m) nguage, s, and he ted appr mation-s , and ga ad paralle	r basic ow to oach yster rbage elism									
CO5 (CP- Cc Quiz; A COUR: The ol (procec declare modula domain collectio Object-	various C Develop topics on SG – Assi SE CONT oject-orier lural) eler and use er rity, inher ; Environ on. Advan- oriented	<ul> <li>O concepts.</li> <li>the communication skill by present object oriented software engineering</li> <li>blems, CA-Complex Activities, Klignment; Pr – Presentation; R - Rep</li> <li>ENT</li> <li>ted approach within the contrainents of language: what an Eiffer</li> <li>tities (variables) and routines; The</li> <li>titance, and dynamic binding, ca</li> <li>ment matters: system configuration</li> <li>ced issues: exception handling, resoftware engineering process:</li> </ul>	ng. P-Know ort; F – ext of el progr concep se stud ion, int epeated concen	A2 /ledge Profil Final Exam software e am is, what pts underly ly from the terfacing wi inheritance ttrating on	engineer t the ins ing the e manage ith exter , typing specific	ting, the struction object- gement runal soft problement of the structure object objec	ne lar n Exa n set i orient inform ftware ms, ar lines,	pect ; Q - m) nguage, s, and he ted appr mation-s , and ga ad paralle facilitat	r 									
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CO3		s and (	t domain constraints on or) on their H								
CO4		lesign	solutions for problems H								
CO5	Develop the	he con g topic:	nmunication skill by s on object oriented					L			
(H – Hi	igh, M- Med	-	· ·								
JUSTI	FICATION	J FOR	CO-PO MAPPING								
Mapp	oing L	evel	Justi	fications							
CO1-PO1 High Understand where to appropriately apply different conce										fere	
CO2-PO		High	context through a strong level of know Design and conduct experiments by id domains, their attributes and different a	entifying	relev	vant c	lata obj			ere	
CO3-PO2 High Derive a model or representation for a solution certain constraints on data objects and their relation						spec		and ii	nterpi	etir	
CO4-PO	ОЗ Н	Iigh	Design and develop different solution through a detailed knowledge on vario	ons basin	ig of	n the					
CO5-PO	D10 L	Low	Develop communication skills through								
ГЕАСІ	HING LEA	RNIN	G STRATEGY								
Teaching and Learning Activities         Face-to-Face Learning         Lecture         Practical / Tutorial / Studio         Student-Centred Learning						Engagement (hours) 42 -					
Self-Di	rected Learn	ning						-			
	Non-face- Revision Assessme						42 21 21				
Formal	Assessment							21			
	Continuou							2			
Fotal	Final Exa	minati	on					3 131			
Total	UINC MET							151			
TEACI		TUOD									
			OLOGY	D 11		13.6	.1 1				
Lecture		ssion, <b>C</b>	OLOGY Co-operative and Collaborative Method,	Problem ]	Base	d Me	thod				
Lecture COUR	and Discus	ssion, ( DULE	Co-operative and Collaborative Method,	Problem 1	Base	d Me					
Lecture	and Discus	ssion, ( DULE		Problem 1	Base	d Me	As	ssessn			
Lecture COUR	and Discus	ssion, ( DULE ture	Co-operative and Collaborative Method, Topics	Problem 1	Base	d Me	As	ssessn Metho			
Lecture COUR Wee	e and Discus SE SCHED ek Lect	ssion, O DULE ture	Co-operative and Collaborative Method, Topics Object-oriented approach	Problem 1	Base	d Me	As				
Lecture COUR	e and Discus SE SCHED ek Lect	ssion, <b>OULE</b> ture	Co-operative and Collaborative Method, Topics Object-oriented approach Object-oriented approach (Contd.)	Problem 1	Base	d Me	As				
Lecture COUR Wee	e and Discus SE SCHED ek Lect 1 2 3	ssion, C DULE ture 1 2 3	Co-operative and Collaborative Method, Topics Object-oriented approach Object-oriented approach (Contd.) Object-oriented approach (Contd.)		Base	d Me	As				
COUR Wee	e and Discus SE SCHED ek Lect 1 2 3 3 4	ssion, C DULE ture 1 2 3 4	Co-operative and Collaborative Method, Topics Object-oriented approach Object-oriented approach (Contd.) Object-oriented approach (Contd.) Basic (procedural) elements of language	2		d Me	As N		ods		
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Lecture COUR Wee	e and Discus SE SCHED ek Lect 1 2 3 3 4	ssion, ( DULE ture 1 2 3 4 5 5	Co-operative and Collaborative Method, Topics Object-oriented approach Object-oriented approach (Contd.) Object-oriented approach (Contd.) Basic (procedural) elements of language Basic (procedural) elements of language	e e (Contd.)		d Me	As N	Metho	ods		
Lecture COUR Wee 1	e and Discus SE SCHED ek Lect 1 2 3 4 5 6 7	ssion, ( DULE ture 1 2 3 4 5 5 7	Co-operative and Collaborative Method, Topics Object-oriented approach Object-oriented approach (Contd.) Object-oriented approach (Contd.) Basic (procedural) elements of language Basic (procedural) elements of language Eiffel program	e e (Contd.)		d Me	As N	Metho	ods		
Lecture COUR Wee	e and Discus SE SCHED ek Lect 1 2 3 4 5 6 7 8	ssion, <b>OULE</b> ture 1 2 3 4 5 5 7 3	Co-operative and Collaborative Method, Topics Object-oriented approach Object-oriented approach (Contd.) Object-oriented approach (Contd.) Basic (procedural) elements of language Basic (procedural) elements of language	e e (Contd.)		d Me	As N	Metho	ods		
Lecture COUR Wee 1	e and Discus SE SCHED ek Lect 1 2 3 4 5 6 7 8 9	ssion, ( <b>DULE</b> ture 1 2 3 4 5 5 5 7 8 9 0	Co-operative and Collaborative Method, Topics Object-oriented approach Object-oriented approach (Contd.) Object-oriented approach (Contd.) Basic (procedural) elements of language Basic (procedural) elements of language Easic (procedural) elements of language Eiffel program Instruction set Entities (variables) and routines	e e (Contd.)		d Me	As N	Metho	ods		
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	14	Dynamic binding	
	15	Management information-system domain	
	16	Environment matters: system configuration	
6	17	Environment matters: system configuration (Contd.)	
	18	Environment matters: system configuration (Contd.)	
	19	Interfacing with external software	
7	20	Garbage collection	
	21	Garbage collection (Contd.)	
	22	Advanced issues involving exception handling	
8	23	Advanced issues involving exception handling (Contd.)	
	24	Advanced issues involving exception handling (Contd.)	Mid Term Exam
	25	Repeated inheritance	
9	26	Typing problems	
	27	Typing problems (Contd.)	
	28	Parallelism	
10	29	O-O software engineering process	
	30	O-O software engineering process (Contd.)	
	31	OOAD to a maintainable Addresses verification	
	32	OOAD to a maintainable Addresses verification	
11		(Contd.)	
	33	OOAD to a maintainable Addresses verification	
		(Contd.)	
	34	OOAD to Address validation (V&V)	
12	35	Issues of Eiffel software systems	
	36	Issues of Eiffel software systems (Contd.)	
	37	Building reusable libraries	Class Test 3
13	38	Building reusable libraries (Contd.)	
	39	Building reusable libraries (Contd.)	
	40	The building of a parallel linear algebra library	
		(Paladin)	
14	41	The building of a parallel linear algebra library	
14		(Paladin) (Contd.)	
	42	The building of a parallel linear algebra library	
		(Paladin) (Contd.)	

Comp	oonents	Grading	СО	Blooms Taxonomy
			CO1	C1, C2
Cantinuana	Test 1-3	20%	CO3	C6
Continuous Assessment			CO4	C3, C6
(40%)	Class Participation	5%	CO5	A2
	Mid Term	15%	CO2	C1, C2, C4
			CO1	C1, C2
Einal	Exam	60%	CO2	C1, C2, C4
ГШа	Exam	00%	CO3	C6
			CO4	C3, C6
Total	Marks	100%		

# (CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

#### **REFERENCE BOOKS**

- Object-Oriented Software Engineering (1st Edition) by Stephen Schach
   Object Oriented Software Engineering: A Use Case Driven Approach (1st Edition) by Ivar Jacobson

3. Object-Oriented Software Engineering: Practical Software Development using UML and Java (2nd Edition) by Timothy Lethbridge and Robert Laganiere

# **REFERENCE SITE**

# **CSE-433:** Artificial Neural Networks and Fuzzy Systems

COURSE INFOR	MATION								
Course Code	: CSE 433	Lecture Contact Hours	: 3.00						
Course Title	: Artificial Neural Networks and Fuzzy Systems	Credit Hours	: 3.00						
PRE-REQUISITE									
Course Code: Nil									

Course Title: Nil

# **CURRICULUM STRUCTURE**

Outcome Based Education (OBE)

#### RATIONALE

Artificial Neural Networks and Fuzzy Systems course is designed for reasoning complex situations by the artificial agents with the help of neural network and fuzzy system provides better performance.

#### **OBJECTIVE**

1. To develop the skills on neural network theory and fuzzy logic theory and explore the functional components of neural network classifiers or controllers, and the functional components of fuzzy logic classifiers or controllers.

2. To design and implement basic trainable neural network or a fuzzy logic system for a typical control, computing application or biomedical application.

LEARN	ING OUTCOMES & GENERIC SKILLS					
No.	Course Learning Outcome (Upon completion of the course, the students will be able to)	Bloom's Taxonomy	СР	CA	KP	Assessment Methods
CO1	Develop the skills to gain a basic understanding of neural network theory and fuzzy logic theory.	C1, C5	1	1	1, 2, 3, 4	T, F
CO2	Explore the functional components of neural network classifiers or controllers, and the functional components of fuzzy logic classifiers or controllers.	C3, C4	3	1	1, 2, 3, 4	MT, F
CO3	Select and implement a basic trainable neural network or a fuzzy logic system for a typical control, computing application or biomedical application.	C1-C3, A1			8	T, ASG, F
CO4	Develop the communication skill by presenting topics on artificial neural networks and fuzzy systems.	A2		1		Pr

(CP- Complex Problems, CA-Complex Activities, KP-Knowledge Profile, T – Test ; PR – Project ; Q – Quiz; ASG – Assignment; Pr – Presentation; R - Report; F – Final Exam, MT- Mid Term Exam)

# COURSE CONTENT

**Biological nervous system:** the brain and neurons, Introduction to artificial neural network and fuzzy systems, Theory and application of Artificial neural networks and fuzzy logic; **Multi-layer perception:** Back propagation algorithm, Self-organization map, Radial basis network, Hop field network, Recurrent network, Fuzzy set theory, Failing Adaptive Linear (ADALINE) and Multiple Adaptive Linear

(MADALINE) networks, Generating internal representation, Cascade correlation and counter propagation networks, Higher order and bi-directional associated memory, Lyapunov energy function, attraction basin, **Probabilistic updates:** simulated annealing, Boltzmann machine, Adaptive Resonance Theory (ART) network. ARTI. ART2. Fuzzy ART mapping (ARTMAF) networks. Kohonen feature. **Learning Vector Quantization (LVQ) networks, Logic control:** Adaptive fuzzy neural network; Genetic algorithm and evolution compacting, Applications to control; Pattern recognition; Nonlinear system modeling, Speech and image processing.

#### SKILL MAPPING

No.	Course Learning Outcome			PI	ROG	RAM	101	JTC	OM	ES	(PO)		
INU.	Course Learning Outcome	1	2	3	4	5	6	7	8	9	10	11	12
CO1	Develop the skills to gain a basic understanding of neural network theory and fuzzy logic theory.	Н											
CO2	Explore the functional components of neural network classifiers or controllers, and the functional components of fuzzy logic classifiers or controllers.		Н										
CO3	Select and implement a basic trainable neural network or a fuzzy logic system for a typical control, computing application or biomedical application.				Н								
CO4	Develop the communication skill by presenting topics on artificial neural networks and fuzzy systems.										L		

# (H-High, M-Medium, L-low)

# JUSTIFICATION FOR CO-PO MAPPING:

JUSTIFICA	TION FU	K CO-PO MAPPING:					
Mapping	Level	Justifications					
CO1-PO1	High	Apply engineering knowledge to develop the skills to gain of neural network theory and fuzzy logic theory.	a basic understanding				
CO2-PO2	High	Explore the functional components of neural network classi need to analyze, design and conduct experiments.	fiers or controllers we				
CO3-PO4	High	application or biomedical application.					
CO4-PO10 Low Develop strong communication skills through presentation on the selective topics from the course taught.							
TEACHING LEARNING STRATEGY							
Teaching and	Learning	Activities	Engagement (hours)				
Face-to-Face	0						
Lect			42				
		orial / Studio	-				
		ed Learning	-				
Self-Directed							
		ace learning	42				
	ision		21				
		reparations	21				
Formal Asses							
		ssessment	2				
	l Examina	ation	3				
Total			131				
TEACHING							
Lecture and Discussion, Co-operative and Collaborative Method, Problem Based Method							

Week	Lecture	Topics				Assessment Methods		
1	Lec 1 Lec 2 Lec 3	Biologica	al nervous syste	em: the brain and neurons				
2	Lec 4 Lec 5 Lec 6	Introduct	ion to artificial	neural network and fuzzy sys	stems	Class Test 1		
3	Lec 7 Lec 8 Lec 9	Theory a logic	heory and application of Artificial neural networks and fuzzy gic					
4	Lec 10 Lec 11 Lec 12	Multi-layer perception, Back propagation algorithm, Self- organization map						
5	Lec 13 Lec 14 Lec 15	Radial ba	asis network, He	op field network, Recurrent n	nt network Class Test 2			
6	Lec 16 Lec 17 Lec 18			g Adaptive Linear (ADALINI ar (MADALINE)	Ξ),			
7	Lec 19 Lec 20 Lec 21		ng internal repro propagation net					
8	Lec 22 Lec 23 Lec 24		Higher order bi-directional associated memory, Lyapunov energy function					
9	Lec 25 Lec 26 Lec 27		Attraction basin, Probabilistic updates: simulated annealing,         Mid           Boltzmann machine         Image: Simulated annealing,         Image: Simulated annealing,					
10	Lec 31 Lec 32 Lec 33	Adaptive	Resonance The	eory (ART) network. ARTI. A	ART2.			
11	Lec 28 Lec 29 Lec 30	Fuzzy Al networks	11 0 1	RTMAF), Kohonen feature, l	LVQ			
12	Lec 34 Lec 35 Lec 36	Logic co	ntrol: adaptive	fuzzy neural network		Class Test 3		
13	Lec 37 Lec 38 Lec 39	Genetic a control	llgorithm and e	volution compacting, Applica	ations to			
14	Lec 40 Lec 41 Lec 42	Pattern recognition; Nonlinear system modeling, Speech and image processing						
SSESS	MENT S	FRATEGY	7					
				СО	Plas	ms Taxonom.		
	Compone	nts Fest 1-3	Grading 20%	CO1	B1001	ms Taxonomy		
Continu Assessi	ious	Class ticipation5%CO3C1-C3A2						

15%

Mid term

CO2

C3, C4

		CO1	C1, C5
Final Exam	60%	CO2	C3, C4
		CO3	C1-C3, A1
Total Marks	100%		

# (CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

# **REFERENCE BOOKS**

Neural Networks and Fuzzy Systems - Shigeo Abe
 Introduction to Artificial Neural Systems - Jacek M. Zurada

3. Artificial neural systems: foundations, paradigms, applications, and implementations - Patrick K. Simpson

#### **REFERENCE SITE**

# **CSE-435: Distributed Algorithms**

COURSE INFORMATION										
	se Code	: CSE-435	Lecture Contac	et Hours	: 3.00					
Course Title     : Distributed Algorithms     Credit Hours     : 3.00										
	PRE-REQUISITE									
	Course Code: Nil Course Title: Nil									
CUR	CURRICULUM STRUCTURE									
Outco	ome Based	Education (OBE)								
RATI	IONALE									
The Distributed Algorithms course is designed to study of basic techniques in the design and development of Distributed Systems and understanding solutions of the fundamental problems in distributed systems. The course begins with different models of distributed computing and then covers essential concepts of distributed algorithms.										
OBJE	ECTIVE									
1. T	o underst	and the limitations and fundation	amental concept	s in the area	of me	ssage	passin	g and shared		
	•	ncurrency.		1						
		e concepts to the example sys		nms.						
LEA	KNING U	UTCOMES & GENERIC S			<b>1</b>	1				
No.	(Upon c	Course Learning Outcom ompletion of the course, the stude to)		Bloom's Taxonomy	СР	CA	KP	Assessment Methods		
CO1		and the limitations and s in the area of message pass concurrency		C1	1		1	Т		
CO2	Apply t algorith	he concepts to the example	e systems and	C3	2		4	МТ		
CO3	parallel	and design algorithms for and distributed settings		C2,C3,C5	3		5	T,F		
CO4	security	the algorithms for correctne and performance	-	C4	3		2	F		
CO5	CO5Be able to develop communication skill by presenting topics on distributed algorithms.A21Pr									
	(CP- Complex Problems, CA-Complex Activities, KP-Knowledge Profile, T – Test ; PR – Project ; Q – Quiz; ASG – Assignment; Pr – Presentation; R - Report; F – Final Exam, MT- Mid Term Exam)									

#### **COURSE CONTENT**

**Models of distributed computing**: Synchrony communication, Failure concerns, Synchronous messagepassing; **Distributed systems**: Algorithms in systems with no failures-Leader Election, Breadth-First Search algorithms; **The atomic commit problem**: Consensus problems-the Byzantine Generals Problem; **Asynchronous message-passing of distributed systems**: Failure detectors I, Failure detectors II, **Logical time Vector clocks:** Routing algorithm

#### SKILL MAPPING

N	No. Course Learning Outcome			Р	ROG	RAN	101	JTC	OMI	ES (P	0)		
INO.			2	3	4	5	6	7	8	9	10	11	12
CO1	Understand the limitations and fundamental concepts in the area of message passing and shared memory concurrency	Н											
CO2	Apply the concepts to the example systems and algorithms	Н											
CO3	Adapt and design algorithms for execution in parallel and distributed settings			М									
CO4	Analyse the algorithms for correctness, reliability, security and performance		Η										
CO5	Be able to develop communication skill by presenting topics on distributed algorithms.										L		

# (H-High, M-Medium, L-low)

#### JUSTIFICATION FOR CO-PO MAPPING

Mapping	Level	Justifications						
CO1-PO1	High	Increase the breadth and depth of knowledge by understanding the fundamental concepts in the area of message passing and shared memory concurrency						
CO2-PO1	High	Improve the breadth and depth of knowledge by applying the concepts to the example systems and algorithms						
CO3-PO3	Medium	Adapt and design algorithms for execution in parallel and distributed settings in which solutions have previously been identified and coded						
CO4-PO2	High	Improving the skill of problem analysis by analysing the algorithms for correctness, reliability, security and performance						
CO5- PO10	Low	Develop communication skills through participating in presentation.						

# TEACHING LEARNING STRATEGY

Teaching and Learning Activities	Engagement (hours)			
Face-to-Face Learning				
Lecture	42			
Practical / Tutorial / Studio	-			
Student-Centred Learning	-			
Self-Directed Learning				
Non-face-to-face learning	42			
Revision	21			
Assessment Preparations	21			
Formal Assessment				
Continuous Assessment	2			
Final Examination	3			
Total	131			
TEACHING METHODOLOGY				
Lecture and Discussion, Co-operative and Collaborative Method, Problem Based Method				

Week	Lecture		Topics	Assessment Method		
	Lec 1					
1		Models of distrib	outed computing			
	Lec 3					
	Lec 4	Synchrony comn				
2		Class Test 1				
	Lec 6					
	Lec 7					
3		Failure concerns				
	Lec 9					
	Lec 10		_			
4		Synchronous me	ssage-passing			
	Lec 12					
_	Lec 13 Lec 14					
5	stems					
	Lec 15			Class Test 2		
_	Lec 16	Algorithms in sy	C1000 1 000 2			
6	Lec 1/	Election				
	Lec 18					
_	Lec 19					
7		Breadth-First Sea	arch algorithms			
	Lec 21					
0	Lec 22					
8		The atomic com				
	Lec 24					
0	Lec 25	Consensus probl	ems - the Byzantine Generals			
9	Lec 20	Problem	5	Mid Term Exam		
	Lec 27					
	Lec 31	Asynchronous m				
10		systems				
	Lec 33	systems				
	Lec 28					
11	Lec 29	Failure detectors				
	Lec 30					
	Lec 34					
12	Lec 35	Failure detectors				
	Lec 36		Close Test 2			
	Lec 37			Class Test 3		
13		Logical time Veo	ctor clocks			
	Lec 39					
	Lec 40					
14		Routing algorith	ms			
	Lec 42					
SESSMENT	T STRATEGY					
Comp	onents	Grading	CO	Blooms Taxonomy		
201110			C1			
ontinuous Test 1-3 20% CO1 CO3				C2,C3,C5		
Assessment	Class	1				
(40%)	Participation	5%	CO5	A2		
(,	Mid term	15%	CO2	C3		
			CO2 CO3	C2,C3,C5		
Final	Exam	60%	CO3	<u>C2,C3,C3</u> C4		
	Marks	100%	0.04	C+		

# (CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

# **REFERENCE BOOKS**

Distributed Systems - S. Mullender (ed.), Addison-Wesley
 Introduction to Distributed Algorithms - G. Tel. Cambridge Univ. Press

# **REFERENCE SITE**

# **CSE-437: Bioinformatics**

COURSE INFORMATION										
	e Code	: CSE-437 : Bioinformatics	Lecture Contac Credit Hours	et Hours	: 3.0					
Course Title     : Bioinformatics     Credit Hours     : 3.00       PRE-REQUISITE										
	-									
	e Code: N e Title: N									
		M STRUCTURE								
Outco	me Based	Education (OBE)								
RATI	IONALE									
This course is designed to introduce bioinformatics at a level appropriate for computer science majors having an interest in computational biology. The main course includes (but not limited to) bioinformatics databases, phylogenetics, protein structure prediction, multiple sequence alignment, genome assembly, application of machine learning in computational biology, security and privacy for genomic data, etc.										
OBJE	ECTIVE									
<ol> <li>To familiarize with vast amounts of biomedical and genomic data and the use of computational power of analyze those data.</li> <li>To impart a solid understanding of the field of bioinformatics sequence analysis, phylogenetics, protein structure prediction, different topics of molecular biology and their application in medical science.</li> <li>To familiarize with the application of machine learning in computational biology, security and privacy for genomic data etc.</li> </ol>										
	*	OUTCOMES & GENERIC S	KILLS							
No.	(Upon c	Course Learning Outcom ompletion of the course, the stud- to)		Bloom's Taxonomy	СР	CA	KP	Assessment Methods		
C01		t for and use of biomedical an as the use of computational po ta.		C1, C2	1	-	3	T, F		
CO2	sequenc	methods in sequence bioinfor e alignment, phylogenetic ecognition.		C4, P1	3	-	2	T, Mid Term Exam, F		
CO3	Analyze and compile results of bioinformatic T, Mid									
CO4	CO4Solve given biological problems by using appropriate bioinformatic methods and databases.P1, C62, 31, 25PR, F									
	(CP- Complex Problems, CA-Complex Activities, KP-Knowledge Profile, T – Test; PR – Project; Q – Quiz; ASG – Assignment; Pr – Presentation; R - Report; F – Final Exam, MT- Mid Term Exam)									

#### **COURSE CONTENT**

Introduction to Bioinformatics: The central dogma of biology: DNA, RNA, Sequence alignment: Genomic sequences, Scoring matrices. Pairwise alignment. Online databases: BLAST, Advanced BLAST, Molecular phylogeny: Sequence alignment with dot matrix, Alignment visualization, Optimal alignment using dynamic programming method, Analyzing and sequencing nucleic acids, Structure and hierarchy of proteins: Principles of protein structure, protein secondary structure prediction, Protein tertiary structure prediction, Introduction to phylogenetics: drawing tree diagrams, tree building methods, Constructing phylogenetics tree: Stepwise clustering, Fitch Margoliash method, Maximum parsimony and maximum likelihood method, Ancestral studies using phylogeny, DNA replication: transcription, translation, Multiple sequence alignment, DNA digital data storage: DNA-based Archival Storage System. Human variation and disease: Sequence variation, phenologs, comparative genomics, and Personalized medicine.

# SKILL MAPPING

No.	Course Learning Outcome			PI	ROG	RAM	1 OI	JTC	OM	ES (I	20)		
INO.	Course Learning Outcome	1	2	3	4	5	6	7	8	9	10	11	12
CO1	Account for and use of biomedical and genomic data as well as the use of computational power to analyze those data.				Н								
CO2	Percept methods in sequence bioinformatics such as sequence alignment, phylogenetic analysis and pattern recognition.	Н											
CO3	Analyze and compile results of bioinformatic analyses, such as protein structure prediction, molecular biology etc.		Н										
CO4	Solve given biological problems by using appropriate bioinformatic methods and databases.			Н									

# (H – High, M- Medium, L-low)

JUSTIFICA	JUSTIFICATION FOR CO-PO MAPPING							
Mapping	Level	Justifications						
CO1-PO4	High	In-depth investigation and experimentation can be done by figure out medical data and by perceiving the use of computational power to understand them.						
CO2-PO1	High	n-depth engineering knowledge can be perceived through understanding different bioinformatics algorithm, e.g., sequence alignment, phylogenetic analysis and battern recognition.						
CO3-PO3	High	Complexity of an engineering problem can be realized by inspecting results of bioinformatics algorithms.						
CO4-PO3	High	The skill on designing and developing engineering solutions could be developed by solving given biological problems by using appropriate bioinformatic methods and databases.						
TEACHIN	G LEARN	ING STRATEGY						
Teaching an	d Learning	Activities	Engagement (hours)					
Face-to-Fac	e Learning							
Le	cture		42					
	Practical / Tutorial / Studio -							
	Student-Centered Learning -							
	Self-Directed Learning							
		ace learning	42					
	vision		21					
As	sessment P	reparations	21					

3 131 od sessment Methods Class Test-1
od sessment Methods
sessment Methods
sessment Methods
Class Test-1
Class Test-1
Class Test-1
01400 1000 1
Mid Term Exam
Class Test-2
Class Test-2
Class Test-2
_

clustering, Fitch Margoliash method

Ancestral studies using phylogeny

Multiple sequence alignment.

Storage System.

medicine.

Constructing phylogenetics tree: Maximum

parsimony and maximum likelihood method,

DNA replication, transcription, translation,

DNA digital data storage, DNA-based Archival

Human variation and disease. Sequence variation,

phenologs, comparative genomics. Personalized

Class Test-3

Lec 30 Lec 31

Lec 32

Lec 33 Lec 34

Lec 35

Lec 36

Lec 37

Lec 38

Lec 39 Lec 40

Lec 41

Lec 42

11

12

13

14

r				
С	omponents	Grading	CO	Blooms Taxonomy
	Test 1-3	20%	CO1	C1, C2
Continuous	Test 1-5	20%	CO3	C4, C5
Assessment (40%)	Class Performance/Project	5%	CO4	C6, P1
	Mid term	15%	CO2	C4, P1
			CO1	C1, C2
F	inal Exam	60%	CO2	C4, P1
			CO3	C4, C5
Total Marks 100%				

(CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

#### **REFERENCE BOOKS**

1. Understanding bioinformatics (1st Edition) by Zvelebil, Marketa J; Baum, Jeremy O

2. Bioinformatics and Functional Genomics (2nd edition) by Jonathan Pevsner

**REFERENCE SITE** 

# **CSE-439: Robotics**

COU	RSE INFO	ORMATION									
Cours	e Code	: CSE-439	Lecture Co	ntact Hours	: 3.00						
Cours	e Title	: Robotics	Credit Hou	rs	: 3.00						
PRE-	PRE-REQUISITE										
	Course Code: Nil Course Title: Nil										
CURI	RICULU	M STRUCTURE									
Outco	me Based	Education (OBE)									
RATI	IONALE										
kinem	This course introduces the fundamentals of robotics design and development, the principles of robot kinematics, dynamics, motion planning, trajectory generation and control as well as plan and research complete robots for various industrial applications.										
OBJE	ECTIVE										
2. T	o specify	the basics of robotic systems, 1 and analyse the simulation, mo vironment.									
LEAF	RNING O	UTCOMES & GENERIC SI	KILLS								
No.	(Upon c	Course Learning Outcome completion of the course, the stude able to)	ents will be	Bloom's Taxonomy	СР	CA	KP	Assessment Methods			
CO1		with the concept developme ents of robotics technologies.	nt and key	C1, C2, P1, A1	1	1	1, 2	Т			
CO2	locomoti	problems in spatial tation and spatial transforma ion design, kinematics, moti- ion and mapping, navigation	on control,	C4, A2, A4, P5, P6	2		3, 4	F, T			

CO3	Design and implement a robotic project on a physical mobile robot platform, with tasks involving project specification, algorithm design, software programming, simulation and modelling, control and obstacle avoidance in a complex and interactive environment.	C3, C4, C6, P3, P7, A4, A5	3, 5, EP2	3, 5	5, 6	MT, PR, F
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(CP- Complex Problems, CA-Complex Activities, KP-Knowledge Profile, T – Test ; PR – Project ; Q – Quiz; ASG – Assignment; Pr – Presentation; R - Report; F – Final Exam, MT- Mid Term Exam)

#### **COURSE CONTENT**

**Introduction to robotics**: overview of robot mechanisms, dynamics, and intelligent controls, planar and spatial kinematics, and motion planning; mechanism design for manipulators and mobile robots, multi-rigid body dynamics, 3D graphic simulation; **Control design**: actuators, and sensors; wireless networking, task modelling; **Human-machine interface**: embedded software mechanical design, rigid body velocity, Jacobean, inverse kinematics, redundant and parallel robots, trajectory control, face control and haptics, **Micro and Nano-robotics**: mobile robots. Human-robot interaction, Multiagents, fault diagnosis.

#### SKILL MAPPING

No.	Course Learning Outcome	PROGRAM OUTCOMES (PO)											
INO.	č		2	3	4	5	6	7	8	9	10	11	12
CO1	Explain with the concept development and key components of robotics technologies.	Н											
CO2	Solve problems in spatial coordinate representation and spatial transformation, robot locomotion design, kinematics, motion control, localization and mapping, navigation and path planning.		Н										
CO3	Design and implement a robotic project on a physical mobile robot platform, with tasks involving project specification, algorithm design, software programming, simulation and modelling, control and obstacle avoidance in a complex and interactive environment.			Н									

(H-High, M- Medium, L-low)

JUSTIFICATION FOR CO-PO MAPPING							
Mapping	Level	Justifications	Justifications				
CO1-PO1	High	Understand the breadth and depth of different concept development and key components of robotics technologies.					
CO2-PO2	High	Analyse complex robotics problems and understand the ways to solve them.					
CO3-PO3	High	Design and solve unique engineering problems by implementing a robotic project on a physical mobile robot platform.					
TEACHIN	G LEARNI	NG STRATEGY					
Teaching an	d Learning	Activities	Engagement (hours)				
Face-to-Face	e Learning						
Leo	cture		42				
Pra	actical / Tuto	orial / Studio	-				
Stu	Student-Centred Learning -						
Self-Directe	Self-Directed Learning						
No	n-face-to-fa	ce learning	42				

Revis Asses	sment Prepara	tions	21 21
rmal Assess			
Conti	nuous Assessr	nent	2
Mid-7	Ferm Exam		1
Final	Examination		3
tal	132		
ACHING I	METHODOL	OGY	
		operative and Collaborative Method, Problem Based Me	ethod
OURSE SCI	HEDULE	·	
Week	Lecture	Topics	Assessment Methods
1	Lec 1	Introduction to Robotics	
	Lec 2	Applications of Robotics	
	Lec 3	Evolution of Robotics	
2	Lec 4	Overview of Robot Mechanisms	
-	Lec 5	Overview of Robot Dynamics	Class Test-1
	Lec 6	Overview of Robot Dynames Overview of Robot Intelligent Controls	
3	Lec 0	Spatial Descriptions	
3	Lec 7	Transformations	
	Lec 8	Introduction to Kinematics	
4	Lec 9	Planar Kinematics	
4			
	Lec 11	Spatial Kinematics	
-	Lec 12	Motion Planning	_
5	Lec 13	Mechanism Design for Manipulators	
	Lec 14	Mechanism Design for Mobile Robots	Class Test-2
	Lec 15	Mechanism Design for Mobile Robots (Contd.)	_
6	Lec 16	Manipulator Kinematics	
	Lec 17	Inverse Manipulator Kinematics	
	Lec 18	Introduction to Dynamics	
7	Lec 19	Manipulator Dynamics	
	Lec 20	Trajectory Generation	
	Lec 21	Multi-rigid body Dynamics	_
8	Lec 22	Linear Control of manipulators	
	Lec 23	Non-Linear Control Manipulators	
	Lec 24	Force Control of Manipulators	— Mid Term Exam
9	Lec 25	3D Graphic Simulation	
	Lec 26	3D Graphic Simulation (Contd.)	
	Lec 27	3D Graphic Simulation (Contd.)	
10	Lec 28	Control Design	
	Lec 29	Actuators	
	Lec 30	Sensors	
11	Lec 31	Task Modelling, Face Control and Haptics	
	Lec 32	Human-Machine Interface	
	Lec 33	Embedded Software Mechanical Design	
12	Lec 34	Jacobean Kinematics	
	Lec 35	Inverse Kinematics	
	Lec 36	Redundant and Parallel Robots	
13	Lec 30	Micro Robotics	Class Test-4
10	Lec 37	Nano-Robotics	
	Lec 38	Mobile Robots	
14	Lec 39	Human-robot interaction	
14			
	Lec 41	Multiagents Fault Diagnosis	
	Lec 42	raun Diagnosis	

Components		Grading	СО	Blooms Taxonomy
			CO1	C1, C2
Continuous	Test 1-3	20%	CO2	C3, C4
Assessment (40%)	Class Participation	5%	CO3	A2
	Mid term	15%	CO2	C4, P6
Final Exam		60%	CO1, CO3 CO2	C1-C4, C6 P3, A4
Total Marks		100%		-

#### (CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

#### **REFERENCE BOOKS**

1. Introduction to Robotics: Analysis, Control, Applications (6th Edition) - Saeed B. Niku; Wiley (2019)

2. Introduction to Robotics: Mechanics and Control (3rd Edition) - John J. Craig; Pearson (2015)

#### **REFERENCE SITE**

# **CSE-447:** Telecommunication Engineering

COURSE INFORMATION								
Course Code	: CSE 447	Lecture Contact Hours : 3.00						
Course Title	: Telecommunication Engineering	Credit Hours : 3.00						
PRE-REQUISITE								
Course Code: N	Jil							
Course Title: N	Course Title: Nil							
CURRICULUM STRUCTURE								
Outcome Based	l Education (OBE)							
RATIONALE								
	tivates to design and install equipment used for	• •						
	as well as working with copper or fiber op	0	0					
systems in order to enable companies to communicate effectively with customers and deliver high standards								
	of customer service.							
OBJECTIVE								
1 To perceiv	e knowledge regarding different components a	nd techniques of telecommu	nication system					

- 1. To perceive knowledge regarding different components and techniques of telecommunication system.
- 2. To develop knowledge on design and management of various telecommunication system.
- 3. To develop skill on identification of telecommunication problems solving the respective problems.
- 4. To acquire the knowledge and expertise in the field of telecommunication hardware.

LEAR	LEARNING OUTCOMES & GENERIC SKILLS									
No.	Course Learning Outcome (Upon completion of the course, the students will be able to)	Bloom's Taxonomy	СР	CA	KP	Assessment Methods				
CO1	Demonstrate theoretical and technical knowledge of telecommunications systems associated with LANs, MANs, and WANs.	C2,P1	1	1	1	T, F				
CO2	Learn to design, implement, and manage telecommunications systems using voice and	C6	2	2	1, 3	Q,MT,F				

	data.					
CO3	Model and simulate telecommunications systems and networks in order to identify and solve these problems	P6	3	3	5	ASG
CO4	Acquire the knowledge and expertise in the field of telecommunication hardware	C3, A2	2	1	5	Q, F

(CP-Complex Problems, CA-Complex Activities, KP-Knowledge Profile, T-Test; PR-Project; Q-Quiz; ASG-Assignment; Pr-Presentation; R - Report; F-Final Exam, MT-Mid Term Exam)

#### **COURSE CONTENT**

**Introduction**: overview of telecommunication; history, evolution, convergence of telecommunication and data networks, National and International regulatory bodies; **Basic elements of Telecommunication**: Telephone apparatus, microphone, speaker, ringer, pulse and tone dialing mechanism, local and central batteries and advanced systems of power supplies; **Transmission media**: Characteristics and applications of twisted pairs, coaxial cables and optical fibers, Terrestrial and satellite microwave, radio waves, VSAT; **Telephone operating principles**: telephone equipment, description of the modern phone; **Telephone switching systems**: PSTN, PBX, standards; **Basics of communication systems**: modulation, multiplexing; **Switching system**: circuit switching, packet switching; **Traffic analysis**: Traffic characterization, grades of service, network blocking probabilities, delay system and queuing, Integrated services digital network (ISDN), Digital subscriber loop (DSL); **Data communication equipment**: Tele-Traffic analysis; **Cellular telephony:** Frequency reuse, frequency management, channel alignment, handoff strategies, FDMA, TDMA, CDMA and GSM, Introduction to satellite communication, Optical fiber communication, Submarine cables, Digital Radio Microwave, etc.

#### SKILL MAPPING

No.	Course Learning Outcome	PROGRAM OUTCOMES (PO)					PROGRAM OUTCOMES (PO)								
NO.	Course Learning Outcome		2	3	4	5	6	7	8	9	10	11	12		
CO1	Demonstrate theoretical and technical knowledge of telecommunications systems associated with LANs, MANs, and WANs.	Н													
CO2	Learn to design, implement, and manage telecommunications systems using voice and data			М											
CO3	Model and simulate telecommunications systems and networks in order to identify and solve these problems			Н	М										
CO4	Acquire the knowledge and expertise in the field of telecommunication hardware					М									

#### (H-High, M- Medium, L-low)

#### JUSTIFICATION FOR CO-PO MAPPING Justifications Mapping Level Understanding the theoretical and technical will highly increase the breadth and CO1-PO2 High depth of knowledge Designing, implementation and managing telecommunications systems help to understand the breadth and uniqueness of engineering problem to the extent to CO2-PO3 Medium which problems are original and to which solutions have previously been identified and coded Identifying and solving the problems of telecommunications systems and CO3-PO3 High networks enhance breadth & uniqueness of engineering problems Application of standard distribution will help to understand the breadth and CO3-PO4 Medium uniqueness of engineering problem Knowledge and expertise in the field of telecommunication hardware enable CO4-PO5 Medium understanding of the appropriateness of the tool

TEACHING I	LEARNING S	STRATEGY	
Teaching and L	earning Activ	vities	Engagement (hours)
Face-to-Face L	earning		
Lectur			42
Practi	-		
Studer	-		
Self-Directed L			10
	ace-to-face lea	arning	42
Revisi		d'ann	21
Assign Formal Assessr	nment Prepara	ttions	21
	nem nuous Assessr	nent	2
Quiz/		ient	3
Mid-T			1
	Examination		3
Total			132
TEACHING N	METHODOL	OGY	
		operative and Collaborative Method, Problem Based I	Method
		sperarive and conaborative method, i robiem based i	victilou
COURSE SCH	HEDULE		
Week	Lecture	Topics	Assessment Methods
1	Lec 1	Introduction: Overview of Telecommunication	
	Lec 2	History of Telecommunication	
	Lec 3	Evolution of Telecommunication	
2	Lec 4	Convergence of Telecommunication Data	
	Lec 5	Networks	
	Lec 6	Introduction: Regulatory Bodies	
3	Lec 7	National Regulatory Bodies International	Class Test 1
	Lec 8	Regulatory Bodies	
	Lec 9	International Regulatory Bodies (Contd.)	
4	Lec 10	Basic Elements of Telecommunication,	
	Lec 11	Telephone Apparatus	
	Lec 12	Microphone, Speaker and Ringer Pulse and Tone Dialing Mechanism, Local	
		and Central Batteries	
5	Lec 13	Advanced Systems of Power	4
5	Lec 13 Lec 14	Supplies Transmission Media	
	Lec 14 Lec 15	Characteristics and Applications: Twisted Pairs	Class Test 2
6	Lec 16	Characteristics and Applications: Coaxial Cable	
	Lec 17	Characteristics and Applications: Optical Fibers	
	Lec 18	Terrestrial Microwave	
7	Lec 19	Satellite	
	Lec 20	Microwave	
	Lec 21	VSAT	
		Radio Waves	
8	Lec 22	Telephone Operating Principles	
	Lec 23	Telephone Equipment	
-	Lec 24	Description of a Modern Phone	4
9	Lec 25	PSTN, PBX	
	Lec 26	Standards Modulation Multiplexing	Mid Term Exam
10	Lec 27	Switching System	4
10	Lec 31 Lec 32	Switching System Circuit Switching	
	Lec 32 Lec 33	Packet Switching	
	Let 35		
11	Lec 28	Traffic Characterization	
	Lec 29	Traffic Analysis	
	LUC 27	1 1 willo 1 lilui j 010	

	Lec 30	Grades of Service	
12	Lec 34	ISDN DSL	Class Test 3
	Lec 35	Cellular Telephony	
	Lec 36		
13	Lec 37	FDMA, CDMA TDMA, GSM	
	Lec 38	Introduction to Satellite Communication	
	Lec 39		
14	Lec 40	Optical Fibre Communication	
	Lec 41	Submarine Cables	
	Lec 42	Digital radio Microwave	
	_ ~		

Comp	oonents	Grading	СО	Blooms Taxonomy
Continuous	Continuous Test 1-3		CO 1 CO 2	C1, C2 C3, C4
Assessment (40%)	Class Participation	5%	CO3, CO4	A2
	Mid term	15%	CO 2	C2
Final	Final Exam		CO 1, CO 2, CO 4	C2, C3, C4, A2
Total	Marks	100%		

# (CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

#### **REFERENCE BOOKS**

1. Introduction to Telecommunication: Voice, Data and the Internet (1st Edition) – Marion Cole; Prentice Hall (2010)

- 2. Essential Guide to Telecommunications (5th Edition) Annabel Z. Dodd; Prentice Hall (2012)
- 3. Optical Fiber Communication: Principles and Practice (3rd Edition) John M Senior; Pearson (2010)
- 4. Modern Digital and Analog Communication System (4th Edition) B P Lathi; Oxford (2011)

# **REFERENCE SITE**

# <u>TECHNICAL ELECTIVE – II</u>

# CSE-411: VLSI Design

COUR	COURSE INFORMATION									
	e Code	: CSE-411	Lecture Contact H	Iours	: 3.0					
Course	e Title	: VLSI Design	Credit Hours		: 3.0	00				
PRE-REQUISITE										
	e Code: Nil									
	e Title: Nil						_			
CURF	RICULUM STRU	CTURE								
Outcom	me Based Education	n (OBE)								
RATI	ONALE									
fabrica	ation, the design p	to enhance students' unders rinciples and logical consid	erations of designi	ing sili	con chi	ps, an	d finally, to			
		g of design considerations a								
		s also intended to enable stud ng of the different characterist			SI system	m desi	gning and to			
			lies of such circuits							
ORIE	CTIVE									
electro 2. To digital 3. To u	onic circuits to perfore study and analyze electronic circuits. understand the vario	logical components as well a orm certain digital functions. different properties, behavio ous stages involved in designi lesigning each layer of silicor	or, and performand	ce metr	ics of of from th	differe e initia	nt integrated			
LEAR	RNING OUTCOM	ES & GENERIC SKILLS								
No.	(Upon completion	e Learning Outcome of this course, the students will l able to)	Taxonomy	СР	CA	KP	Assessment Methods			
CO1	analysis models i	matical methods and circ n the analysis of CMOS digi ts, including logic compone nections	ital C1, C2,	1	1	2, 3	T, F, Pr			
CO2		analyze models of moderate rcuits to implement specifi		1, 2	2	2-4	MT, F			
		apply the basic theory of Mo	OS							

COUR	RSE CONTENT					
Quiz; A	ASG – Assignment; Pr – Presentation; R - Report; F	– Final Exam,	MT- M	id Term	Exan	1)
(CP-C	Complex Problems, CA-Complex Activities, KP-Kno	wledge Profile	,T – Te	st;PR-	- Proje	ect ; Q -
	design rules and geometric or stick diagrams.	P1, P2			3	
CO4	moderately complex digital functions using VLSI	A4, A5	3, 7	3, 5	+, 5	MT,

devices and basic circuits, the overall process of

designing MOS circuits, and the VLSI

Design MOS circuits to achieve various basic to

fabrication process on an industrial scale ..

CO3

**VLSI design methodology:** Top-down Design Approach, Technology Trends and Design Automation Algorithms; **Introduction to CMOS Inverters** and Basic Gates; MOS devices and Basic Circuits (various inverters, pass gates and buffer circuits), **CMOS Fabrication Process** and Layout; CMOS Circuit Characteristics and Performance Estimation; **Buffer Circuit Design**; Introduction to **BiCMOS Circuits**; Complex CMOS Gates; CMOS layout design rules, **CMOS Building Blocks** - Adder, Comparator,

C1, C2, C6

A1-A3

C3-C6,

1

3,

4

1

MT,T,F

T, F

Multiplier, Counter, and Shifter; Data Path and Memory structures. Design Methodology and Tools; **Geometric and stick diagrams**, PLA, FPGA, cell-based and full custom design methods, System-on chip design, **Hardware modeling** - Hardware Modeling Languages, Logic Networks, State Diagrams, Data-flow and Sequencing Graphs, Behavioral Optimization; Floor Planning and Architecture Design.

#### SKILL MAPPING

No.	Course Learning Outcome			Р	ROG	RAN	101	JTC	OM	ES (	(PO)		
INO.	Course Learning Outcome		2	3	4	5	6	7	8	9	10	11	12
CO1	Describe mathematical methods and circuit analysis models in analysis of CMOS digital electronics circuits, including logic components and their interconnections	Н											
CO2	Understand and analyze models of moderately sized CMOS circuits to implement specified digital functions.		Н		М								
CO3	Understand and apply the basic theory of MOS devices and basic circuits, the overall process of designing MOS circuits, and the VLSI fabrication process on an industrial scale.	Н				М	L	L					
CO4	Design MOS circuits to achieve various basic to moderately complex digital functions using VLSI design rules and geometric or stick diagrams.		Н	Н							L	L	

#### (H-High, M- Medium, L-low)

#### JUSTIFICATION FOR CO-PO MAPPING Mapping Level Justifications The student would acquire engineering knowledge of the fundamental circuits, CO1-PO1 High their analysis, logical and mathematical characteristics and how these concepts are used for VLSI fabrication. Understanding the models and internal workings of basic CMOS circuits will CO2-PO1 High help in acquiring fundamental knowledge on VLSI circuits. Understanding the models and internal workings of basic CMOS circuits will also help in developing the design considerations and solution formulation for a CO2-PO2 High given digital function to be solved by a VLSI circuit. The student will also get an idea on the logical and design considerations for CO2-PO4 Medium designing a system on chip and how to compare between them to get desired output. Understanding the basic theory of MOS devices and basic circuits, the overall CO3-PO1 process of designing MOS circuits, and the VLSI fabrication process will High provide the students with basic knowledge of VLSI design. The students will also learn about the modern fabrication process and the CO2-PO5 Medium various tool and techniques used in modern VLSI fabrication. While understanding the silicon fabrication process on an industrial scale, the CO2-PO6 student will also learn about the design considerations to ensure minimized Low health, safety hazards and making a lean and efficient fabrication process. The students will also learn about the best use of silicon and other resources in CO2-PO7 Low the VLSI fabrication process while considering it's environmental impact. The VLSI design process requires the analytical ability of students in coming up CO4-PO2 High with logical designs for the various VLSI designs. The students would need to apply their knowledge of basic CMOS circuits and CO4-PO3 High gates to design various basic to moderately complex VLSI systems. CO4-The students will also develop the skill to work as an individual in engineering Low PO10 design problems such the VLSI system design.

CO4- PO11		While designing the systems, students will, in hinds how to come up with various design solution	
011		equipments and other modern tools available.	ns based on the materia
EACHIN	G LEARNING		
eaching a	nd Learning Act	ivities	Engagement (hours
	e Learning		
	ecture		42
	actical / Tutoria		-
	udent-Centred L	Learning	-
	ed Learning		10
	on-face-to-face	learning	42 21
	ssessment Prepa	rations	21
ormal Ass	-		21
	ontinuous Asses	sment	1
			1
F1	nal Examinatior	1	3
otal			131
EACHIN	G METHODO	DLOGY	
			ad Mathad
ecture and	Discussion, Co	o-operative and Collaborative Method, Problem Bas	sed Method
OURSE S	SCHEDULE		
Week	Lecture	Topics	Assessment Methods
1	Lec 1-3	Introduction to VLSI design diodes,	
		BJTs and MOSFETs,	
		NMOS and CMOS	
2	Lec 4 -6	Internal Structure of MOSFETs	
		Hierarchical Design	Class Test 1
2	1 7 0	Inverter Principles	
3	Lec 7-9	Threshold Voltage	
		Ids Calculation for Saturation Region Ids Calculation for Resistive Region	
4	Lec 10-12	Characteristics Curves	
4	Let 10-12	Characteristics Curves (Contd.)	
		NMOS Inverter with Resistive Load	
5	Lec 13-15	NMOS Inverter with Enhancement Load	
		Inverter Ratio for NMOS Inverter with	
		Enhancement Load	
		Problems with Enhancement Transistor	Class Test 2
6	Lec 16-18	NMOS Inverter with Depletion Load	
		Rise Time Calculation	
-		Fall Time Calculation	
7	Lec 19-21	CMOS Characteristics Curve	
		CMOS Power and Transfer Curve	
0	1	Pass Transistor Principles Pass Transistor NMOS	
8	Lec 22-24	Ratioless NMOS Inverter	
		CMOS Pulse Gate	
9	Lec 25-27	Buffer Circuits	
2	LAC 25-21	Buffer Chain	Class Test 3
		Super Buffer	
10	Lec 28-30	Power Dissipation	
10	100 20.50	Static Power Dissipation	
		Dynamic Power Dissipation	
11	Lec 31-33	Short Circuit Power Dissipation	
		CMOS Noise Margin	Mid Term Exam /
		CMOS Noise Margin (Contd.)	Project

12	Lec 34-36	NMOS Noise Margin	
		NMOS NAND and NOR Gates	
		CMOS NAND and NOR Gates	
13	Lec 37-39	Stick Diagrams	
		Design Rules of Geometric Layout	
		Circuit Design using Stick Diagrams and	
		Geometric Layout	
14	Lec 40-42	n-well Formation	
		Oxide Layer Formation	
		Cross Section of CMOS	

Comp	oonents	Grading	СО	Bloom's Taxonomy
			CO1	C1, C2, A1, A2
Continuous	Test 1-3	20%	CO3	C1, C2, C6, A1-A3
Continuous Assessment			CO4	C3-C6
(40%)	Class Participation	5%	CO1	A1, A2
	Mid term	15%	CO2-CO4	C1-C6, A1-A3, P1-P2
			CO1	C1, C2, A1, A2
Final	Exom	60%	CO2	C1-C4, C6, A2, P1-P2
ГШа	Final Exam		CO3	C1, C2, C6 A1-A3
			CO4	C3-C6, A4, A5, P1, P2
Total Marks 100%				

# (CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

# **REFERENCE BOOKS**

1. Design of VLSI Systems - A Practical Introduction - Linda E.M. Brackenbury

2. Modern VLSI Design: System-on-Chip Design (3rd Edition) - Wayne Wolf; Prentice Hall (2002)

3. CMOS VLSI Design- A Circuit and System Perspective (3rd Edition) - Neil H.E. Weste, David Harris and Ayan Banerjee; Pearson (2009)

#### **REFERENCE SITE**

# **CSE-412: VLSI Design Sessional**

COURSE INFORMATION									
Course Code	: CSE-412 Lecture Contact Hours : 3.00 hrs in alternative week								
Course Title	: VLSI Design Sessional	Credit Hours	: 0.75						
PRE-REQUIS	PRE-REQUISITE								
Course Code: Nil									
Course Title: N	Vil								
CURRICULU	M STRUCTURE								
Outcome Base	d Education (OBE)								
RATIONALE									
This course is	This course is designed to be offered alongside CSE 411 so that students may acquire a better								
understanding of VLSI and CMOS circuit design principles, logical and mathematical considerations, the									

overall design process, and the silicon fabrication process using various modern tools, ICs, and simulators.

#### **OBJECTIVE**

- 1. To achieve basic knowledge of VLSI system design principles, design considerations, and the design process.
- 2. To analyze and solve various given digital function problems using the concepts of VLSI and CMOS systems.
- 3. To design the solutions developed by the students using ICs and simulators to get a practical understanding of the VLSI system design process.

LEAR	NING OUTCOMES & GENERIC SKILLS					
No.	Course Learning Outcome (Upon completion of this course, the students will be able to)	Bloom's Taxonomy	СР	CA	KP	Assessment Methods
CO1	Acquire fundamental knowledge and understating of VLSI systems, their design principles, design considerations, and the overall design process using simulation and design software.	C1, C2, A1, A2, P1, P2		1	1, 3	T, Q
CO2	Analyze a given digital function or a given circuit problem to implement and evaluate a VLSI system or CMOS circuit.	C3, C4, C6, A5		2	2, 5	T, Q, ASG
CO3	Design and implement the solutions developed by the students for particular problems using ICs and simulator software.	C3-C6, A5- A5, P2		3	5, 6	T, ASG

⁽CP-Complex Problems, CA-Complex Activities, KP-Knowledge Profile, T-Test; PR-Project; Q-Quiz; ASG-Assignment; Pr-Presentation; R - Report; F-Final Exam, MT-Mid Term Exam)

# COURSE CONTENT

**Introduction:** Various simulator software for electronic system design (**PSpice, DSCH and Microwind**), implementing basic electrical circuits with PSpice, design, and implementation of **logic gates and inverter circuits** (inverter, AND, OR, NAND, NOR), comparing the **I/O and electrical characteristics graphs** of logic gates with various simulator software, Designing **basic electrical circuits** (inverters, AND, OR, NAND, NOR) with microwind and comparing the I/O and electrical characteristic graphs with PSpice, DSCH and Microwind.

# SKILL MAPPING

No.	Course Learning Outcome			PROGRAM OUTCOMES (PO)									
INO.	Course Learning Outcome		2	3	4	5	6	7	8	9	10	11	12
CO1	Acquire fundamental knowledge and understating of VLSI systems, their design principles, design considerations, and the overall design process using simulation and design software.	Н				Н							
CO2	Analyze a given digital function or a given circuit problem to implement and evaluate a VLSI system or CMOS circuit.		Н	Н				М					
CO3	Design and implement the solutions developed by the students for particular problems using ICs and simulator software.			Н		Н					Н	М	

(H – High, M- Medium, L-low)

JUSTIFICATION FOR CO-PO MAPPING							
Mapping	Level	Justifications					
CO1-PO1	High	Use of simulators to get practical understanding of various CMOS and VLSI					

of VLSI systems.         of vLSI systems.           C01-POS         High         Software in designing and evaluating various CMOS circuits and systems.           C02-PO2         High         Students will have to analyze the given digital function and design a solution for that using CMOS circuits.           C02-PO3         High         As per their analysis, students will have to design and implement VLSI systems to implement a given digital function or to achieve a specific set of digital outcomes.           C02-PO3         High         As per their analysis, students will also get to apply their theoretical knowledge of sustainability, environmental impact and cost-efficiency of certain resources needed for a particular chip/system fabrication.           C03-PO3         High         While implementing their solutions in simulators, students will get a better indecession of a consolerations.           C03-PO3         High         Students will be using various latest simulator software for implementing their designs and to test the characteristics of basic designs of various. CMOS circuits.           C03-PO1         High         Medium         Through the overall design process, students will also get an overall member of a design and implementation team.           C03-PO11         Medium         Through the overall design process, students will also get an overall member of a design and implementation team.         Through the vLSI system and it's fabrication process, resulting in a ability to use this intuition in designing such systems in future, on an industrial setting.           C03	1		systems will help students to strengthen their fundament	al theoretical knowledge			
COLPOS         Figh software in designing and evaluating various CMOS circuits and systems.           CO2_PO2         High that using CMOS circuits.         Students will have to analyze the given digital function and design a solution for that using CMOS circuits.           CO2_PO3         High that using CMOS circuits.         As per their analysis, students will have to design and implement VLSI systems to implement a given digital function or to achieve a specific set of digital outcomes.           CO2_PO3         High that using CMOS circuits.         While coming up with the design, students will also get to apply their theoretical knowledge of sustainability, environmental impact and cost-efficiency of certain resources needed for a particular chip'system fabrication.           CO3-PO3         High understanding of their VLSI system design and it's various considerations.           CO3-PO1         High understanding of their VLSI system disign and it's various considerations.           CO3-PO1         High while making logical and mathematical design choices for their VLSI systems and CMOS circuits, students will get to learn how to function as an individual member of a design and implementation team.           CO3-PO11         Mediur         Through the overall design process, students will also get an overall ability to use this invition in designing such systems in future, on an industrial setting.           CO3-PO11         Mediur         Through the versal systems and it's fabrication process, resulting in a ability to use this invition in designing such systems in future, on an industrial setting.           CO3-PO11			of VLSI systems.	_			
CO2-PO2         High that using CMOS circuits.         Implement VLSI systems to implement a given digital function or to achieve a specific set of digital outcomes.           CO2-PO3         High implement a given digital function or to achieve a specific set of digital outcomes.           CO2-PO3         While coming up with the design, students will also get to apply their theoretical resources needed for a particular chip/system fabrication.           CO3-PO3         High understanding of their VLSI system design and it's various considerations.           CO3-PO5         High understanding of their VLSI system design and it's various considerations.           CO3-PO1         High understanding of their VLSI system design and it's various considerations.           CO3-PO1         High understanding of the VLSI system and it's fabrication process, resulting in an ability to use this intuition in designing such systems in future, on an individual member of a design and implementation team.           CO3-PO11         Medium distratanding of the VLSI system and it's fabrication process, resulting in an ability to use this intuition in designing such systems in future, on an industrial setting.           TEACHING LEARNING STRATEGY         Engagement (hours)           Face-to-Face Learning Lecture         -           Practical / Tutorial / Studio         21 Student with system straing           Student Centrel Learning         -           Student Settement Pranal Assessment         -           Continuous Assessment         - <td>CO1-PO5</td> <td>High</td> <td>software in designing and evaluating various CMOS circu</td> <td>uits and systems.</td>	CO1-PO5	High	software in designing and evaluating various CMOS circu	uits and systems.			
CO2-POS         High         implement a given digital function or to achieve a specific set of digital outcomes.           CO2-PO7         Medium         While coming up with the design, students will also get to apply their theoretical knowledge of sustainability, environmental impact and cost-efficiency of certain resources needed for a particular chip/system fabrication.           CO3-PO3         High         While implementing their solutions in simulators, students will get a better understanding of their VLSI system design and it's various considerations.           CO3-PO5         High         Students will be using various latest simulator software for implementing their designs and to test the characteristics of basic designs of various CMOS circuits.           CO3-PO1         High         While making logical and mathematical design choices for their VLSI system and it's fabrication process, resulting in an ability to use this intuition in designing such systems in future, on an industrial setting.           CO3-PO11         Medium         Through the overall design process, students will also get an overall understanding of the VLSI system and it's fabrication process, resulting in an ability to use this intuition in designing such systems in future, on an industrial setting.           TEACHING LEARNING STRATEGY         Engagement (hours)           Face-to-face learning         -           Lecture         -           Practical / Tutorial / Studio         21           Student-Centred Learning         -           Revision         -	CO2-PO2	High	that using CMOS circuits.	-			
CO2-PO7         Medium         knowledge of sustainability, environmental impact and cost-efficiency of certain resources needed for a particular chip/system fabrication.           CO3-PO3         High         While implementing their solutions in simulators, students will get a better understanding of their VLSI system design and it's various considerations.           CO3-PO3         High         Students will be using various latest simulators oftware for implementing their designs and to test the characteristics of basic designs of various CMOS circuits.           CO3-PO10         High         While making logical and mathematical design choices for their VLSI system and it's fabrication process, resulting in an ability to use this intuition in designing such systems in future, on an industrial setting.           CO3-PO11         Medium         Through the overall design process, students will also get an overall understanding of the VLSI system and it's fabrication process, resulting in an ability to use this intuition in designing such systems in future, on an industrial setting.           TEACHING LEARNING STRATEGY         Engagement (hours)           Practical / Tutorial / Studio         21           Student-Centred Learning         -           Non-face-to-face learning         -           Revision	CO2-PO3	High	implement a given digital function or to achieve a specific	c set of digital outcomes.			
CO3-PO3       High       understanding of their VLSI system design and it's various considerations.         CO3-PO5       High       Students will be using various latest simulator software for implementing their designs and to test the characteristics of basic designs of various CMOS circuits.         CO3-PO1       High       While making logical and mathematical design choices for their VLSI systems and CMOS circuits, students will get to learn how to function as an individual member of a design and inplementation team.         CO3-PO11       Medium       Through the overall design process, students will also get an overall ability to use this intuition in designing such systems in future, on an industrial setting.         TEACHING LEARNING STRATEGY       Teaching and Learning Activities       Engagement (hours)         Face-to-Face Learning       -       -         Lecture       -       -         Practical / Tutorial / Studio       21       -         Student-Centred Learning       -       -         Non-face-to-face learning       -       -         Non-face-to-face learning       -       -         Non-face-to-face learning       -       -         Non-face-to-face learning       -       -         Revision       -       -       -         Total       26       -       -         Continuous Assessment       2 <td>CO2-PO7</td> <td>Medium</td> <td>knowledge of sustainability, environmental impact and c resources needed for a particular chip/system fabrication.</td> <td>ost-efficiency of certain</td>	CO2-PO7	Medium	knowledge of sustainability, environmental impact and c resources needed for a particular chip/system fabrication.	ost-efficiency of certain			
COS-POS         High         designs and to test the characteristics of basic designs of various CMOS circuits.           CO3-PO10         High         While making logical and mathematical design choices for their VLSI systems and CMOS circuits, students will get to learn how to function as an individual member of a design and implementation team.           CO3-PO11         Medium         Through the overall design process, students will also get an overall understanding of the VLSI system and it's fabrication process, resulting in an ability to use this intuition in designing such systems in future, on an industrial setting.           TEACHING LEARNING STRATEGY         Engagement (hours)           Lecture         -           Practical / Tutorial / Studio         21           Student-Centred Learning         -           Non-face-to-face learning         -           Revision         -           Student-Centred Learning         -           Formal Assessment         2           Final Examination         3           Total         266           TEACHING METHODOLOGY         Exeture and Discussion, Co-operative and Collaborative Method, Problem Based Method           COURSE SCHEDULE         Introduction to PSpice, Design and implement some basic destriction and implement some basic detertical circuits with Microwind           1         Lab-3,4         Design and implement logic gates (inverter, AND, OR, NAND, NOR) and their I/O graphs	CO3-PO3	High	understanding of their VLSI system design and it's variou	us considerations.			
CO3-PO10       High member of a design and implementation team.       Involution as an individual member of a design process, students will also get an overall understanding of the VLSI system and it's fabrication process, resulting in an ability to use this intuition in designing such systems in future, on an industrial setting.         TEACHING LEARNING STRATEGY       Engagement (hours)         Teaching and Learning Activities       Engagement (hours)         Face-to-Face Learning Lecture Practical / Tutorial / Studio       21         Student-Centred Learning Non-face-to-face learning Non-face-to-face learning Non-face-to-face learning       -         Revision       -         Assessment Final Examination       2         Cottunuous Assessment Final Examination       2         Cottex and Discussion, Co-operative and Collaborative Method, Problem Based Method         COURSE SCHEDULE       Introduction to PSpice, Design and implement some basic electrical circuits with PSpice         3       Lab-1,2       Introduction to PSpice, Design and implement some basic electrical circuits with PSpice         3       Lab-3,4       Design and implement logic gates (inverter, AND, QR, NAND, NOR) with PSpice         5       Lab-5,6       Design and implement logic gates (inverter, AND, Qr aphs with PSpice and DSCH and compare the results       3:00 hrs in alternate week         9       Lab-9,10       Design and implement some basic electrical circuits with Microwind       3:00 hrs in alt	CO3-PO5	High	designs and to test the characteristics of basic designs of	various CMOS circuits			
CO3-PO11         Medium         understanding of the VLSI system and it's fabrication process, resulting in an ability to use this intuition in designing such systems in future, on an industrial setting.           TEACHING ELEARNING STRATEGY           Teaching and Learning Activities         Engagement (hours)           Face-to-Face Learning         -           Lecture         -           Practical / Tutorial / Studio         21           Student-Centred Learning         -           Non-face-to-face sessment         2           Continuous Assessment         2           Final Examination         3           Total         26           TEACHING METHODOLOGY         E           Lecture and Discussion, Co-operative and Collaborative Method, Problem Based Method           COURSE SCHEDULE         Introduction to PSpice, Design and implement some basic electrical circuits with PSpice           3         Lab-1,2         Introduction to PSpice, Design and implement some basic (AND, OR, NAND, NOR) and their I/O graphs with PSpice           5         Lab-3,6         Design and implement logic gates (AND, OR, NAND, NOR) and their I/O graphs	CO3-PO10	High	and CMOS circuits, students will get to learn how to f				
Teaching and Learning Activities       Engagement (hours)         Face-to-Face Learning       -         Practical / Tutorial / Studio       21         Student-Centred Learning       -         Non-face-to-face learning       -         Revision       -         Assessment Preparations       -         Formal Assessment       2         Continuous Assessment       2         Final Examination       3         Total       26         Teacture and Discussion, Co-operative and Collaborative Method, Problem Based Method         COURSE SCHEDULE         Week       Lab       Topics         1       Lab-1,2       Introduction to PSpice, Design and implement some basic electrical circuits with PSpice         3       Lab-3,4       Design and implement logic gates (inverter, AND, OR, NAND, NOR) and their I/O graphs with PSpice and DSCH and compare the results       3:00 hrs in alternate week         7       Lab-7,8       Design and implement logic gates (various types of inverters and buffer circuits) and their I/O graphs with PSpice and DSCH and compare the results       3:00 hrs in alternate week         9       Lab-9,10       Design and implement some basic electrical circuits with Microwind       4:00 hrs in alternate week         11       Lab-1,12       Design and implement some basic	CO3-PO11	Medium	understanding of the VLSI system and it's fabrication ability to use this intuition in designing such systems in	process, resulting in an			
Face-to-Face Learning     -       Practical / Tutorial / Studio     21       Student-Centred Learning     -       Non-face-to-face learning     -       Non-face-to-face learning     -       Revision     -       Assessment Preparations     -       Formal Assessment     2       Continuous Assessment     2       Final Examination     3       Total     26       TEACHING METHODOLOGY       Lecture and Discussion, Co-operative and Collaborative Method, Problem Based Method       COURSE SCHEDULE       Week     Lab       1     Lab-1,2       Introduction to PSpice, Design and implement some basic electrical circuits with PSpice       3     Lab-3,4       Design and implement logic gates (inverter, AND, OR, NAND, NOR) with PSpice       5     Lab-5,6       Design and implement logic gates (various types of inverters and buffer circuits) and their I/O graphs with PSpice and DSCH and compare the results       7     Lab-7,8       9     Lab-9,10       9     Lab-9,10       Design and implement some basic electrical circuits with Microwind       11     Lab-1,12       Design and implement some basic electrical circuits with Microwind	TEACHING	LEARNI	NG STRATEGY				
Lecture       -         Practical / Tutorial / Studio       21         Student-Centred Learning       -         Non-face-to-face learning       -         Revision       -         Assessment Preparations       -         Formal Assessment       2         Continuous Assessment       2         Final Examination       3         Total       26         TEACHING METHODOLOGY         Lecture and Discussion, Co-operative and Collaborative Method, Problem Based Method         COURSE SCHEDULE         Week       Lab       Topics         1       Lab-1,2       Introduction to PSpice, Design and implement some basic electrical circuits with PSpice         3       Lab-3,4       Design and implement logic gates (Inverter, AND, OR, NAND, NOR) and their I/O graphs with PSpice       3:00 hrs in alternate week         7       Lab-5,6       Design and implement logic gates (various types of inverters and buffer circuits) and their I/O graphs with PSpice and DSCH and compare the results       3:00 hrs in alternate week         9       Lab-9,10       Design and implement some basic electrical circuits with Microwind       4:00 hrs in alternate week         11       Lab-9,10       Design and implement some basic electrical circuits with Microwind         11       Lab-9,			Activities	Engagement (hours)			
Practical / Tutorial / Studio     21       Student-Centred Learning     -       Self-Directed Learning     -       Non-face-to-face learning     -       Revision     -       Assessment     -       Continuous Assessment     2       Final Examination     26       TEACHING METHODOLOGY     26       Lecture and Discussion, Co-operative and Collaborative Method, Problem Based Method       COURSE SCHEDULE     Topics       Remarks     1       Lab-1,2     Introduction to PSpice, Design and implement some basic electrical circuits with PSpice       3     Lab-3,4       OR, NAND, NOR) with PSpice     3:00 hrs in alternate week       7     Lab-5,6     Design and implement logic gates (various types of inverters and buffer circuits) and their I/O graphs with PSpice and DSCH and compare the results     3:00 hrs in alternate week       9     Lab-9,10     Design and implement some basic electrical circuits with Microwind       11     Lab-1,12     Design and implement some basic electrical circuits with Microwind		-					
Student-Centred Learning       -         Self-Directed Learning       -         Non-face-to-face learning       -         Revision       -         Assessment Preparations       -         Formal Assessment       2         Continuous Assessment       2         Final Examination       3         Total       26         TEACHING METHODOLOGY         Lecture and Discussion, Co-operative and Collaborative Method, Problem Based Method         COURSE SCHEDULE         Week       Lab       Topics       Remarks         1       Lab-1,2       Introduction to PSpice, Design and implement some basic electrical circuits with PSpice       3         3       Lab-3,4       Design and implement logic gates (AND, OR, NAND, NOR) with PSpice       3:00 hrs in alternate of inverters and buffer circuits) and their I/O graphs with PSpice and DSCH and compare the results       3:00 hrs in alternate week         7       Lab-7,8       Design and implement logic gates (various types of inverters and buffer circuits) and their I/O graphs with PSpice and DSCH and compare the results       3:00 hrs in alternate week         9       Lab-9,10       Design and implement some basic electrical circuit with Microwind       3:00 hrs in alternate week		-					
Self-Directed Learning Non-face-to-face learning Revision       -         Assessment Preparations       -         Formal Assessment Continuous Assessment Continuous Assessment       2         Final Examination       3         Total       26         TEACHING METHODOLOGY         Lecture and Discussion, Co-operative and Collaborative Method, Problem Based Method         COURSE SCHEDULE         Week       Lab         1       Lab-1,2         Introduction to PSpice, Design and implement some basic electrical circuits with PSpice       Remarks         3       Lab-3,4       Design and implement logic gates (inverter, AND, OR, NAND, NOR) with PSpice       3:00 hrs in alternate         5       Lab-5,6       Design and implement logic gates (various types of inverters and buffer circuits) and their I/O graphs with PSpice and DSCH and compare the results       3:00 hrs in alternate         9       Lab-9,10       Design and implement some basic electrical circuits with Microwind       3:00 hrs, in alternate         11       Lab-11,12       Design and implement inverter, AND, OR,       3:00 hrs, in alternate							
Non-face-to-face learning Revision       -         Assessment Preparations       -         Formal Assessment Continuous Assessment       2         Final Examination       3         Total       26         TEACHING METHODOLOGY         Lecture and Discussion, Co-operative and Collaborative Method, Problem Based Method         COURSE SCHEDULE         Week       Lab         1       Lab-1,2         Introduction to PSpice, Design and implement some basic electrical circuits with PSpice       Remarks         3       Lab-3,4       Design and implement logic gates (inverter, AND, OR, NAND, NOR) and their I/O graphs with PSpice and DSCH and compare the results       3:00 hrs in alternate week         7       Lab-7,8       Design and implement logic gates (various types of inverters and buffer circuits) and their I/O graphs with PSpice and DSCH and compare the results       3:00 hrs in alternate week         9       Lab-9,10       Design and implement some basic electrical circuits with Microwind       3:00 hrs in alternate         11       Lab-11,12       Design and implement inverter, AND, OR,       3:00 hrs in alternate							
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13 Lab- 13,14 Design and implement logic gates and their I/O	13	Lab- 13,1					

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Components	Grading	СО	Bloom's Taxonomy
ASG/Class	30%	CO2	C3, C4, C6, A5
Evaluations	30%	CO3	C3-C6, A5-A5, P2
Class Dartisinstian	5%	CO1	C1, C2, A1, A2, P1, P2
Class Participation	3%	CO2	C3, C4, C6, A5
Quiz	15%	CO1	C1, C2, A1, A2, P1, P2
Tests (Online 1 and 2)	50%	CO2	C3, C4, C6, A5
Tests (Omme T and 2)	30%	CO3	C3-C6, A5-A5, P2
Total Marks	100%		

# (CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

#### **REFERENCE BOOKS**

1. Design of VLSI Systems - A Practical Introduction - Linda E.M. Brackenbury

2. Modern 1.Modern VLSI Design: System-on-Chip Design (3rd Edition) - Wayne Wolf; Prentice Hall (2002)

# **REFERENCE SITE**

# **CSE-441: Machine Learning**

COURSE INFORMATION										
Course Code	: CSE-441	Lecture Contact Hours	: 3.00							
Course Title	: Machine Learning	Credit Hours	: 3.00							
PRE-REQUISI	TE									
Course Code: N	il									
Course Title: Ni	1									
CURRICULU	M STRUCTURE									
Outcome Based Education (OBE)										
RATIONALE	RATIONALE									

The Machine Learning course provides a broad introduction to machine learning and statistical pattern recognition. Topics include: supervised learning (generative/discriminative learning, parametric/non-parametric learning, neural networks, support vector machines); unsupervised learning (clustering, dimensionality reduction, kernel methods); learning theory (bias/variance tradeoffs, practical advice); reinforcement learning and adaptive control. The course will also discuss recent applications of machine learning, such as to robotic control, data mining, autonomous navigation, bioinformatics, speech recognition, and text and web data processing.

#### **OBJECTIVE**

1. To learn paradigms in different environmental setting and apply the appropriate learning algorithm to best suit the current need.

- 2. To enhance the learning parameters to achieve maximum performance.
- 3. To familiarize with a broad cross-section of models and algorithms for machine learning, and prepare for research or industry application of machine learning techniques.

LEAF	LEARNING OUTCOMES & GENERIC SKILLS									
No.	Course Learning Outcome (Upon completion of the course, the students will be able to) Bloom's Taxonomy CP C		CA	KP	Assessment Methods					
CO1	Develop an appreciation for what is involved in learning models from data.	C2, P1	1		1, 3	Т				
CO2	Understand a wide variety of learning algorithms.	C1 - C2, A1	1		2	F, T				
CO3	Understand how to evaluate models generated from data and Enhance the learning parameters to achieve maximum performance.	C4 – C6 P6, P5, A4	1, 3		6	МТ				
CO4	Apply the algorithms to a real-world problem, optimize the models learned and report on the expected accuracy that can be achieved by applying the models.	C1-C6, A2, P3 - P5	1, 3, 7, EP1, EP2	5	1,6	Pr, F				

(CP- Complex Problems, CA-Complex Activities, KP-Knowledge Profile,T – Test; PR – Project; Q – Quiz; ASG – Assignment; Pr – Presentation; R - Report; F – Final Exam, MT- Mid Term Exam)

#### **COURSE CONTENT**

Introduction to Machine Learning; **Regression analysis**: Logistic Regression, Linear Regression; **Supervised and Unsupervised learning**: Bayesian Learning; Decision Tree Learning; Rule based learning; Instance based learning; Neural Nets; **Support Vector Machine**: Genetic Algorithms; Reinforcement learning; Ensemble learning; **Hidden Markov Models**: Maximum Likelihood Estimates, Parameter Estimation; Computational learning theory.

#### SKILL MAPPING

No.	Course Looming Outcome		PROGRAM OUTCOMES (PO)										
INO.	Course Learning Outcome	1	2	3	4	5	6	7	8	9	10	11	12
CO1	Develop an appreciation for what is involved in learning models from data.	Н											
CO2	Understand a wide variety of learning algorithms.	М											
CO3	Understand how to evaluate models generated from data and Enhance the learning parameters to achieve maximum performance.		Н	М									
CO4	Apply the algorithms to a real-world problem, optimize the models learned and report on the expected accuracy that can be achieved by applying the models.												М

(H-High, M- Medium, L-low)

#### JUSTIFICATION FOR CO-PO MAPPING Justifications Mapping Level Understand the breadth and depth of different machine learning models through CO1-PO1 High which developing an appreciation for the things that are involved in this study. CO2-PO1 Medium Explore the branches of learning algorithms Design and solve unique engineering problems by enhancing the learning CO3-PO2, High, parameters to achieve maximum performance and better understanding of the PO3 Medium subject. CO4-Apply the learning techniques and algorithms in real-world problems having a Medium PO12 life-long impact.

TEACHING	LEARNING	STRATEGY					
Teaching and I	Learning Activ	vities	Engagement (hours)				
Face-to-Face I							
Lectu	ire		42				
	ical / Tutorial		-				
	Student-Centred Learning						
Self-Directed I							
	face-to-face le	earning	42				
Revis			21				
Asses Formal Assess	ssment Prepara	ations	21				
	nuous Assess	mont	2				
	Term Exam	ment	1				
	Examination		3				
Total			132				
TEACHING	METHODOI	LOGY					
		operative and Collaborative Method, Problem 1	Based Method				
COURSE SC	1						
Week	Lecture	Topics	Assessment Methods				
1	Lec 1	Introduction to Machine Learning					
	Lec 2	4					
	Lec 3						
2	Lec 4	Regression Analysis					
	Lec 5	Logistic Regression	Class Test-1				
	Lec 6						
3	Lec 7	Linear Regression					
	Lec 8	-					
4	Lec 9 Lec 10	Supervised Learning					
4	Lec 10 Lec 11	Unsupervised Learning					
	Lec 12	Chsupervised Learning					
5	Lec 12	Bayesian Learning					
2	Lec 14	Decision Tree Learning	Class Test-2				
	Lec 15						
6	Lec 16	Rule Based Learning					
	Lec 17	Instance Based Learning					
	Lec 18	]					
7	Lec 19	Neural Networks					
	Lec 20	]					
	Lec 21						
8	Lec 22	Support Vector Machine					
	Lec 23	Genetic Algorithm					
	Lec 24						
9	Lec 25	Reinforcement Learning					
	Lec 26	4	Mid Term Exam				
10	Lec 27	Encomble Looming					
10	Lec 28 Lec 29	Ensemble Learning					
	Lec 29	4					
11	Lec 30	Hidden Markov Model	—				
	Lec 31						
	Lec 32	1					
12	Lec 34	Maximum Likelihood Estimates					
	Lec 35						
	Lec 36	1	Class Test-3				
13	Lec 37	Parameter Estimation					
10	200 37	- manieter Louintution					

	Lec 38	
	Lec 39	
14	Lec 40	Computational Learning Theory
	Lec 41	
	Lec 42	

Comr	oonents	Grading	СО	Blooms Taxonomy
Com	onents	Grading	CO1	C1. C2
	Test 1-3	20%	CO1	C1, C2
Continuous	1050 1 5	2070	CO2	C3, C4
Assessment (40%)	Class Participation	5%	CO3	A2
	Mid term	15%	CO3	C4, P6
Final	Evom	60%	CO1, CO3	C1-C4, C6
Fillal	Final Exam		CO4	P3, A4
Total	Total Marks			

# (CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

#### **REFERENCE BOOKS**

- 1. Pattern Recognition and Machine Learning Christopher M. Bishop; Springer
- 2. Machine Learning Tom Mitchell, McGraw Hill (International Edition)
- 3. Introduction to Machine Learning, Second Edition Ethem Alpaydin (2nd Edition)
- 4. Pattern Recognition Sergios Theodoridis and Konstantinos Koutroumbas; Elsevier Inc.
- 5. Machine Learning: An Algorithmic Perspective Stephen Marsland

# **REFERENCE SITE**

# **CSE-442: Machine Learning Sessional**

COURSE INFO	ORMATION								
Course Code	CSE 442 Lecture Contact Hours : 3.00 hrs in alternativ								
Course Title	: Machine Learning Sessional	al Credit Hours : 0.75							
PRE-REQUISI	TE								
Course Code: N	il								
Course Title: Ni	1								
CURRICULU	<b>M STRUCTURE</b>								
Outcome Based	Education (OBE)								
RATIONALE									
The Machine Learning Sessional course is structured to orient different algorithm of machine learning practically to best suit the current need. This course will help understand the iterative aspect of machine learning as models are exposed to new data, they are able to independently adapt. Models learn from previous computations to produce reliable, repeatable decisions and results and helps in implementing the enhanced learning parameters for maximum performance.									

# OBJECTIVE

- 1. To implement the appropriate learning algorithm to best suit the current need.
- 2. To use practical knowledge to enhance the learning parameters to achieve maximum performance and enhance the learning parameters to achieve maximum performance.

LEAI	LEARNING OUTCOMES & GENERIC SKILLS									
No.	Course Learning Outcome (Upon completion of the course, the students will be able to)	Bloom's Taxonomy	СР	CA	KP	Assessment Methods				
CO1	Develop a good understanding of the fundamental issues and challenges of machine learning: data, model selection, model complexity, etc.	C2-C6, P1, P6	1	1	6	T, Q				
CO2	Evaluate the strengths and weaknesses of many popular machine learning approaches.	C3, C6, A4, A5, P6	2	2	8	ASG, T				
CO3	Appreciate the underlying mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised and un-supervised learning.	C2 – C6 P1, A1, A2	6	4	2	R, Q, Pr				
CO4	Design and implement various machine learning algorithms in a range of real-world applications.	P3, A4, C3, C4, C6	3, 7, EP2	3	5	T, Q				

(CP- Complex Problems, CA-Complex Activities, KP-Knowledge Profile,T – Test ; PR – Project ; Q – Quiz; ASG – Assignment; Pr – Presentation; R - Report; F – Final Exam, MT- Mid Term Exam)

# COURSE CONTENT

Supervised Learning: Regression, Model Selection and Generalization, Dimensions of a supervised learning algorithm; Bayesian Decision: Association Rules, Discriminant Functions; Clustering: k-means cluster, Hierarchical cluster, Expectation-Maximization Algorithm, Supervised Learning after Clustering; Decision Tree: Classification tress, Regression trees, Pruning, Multivariate trees; Hidden Markov Model: Basic problems of HMM, Evaluation problem, Model Selection in HMM, Find State Sequence; Kernel Machines: SVM, Victorian Kernels, Multiple Kernel Learning, One-Class Kernel Machine, Kernel Dimensionality Reduction; Design and Analysis of ML Experiment: Randomization, Interval Estimation, McNemer's Test, K-Fold Cross-Validated Paired t Test, Binomial Test, Approximate Normal Test.

# SKILL MAPPING

No.	Course Learning Outcome	PROGRAM OUTCOMES (PO)											
140.	Course Learning Outcome	1	2	3	4	5	6	7	8	9	10	11	12
CO1	Able to develop a good understanding of the fundamental issues and challenges of machine learning: data, model selection, model complexity, etc.		Н										
CO2	Able to evaluate the strengths and weaknesses of many popular machine learning approaches.					Н							
CO3	Appreciate the underlying mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised and un-supervised learning.				М								
CO4	Able to design and implement various machine learning algorithms in a range of real-world applications.			Н									

(H-High, M- Medium, L-low)

# JUSTIFICATION FOR CO-PO MAPPING

Mapping	Level	Justifications
CO1-PO2	High	Able to understand the complexity in analysis of data. Model selection, challenges and fundamental issues of machine learning.
CO2-PO5	High	Able to identify the appropriate modern tools or learning algorithms and evaluate their strengths and weaknesses.

CO4-PO3       High       Able to implement Machine Learning algorithms and develop unique solution of the paradigms of supervised and unsupervised learning.         CO4-PO3       High       Able to implement Machine Learning algorithms and develop unique solution of the paradigms of supervised and unsupervised learning.         TEACHING LEARNING STRATEGY       Example algorithms and develop unique solution of the paradigms of supervised and unsupervised learning.	Week	Lectu	e Tonics	Remarks				
CO4-PO3HighAble to implement Machine Learning algorithms and develop unique soluti engineering problems from real-world.TEACHING LEARNING STRATEGYEngagement (here) a clearning and Learning ActivitiesTeaching and Learning ActivitiesEngagement (here) a clearningFace-to-Face Learning Lecture-Practical / Tutorial / Studio21Student-Centred Learning-Self-Directed Learning-Non-face-to-face learning-Revision-Assessment Preparations-Formal Assessment2Mid-Term Exam-Final Examination3Total26TEACHING METHODOLOGY21Lecture and Discussion, Co-operative and Collaborative Method, Problem Based Method								
CO4-PO3HighAble to implement Machine Learning algorithms and develop unique soluti engineering problems from real-world.TEACHING LEARNING STRATEGYEngagement (hTeaching and Learning ActivitiesEngagement (hFace-to-Face Learning Lecture-Practical / Tutorial / Studio21Student-Centred Learning-Self-Directed Learning-Non-face-to-face learning-Revision-Assessment Preparations-Formal Assessment2Mid-Term Exam-Final Examination3Total26TEACHING METHODOLOGY	COURSE SCHEDULE							
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$\frac{    }{                               $	Fin	nal Examinat	on	3				
CO4-PO3HighAble to implement Machine Learning algorithms and develop unique soluti engineering problems from real-world.TEACHINE LEARNINE STRATEGYTeaching and Learning ActivitiesEngagement (hFace-to-Face Learning LectureEngagement (hFace-to-Face Learning-Practical / Tutorial / Studio21Self-Directed Learning-Self-Directed Learning-Non-face-to-face learning-Revision-Assessment Preparations-Formal Assessment-	Mi	id-Term Exa	1	-				
$\frac{1}{10000000000000000000000000000000000$	Co	ontinuous As	essment	2				
CO4-PO3       High       Able to implement Machine Learning algorithms and develop unique solution of the paradigms of supervised and unsupervised learning.         CO4-PO3       High       Able to implement Machine Learning algorithms and develop unique solution of the paradigms from real-world.         TEACHING EEARNING STRATEGY         Teaching and Learning Activities       Engagement (horeworld).         Face-to-Face Learning       Engagement (horeworld).         Lecture       Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2">Colspan="2" Colspan="2">Colspan="2" Colspan="2" Cols								
CO4-PO3       High       Able to implement Machine Learning algorithms and develop unique solution of the paradigms of supervised and unsupervised learning.         CO4-PO3       High       Able to implement Machine Learning algorithms and develop unique solution of the paradigms of supervised and unsupervised learning.         Teaching and Learning Activities       Engagement (horeward)         Face-to-Face Learning       Implement Machine Learning         Lecture       -         Practical / Tutorial / Studio       21         Student-Centred Learning       -         Self-Directed Learning       -         Non-face-to-face learning       -	110	-						
CO4-PO3       High       Able to implement Machine Learning algorithms and develop unique solution of the paradigms of supervised and unsupervised learning.         CO4-PO3       High       Able to implement Machine Learning algorithms and develop unique solution of the paradigms of supervised and unsupervised learning.         Teaching and Learning Activities         Engagement (he face-to-Face Learning         Lecture       -         Practical / Tutorial / Studio       21         Self-Directed Learning       -			e learning	_				
CO4-PO3       High       Able to implement Machine Learning algorithms and develop unique solution of the paradigms of supervised and unsupervised learning.         CO4-PO3       High       Able to implement Machine Learning algorithms and develop unique solution of the paradigms from real-world.         TEACHING LEARNING STRATEGY         Teaching and Learning Activities       Engagement (here)         Face-to-Face Learning         Lecture       -         Practical / Tutorial / Studio       21         Student-Centred Learning       -			e learning					
CO4-PO3       High       Able to implement Machine Learning algorithms and develop unique solution of the paradigms of supervised and unsupervised learning.         CO4-PO3       High       Able to implement Machine Learning algorithms and develop unique solution of the paradigms from real-world.         TEACHING LEARNING STRATEGY         Teaching and Learning Activities       Engagement (here)         Face-to-Face Learning         Lecture       -         Practical / Tutorial / Studio       21			Learning	-				
CO4-PO3       High       Able to implement Machine Learning algorithms and develop unique solution of the paradigms of supervised and unsupervised learning.         CO4-PO3       High       Able to implement Machine Learning algorithms and develop unique solution of the paradigms of supervised and unsupervised learning.         TEACHING LEARNING STRATEGY       Engagement (here)         Teaching and Learning Activities       Engagement (here)         Face-to-Face Learning       Lecture       -				21				
CO4-PO3       High       Able to implement Machine Learning algorithms and develop unique solution of the paradigms of supervised and unsupervised learning.         CO4-PO3       High       Able to implement Machine Learning algorithms and develop unique solution of the paradigms of supervised and unsupervised learning.         TEACHING LEARNING STRATEGY       Engagement (here)         Teaching and Learning Activities       Engagement (here)	200	e cui e		-				
CO4-PO3       High       Able to implement Machine Learning algorithms and develop unique solution of the paradigms of supervised and unsupervised learning.         CO4-PO3       High       Able to implement Machine Learning algorithms and develop unique solution of the paradigms of supervised and unsupervised learning.         Teaching and Learning Activities       Engagement (here)	Face-to-Face	e Learning						
CO4-PO3HighAble to implement Machine Learning algorithms and develop unique soluti engineering problems from real-world.	Teaching an	nd Learning	ctivities	Engagement (hours)				
CO1 PO3HighAble to implement Machine Learning algorithms and develop unique solution	TEACHING	G LEARNI	IG STRATEGY					
experimentation of the paradigms of supervised and unsupervised learning.	CO4-PO3	HighAble to implement Machine Learning algorithms and develop unique solutions to engineering problems from real-world.						
	CO3-PO4	Medium						

Week	Lecture	Topics		Remarks			
1	Lab -1, 2	Selection an	<b>Learning:</b> Regression, ad Generalization, Dimension earning algorithm;				
3	Lab -3, 4	<b>Bayesian</b> Discriminan					
5	Lab -5, 6	cluster, Exp	k-means cluster, Hiera pectation-Maximization Alg Learning after Clustering;				
7	Lab -7, 8		ree: Classification tress, Reg ng, Multivariate trees;	3.00 in alternate week			
9	Lab -9, 10	HMM, Eval	<b>arkov Model:</b> Basic proble uation problem, Model Selec State Sequence;				
11	Lab -11, 12	Multiple Ke	chines: SVM, Victorian K ernel Learning, One-Class ernel Dimensionality Reducti	Kernel			
13	Lab -13, 14	Randomizat McNemer's	Test, K-Fold Cross-Va est, Binomial Test, Appro				
ASSESSMENT STRATEGY							
			20	_			
Comp	oonents	Grading	СО	В	Blooms Taxonomy		
C	$\mathbf{T}$ $\cdot$		CO1	1	$C_{2}$ D(		

Comp	Components		СО	Blooms Taxonomy
Continuous	Test and	40%	CO1	C2, P6
Assessmen	Assignment	40%	CO2	C3, A5

	t (40%)	t (40%) Class Participation		CO3	C4, A2, A1
		Presentation	10%	CO2	C6, A4, P3
	Final Exam (Online Test + Quiz)		40%	CO1, CO3	C2-C6, P1
			40%	CO4	P3, A4
	Total	Marks	100%		

# (CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

#### **REFERENCE BOOKS**

- 1. Pattern Recognition and Machine Learning Christopher M. Bishop; Springer
- 2. Machine Learning Tom Mitchell, McGraw Hill
- 3. Introduction to Machine Learning, Second Edition Ethem Alpaydin
- 4. Pattern Recognition Sergios Theodoridis and Konstantinos Koutroumbas; Elsevier Inc.
- 5. Machine Learning: An Algorithmic Perspective Stephen Marsland

# **REFERENCE SITE**

# **CSE-443: Pattern Recognition**

COU	COURSE INFORMATION									
	e Code	: CSE-443	Lecture Con		: 3.00					
Course	e Title	: Pattern Recognition	Credit Hour	rs	: 3.00					
PRE-	REQUISI	TE								
	e Code: N									
	e Title: Ni									
CURI	RICULUN	A STRUCTURE								
Outco	me Based	Education (OBE)								
RATI	ONALE									
organi intellig	izational d gence.	tion algorithms and technique cisions as well as contributing								
OBJE	ECTIVE									
1 2. 7	understand contemporary terminology, progress, issues, and trends.									
LEAF	RNING O	UTCOMES & GENERIC SI	KILLS							
No.	(Upon c	Course Learning Outcome ompletion of the course, the stude able to)	ents will be	Bloom's Taxonomy	СР	CA	KP	Assessment Methods		
CO1	Identify technique	areas where pattern es can offer a solution	recognition	C1-C3	1		3	T, F		
CO2	technique	the strength and limitation es used in pattern recognition, regression and density s.	gnition for	C4	1		1, 3	МТ		
CO3	Solve pro	oblems in regression and class	ification.	Р3	7	3	6	F		
CO4		communication skill by pattern recognition	presenting	A2		1	5	Q, Pr		

(CP- Complex Problems, CA-Complex Activities, KP-Knowledge Profile, T – Test ; PR – Project ; Q – Quiz; ASG – Assignment; Pr – Presentation; R - Report; F – Final Exam, MT- Mid Term Exam)

#### COURSE CONTENT

**Introduction to pattern recognition**: Statistical and Neural Pattern Recognition, Bayesian decision theory; **Classifiers:** Linear classifiers, Nonlinear classifiers; **Estimation Techniques**: Parametric estimation techniques; Non-parametric estimation techniques; **Methods and Models**: Template matching, Dynamic programming methods, correlation methods, Hidden Markov model, Support vector machine, Syntactic pattern recognition, Clustering algorithms, Principle component analysis.

#### SKILL MAPPING

No.	Course Learning Outcome	PROGRAM OUTCOMES (PO)											
INO.	Course Learning Outcome		2	3	4	5	6	7	8	9	10	11	12
CO1	Identify areas where pattern recognition techniques can offer a solution.	Н											
CO2	Analyze the strength and limitations of some techniques used in pattern recognition for classification, regression and density estimation problems.		Н										
CO3	Solve problems in regression and classification.			Н									
CO4	Develop communication skill by presenting topics on pattern recognition										L		

#### (H-High, M- Medium, L-low)

JUSTIFICAT	TION FOR	CO-PO MAPPING						
Mapping	Level	Justifications						
CO1 – PO1	High	Able to increase breadth and depth of knowledge through identifying and analysing various aspect of pattern recognition algorithms						
CO2 – PO2	High	Able to understand and analyse of pattern recognition a	lgorithms					
CO3 – PO3	High	Able to implement of pattern recognition algorithms						
CO4-PO10	CO4-PO10 Low Able to develop communication skills through participating in quiz, presentation etc.							
TEACHING	LEARNIN	IG STRATEGY						
Teaching and	Learning A	ctivities	Engagement (hours)					
Face-to-Face I	Learning							
Lectu	42							
Pract	ical / Tutor	rial / Studio	-					
Stude	ent-Centred	l Learning	-					
Self-Directed	Learning							
Non-	face-to-fac	e learning	42					
Revis	sion		21					
Asse	ssment Pre	parations	21					
Formal Assess	sment							
Cont	2							
Final	3							
Total			131					
TEACHING	METHOD	OLOGY						

Lecture and Discussion, Co-operative and Collaborative Method, Problem Based Method

Week	Lecture	Topics	Assessment Method
	Lec 1	Introduction to Pattern Recognition	
1	Lec 2	Importance of Pattern Recognition, Statistical	
	Lec 3	and Neural Pattern Recognition	
	Lec 4	Review of Probability Distributions	
2	Lec 5	Review of Probability Distributions (Contd.)	
	Lec 6	Bayesian classifier	
	Lec 7	Bayes Decision Theory	Class Test 1
3	Lec 8	Discriminate Functions	
	Lec 9	Decision Surface	
	Lec 10	Bayesian Classifier for Normal Distribution	
4	Lec 11	Naïve Bayes Classifier	
	Lec 12	Bayesian Belief Networks	
	Lec 13	Linear Classifiers	
5	Lec 14	Discriminate Functions	
	Lec 15	Decision Hyperplanes	Class Test 2
	Lec 16	Perceptron Algorithm	Class Test 2
6	Lec 17	Least Squares Methods	
	Lec 18	Kessler's Construction	
	Lec 19	Nonlinear Classifier	
7	Lec 20	Two and Three Layer Perceptrons	
	Lec 21	Back Propagation Algorithm	
	Lec 22	Template matching	
8	Lec 23	Optimal Path Searching Techniques	
	Lec 24	Optimal Path Searching Techniques (Contd.)	
	Lec 25	Dynamic Programming Methods (Contd.)	
9	Lec 26	Dynamic Programming Methods (Contd.)	
	Lec 27	Correlation Methods	
	Lec 31	Context Dependent Classification	Mid Term Exam
10	Lec 32	Observable and Hidden Markov Models	
	Lec 33	Viterbi Algorithm	
	Lec 28	Problems of HMM	
11	Lec 29	Problems of HMM	
	Lec 30	Application of HMM in Speech Recognition	
	Lec 34	Syntactic Pattern Recognition	
12	Lec 35	Syntactic Pattern Recognition (Contd.)	
	Lec 36	Syntactic Pattern Recognition (Contd.)	
	Lec 37	Clustering Algorithms	
13	Lec 38	Clustering Algorithms (Contd.)	Class Test 3
	Lec 39	Clustering Algorithms (Contd.)	
	Lec 40	Support Vector Machine	
14	Lec 41	Support Vector Machine (Contd.)	
	Lec 42	Support Vector Machine (Contd.)	

Comp	Components		СО	Blooms Taxonomy
Continuous	Test 1-3	20%	CO 1 CO 2	C1, C2 C3, C4
Assessment (40%)	Class Participation	5%	CO 4	A2
	Mid term	15%	CO 3	C4
			CO 1	C1, C2, C3
Final	Final Exam		CO 2	C4
			CO3	P3

	Total Marks	100%							
	(CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)								
R	EFERENCE BOOKS								
1.		d Edition) - R.	O. Duda, P.E.D. Hart and G. Stork; John Wiley and Sons						
2	(2000) Dettern recognition (Ath Edition) Service Theodoridis and Konstantings Kontroumbes: Academic								
2.	<ul> <li>Pattern recognition (4th Edition) –Sergios Theodoridis and Konstantinos Koutroumbas; Academic Press (2008)</li> </ul>								

#### **REFERENCE SITE**

# **CSE-444: Pattern Recognition Sessional**

COU	RSE INFO	ORMATION								
	e Code	: CSE 444	Lecture Contact Hour			in alter	mative week			
Cours	e Title	: Pattern Recognition sessional	Credit Hours	t Hours : 0.75						
PRE-REQUISITE										
Course Code: Nil Course Title: Nil										
CUR	RICULU	M STRUCTURE								
Outco	me Based	Education (OBE)								
RATI	IONALE									
This course motivates to apply various algorithm and techniques - classification, regression, clustering, neural network, decision tree and other estimation techniques which helps to identify different types of pattern in data that can give required solution and suggestions to real-life problems for various applications.										
paner	OBJECTIVE									
-		· ·								
OBJE 1. T al	<b>ECTIVE</b> o achieve lgorithm a	a basic idea about designing and d nd techniques.					-			
<b>OBJH</b> 1. T al 2. T	CCTIVE o achieve lgorithm a o analyze	a basic idea about designing and d	order to find out potent				-			
<b>OBJH</b> 1. T al 2. T	CTIVE o achieve lgorithm a o analyze RNING O	a basic idea about designing and d nd techniques. regular/irregular pattern in data in	order to find out potent				-			
<b>OBJE</b> 1. T al 2. T <b>LEAE</b>	CTIVE o achieve gorithm a o analyze RNING O (Upon c Understa	a basic idea about designing and d nd techniques. regular/irregular pattern in data in <b>UTCOMES &amp; GENERIC SKIL</b> Course Learning Outcome completion of the course, the students v	order to find out potent LS vill be Bloom's Taxonomy ns and C2, A2	ially u	seful int	formati	on Assessment Methods			
OBJE 1. T al 2. T LEAI No.	CTIVE o achieve lgorithm a o analyze RNING O (Upon c Understa select su Impleme	a basic idea about designing and d nd techniques. regular/irregular pattern in data in <b>UTCOMES &amp; GENERIC SKIL</b> Course Learning Outcome completion of the course, the students v able to) und pattern recognition problem	order to find out potent LS vill be Bloom's Taxonomy Is and C2, A2 blution	ially u	cA	formati KP	on Assessmen			

(CP- Complex Problems, CA-Complex Activities, KP-Knowledge Profile, T – Test; PR – Project; Q – Quiz; ASG – Assignment; Pr – Presentation; R - Report; F – Final Exam, MT- Mid Term Exam)

#### **COURSE CONTENT**

Bayes Classifier, Perceptron Algorithm, Pocket Algorithm, Edit Distance, Basic Sequential Algorithmic Scheme, K-Means Clustering algorithm, Support Vector Machine, Neural Network, Decision Tree.

SKILL	MAPF	PING													
No.		Course Lear	ning Outcome		-		1					ES (I	· .		
1,0.	TL 1			1	2	3	4	5	6	7	8	9	10	11	12
CO1		1	ttern recognition et suitable techniques ation				Н								
CO2	classi		on to problems in regression through									Н			
CO3	Develop oral and written communication skills to deliver solution on pattern recognition problems							Н							
(H – H	igh, M-	Medium, L-l	ow)												
JUSTI	FICAT	ION FOR C	O-PO MAPPING												
Mapp	oing	Level						tions							
CO1 –	PO4	High	Able to increase brea analysing various as appropriate solution.												
CO2 –	PO9	High	Able to analyse and in	nple	ment	solut	tion	of pa	tteri	ı rec	ogni	ition	tasks		
CO3- F	PO10	High	Able to develop compared them.	muni	catio	n ski	lls tł	nroug	h w	ritin	g re	ports	and	prese	nting
TEACH	HING I	LEARNING	STRATEGY												
Teachin	ig and I	Learning Acti	vities								E	Engagement (hours)			
Face-to-															
	Lectu										21				
		cal / Tutorial nt-Centred Le											-		
Self-Di	rected I	Learning													
		face-to-face le	arning										-		
	Revis	sment Prepar	ations										-		
Formal															
		nuous Assess	ment										2		
	Final	Examination											3		
Total													26		
TEACH	HING I	METHODOI	LOGY												
			operative and Collabor	ative	e Met	hod,	Prob	lem	Base	ed M	letho	od			_
1		HEDULE													
W	eek	Lab	Topics	<b></b>		1	<u>a ·</u>		•				Re	marl	KS
	1	Lab 1,2	Introduction to MAT Distribution, Project	Idea	Dist	ributi	on		•						
	3	Lab 3,4	Project Proposal Pres Assignment												
	5	Lab 5,6	Lab 5,6       K-Nearest Neighbour Classification, Home Assignment, Linear Classifiers, Home Assignment       3.00 hrs in						in						
	7	Lab 7, 8	Lab 7, 8 Perceptron Algorithm, Home Assignment, Lab Test 1						e						
	9	Lab 9,10	Clustering Algorithm Project Update	ns, H	ome	Assi	gnme	ent, P	roje	ct U	pdat	te,		week	
1	11	Lab 11,12	Support Vector Mac	hine,	Neu	al N	etwo	rk, D	ecis	ion	Tree	÷			
1	13	Lab 13,14	Quis, Viva, Project F	Final	Subn	nissio	on		_	_					

(	Components	Grading	СО	Blooms Taxonomy
Cantinuana	Test and Assignment	200/	CO 1	C2, A2
Continuous	Test and Assignment	30%	CO 2	C3, A5
Assessment (40%)	<b>Class Participation</b>	20%	CO 3	P3, A4
(40%)	Presentation	10%	CO 3	P3,A4
Final Exam(	Quiz+Viva+Online Test)	40%	CO1, CO2	C2, C3,C4,A2,A5
,	Total Marks	100%		

### (CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

#### **REFERENCE BOOKS**

- A Guide to MATLAB for Beginners and Experienced Users (2nd Edition) Brian R. Hunt Ronald L. Lipsman Jonathan M. Rosenberg with Kevin R. Coombes, John E. Osborn, and Garrett J. Stuck; Cambridge University Press (2006)
- Sergios Theodoridis Introduction to Pattern Recognition: A Matlab Approach (1st Edition) Sergios Theodoridis, Aggelos Pikrakis, Konstantinos Koutroumbas and Dionisis Covourous; Academic Press (2010)

# **REFERENCE SITE**

# **CSE-445: Digital Signal Processing**

COURSE INFORMATION										
Course		: CSE-445	Lecture Con		: 3.00					
Course	Title	: Digital Signal Processing	Credit Hour	rs	: 3.00					
PRE-REQUISITE										
Course Code: Nil										
Course	Title: Ni									
CURR	ICULUN	I STRUCTURE								
Outcom	ne Based	Education (OBE)								
RATIO	ONALE									
	Digital Signal Processing course is designed to introduce the fundamental concepts of discrete signal processing and their applications in communications, control and instrumentation.									
OBJEC	CTIVE									
		the key theoretical principles	s underpinni	ng DSP in a	design	proced	lure th	rough design		
-		se studies.								
		ow to use a powerful general- gital Signal Processing system		hematical pac	ckage si	ich as l	MATL	AB to design		
		analyze the architecture of		nal processor	and so	me nro	aramm	ing issues in		
		al signal processor in real-time			and so	ine pro	granni	ing issues in		
		al-time signal processing algo			d-point	process	or.			
		UTCOMES & GENERIC SI				-				
		Course Learning Outcome		Bloom's				Assessment		
No.	(Upon c	ompletion of the course, the stude able to)	ents will be	Taxonomy	СР	CA	KP	Methods		
COL	Understa		principles	C2	1		2	ΤD		
CO1	underpin	ning DSP in a design procedu		C2	1		3	T, F		

	this design examples and case study				
CO2	Evaluate the basic architecture of a digital signal processor and some programming issues in fixed- point digital signal processor in real-time implementation.	C5	2	5	T, M, F
CO3	Analyze and implement signal processing algorithms	C4	1	3	T, F, PR
CO4	Able to develop the communication skill by presenting topics on operating systems	A2		5	Q, Pr

(CP- Complex Problems, CA-Complex Activities, KP-Knowledge Profile, T - Test ; PR - Project ; Q -Quiz; ASG – Assignment; Pr – Presentation; R - Report; F – Final Exam, MT- Mid Term Exam)

#### **COURSE CONTENT**

Introduction to speech, image & data processing; Discrete time signals, sequences; Linear Constant Coefficient difference equation; Sampling continuous time signals; Two dimensional sequences and systems; Z-transform, Inverse Z-transform, H-transform; Frequency domain representation, discrete time systems and signals; Fourier series and Fourier Transform; Parseval's theorem; Equivalent noise definition of bandwidth; Convolution, Correlation and method of numerical integration; Computation of the DFT: Goertzel FFT, Chirp Z-transform algorithms. Two-dimensional filter design, Quantization effects in digital filters.

#### **SKILL MAPPING**

No.	Course Learning Outcome	PROGRAM OUTCOMES (PO)											
INO.	Course Learning Outcome		2	3	4	5	6	7	8	9	10	11	12
CO1	Understand the key theoretical principles underpinning DSP in a design procedure through this design examples and case study	Н											
CO2	Evaluate the basic architecture of a digital signal processor and some programming issues in fixed-point digital signal processor in real-time implementation.		Н										
CO3	Analyze and implement signal processing algorithms			Н									
CO4	Able to develop the communication skill by presenting topics on operating systems										L		

(H-High, M-Medium, L-low)

JUSTIFICA	JUSTIFICATION FOR CO-PO MAPPING							
Mapping	Level	Justifications						
CO1-PO1	High	Amplify depth of knowledge through understanding the key theoretical principles underpinning DSP in a design procedure through this design examples and case study is very important.						
CO2-PO2	High	Understand and solve various complex problems by analysing the architecture of a digital signal processor and some programming issues in fixed-point digital signal processor in real-time implementation.						
CO3-PO3	High	Understand and implement the design issues required design signal processing algorithms.	to develop and analyse					
CO4-PO4	High	Develop communication skills through participating in qu	iz, presentation etc.					
TEACHING LEARNING STRATEGY								
U	Teaching and Learning Activities Engagement (hours)							
Face-to-Face	e Learning							

Lecture	42
Practical / Tutorial / Studio	-
Student-Centred Learning	-
Self-Directed Learning	
Non-face-to-face learning	42
Revision	21
Assessment Preparations	21
Formal Assessment	
Continuous Assessment	2
Mid Term Exam	1
Final Examination	3
Total	132

# **TEACHING METHODOLOGY**

Lecture and Discussion, Co-operative and Collaborative Method, Problem Based Method

COURSE SCHEDULE								
Week	Lecture	Topics	Assessment Methods					
1	Lec 1	Introduction to speech image & data processing						
	Lec 2							
	Lec 3		_					
2	Lec 4	Discrete time signals Sequences						
	Lec 5		Class Test 1					
	Lec 6		_					
3	Lec 7	Linear Constant Coefficient difference equation						
	Lec 8							
	Lec 9							
4	Lec 10	Sampling continuous time signals						
	Lec 11							
	Lec 12		_					
5	Lec 13							
	Lec 14	Two dimensional sequences and systems						
	Lec 15		Class Test 2					
6	Lec 16	Z-transform						
	Lec 17	Inverse Z-transform						
	Lec 18	H-transform						
7	Lec 19	Frequency domain representation						
	Lec 20	Discrete time systems and signals						
	Lec 21							
8	Lec 22	Fourier series and Fourier Transform						
	Lec 23							
	Lec 24							
9	Lec 25	Parseval's Theorem						
	Lec 26		Mid Term Exam					
	Lec 27							
10	Lec 28	Equivalent Bandwidth						
	Lec 29	Noise Convolution						
	Lec 30							
11	Lec 31	Correlation						
	Lec 32	Numerical integration						
	Lec 33							
12	Lec 34	Computation of the DFT						
	Lec 35							
	Lec 36		Class Test 2					
13	Lec 37							
	Lec 38							
	Lec 39							
14	Lec 40	Two-dimensional filter design	1					
	Lec 41	Quantization effects in digital filters.						
	Lec 42							

Comp	oonents	Grading	СО	Blooms Taxonomy
			CO1	C2
Continuous	Test 1-3	20%	CO2	C5
Continuous			CO3	C4
Assessment (40%)	Class Participation	5%	CO4	A2
	Mid term	15%	CO2	C5
			CO1	C2
Final	Exam	60%	CO2	C5
			CO3	C4
Total	Marks	100%		

#### (CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

## **REFERENCE BOOKS**

- 1. Digital Signal Processing John G. Proakis & Dimitris Manolakis
- 2. Discrete-Time Signal processing Allan Oppenheim & Ronald Schafer
- 3. Digital Signal Processing-A practical approach Emmanuel C. Ifeachor Barrie W. Jervis
- 4. Signals and Systems Rodger Ziemer & William Tranter

# **REFERENCE SITE**

# **CSE-446: Digital Signal Processing Sessional**

COU	RSE INF	ORMATION					
	se Code se Title	: CSE-446 : Digital Signal Processing Sessional	Lecture Contact H Credit Hours	ours	: 3.0 week : 0.7	ς	n alternative
PRE-	REQUIS	SITE					
	se Code: I se Title: N						
CUR	RICULU	<b>M STRUCTURE</b>					
Outco	ome Base	d Education (OBE)					
RATI	IONALE	:					
	0	gnal Processing Sessional course is des cessing signals for getting desired outpu	6			0	0
OBJE	ECTIVE						
2. To	use prac	imulate and implement digital signal pro- tical knowledge to design and implemer nt processor.				lgorith	ms using the
LEAI	RNING (	OUTCOMES & GENERIC SKILLS					
No.	(Upon	Course Learning Outcome completion of the course, the students will be able to)	Bloom's Taxonomy	СР	CA	KP	Assessment Methods
CO1	fundam	p a good understanding of the ental issues and challenges of DSP: odel selection, model complexity, etc.	C2-C6, P1,P6		1	1,6	T, Q
CO2	Evaluat	te the strengths and weaknesses of	C3,C6,A4,A5,P6		2	8	T, ASG

	many popular DSP approaches.				
CO3	Appreciate the underlying mathematical relationships within and across DSP algorithms.	C2-C6,P1,A1- A2	4	2	R, Q, Pr
CO4	Design and implement various DSP algorithms in a range of real-world applications.	P3,A4,C3- C4.C6	3	5	T, Q, F

(CP- Complex Problems, CA-Complex Activities, KP-Knowledge Profile, T - Test ; PR - Project ; Q -Quiz; ASG – Assignment; Pr – Presentation; R - Report; F – Final Exam, MT- Mid Term Exam)

#### **COURSE CONTENT**

Speech, image & data processing algorithms; Sampling continuous time signals; Z-transform, Inverse Ztransform, Frequency domain representation, Fourier series and Fourier Transform; Equivalent noise definition of bandwidth; Convolution, Correlation and method of numerical 281 integration; Computation of the DFT: Goertzel FFT, Chirp Z-transform algorithms. Two-dimensional filter design.

#### **SKILL MAPPING**

No.	Course Learning Outcome			Pl	ROG	RAM	101	JTC	OM	ES (I	PO)		
10.	Course Learning Outcome	1	2	3	4	5	6	7	8	9	10	11	12
CO1	Develop a good understanding of the fundamental issues and challenges of DSP: data, model selection, model complexity, etc.		Н										
CO2	Evaluate the strengths and weaknesses of many popular DSP approaches.					Н							
CO3	Appreciate the underlying mathematical relationships within and across DSP algorithms.				М								
CO4	Design and implement various DSP algorithms in a range of real-world applications.			Н									

(H – High, M- Medium, L-low)

JUSTIFIC	ATION F	OR CO-PO MAPPING	
Mapping	Level	Justifications	
CO1-PO2	High	Able to understand the complexity in analysis of data. Mode and fundamental issues of DSP.	el selection, challenges
CO2-PO5	High	Able to identify the appropriate modern tools or learning all their strengths and weaknesses.	lgorithms and evaluate
CO3-PO4	High	Able to appreciate the mathematical relationships and in d experimentation of the paradigms of DSP.	epth investigation and
CO4-PO3	High	Able to implement DSP algorithms and develop unique so problems from real-world.	olutions to engineering
TEACHIN	G LEARN	NING STRATEGY	
Teaching an	nd Learnin	g Activities	Engagement (hours)
Face-to-Fac	e Learning		
Le	ecture		21
Pr	actical / Tu	ntorial / Studio	-
St	udent-Cent	red Learning	-
Self-Directe	ed Learning	g	
No	on-face-to-	face learning	-
Re	evision		-
As	ssessment l	Preparations	-
Formal Ass	essment		

	nuous Assessme 'erm Exam	nt	- 2
Final	Examination		3
Total			26
TEACHING N	<b>METHODOLO</b>	GY	
Lecture and Dia	scussion, Co-ope	erative and Collaborative Method, Problem Based M	lethod
COURSE SCH	HEDULE		
Week	Lecture	Topics	Remarks
1	Lab -1, 2	Discrete time signals Sequences	
3	Lab -3, 4	Linear Constant Coefficient difference equation, Sampling continuous time signals	
5	Lab -5, 6	Two dimensional sequences and systems, Z- transform, Inverse Z-transform, H-transform	
7	Lab -7, 8	Frequency domain representation, Discrete time systems and signals, Fourier series and Fourier Transform	3.00 in alternate week
9	Lab -9, 10	Parseval's Theorem, Equivalent Bandwidth, Noise Convolution	
11	Lab -11, 12	Correlation, Numerical integration, Computation of the DFT	
13	Lab -13, 14	Goertzel FFT, Chirp Z-transform algorithms. Two-dimensional filter design, Quantization effects in digital filters.	
ASSESSMEN	<b>T</b> STRATEGY		

#### CO Blooms Taxonomy Components Grading CO1 C1, C2 Test 1-3 20% CO2 C1, C2 Continuous Class CO1 C4, C5 Assessment 5% Participation (40%) CO3 C4 Mid term 15% CO2 C4 CO3 C4, C5 Final Exam 60% CO4 C6 Total Marks 100%

### (CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

#### **REFERENCE BOOKS**

- 1. Digital Signal Processing John G. Proakis & Dimitris Manolakis
- 2. Discrete-Time Signal processing Allan Oppenheim & Ronald Schafer
- 3. Digital Signal Processing-A practical approach Emmanuel C. Ifeachor Barrie W. Jervis
- 4. Signals and Systems Rodger Ziemer & William Tranter

#### **REFERENCE SITE**

# **CSE-449:** Mobile and Ubiquitous Computing

COU	RSE INFO	ORMATION					
Cours	e Code	: CSE-449	Lecture Co	ontact H	ours	: 3.0	0
Cours	e Title	: Mobile and Ubiquitous Computing	Credit Hou	ırs		: 3.0	0
PRE-	REQUISI	TE					
	e Code: N						
	e Title: Ni						
CUR	RICULUN	A STRUCTURE					
Outco	ome Based	Education (OBE)					
	IONALE						
		tivates to enable computing technologies					
		and everywhere by studying affordances,					
	-	gn etc. of such computing systems in order	to implement	them IC	or differ	ent app	oncations.
	ECTIVE		1.1	11	1 1		· · · ·
	uting syste	different features that helps to develop a	mobile, pers	sonalize	d and	context	independen
		ne different properties and requirements the	hat influences	the de	velopm	ent of	a mobile and
		buting system.			· • • • • • • • •		
LEA	RNING O	UTCOMES & GENERIC SKILLS					
		Course Learning Outcome	Bloom's				Assessmen
No.	(Upon c	ompletion of the course, the students will be	Taxonomy	СР	CA	KP	Methods
	Illustrate	able to) mobile wireless communication					
CO1		gies and explain their functioning.	C1-C2			1, 3	T, F
		the fundamental trade-offs related to					T, Mid
CO2	-	limitations and communication needs in	C1-C2			3	T, Mid Term
		ommunication and sensing systems.					Exam, F
		and compare the range of novel					Mid Term
CO3		ons based upon mobile systems as well	C3-C4,	1		2, 3	Exam, F,
		particular requirements.	A2			,	ASG
CO4		the communication skill by presenting	A2		1	5	PR
04	topics on	mobile and ubiquitous computing.	AL		1	5	ΓK
(CP-	Complex P	roblems, CA-Complex Activities, KP-Kno	wledge Profil	<u>е Т_</u> Т	Pest · PL	P = Proi	$iect \cdot 0 =$
	-	signment; Pr – Presentation; R - Report; F				<b>、</b> 110j	jeer, Q
	RSE CON						
		Evolution of mobile computing systems				•	· •
	• •	rsonalization, context awareness), Constr			-		
	•	ons, UI limitations, sensing accuracy), 1		-			
		ile IP and Variants of TCP; <b>Distribute</b>	•		•		-
	-	ing, Proxy Based Architectures, Service	•				-
		<b>[obile Computing</b> : Development in Con-			-	-	-
		ces, Information Appliance and Wearable	-	-			-
-		nputing; <b>Proximity-based Networking</b> :		-			
		nan Interaction in Ubiquitous Comput urity. Technological Component of Locati	-		-		
1 11 1 10 10	Ly and Sec	ireless VXMI SMSMMS Personal Area					

Location, 3G wireless, VXML, SMSMMS, Personal Area Networks (802.11, Bluetooth, IRFIDs), Micro-Electro- Mechanical (MEMES), Recommender systems (Collaborative Filtering, Intelligent Agents). Android Framework, and Application structure.

	MAPPI	NG													
No.		Course Lear	ning Outcome		-				M (	DUT	CON	<b>AES</b>	(PO)	-	
140.				1	2	3	4	5	6	7	8	9	10	11	12
	Illustra	ite me	obile wireless												
CO1	comm	inication	technologies and	Н											
COI	explain	n their functi	oning.	п											
	-		-												
	Explai	n the fund	damental trade-offs												
CO2			ce limitations and	н											
02	comm	inication	needs in mobile	н											
	comm	inication and	d sensing systems.												
			mpare the range of												
CO3			based upon mobile				М			Н					
005			as their particular				1.1			••					
		ements.													
<b>GO</b> 4			munication skill by												
CO4			on mobile and										L		
		tous comput													
(H–High	n, M–Me	dium, L–Lo	w)												
ГЕАСІ	HING I	EARNIN	G STRATEGY												
Teachir	ng and L	earning Ad	ctivities								]	Enga	ıgem	ent (h	ours
Face-to	-Face L	earning													
	Lectur	•											2	42	
	Practic	al / Tutoria	ıl / Studio											-	
	Studen	t-Centred I	Learning											-	
Self-Di [,]		earning													
		ce-to-face	learning										2	42	
	Revisi													21	
		ment Prepa	arations											21	
Formal	Assessi														
ormar		uous Asses	sment											2	
		Examination												3	
Total	I IIIai L		1											<u>3</u> 1	
	HINC												1	51	
I D.A.L		AETHOD	OLOGY												
		METHOD		llab	orati	vo N	/loth/	od 1	Drol	alam	Ba	ad I	Math	od	
Lecture	and Di	scussion, C	OLOGY Co-operative and Co	llabo	orati	ve N	/leth	od, I	Prol	olen	Ba	sed I	Meth	od	
Lecture	and Di			llabo	orati	ve N	/leth	o <b>d</b> , 1	Prol	olen	Ba	sed I	Meth	od	
Lecture COUR	and Di	scussion, C IEDULE Lecture	Co-operative and Co	To	pics					olem				od t Met	hods
Lecture COUR	and Di SE SCI	scussion, C HEDULE Lecture Lec 1	Co-operative and Co	To	pics					olem					hods
Lecture COUR	and Di SE SCI	scussion, C HEDULE Lec 1 Lec 2	Co-operative and Co Introduction, Evolut Systems	To tion o	opics of M	obile				olem					hods
Lecture COUR We	and Di SE SCH eek	scussion, C HEDULE Lec 1 Lec 2 Lec 3	Co-operative and Co Introduction, Evolut Systems Affordances of Mob	To tion o bile S	o <b>pics</b> of M Syste	obile	e Cor	nput	ing	olem					hods
Lecture COUR	and Di SE SCH eek	scussion, C HEDULE Lec 1 Lec 2 Lec 3 Lec 4	Co-operative and Co Introduction, Evolut Systems Affordances of Mob Constraints of the M	To tion o bile S fobil	opics of M Syste	obile ms	e Cor	nput	ring			sses	smen	t Met	hods
Lecture COUR We	and Di SE SCH eek	scussion, C HEDULE Lec 1 Lec 2 Lec 3 Lec 4 Lec 5	Co-operative and Co Introduction, Evolut Systems Affordances of Mot Constraints of the M Protocol for Wireles	To tion o bile S lobil	opics of M Syste le Pla	obile ms atforr	e Cor	nput	ring	olem		sses	smen		hods
Lecture COURS We 1	e and Di SE SCH eek I	scussion, C IEDULE Lec 1 Lec 2 Lec 3 Lec 4 Lec 5 Lec 6	Co-operative and Co Introduction, Evolut Systems Affordances of Mob Constraints of the M Protocol for Wireles Protocol for Wireles	To tion o bile S fobil ss Ne ss Ne	opics of M Syste le Pla etwo	obile ms atforn rks, 7	e Cor m, Ne Гrans	nput	ring ork			sses	smen	t Met	hods
Lecture COUR We	e and Di SE SCH eek I	scussion, C IEDULE Lec 1 Lec 2 Lec 3 Lec 4 Lec 5 Lec 6 Lec 7	Co-operative and Co Introduction, Evolut Systems Affordances of Mot Constraints of the M Protocol for Wireles Protocol for Wireles Mobile IP, Variants	To tion o pile S fobil ss No ss No of T	opics of M Syste le Pla etwo	obile ms atforn rks, 7	e Cor m, Ne Гrans	nput	ring ork			sses	smen	t Met	hods
Lecture COUR We 1	e and Di SE SCH eek I	scussion, C IEDULE Lec 1 Lec 2 Lec 3 Lec 4 Lec 5 Lec 6 Lec 7 Lec 8	Co-operative and Co Introduction, Evolut Systems Affordances of Mob Constraints of the M Protocol for Wireles Protocol for Wireles	To tion o pile S fobil ss No ss No of T	opics of M Syste le Pla etwo	obile ms atforn rks, 7	e Cor m, Ne Гrans	nput	ring ork			sses	smen	t Met	hods
Lecture COUR We	and Di SE SCH eek I	scussion, C IEDULE Lec 1 Lec 2 Lec 3 Lec 4 Lec 5 Lec 6 Lec 7 Lec 8 Lec 9	Co-operative and Co Introduction, Evolut Systems Affordances of Mot Constraints of the M Protocol for Wireles Protocol for Wireles Mobile IP, Variants for Mobile Computi	To tion o fobil ss No ss No of T ing	opics of M Syste le Pla etwo CP,	obile ms atforn rks, 7 rks Distr	e Cor m, No Frans ribute	nput etwo sport	ing prk t	orms		sses	smen	t Met	hods
Lecture COUR We 1	and Di SE SCH eek I	scussion, C IEDULE Lec 1 Lec 2 Lec 3 Lec 4 Lec 5 Lec 6 Lec 7 Lec 8 Lec 9 Lec 10	Co-operative and Co Introduction, Evolut Systems Affordances of Mot Constraints of the M Protocol for Wireles Protocol for Wireles Mobile IP, Variants for Mobile Computi	Te tion of oile S fobil ss Ne of T ing ectur	opics of M Syste le Pla etwo CP,	obile ms atforn rks, 7 rks Distr	e Cor m, No Frans ribute	nput etwo sport	ing prk t	orms		sses	smen	t Met	hods
Lecture COUR We 1 2	and Di SE SCH eek I	scussion, C <b>IEDULE</b> Lec 1 Lec 2 Lec 3 Lec 4 Lec 5 Lec 6 Lec 7 Lec 8 Lec 9 Lec 10 Lec 11	Co-operative and Co Introduction, Evolut Systems Affordances of Mot Constraints of the M Protocol for Wireles Protocol for Wireles Mobile IP, Variants for Mobile Computi	Te tion of oile S fobil ss Ne of T ing ectur	opics of M Syste le Pla etwo CP,	obile ms atforn rks, 7 rks Distr	e Cor m, No Frans ribute	nput etwo sport	ing prk t	orms		sses (	smen Class '	<b>t Met</b> Test 1	hods
Lecture COURS We 1 2 3 4	e and Di SE SCH eek 1 2 3	scussion, C IEDULE Lec 1 Lec 2 Lec 3 Lec 4 Lec 5 Lec 6 Lec 7 Lec 8 Lec 9 Lec 10 Lec 11 Lec 12	Co-operative and Co Introduction, Evolut Systems Affordances of Mob Constraints of the M Protocol for Wireles Protocol for Wireles Mobile IP, Variants for Mobile Computi Proxy Based Archite Interaction Platform	Te tion of fobile S fobil ss Ne of T ing ectur is	of M Syste e Pla etwo CCP, res, S	obile ms atforn rks, 7 Distr Gervi	e Cor m, No Trans ribute	mput etwo port ed P	ing ork latfc	orms		sses (	smen Class '	t Met	hods
Lecture COUR We	e and Di SE SCH eek 1 2 3	scussion, C <b>IEDULE</b> Lec 1 Lec 2 Lec 3 Lec 4 Lec 5 Lec 6 Lec 7 Lec 8 Lec 9 Lec 10 Lec 11	Co-operative and Co Introduction, Evolut Systems Affordances of Mot Constraints of the M Protocol for Wireles Protocol for Wireles Mobile IP, Variants for Mobile Computi	To tion of bile S fobil ss Ne of T ng ectur is	ppics of M Syste e Pla etwo CP, CP, res, S	obile ms	e Cor m, No Trans ribute ce Di	nput etwo sport ed P scov	ing ork t latfo	orms		sses (	smen Class '	<b>t Met</b> Test 1	hods

6	Lec 16	Smart Embedded Device, Information Appliance,	
	Lec 17	Wearable Computers	
	Lec 18		
7	Lec 19	Context Acquisition, Proximity Based Networking	
	Lec 20	Proximity Based Networking (Contd.)	
	Lec 21		
8	Lec 22	Proximity Based Networking (Contd.),	
	Lec 23	Communication Protocol for Wireless Sensor	
	Lec 24	Network, Human Interaction in Ubiquitous	
		Computing Environment	
9	Lec 25	Tangible User Interfaces, Privacy and Security	
	Lec 26	Privacy and Security (Contd.)	Mid Term Exam
	Lec 27		
10	Lec 31	Components of LBS-WAP, Components of GPS,	
	Lec 32	Cell-based Location Service	
	Lec 33		
11	Lec 28	3G, Wireless, VXML, SMS-MMS	
	Lec 29		
	Lec 30		
12	Lec 34	Personal Area Network, 802.11 and Bluetooth,	
	Lec 35	IRFIDs	
	Lec 36		
13	Lec 37	Micro-electro-mechanical (MEMES), Android	
	Lec 38	Framework, Android Application Structure	Class Test 3
	Lec 39		
14	Lec 40	Recommender System, Collaborative Filtering,	
	Lec 41	Intelligent Agents	
	Lec 42		
ASSESSMEN	T STRAT	EGY	

Comp	oonents	Grading	СО	Blooms Taxonomy
	Test 1-3	20%	CO 1, CO 2	C1, C2
Continuous	1031 1-5	2070	CO 3	C3, C4
Assessment (40%)	Class Participation	5%	CO 4	A2
	Mid term	15%	CO 2, CO 3	C1, C2, C3, C4, A2
			CO 1	C1, C2
Final	Exam	60%	CO 2	C1, C2
			CO 3	C3, C4, A2
Total	Marks	100%		

# (CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

# **REFERENCE BOOKS**

1. Context-Aware Mobile and Ubiquitous Computing for Enhanced Usability: Adaptive Technologies and Applications (1st Edition) –Dragan Stojanovic; Information Science Reference (2009)

2. Fundamentals of Mobile and Pervasive Computing (1st Edition) - Frank Adelstein, Sandeep KS Gupta, Golden Richard III and Loren Schwiebert; McGraw-Hill (2004)

3. Handbook on Mobile and Ubiquitous Computing: Status and Perspective (1st Edition) - Laurence T. Yang, EviS Yukur and Seng W. Loke; CRC Press (2013)

# **REFERENCE SITE**

# CSE-450: Mobile and Ubiquitous Computing Sessional

000	RSE INF	ORMATION													
	e Code e Title	: CSE-450 : Mobile and Ubiquitous Com	puting	g Se	ssio	nal			e Co Hou		t Ho	urs		.00 hrs native 75	
PRE-	REQUIS	SITE													
	e Code:														
	e Title: N	MI STRUCTURE													
		d Education (OBE)													
This of equipped and the	ped with ne enviro	notivates to use mobile comm sensors that enable the inferen- nment of the user and emphasis s networks, mobile sensing, per	ce of ize or	the s	surro veloj	oundi ping	ng c deep	conte per u	ext, 1nde	incl ersta	uding nding	g th g of	e posi the f	tion, a unction	ctivit
	ECTIVE														
со 2. Т	ommunic 'o develo	strate understanding of the te ations and the basics of wireles p simple wireless web applicati	ss con	nmu				nd	soci	al is	ssues	rel	lated	to ubio	quito
LEAI	RNING	OUTCOMES & GENERIC S		LS					r			-		1	
No.	(Upon	Course Learning Outcome completion of the course, the stud able to)		vill be	e	Blo Tax	oom ³ onor	-	С	Р	CA		KP	Asse Me	ssme thods
CO1	sensing	strate practical skills in develog applications.					C4						4	PI	R, Q
CO2	base wi	and create mobile application th presentation.				C	5, P3	3	1	l			5	ASG	G, PR
CO3	-	the range of novel applica nobile systems as well as the ments.				C4	4, A2	2					6	ASG	, Pr,
		Problems, CA-Complex Activi Assignment; Pr – Presentation; 1								– T	est;	PR	– Pro	ject ; Ç	2 –
COU	RSE CO	NTENT													
for W protoc	vireless N	nobile computing systems, Aff Vetworks, Mobile IP and Vari ireless Sensor Networks. PING					-							-	
No		Course Learning Outcome		1	2								S (PO	·	10
CO1	Dem deve	onstrate practical skills loping mobile sens ications.	in ing	1 H	2	3	4	5	6	7	8	9	10	11	12
CO2	Desi in te	gn and create mobile applicat am base with presentation.			Η							Н			
	Expl	e	ovel bile							Н					1

JUSTIFI	CATION 1	FOR (	CO-PO MAPPING:			
Mappi	ng Le	evel		Justifications		
CO1-P		ligh	Apply knowledge of	mobile applications to dev	velop practical	skills.
CO2-P	О2 Н	ligh	Analyze each probler	n and propose an appropri	ate design.	
CO2-P		ligh	• •	ams as well as individual		bile application.
CO3-P		dium		over the applications of mo	•	TI
CO3-P			=	ations using mobile tech	=	propose differe
		ligh	solutions.			
			STRATEGY			
	and Learni		ivities	Eng	agement (hours	5)
	Face Learnin	ng				
	Lecture Practical / 7	Futorio	1 / Studio		- 21	
					21	
	Student-Ce cted Learni		Lating		-	
	Non-face-to		learning		_	
	Revision	J-race i	learning		-	
	Assessment	t Prena	rations		_	
	ssessment	t i iepu	liutons			
	Continuous	Asses	sment		2	
	Final Exam				3	
Fotal					26	
LACH	ING METI		LUGI			
Lecture a		ion, Co		orative Method, Problem I	Based Method	
Lecture a	nd Discussi	ion, Co J <b>LE</b>			Based Method	Remarks
Lecture a	nd Discussi E <b>SCHEDU</b>	ion, Co U <b>LE</b> es	o-operative and Collabo	orative Method, Problem I Topics and Ubiquitous Computing		Remarks
Lecture a	nd Discussi E <b>SCHEDU</b>	ion, Co U <b>LE</b> es In	p-operative and Collabo ntroduction to Mobile a	Topics	g,	Remarks
Lecture a COURSI Week	nd Discussi E SCHEDU Lecture	ion, Co U <b>LE</b> es In 2 A	p-operative and Collabo ntroduction to Mobile a	Topics and Ubiquitous Computing Systems, Constraints of M	g,	Remarks
Lecture a COURSI Week	nd Discussi E SCHEDU Lecture Lab-1,2	ion, Co ULE s 2 A P	ntroduction to Mobile a	Topics and Ubiquitous Computing Systems, Constraints of M	g, lobile	Remarks
Lecture a COURSI Week	nd Discussi E SCHEDU Lecture	ion, Co ULE s In 2 A P 4 D A	p-operative and Collaborative	<b>Topics</b> and Ubiquitous Computing Systems, Constraints of M damentals, roposal, Android Program ndroid Application Structu	g, lobile ming - ıre	Remarks
COURSI Week 1 3	nd Discussi E SCHEDU Lecture Lab-1,2 Lab-3,4	ion, Co JLE s In 2 A P 4 A 5 U	ntroduction to Mobile a Affordances of Mobile a latform, Wireless Fund Discussion of Project Pr Android Framework, A JI components and Lay	Topics and Ubiquitous Computing Systems, Constraints of M damentals, roposal, Android Program ndroid Application Structu routs, Notification Manage	g, lobile ming - ire er and	
Lecture a COURSI Week 1 3 5	nd Discussi E SCHEDU Lecture Lab-1,2 Lab-3,4 Lab-5,6	ion, Co ULE s In 2 A P 4 D 4 A 5 U	p-operative and Collabor introduction to Mobile a Affordances of Mobile a Platform, Wireless Fund Discussion of Project Pro- Android Framework, A JI components and Lay Listeners, Presentation of	Topics and Ubiquitous Computing Systems, Constraints of M damentals, roposal, Android Program ndroid Application Structu routs, Notification Manage on the project proposal wi	g, lobile ming - ire er and	3:00 hrs in
Lecture a COURSI Week 1 3	nd Discussi E SCHEDU Lecture Lab-1,2 Lab-3,4	ion, Co ULE s In 2 A P 4 D 4 A 5 U	p-operative and Collabor introduction to Mobile a Affordances of Mobile a Platform, Wireless Fund Discussion of Project Pro- Android Framework, A JI components and Lay Listeners, Presentation of	Topics and Ubiquitous Computing Systems, Constraints of M damentals, roposal, Android Program ndroid Application Structu routs, Notification Manage	g, lobile ming - ire er and	3:00 hrs in
Lecture a COURSI Week 1 3 5	nd Discussi E SCHEDU Lecture Lab-1,2 Lab-3,4 Lab-5,6	ion, Co ULE s In 2 A P 4 D 4 D 4 D 4 D 4 D 5 L 5 L 3 L	p-operative and Collabor introduction to Mobile a Affordances of Mobile a Platform, Wireless Fund Discussion of Project Pro- Android Framework, A JI components and Lay Listeners, Presentation of	Topics and Ubiquitous Computing Systems, Constraints of M damentals, roposal, Android Program ndroid Application Structu youts, Notification Manage on the project proposal win aterfaces on Smartphones	g, lobile ming - ire er and	3:00 hrs in
Lecture a COURSI Week 1 3 5 7	nd Discussi E SCHEDU Lab-1,2 Lab-3,4 Lab-5,6 Lab-7,8	ion, Co ULE ss P A A D A A D A D L D S L D C O N C C	p-operative and Collaborative	Topics and Ubiquitous Computing Systems, Constraints of M damentals, roposal, Android Program ndroid Application Structu youts, Notification Manage on the project proposal win aterfaces on Smartphones ies, Sensor Sampling ement in Android Java So	g, lobile ming - ire er and th report	3:00 hrs in
Lecture a COURSI Week 1 3 5 7 9 11	nd Discussi E SCHEDU Lab-1,2 Lab-3,4 Lab-3,4 Lab-5,6 Lab-7,8 Lab-9,10 Lab-11,1	ion, Co ULE s In 2 A P 4 A 5 L 5 L 5 L 0 M 12 C	p-operative and Collaboration introduction to Mobile a affordances of Mobile Platform, Wireless Fund Discussion of Project Pro- android Framework, A JI components and Lay isteners, Presentation of cocal- Area Wireless In Mobile Sensing Strategia Communication Manag ansfer with Android ,	Topics and Ubiquitous Computing Systems, Constraints of M damentals, roposal, Android Program ndroid Application Structu /outs, Notification Manage on the project proposal win aterfaces on Smartphones ies, Sensor Sampling ement in Android Java So Project Update	g, lobile ming - ire er and th report	3:00 hrs in
COURSI Week 1 3 5 7 9	nd Discussi E SCHEDU Lab-1,2 Lab-3,4 Lab-3,4 Lab-5,6 Lab-7,8 Lab-9,10	ion, Co ULE s In 2 A P 4 A 5 L 5 L 5 L 0 M 12 C	p-operative and Collaborative	Topics and Ubiquitous Computing Systems, Constraints of M damentals, roposal, Android Program ndroid Application Structu /outs, Notification Manage on the project proposal win aterfaces on Smartphones ies, Sensor Sampling ement in Android Java So Project Update	g, lobile ming - ire er and th report	3:00 hrs in
Lecture a COURSI Week 1 3 5 7 9 11 13	nd Discussi E SCHEDU Lab-1,2 Lab-3,4 Lab-3,4 Lab-5,6 Lab-7,8 Lab-9,10 Lab-11,1	ion, Co ULE S P P P A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A	p-operative and Collaboration introduction to Mobile a affordances of Mobile Platform, Wireless Fund Discussion of Project Prandroid Framework, A II components and Lay isteners, Presentation of cocal- Area Wireless In Mobile Sensing Strateg Communication Manag ransfer with Android , ubmission of Final Pro	Topics and Ubiquitous Computing Systems, Constraints of M damentals, roposal, Android Program ndroid Application Structu /outs, Notification Manage on the project proposal win aterfaces on Smartphones ies, Sensor Sampling ement in Android Java So Project Update	g, lobile ming - ire er and th report	3:00 hrs in
Lecture a COURSI Week 1 3 5 7 9 11 13	nd Discussi E SCHEDU Lab-1,2 Lab-3,4 Lab-5,6 Lab-7,8 Lab-9,10 Lab-11,1 Lab-13,1	ion, Co ULE S P P P A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A A	p-operative and Collaboration introduction to Mobile a affordances of Mobile Platform, Wireless Fund Discussion of Project Prandroid Framework, A II components and Lay isteners, Presentation of cocal- Area Wireless In Mobile Sensing Strateg Communication Manag ransfer with Android , ubmission of Final Pro	Topics and Ubiquitous Computing Systems, Constraints of M damentals, roposal, Android Program ndroid Application Structu /outs, Notification Manage on the project proposal win aterfaces on Smartphones ies, Sensor Sampling ement in Android Java So Project Update	g, lobile ming - ire er and th report	3:00 hrs in
Lecture a COURSI Week 1 3 5 7 9 11 13 ASSESSI	nd Discussi E SCHEDU Lab-1,2 Lab-3,4 Lab-3,4 Lab-5,6 Lab-7,8 Lab-9,10 Lab-11,1 Lab-13,1	ion, Co ULE ss P A A A A A A A A C L 3 L 0 N 2 L 3 L 0 N 2 L 3 L 0 N 2 L 3 L 0 N 2 L 3 L 1 0 N RATE	p-operative and Collaboration introduction to Mobile a affordances of Mobile a datform, Wireless Fund Discussion of Project Ph android Framework, A JI components and Lay isteners, Presentation of cocal- Area Wireless In Aobile Sensing Strateg Communication Manag cansfer with Android , ubmission of Final Pro <b>GY</b>	Topics and Ubiquitous Computing Systems, Constraints of M damentals, roposal, Android Program ndroid Application Structu /outs, Notification Manage on the project proposal win aterfaces on Smartphones ies, Sensor Sampling ement in Android Java So Project Update	g, lobile ming - rre er and th report ckets, Data	3:00 hrs in
Lecture a COURSI Week 1 3 5 7 9 11 13 ASSESSI	nd Discussi E SCHEDU Lab-1,2 Lab-3,4 Lab-3,4 Lab-5,6 Lab-7,8 Lab-9,10 Lab-11,1 Lab-13,1 MENT ST	ion, Co ULE ss P A A D A A D A A D A A D A A D A A D A A A A C tr 14 S RATE	p-operative and Collaboration introduction to Mobile a Affordances of Mobile Platform, Wireless Fund Discussion of Project Play Android Framework, A II components and Lay Android Framework, A II co	Topics and Ubiquitous Computing Systems, Constraints of M damentals, roposal, Android Program ndroid Application Structu routs, Notification Manage on the project proposal win iterfaces on Smartphones ies, Sensor Sampling ement in Android Java So Project Update oject with presentation	g, lobile ming - ire er and th report ckets, Data Blooms	3:00 hrs in alternate week
Lecture a COURSI Week 1 3 5 7 9 11 13 ASSESSI	nd Discussi E SCHEDU Lecture Lab-1,2 Lab-3,4 Lab-3,4 Lab-5,6 Lab-7,8 Lab-9,10 Lab-11,1 Lab-13,1 MENT STI Components ss Assessm	ion, Co ULE ss P A A D A A D A A D A A D A A D A A D A A A A C tr 14 S RATE	p-operative and Collaboration introduction to Mobile a affordances of Mobile a affordances of Mobile a affordances of Mobile a afform, Wireless Fund Discussion of Project Prandroid Framework, A JI components and Lay isteners, Presentation of cocal- Area Wireless In Aobile Sensing Strategi Communication Manag ransfer with Android , ubmission of Final Pro- <b>GY</b> Grading 10%	Topics and Ubiquitous Computing Systems, Constraints of M damentals, roposal, Android Program ndroid Application Structu youts, Notification Manage on the project proposal win aterfaces on Smartphones ies, Sensor Sampling ement in Android Java So Project Update oject with presentation	g, lobile ming - ire er and th report ckets, Data Blooms	3:00 hrs in alternate week Taxonomy C4
Lecture a COURSI Week 1 3 5 7 9 11 13 ASSESSI	nd Discussi E SCHEDU Lab-1,2 Lab-3,4 Lab-3,4 Lab-5,6 Lab-7,8 Lab-9,10 Lab-11,1 Lab-13,1 MENT ST	ion, Co ULE ss P A A D A A D A A D A A D A A D A A D A A A A C tr 14 S RATE	p-operative and Collaboration introduction to Mobile a affordances of Mobile flatform, Wireless Fund Discussion of Project Prandroid Framework, A II components and Lay isteners, Presentation of cocal- Area Wireless In Mobile Sensing Strateg Communication Manag ransfer with Android , ubmission of Final Pro <b>GY</b>	Topics and Ubiquitous Computing Systems, Constraints of M damentals, roposal, Android Program ndroid Application Structu routs, Notification Manage on the project proposal win iterfaces on Smartphones ies, Sensor Sampling ement in Android Java So Project Update oject with presentation	g, lobile ming - ire er and th report ckets, Data Blooms	3:00 hrs in alternate week
Lecture a COURSI Week 1 3 5 7 9 11 13 ASSESSI	nd Discussi E SCHEDU Lecture Lab-1,2 Lab-3,4 Lab-3,4 Lab-5,6 Lab-7,8 Lab-9,10 Lab-11,1 Lab-11,1 MENT STI Components ss Assessm	ion, Co ULE ss I P A D A A D A D A A D L B C T T A S C T T A S S S S S S	p-operative and Collaboration introduction to Mobile a affordances of Mobile a affordances of Mobile a affordances of Mobile a afform, Wireless Fund Discussion of Project Prandroid Framework, A JI components and Lay isteners, Presentation of cocal- Area Wireless In Aobile Sensing Strategi Communication Manag ransfer with Android , ubmission of Final Pro- <b>GY</b> Grading 10%	Topics and Ubiquitous Computing Systems, Constraints of M damentals, roposal, Android Program ndroid Application Structu youts, Notification Manage on the project proposal win aterfaces on Smartphones ies, Sensor Sampling ement in Android Java So Project Update oject with presentation	g, lobile ming - nre er and th report ckets, Data Blooms C4,	3:00 hrs in alternate week Taxonomy
Lecture a COURSI Week 1 3 5 7 9 11 13 ASSESSI CC Class	nd Discussi E SCHEDU Lab-1,2 Lab-3,4 Lab-3,4 Lab-5,6 Lab-7,8 Lab-9,10 Lab-11,1 Lab-13,1 MENT STI Components ss Assessm Report	ion, Co ULE ss I P A D A A P A D L B L O M L B L O M L C tr 14 S RATE	o-operative and Collaboration introduction to Mobile a affordances of Mobile a datform, Wireless Fund Discussion of Project Ph android Framework, A JI components and Lay isteners, Presentation of cocal- Area Wireless In Aobile Sensing Strategi Communication Manag ansfer with Android , ubmission of Final Pro Grading 10% 10%	Topics         and Ubiquitous Computing         Systems, Constraints of M         damentals,         roposal, Android Program         ndroid Application Structur         vouts, Notification Manage         on the project proposal with         iterfaces on Smartphones         ies, Sensor Sampling         ement in Android Java So         Project Update         oject with presentation         CO         CO         CO         CO         CO         CO         CO         CO         CO	g, lobile ming - ire er and th report ckets, Data Blooms C4, C4	3:00 hrs in alternate week Taxonomy C4 C6, P3

CO 1

20%

Final Quiz

C4

		CO 3	C4, A2
Total Marks	100%		
(CO = Course Outcome, O	C = Cognitive	Domain, P = Psychomotor Dom	main, A = Affective Domain)
	d Ubiquitous (	Computing: Status and Perspectiv	ve (1st Edition) - Laurence T
Yang, EviS Yukur and S			
2. Android Studio 3.0 Deve Independent Publishing	-	ntials (1st Edition) - Android 8 E 7)	dition; Create Space
<b>REFERENCE SITE</b>			

COU	RSE INFO	ORMATION											
	e Code	: CSE-451		ntact Hours	: 3.00								
Cours	e Title	: Simulation and Modeling	Credit Hou	rs	: 3.00								
PRE-	PRE-REQUISITE Course Code: Nil												
Cours	e Title: Ni	1											
CUR	RICULUN	<b>M STRUCTURE</b>											
Outco	ome Based	Education (OBE)											
RATI	IONALE												
conducting experiments on a real system which is impossible or impractical, often because of cost or time and instead uses mathematical knowledge and computer's computation power to solve real-world problems reasonably and in a time efficient manner. <b>OBJECTIVE</b>													
2. T	'o design a	e different parameters and var model for a particular dataset	and analyse				life pr	oblems.					
LEAI	RNING O	UTCOMES & GENERIC SI	KILLS										
No.	(Upon c	Course Learning Outcome completion of the course, the stude able to)	ents will be	Bloom's Taxonomy	СР	CA	KP	Assessment Methods					
CO1	Define b (M&S)	asic concepts in modeling and	simulation	C1, C2	1	-	1,3	Т					
CO2		various simulation models and examples for each category	l give	C2, C3	4	3	2,5	MT, F					
CO3		t a model for a given set of da its validity	ta and	C4-C6	3	5	2	F					
CO4		the communication skill by pr	resenting	A2		1		Pr					
(CP- 0	Complex F	Problems, CA-Complex Activity	ties, KP-Kno	wledge Profil	e,T – Te	est ; PR	– Proj	ect ; Q –					

(CP- Complex Problems, CA-Complex Activities, KP-Knowledge Profile, T – Test ; PR – Project ; Q Quiz; ASG – Assignment; Pr – Presentation; R - Report; F – Final Exam, MT- Mid Term Exam)

#### **COURSE CONTENT**

**Simulation modelling basics:** systems, models and simulation; Classification of simulation model; Steps in a simulation study; **Concepts in discrete-event simulation:** event scheduling vs. process interaction approaches, Time-advance mechanism, organization of a discrete-event simulation model; Continuous simulation models; Combined discrete-continuous models; Monte Carlo simulation; Simulation of queuing systems. Building valid and credible simulation models: validation principles and techniques, statistical procedures for comparing real-world observations and simulated outputs, input modeling; Generating random numbers and random variants; Output analysis. Simulation languages; Analysis and modeling of some practical systems: Random Number Generator, Random Variables, Probability Distribution

#### SKILL MAPPING

No.	Course Learning Outcome	PROGRAM OUTCOMES (PO)											
INO.		1	2	3	4	5	6	7	8	9	10	11	12
CO1	Define basic concepts in modeling and simulation (M&S)	Н											
CO2	Classify various simulation models and give practical examples for each category				Н								
CO3	Construct a model for a given set of data and motivate its validity			Н									
CO4	Develop the communication skill by presenting topics on simulation and modeling										L		

#### (H – High, M- Medium, L-low)

JUSTIFICA	TION FOR	CO-PO MAPPING									
Mapping	Level	Justifications									
CO1-PO1	High	defining the basic concepts depth of knowledge will be necessary									
CO2-PO4	High	Investigation and experimentation are required in order to classify different methods and to give proper example									
CO3-PO3	High	igning and development of a simulation model according to dataset									
CO4-PO10	Low	Develop communication skills through participating in quiz, presentation etc									
TEACHING	LEARNIN	NG STRATEGY									
Teaching and	Learning A	ctivities	Engagement (hours)								
Face-to-Face Lect	0	ial / Studia	42								
	lent-Centred		-								
Self-Directed		i Ecurining									
	-face-to-fac	e learning	42								
	ision	C	21								
	essment Pre	parations	21								
Formal Asses											
	tinuous Ass		2								
	l Examinati	on	3								
Total	_		131								
TEACHING	METHOL	OOLOGY									
Lecture and I	Discussion,	Co-operative and Collaborative Method, Problem Based M	ethod								
COURSE SO	CHEDULE										
Week	Lecture		Assessment Methods								
1	Lec 1	Introduction to Simulation									
	Lec 2	Applications of Simulation									

	Lec 3	System and System Environment	
2	Lec 4	Attributes of a System, Types of Models	
	Lec 5	Components and Organization of a Discrete Event	Class Test 1
	Lec 6	Simulation Model	
3	Lec 7	Single Server Queuing System	
-	Lec 8	Performance Measure	
	Lec 9	Event Routines	
4	Lec 10	Review Of Basic Probability And Statistics	
	Lec 11	PDF And CDF	
	Lec 12	Properties Of Random Variables	
5	Lec 13	Covariance and Correlation	
	Lec 14	Jointly Continuous Random Variables	
	Lec 15	Simulation of Inventory System	
6	Lec 16	Continuous Simulation	Mid Term Exam
	Lec 17	Predator-Prey Model	
	Lec 18	Useful Probability Distributions	
7	Lec 19	Parameterization of Continuous Distributions	
	Lec 20	Continuous Probability Distribution	
	Lec 21	Continuous Probability Distribution (Contd.)	
8	Lec 22	Discrete Probability Distribution	
	Lec 23	Discrete Probability Distribution (Contd.)	
	Lec 24	Monte Carlo Simulation	
9	Lec 25	Monte Carlo Simulation (Contd.)	
	Lec 26	Generating Random Variables	Class Test 2
	Lec 27	Random Variable Method: Inverse Transform	
10	Lec 28	Random Variable Method: Composition	
	Lec 29	Random Variable Method: Convolution	
	Lec 30	Random Variable Method: Acceptance -Rejection	
11	Lec 31	Random Variable Method: Acceptance -Rejection	
	Lec 32	(Contd.), Mathematical Problems For Inverse Method	
	Lec 33	Generating Random Variates	
12	Lec 34	Acceptance-Rejection Method For Generating Random	
	Lec 35	Variates, Sample Variance And Mean	
	Lec 36	Central Limit Theorem	
13	Lec 37	Mathematical Problems of Central Limit Theorem	Class Test 3
	Lec 38	Confidence Interval	
	Lec 39	Test of Hypothesis And its Error	
14	Lec 40	Markov's Inequality and Chebyshev's Inequality	1
	Lec 41	Combined Discrete-Continuous Simulation	
	Lec 42	Validation and Verification Of Simulation Mode	1

		Grading	СО	Blooms Taxonomy
Comp	Components			
Continuous	Test 1-3	20%	CO1	C1-C2
Assessment			CO4	A2
(10,0)	Mid term	15%	CO2	C2-C3
Final	Final Exam 6		CO2, CO3	C2-C6
Total	Marks	100%		

# (CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

### **REFERENCE BOOKS**

Simulation Modeling and Analysis (5th Edition) -Law A. M., Kelton W. D.; McGraw Hill (2014)
 Computer Aided Modeling and simulation - J. A. Spriet

- Computer Simulation and Modeling R. S. Lehman
   System Simulation G. Cordon

# **REFERENCE SITE**

# CSE-452: Simulation and Modeling Sessional

-			_		_		_	_			_		_				
COU	RSE INFO	ORMATION								1							
Cours	e Code	: CSE-452		L	ecture	e Cor	ntact	Hou	rs		8.00 h						
Cours	e Title	: Simulation and Modelling Sess	Iling Sessional Credit Hours									alternative week					
PRE-	E-REQUISITE																
Cours	e Code: N	il															
	e Title: Ni					_	_	_	_	_		_					
CUR	RICULUN	A STRUCTURE															
Outco	me Based	Education (OBE)															
RATI	IONALE																
progra	amming la et to provid	ivates to design various models to nguage, computation power etc. an le a reasonable decision regarding	ıd ana	lyze	the b	ehav	iour	of a	syst	em	for di	ffere	nt typ	bes of			
OBJE	ECTIVE																
2. T	latforms.	model for a physical experimenta the characteristics of the simula								-							
LEAI	RNING O	UTCOMES & GENERIC SKIL	LS														
No.	(Upon c	Course Learning Outcome ompletion of the course, the students v able to)	will be		Blo Taxo	om's nomy	y	СР	С	CA	KP		ssess Meth	ment ods			
CO1		and test random number variants em to develop simulation models	and			C5, 7				-	2		V,	R			
CO2		d analyze output data produced by a test the validity of the model	' a			C4, 25				3	3		ASG,	T,Q			
CO3		t a model for a given set of data ar its validity	nd		C	26				5	5,6		ASC	G,T			
Quiz;		Problems, CA-Complex Activities, signment; Pr – Presentation; R - R															
simula	ation study	eling basics: systems, models and y, Single Server Queuing System blem, Probability Distribution Fitt	, Inve	ntor	у Ма	inage	ment	t Sy	stem	n, M	onte	Carl	o Me	thod,			
SKIL	L MAPPI	NG															
					ות				ITC		EC (D						
No.		Course Learning Outcome	1	2	3	4	KAN 5	6	7	8	ES (P 9	10	11	12			
CO1		te and test random number s and apply them to develop		_			1	,		2	-			Н			

5	simula	tion mod	lels														
CO2 ł				tput data produced ne validity of the		Н											
CO3 (	Constr	uct a mo		a given set of data			Н										
(H – High	n, M- I	Medium,	L-low	<i>i</i> )		•			•	•							
JUSTIFI	JUSTIFICATION FOR CO-PO MAPPING																
Mappin	apping Level Justifications																
CO1-PO1	12	High		y learning to produce random variables and applying them will continue in gpreparation for various fields												life-	
CO2-PO2	2	High	Com	plex analysis is nec	essary	to ev	valua	te ou	itcon	ne of	the	mo	del				
CO3-PO3	3	High	Deve	loping an appropria	te and	l vali	d mo	del i	n ter	ms c	of giv	ven	data				
TEACHI	ING L	EARNI	NG ST	FRATEGY													
Teaching			Activit	ies								E	Engag	gemei	nt (ho	urs)	
Face-to-F		-															
	Lectur Practic	e cal / Tuto	rial / 9	Studio										- 21			
		t-Centre												-			
Self-Dire			1														
	Non-fa Revisi	ace-to-fac	ce lear	ning										-			
		sment Pre	eparati	ons									-				
Formal A																	
		uous Ass Examinat		ent								2 3					
Total	1 111.41 1	Zammat	1011									26					
TEACHI	ING M	IETHOI	DOLC	OGY													
Lecture a	nd Dis	cussion,	Co-op	perative and Collabo	rative	Met	hod,	Prob	lem	Base	ed M	letho	od				
COURSE	E SCH	IEDULE	2														
Week		Lectur	e			opic								Rem	arks		
1		ec 1, 2		Single Server Que	U	•											
3		ec 3, 4 ec 5, 6		Inventory Manage Monte Carlo Meth		Syste	em										
7		ec 3, 0 ec 7, 8		Pure Pursuit Prob									3	3:00 ł	nrs in		
9		ec 9, 10		Probability Distrib	ution								alt	ernat	e wee	k	
11	Le	ec 11, 12		Random Number		ation						1					
13	I /	PC 13 1/		Hypothesis Testin Quiz + Viva	g												
	13     Lec 13, 14     Quiz + Viva       SESSMENT STRATEGY																
(	Compo	onents		Grading		CC	)				В	loor	ns Ta	ixono	my		
		Quiz	z	20%		CO	2					С	2, C4	, C5			
Continu Assessm	nent	Repor		10%		CO	1					С	3, C5	5, P5			
(40%	)	Class Assessm		20%	C							С	2, C4	4-C6			
	Г	Viva	ı	10%		int int interview of the second se											

Assignment	40%	CO2, CO3	C2, C4-C6										
Total Marks	Total Marks 100%												
(CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)													
REFERENCE BOOKS	REFERENCE BOOKS												
1. Discrete-Event System Si	mulation (5th E	dition) -Jerry Banks; Prentice	e Hall (2009)										
REFERENCE SITE													

# CSE-455: Natural Language Processing

COURSI	E INFORMATION												
Course C													
Course T	itle : Natural Language Processing		Cred	it Hours		: 3.00							
	QUISITE												
Course C													
Course T	itle: Nil												
	CULUM STRUCTURE												
Outcome	Based Education (OBE)												
RATION	JALE												
NLP intr	oduces the basics of statistical natural langu	age processin	g (NL	P) inclu	ding bot	h linguistics							
concepts	such as morphology and syntax and machine	learning techn	iques r	elevant f	for NLP.	This course							
	a comprehensive introduction to the theory and												
	he development of computer programs th												
	on from, and learn natural language in textual for	orm from web	pages,	books, n	ewspape	rs, etc.							
OBJECT	TIVE												
1. To une	derstand natural language processing and to le	arn how to a	pply ba	sic tech	niques fo	or text-based							
	g of natural language.												
	lerstanding approaches to syntax and semantics												
	derstand current methods for statistical approach		learnii	ng techni	ques use	d in NLP.							
-	plement the NLP technique in different application	on.											
LEARNI	ING OUTCOMES & GENERIC SKILLS	1											
No.	Course Learning Outcome (Upon completion of the course, the students will be able to)	Bloom's Taxonomy	СР	CA	KP	Assessment Methods							
	Develop the knowledge on natural language												
CO1	processing and to learn how to apply basic	C3, C6,	1		1	T, F							
001	techniques for text-based processing of	P1	1		1	1,1							
	natural language.												
con	Familiarize with the current methods for	C2 C4 D4	1.2		1 2								
CO2	statistical approaches to machine learning techniques used in NLP.	C2-C4, P4	1,3		1, 3	MT, F							
	Enable to implement the NLP technique in	C3, C5,											
CO3	different application	C5, C5, C6	1,3		5,6	T, F							
	Develop the communication skill by	~											
CO4	presenting topics on Natural Language	A2		1		Pr							
	Processing												

(CP- Complex Problems, CA-Complex Activities, KP-Knowledge Profile, T – Test; PR – Project; Q – Quiz; ASG – Assignment; Pr – Presentation; R - Report; F – Final Exam, MT- Mid Term Exam)

#### **COURSE CONTENT**

Intro to NLP and Deep Learning; **Simple Word Vector representations:** word2vec, GloVe; **Advanced word vector representations:** language models, softmax, single layer networks; Neural Networks and backpropagation for named entity recognition; **Neural Networks and Back-Prop**: gradient checks, overfitting, regularization, activation functions; Introduction to Tensorflow; **Recurrent neural networks**: - RNN used for language modelling and other tasks; **GRUs and LSTMs**: -- for machine translation; Recursive neural networks -- for parsing; Recursive neural networks -- for different tasks (e.g. sentiment analysis); **Convolutional neural networks**: -- for sentence classification; Speech recognition; Machine Translation; Seq2Seq and Large Scale DL; **Deep Learning for NLP**: Dynamic Memory Networks.

#### SKILL MAPPING

No.	Course Learning Outcome		PROGRAM OUTCOMES (PO)											
NO.	Course Learning Outcome	1	2	3	4	5	6	7	8	9	10	11	12	
CO1	Develop the knowledge on natural language processing and to learn how to apply basic techniques for text-based processing of natural language.	Н												
CO2	Familiarize with the current methods for statistical approaches to machine learning techniques used in NLP.		Н											
CO3	Enable to implement the NLP technique in different application					Н								
CO4	Develop the communication skill by presenting topics on Natural Language Processing										L			

(H – High, M- Medium, L-low)

# JUSTIFICATION FOR CO-PO MAPPING

Mapping	Level	Justification
CO1-PO1	High	Able to understand the basic concept and application of text based natural language processing
CO2-PO2	High	Apply and examine the different machine learning technique used in NLP.
CO3-PO5	High	Construct different real time application using different NLP techniques and evaluate to maximize the better performance.
CO4-PO10	Low	Develop communication skills through participating in quiz, presentation etc.

# TEACHING LEARNING STRATEGY

Teaching and Learning Activities	Engagement (hours)						
Face-to-Face Learning							
Lecture	42						
Practical / Tutorial / Studio	-						
Student-Centred Learning	-						
Self-Directed Learning							
Non-face-to-face learning	42						
Revision	21						
Assessment Preparations	21						
Formal Assessment							
Continuous Assessment	2						
Final Examination	3						
Total	131						
TEACHING METHODOLOGY							
Lecture and Discussion, Problem Based Method, Co-operation	Lecture and Discussion, Problem Based Method, Co-operative and Collaborative Method.						

Week	Lecture			Topics		Assessment Methods		
1	Lec 1	Intro	to NLP and 1	Deep Learning; Simple W	'ord			
	Lec 2			tions: word2vec, GloVe;				
	Lec 3							
2	Lec 4	Adva	nced word v	guage				
	Lec 5		ls, softmax,					
	Lec 6		.,,.	8,				
3	Lec 7	Neura	l Networks	and backpropagation for r	named	Class Test 1		
c	Lec 8		recognition					
	Lec 9		8					
4	Lec 10	Neura	l Networks	and Back-Prop, gradient c	hecks			
•	Lec 10			rization, activation function				
	Lec 12	0,011	ining, regula	inzurion, uetr turion runeti	5115			
5	Lec 12 Lec 13	Recut	rent neural r	networks - for language				
5	Lec 13 Lec 14		ling and othe					
	Lec 14 Lec 15	moue	ing and ould	1 uoro				
6	Lec 15 Lec 16	CRIP	and I STM	s for machine translatio	n	Class Test 2		
U	Lec 16 Lec 17	UNUS	S ALLO I IVI	s for machine translatio	11			
-	Lec 18	D-		notruorla for a single				
7	Lec 19	Recur	sive neural i	networks for parsing				
	Lec 20							
	Lec 21	D		. 1	1			
8	Lec 22			networks for different ta	asks			
	Lec 23	(e.g. s	sentiment and	alysis)				
	Lec 24							
9	Lec 25			aral networks for senten	ice			
	Lec 26	classi	fication					
	Lec 27					Mid Term Exam		
10	Lec 31			aral networks for senten	ice			
	Lec 32	classi	fication					
	Lec 33							
11	Lec 28	Speed	h recognitio	n; Machine Translation;				
	Lec 29	Seq25	Seq and Larg	ge Scale DL;				
	Lec 30	_						
12	Lec 34	Speed	h recognitio	n; Machine Translation;				
	Lec 35			ge Scale DL;				
	Lec 36	Î	_ C			$C_{1} \rightarrow T_{2} \rightarrow 2$		
13	Lec 37	Deep	Learning for	r NLP: Dynamic Memory		Class Test 3		
	Lec 38	Netwo	0	5				
	Lec 39							
14	Lec 40	Deep	Learning for	r NLP: Dynamic Memory				
	Lec 41	Netwo		jj				
	Lec 42							
SESSMENT		Ϋ́			1			
Com	ponents		Grading	CO	Blo	ooms Taxonomy		
					C3, C6, P1			
Gund	Test 1		C2-C4, P4					
Continuous			20%		C3, C5, C6			
	Assessment (40%) Class 5% CO4							
(40%)								
	Participation							
	Mid te							
Eine	l Evam		60%	CO 1		C3, C6, P1		
Final Exam 60%				CO 2		C2-C4, P4		

		CO 3	C3, C5, C6						
Total Marks 100%									
(CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)									
REFERENCE BOOKS	REFERENCE BOOKS								
1. A Primer on Neural Network M Claypool Publishers (2017)	odels for N	atural Language Processin	g - Yoav Goldberg; Morgan &						
REFERENCE SITE									

# CSE-456: Natural Language Processing Sessional

Course	code	: CSE 456	Lecture Contact	Hours	:30	00 hrs ir	alternative
Course		: Natural Language Processing	Lecture Conduct	nouis	wee		i unternuti ve
		Sessional	Credit Hours		: 0.	75	
PRE-F	REQUIS	ITE					
	Code: N						
	Title: N						
		M STRUCTURE					
		Education (OBE)					
RATI	ONALE						
propos	e approa	narization, dialogue state tracking. It en- ches, and judge what techniques are like narkable topics in today's NLP.					
OBJE	CTIVE						
		the skill natural language processing and		· · · · · · ·			1
based j 2. To f 3. To i	processir amiliariz mplemer	ng of natural language. The approaches to syntax and semantics in l at current methods for statistical approach at the NLP technique in different application	NLP. es to machine lear				-
based j 2. To f 3. To i 4. To i	processir amiliariz mplemer mplemer	ng of natural language. The approaches to syntax and semantics in l at current methods for statistical approach	NLP. es to machine lear				-
based j 2. To f 3. To i 4. To i	processir amiliariz mplemer mplemer NING (	ng of natural language. The approaches to syntax and semantics in l at current methods for statistical approach that the NLP technique in different application	NLP. es to machine lear	rning t			-
based j 2. To f 3. To i 4. To i <b>LEAR</b>	processir amiliariz mplemer <b>NING C</b> (Upon c Develo process	ng of natural language. The approaches to syntax and semantics in lateration of the current methods for statistical approaches the NLP technique in different application of the course the students will be able to) The skill on natural language ing and to learn how to apply basic use for text-based processing of natural	NLP. es to machine lear on. Bloom's Taxonomy	rning t	echniq	ues use	d in NLP.
based j 2. To f 3. To i 4. To i LEAR No.	processir amiliariz mplemer <b>NING (</b> (Upon of Develo process techniq languag Familia statistic techniq	ag of natural language. The approaches to syntax and semantics in lateration of the NLP technique in different application of the course the students will be able to) The skill on natural language ing and to learn how to apply basic uses for text-based processing of natural ge. The skill of the course is the students for the statement of the course is approached by the statement of the statement of the course is approached by the statement of the course is approached by the statement of the statement of the statement of the course is approached by the statement of the statement	NLP. es to machine lear ion. Bloom's Taxonomy C3, C6, P1	rning t	echniq	ues use	d in NLP. Assessmen Methods
based j 2. To f 3. To i 4. To i LEAR No.	processir amiliariz mplemer <b>NING (</b> (Upon o Develo process techniq languaą Familia statistic techniq Enable differer	ng of natural language. The approaches to syntax and semantics in latter current methods for statistical approaches the NLP technique in different application of the course the students will be able to) The skill on natural language ing and to learn how to apply basic uses for text-based processing of natural ge. The skill of the current methods for statistical approaches to machine learning defined ap	NLP. es to machine lear ion. Bloom's Taxonomy C3, C6, P1 C2-C4, P4 1 C3, C5	rning t	echniq	KP	d in NLP. Assessmen Methods T, F

#### **COURSE CONTENT**

Language models, softmax, single layer networks; Neural Networks and backpropagation for named entity recognition; Tensorflow; Recurrent neural networks - for language modeling and other tasks; GRUs and LSTMs -- for machine translation; Recursive neural networks -- for parsing; Convolutional neural networks -- for sentence classification; Speech recognition;

#### SKILL MAPPING

7

Lab-7,8

NT -		C a a	Learning Ortes			PR	OG	RA	M	OU	TC	OM	IES (F	20)	
No.		Course	Learning Outcome	1	2	3	4	5	6	7	8	9	10	11	12
			on natural language processing												
CO1			to apply basic techniques for									Η			
		-	ing of natural language.												
600			the current methods for							тт					
CO2		ques used in	ches to machine learning							Η					
			ment the NLP technique in												
CO3		ent application							Η						
CO4			nunication skill by presenting										L		
04	topics	on Natural	Language Processing										L		
(H – H	igh, M-	Medium, L-	low)												
JUSTI	FICAT	ION FOR C	CO-PO MAPPING												
Mapp	oing	Level		Ju	stif	ïca	tior	1							
CO1-I	PO9	High	Able to understand the basic	con	cep	t ar	nd a	appl	ica	tior	ı of	te	xt ba	sed n	atural
CO2-I	007	High	language processing Apply and examine the different	at ma	ahi	na	0.01	nin	r to	ohr	iau	0.11	and in	NI D	
		, e													
CO3-I	PO6	High	Construct different real time a					ng (	liff	ere	nt N	١LF	P tech	inique	s and
			evaluate to maximize the better	1											
CO4-P	O10	Low	Develop communication skills	throu	ıgh	par	tici	pati	ng	in ç	quiz	, pr	esent	ation	etc.
TEACH	HING I	LEARNING	STRATEGY												
		earning Act	ivities						Eı	nga	gen	nen	t (hou	rs)	
Face-to-		-													
Self_Di	Lectur rected I	re .earning				21									
ben Dh		sment Prepa	rations			10.5									
Formal											_				
		nuous Assess					3								
T . ( 1	Final	Examination										$\frac{1.5}{26}$			
Total		IETUODO	LOCY									36			
		METHODO	bblem Based Method, Co-operat	ivos	nd	Col	lah	orot	ive	M	athe	d			
		HEDULE		1100 8	mu		140	oral	176	IVI		u.			
COUR	SE SCI	IEDULE													
W	eek	Lab	Topics									]	Rema	rks	
	1	Lab-1,2	Practical session on language single layer networks;	mo	lels	an	d sc	oftm	ax,						
	3	Lab-3,4	Practical session on Neural N backpropagation for named e					on;			3:(	00 ł	nrs in	altern	ate
	5	Lab-5,6	backpropagation for named entity recognition;       3:00 hrs in alternative         Understanding workflow of Tensorflow Practical session on Recurrent neural networks for language       week												

Practical session on GRUs and LSTMs for

modeling and other tasks;

machine translation

9	Lab-9,10	Practical session on Recursive neural networks for parsing	
11	Lab-	Practical session on Convolutional neural	
11	11,12	networks for sentence classification	
13	Lab-	Practical session on Convolutional neural	
15	13,14	networks for Speech recognition	

Com	Components		СО	Blooms Taxonomy
	Online	20%	CO2	C2-C4, P4
	Quiz	20%	CO2	C2-C4, P4
	Quiz	20%	CO3	C3, C5, C6
Continuous Assessment	Class Participation	10%	CO4	A2
(100%)	Assignment		CO1	C3, C6, P1
	Assignment	30%	CO3	C3, C5, C6
	Class Evaluation	20%	CO1	C3, C6, P1
Tota	Total Marks			

#### (CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

#### **REFERENCE BOOKS**

1. A Primer on Neural Network Models for Natural Language Processing - Yoav Goldberg; Morgan & Claypool Publishers (2017)

#### **REFERENCE SITE**

# **CSE-457: Advanced Database Management Systems**

COURSE INFORMATION									
Co	urse Code	: CSE 457	Lecture Contact Hours	: 3.00					
Co	urse Title	: Advance Database Management Systems Credit Hours : 3.00							
PR	E-REQUISITE								
	urse Code: Nil								
Co	urse Title: Nil								
CU	RRICULUM ST	RUCTURE							
Ou	tcome Based Educ	cation (OBE)							
RA	TIONALE								
and	l other functions o	es to optimize the basic database transactions of database systems using advanced features the lels and designs to contribute to modern databa	at includes complex data and	•					
OB	JECTIVE								
1. 2.	1. To introduce the concepts and implementation schemes in database management systems such as advanced access methods, query processing and optimization, transactions and concurrency control.								

LEARN	ING OUTCOMES & GENERIC SKILLS					
No.	Course Learning Outcome (Upon completion of the course, the students will be able to)	Bloom's Taxonomy	СР	CA	KP	Assessment Methods
CO1	Explain and evaluate the fundamental theories and requirements that influence the design of modern database systems	C2-C4, P2	1		1	T, F
CO2	Assess and apply database functions and packages suitable for enterprise database development and database management.	C3-C4	1,3		1, 3	MT, F
CO3	Critically evaluate alternative designs and architectures for databases and data warehouses.	C4, C5	1,3		5,6	T, F
CO4	Discuss and evaluate methods of storing, managing and interrogating complex data.	C1-C4, A5	1,3		1-3	T, F
CO5	Develop the communication skill by presenting topics on database management system.	A2		1		Pr

(CP- Complex Problems, CA-Complex Activities, KP-Knowledge Profile, T – Test ; PR – Project ; Q – Quiz; ASG – Assignment; Pr – Presentation; R - Report; F – Final Exam, MT- Mid Term Exam)

#### **COURSE CONTENT**

**Object oriented database**: data model, design, languages; **object relational database**: complex data types, querying with complex data types, design; **distributed database**: levels of distribution transparency, translation of global queries to fragment queries, optimization of access strategies, management of distributed transactions, concurrency control, reliability, administration; **Parallel Database**: different types of parallelism, design of parallel database; multimedia database systems basic concepts, design, optimization of access strategies, management of multimedia database systems, reliability; **database warehousing/ data mining:** basic concepts and algorithms.

#### SKILL MAPPING

No.	Course Learning Outcome			PI	ROG	RAN	1 Ol	JTC	OM	ES (I	20)		
110.		1	2	3	4	5	6	7	8	9	10	11	12
CO1	Explain and evaluate the fundamental theories and requirements that influence the design of modern database systems		Н										
CO2	Assess and apply database functions and packages suitable for enterprise database development and database management.			Н									
CO3	Critically evaluate alternative designs and architectures for databases and data warehouses.		Н										
CO4	Discuss and evaluate methods of storing, managing and interrogating complex data.		Н										
CO5	Develop the communication skill by												
(H – H	igh, M- Medium, L-low)												
	FICATION FOR CO-PO MAPPING												

Mapping	Level	Justification
CO1-PO2	High	Explain and evaluate the fundamental concept and application of database systems.
CO2-PO3	High	Apply the SQL concept to solve complex queries using database project.
CO3-PO2	High	Design and evaluate the basic concept of commercial project with the

		help of SQL queries and compar performance.	ison techniqu	e to evaluate the working				
CO4-PO2	Hig	h Able to store, manage and interro	Able to store, manage and interrogating the complex data					
CO4-PO10	) Lov	^w Develop communication skill presentation etc.						
TEACHING I	LEARNING	STRATEGY						
Teaching and I	Learning Activ	vities	En	gagement (hours)				
Face-to-Face L								
Lectu				42				
	cal / Tutorial			-				
	nt-Centred Le	arning		-				
Self-Directed I		amina		42				
Revis	face-to-face le	arning		42 21				
	sment Prepara	ations		21				
Formal Assess								
Conti	nuous Assessi	nent		2				
	Examination			3				
Total				131				
TEACHING N	METHODOL	JOGY						
Lecture and Di	scussion, Prol	plem Based Method, Co-operative and C	Collaborative 1	Method.				
COURSE SCI	HEDULE							
Week	Lecture	Topics		Assessment Methods				
1	Lec 1	Introduction to Database Systems						
	Lec 2	Applications of Database Systems						
	Lec 3	Database Systems over File Systems		_				
2	Lec 4	Types of Database						
	Lec 5	Data Model Design		Class Test 1				
3	Lec 6 Lec 7	Data Languages Object Oriented Database		_				
5	Lec 7 Lec 8	Object Oriented Database Object Oriented Data Model						
	Lec 9	Object Oriented Data Languages and (	Duerv					
4	Lec 10	Object Relational Database						
	Lec 11	Querying with Complex Data Types						
	Lec 12	Design with Complex Data Types						
5	Lec 13	Distributed Database						
	Lec 14	Levels of Distribution Transparency						
6	Lec 15 Lec 16	Query Processing Translation of Global Queries to Frag	nont	Class Test 2				
U	Lec 16 Lec 17	Queries Queries	inciit					
	Lec 17 Lec 18	Optimization of Access Strategies						
		Optimization of Access Strategies (Co	ntd.)					
7	Lec 19	Transaction Processing		1				
	Lec 20	Different Types of Transactions						
	Lec 21	Different Types of Transactions (Cont						
8	Lec 22	Management of Distributed Transaction	ons					
	Lec 23	Concurrency Control						
9	Lec 24	Concurrency Control (Contd.)		Mid Term Exam				
9	Lec 25 Lec 26	Reliability Administration		who term Exam				
	Lec 26 Lec 27	Parallel Database						
10	Lec 31	Different Types of Parallelism		1				
	Lec 32	Different Types of Parallelism (Contd.	.)					
	Lec 33	Design of Parallel Database						
11	Lec 28	Multimedia Database System						
	Lec 29	Basic Concepts and Design						

	ec 34		
La		Management of Multimedia Database Systems	Class Test 3
Le	ec 35	Reliability	
Le	ec 36	Administration	
13 Le	ec 37	Database Warehousing	
Le	ec 38	Types of Database Warehouse	
Le	ec 39	OLTP and OLAP	
14 Le	ec 40	Data Mining	
Le	ec 41	Basic Concepts and Algorithms	
Le	ec 42	Basic Concepts and Algorithms (Contd.)	

			<u> </u>	Dia anna Tarrar arnar
Comp	onents	Grading	CO	Blooms Taxonomy
			CO 1	C2-C4, P2
Continuous	Test 1-3	20%	CO 3	C4, C5
Assessment			CO 4	C1-C4, A5
(40%)	Class Participation	5%	CO 5	A2
	Mid term	15%	CO 2	C3-C4
			CO 1	C2-C4, P2
Einal	Energy	60%	CO 2	C3-C4
Final	Final Exam		CO 3	C4, C5
			CO 4	C1-C4, A5
Total	Marks	100%		

(CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

### **REFERENCE BOOKS**

4. Database System Concept, Abraham Silberschatz, Henry F. Korth, S. Sudarshan, Fourth edition

5. Files and Databases- An Introduction, Peter D. Smith and G.M. Barnes, AddisonWesley

6. Database Management Systems, Raghu Ramakrishnan and Johannes Gehrke, Third edition

**REFERENCE SITE** 

COURSE INFORMATION								
Course Code	: CSE 458	Lecture Contact Hours	: 3.00 hrs in alternative					
Course Title	: Advance Database Management		weeks					
	Systems Sessional	Credit Hours	: 0.75					
PRE-REQUIS	PRE-REQUISITE							
Course Code: N	Jil							
Course Title: N	il							
CURRICULU	M STRUCTURE							
Outcome Based	Education (OBE)							
RATIONALE								
This course motivates to design and develop embedded projects using advanced database functions and								
guary based on advanced detabase models chiese oriented detabase distributed detabase multimedia								

query based on advanced database models - object oriented database, distributed database, multimedia database etc. to solve real-life problems.

# **OBJECTIVE**

1. To develop embedded projects for different applications using advanced database functions

2. To analyse different security aspects of complex data transactions using different database techniques.

LEARN	ING OU	UTCOME	S& GENERIC SKILL	S											
No.		Course Learning Outcome (Upon completion of the course, the students will be able to) Bloom's Taxonomy						C	Р	C.	A	KP	, 1	Asses: Metł	sment 10ds
CO1	in d	ifferent p	ply the advanced knowledge projects with a commercial abase system (Oracle) C3, C4, P1				4,	]	l			1		T,	F
CO2	Emb	ed securit	y aspects in the develops of data transaction.	oped	(	C4, C	25	1,	,3			1,3	3	MT	', F
CO3	and i	nterrogati	ethods of storing, mana ng complex data.	ging		C2-C	24	1,	,3			5,6		Τ,	F
CO4		enting topi	communication skill cs on database manager	by nent		A2				1				Р	r
			CA-Complex Activities, Pr – Presentation; R - R											t ; Q -	-
COURS			allation, Authentication												
Numeric PL/SQL database administ	functio Introduction Distribuction	n, Manipu uction to F outed data Manageme	ints, Advanced Query ( lation function, Conver PL/SQL, Database Trigg base, Management of c ent of multimedia data d algorithms.	rsion er/ Pı listrib	fund roced outed	ction, dure, l tran	, Nes Pack sacti	sting kages ions,	of f , Inc con	unct lexir	ion, 1g, V ency	Abs View. v con	tract Obje trol,	data ect ori relial	type, ented bility,
SKILL I		<u> </u>													
				1		וח				ITC	0.1				
No.	(	Course Lea	arning Outcome	1	2	91 3	KOG 4	RAN 5	1 OL 6	7 7	ОМ 8	ES (P 9	<u>(0)</u> 10	11	12
CO1		lge in dif cial relati	pply the advanced ferent projects with a onal database system	1	2	5	+	5	0	/	0	7	10	Н	12
CO2	Embed	security as	spects in the developed f data transaction.						Н						
CO3	Explain managiı data.		nethods of storing, nterrogating complex							Н					
CO4	presenti												Η		
(H – Hig	gh, M- N	/ledium, L	-low)												
JUSTIF	ICATIO	ON FOR (	CO-PO MAPPING												
Марр	oing	Level						ation							
CO1-P		High	Able to understand the	adva	ince	know	vledg	ge of	data	base	in c	comm	ercia	al pro	ject.
CO2-I		High	Combine security aspe												
	CO3-PO7 High Able to store, manage and interrogate complex data in commercial project.														
	CO4-PO10 High Develop communication skills through participating in quiz, presentation etc.														
	TEACHING LEARNING STRATEGY														
	Teaching and Learning Activities Engagement (hours)														
	ace-to-Face Learning Lecture 21														
Self-Dire		arning nent Prepa	rations									10.5			
Formal A	Continu	ious Asses										3			
	Final E	xaminatio	1									1.5			
Total 36															

#### **TEACHING METHODOLOGY**

Lecture and Discussion, Problem Based Method, Co-operative and Collaborative Method.

Week	Lab	Topics	Remarks
1	Lab 1	Introduction to Oracle Installation, Introduction to Oracle Installation (Contd.), Lab Assignment	
2	Lab 2	Basic SQL Query: Data Expressions, Lab Assignment Home Assignment	
3	Lab 3	Advanced SQL Query and Sub-Query, Lab Assignment Home Assignment	
4	Lab 4	Advanced SQL Query and Sub-query (Contd.), Lab Assignment, Home Assignment	
5	Lab 5	Constraints, Lab Assignment, Home Assignment	
6	Lab 6	Presentation on the project proposal, Submission of a report	
7	Lab 7	Authentication and Security, Lab Assignment, Home Assignment	
8	Lab 8	Submission of the E- R diagram, Submission of Schema diagram, Show Project Update	
9	Lab 9	Introduction to PL Packages, Introduction to PL Packages (Contd.), Lab Assignment	
10	Lab 10	Indexing, Hashing, Lab Assignment	
11	Lab 11	Presentation of Back End (SQL), Report Submission	
12	Lab 12	Show Project Update	
13	Lab 13	Introduction to Database Trigger/Procedure, Lab Assignment, Home Assignment	
14	Lab 14	Viva, Submission of Final Project, Project Presentation	

#### ASSESSM1ENT STRATEGY

Comp	oonents	Grading	СО	Blooms Taxonomy
1	Online	20%	CO2	C4, C5
	Oniz	20%	CO2	C4, C5
	Quiz	20%	CO3	C2-C4
Continuous Assessment	Class Participation	10%	CO4	A2
(100%)	Assignment		CO1	C3, C4, P1
	Assignment	30%	CO3	C2-C4
	Class Evaluation	20%	CO1	C3, C4, P1
Total	Total Marks			

### (CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

#### **REFERENCE BOOKS**

- 1. JAVA How to Program (9th Edition) Paul Deitel, Harvey Deitel; Prentice Hall (2011)
- 2. Microsoft C# Professional Projects (1st Edition) Geetanjali Arora, B. Aiaswamy, Nitin Pandey; Course Technology PTR (2002)

3. PHP: The Complete Reference (1st Edition) - Steven Holzner; McGraw Hill Education (2007) **REFERENCE SITE** 

# **CSE-459:** Internet of Things (IoT)

COUR	SE INFOR	MATION								
Course		: CSE 459		ire Co		Iours		: 3.00		
	Course Title         : Internet of Things (IoT)         Credit Hours         : 3.00									
	Code: Nil									
	Title: Nil									
CURR	ICULUM S	STRUCTURE								
Outcon	ne Based Ed	ucation (OBE)								
RATIO	ONALE									
effectiv	ve solution failed the solution of the solutio	nings (IoT) course introduces the for an industrial environment. The technology, architecture, cha	he course	provid	es a c	ompreh	ensive	e discu	ission c	on th
OBJE	CTIVE									
2. To u	nderstand h	g of how IoT systems are develo ow IoT systems contribute in ind	ustrial revo							
		e challenges and issues (security COMES & GENERIC SKILL		loT.						
LLAK		urse Learning Outcome	1	.			1			
No.	(Upon com	pletion of the course, the students will be able to)	Bloom Taxono		СР	CA	K	P	Assess	
CO1	details of a	l fundamental concepts and the rchitectural framework of IoT.	C1, C	2	1			3	Τ, Ι	F
CO2	models of appropriate industrial c	ontext.	C3, C	6	2	3	4	5	Т, М	IT
CO3	safety issue	he challenges, security and es of an IoT system.	C4		3	4	1	7	F	
CO4	presenting design and	the communication skill by topics on information system development.	A2			1			Pr	
		blems, CA-Complex Activities, I nment; Pr – Presentation; R - Re								_
COUR	SE CONTI	ENT								
industr mining Introd and ed devices netwon architee generic	ies - power, and race of uction to Io ge computin s: the IoT do ck model: cture, application	history and emergence of IoT water, healthcare, transportation cars. <b>The IoT landscape:</b> devi <b>T and embedded systems:</b> intr ng; <b>IoT system architectures:</b> evice design space and platform single-hub network and multi cations and basic challenges; <b>So</b> security, privacy and dependab x fuzzing, black-box fuzzing, fuz	, oil and ga ces, wirele oductory co IoT-orient design; Ev i-hub netw ecurity and bility; Security	s, con ss net oncept ed sta vent-d ork; ] d safe rity te	structi works of Io' ndard <b>riven</b> Indus ty: sy sting	on, agri , cloud T and b s, proto system trial Io stem se of IoT	culture, sense ig data cols a : IoT e oT: in curity, systen	e, gene ors, a a, clou and da event a adustria , netw <b>ns:</b> fuz	e sequer architec id comp tabases analysis al 4.0, ork sec	ncer eture outin ; Io ;; Io ;; Io Eurit
	MAPPIN						syste.			
No.	Co	urse Learning Outcome		1	1 1		1 1	- i - í		1.1
	Understan	d fundamental concepts and of architectural framework of	1 2 3 H	3 4	5	6 7	8	9 10	11	12

CO2-PO3HighUnderstand how to design IoT systems appropriately by applying different type of architecture and network models for different types of industrial context.CO3-PO2HighAcquire knowledge for analysing the challenges of an IoT system and interpre accordingly.CO3-PO7MediumUnderstand the security and safety issues and its impact on the components of a IoT system.CO4-PO10LowDevelop communication skills through participating presentation.TEACHING LEARNING STRATEGYEngagement (hours)Face-to-Face Learning Lecture42Practical / Tutorial / Studio Student-Centred Learning-Self-Directed Learning Non-face-to-face learning Non-face-to-face learning42Formal Assessment Continuous Assessment Continuous Assessment21Formal Assessment Continuous Assessment2Final Examination3	Desi	ion the or	chitecture and network										
CO2       appropriately to different types of industrial context.       Image: Co2       I	mod												
industrial context.       industrial context.       industrial context.       industrial context.         CO3       Analyse the challenges, security and safety issues of an IoT system.       H       M       Industrial context.         CO4       astery issues of an IoT system.       H       M       M       Industrial context.         CO4       presenting topics on information system       Industrial context.       M       Industrial context.         CO4       presenting topics on information system       Industrial context.       Industrial context.       Industrial context.         CO4       presenting topics on information system       Industrial context.       Industrial context.       Industrial context.         CO4       presenting topics on information system       Industrial context.       Industrial context.       Industrial context.         CO1-PO1       High       Understand basic concepts IoT technology and various modules through an in depth knowledge of architectural framework of IoT.       Industrial context.       CO3-PO3       High       Context.       Context.       Context.       CO3-PO3       High       Context.       Context													
CO3       Analyse the challenges, security and alty issues of an IoT system.       H       M       I       L         Develop the communication skill by presenting topics on information system       H       H       M       L       L         CO4       design and development.       Justifications       L       L       L         USTIFICATION FOR CO-PO MAPPING       Justifications       L       L       L       L         CO2-PO3       High       Understand basic concepts IoT technology and various modules through an in depth knowledge of architectural framework of IoT.       CO2-PO3       High       Conterstand how to design IoT systems appropriately by applying different type of architecture and network models for different types of industrial context.         CO3-PO7       Medium       Interstand the security and safety issues and its impact on the components of a lof system.         CO4-PO10       Low       Develop communication skills through participating presentation.         TEACHING LEARNING STRATEGY       Engagement (hours)         Factor-Face Learning       42         Lecture       42         Practical/Tutorial / Studio       -         Student-Centred Learning       21         Non-face-to-face learning       42         Continuous Assessment       21         Continuous Assessment       2													
CO4         Develop the communication skill by presenting topics on information system disgn and development.         L         L           (H - High, M- Medium, L-low)         Interval information system disgn and development.         Justifications         L           Mapping         Level         Justifications         Interval information of IoT.           C01-PO1         High         Understand basic concepts IoT technology and various modules through an in develop the knowledge of architecture framework of IoT.           C02-PO3         High         Understand how to design IoT systems appropriately by applying different type of architecture and network models for different types of industrial context.           C03-PO2         High         Acquire knowledge for analysing the challenges of an IoT system and interpre accordingly.           C03-PO1         Low         Develop communication skills through participating presentation.           TEACHING LEARNING STRATEGY         Engagement (hours)           Face-to-Face Learning Lecture         42           Practical / Tutorial / Studio         -           Student-Centred Learning Student-Centred Learning Non-face-to-face learning         42           Revision         21           Assessment Preparations         21           Student-Centred Learning         21           Lecture         131           TEACHING METHODOLOGY         <	CO2 Ana	lyse the c	hallenges, security and	Н			N	1					
design and development.       (H - High, M- Medium, L-low)         IUSTIFICATION FOR CO-PO MAPPING         Mapping       Level       Justifications         C01-PO1       High       Understand basic concepts IoT technology and various modules through an in depth knowledge of architectural framework of IoT.         C02-PO3       High       Understand basic concepts IoT technology and various modules through an in depth knowledge of architectural framework of IoT.         C03-PO2       High       Understand how to design IoT systems appropriately by applying different type of architecture and network models for different types of industrial context.         C03-PO2       High       Coderpoint of architecture and network models for different types of industrial context.         C03-PO7       Medium       Understand the security and safety issues and its impact on the components of a IoT system.         C04-PO10       Low       Develop communication skills through participating presentation.         TEACHING and Learning Activities       Engagement (hours)         Face-to-Face Learning       42         Non-face-to-face learning       -         Non-face-to-face learning       21	Dev	elop the c	communication skill by							L			
USTIFICATION FOR CO-PO MAPPING           Mapping         Level         Justifications           C01-PO1         High         Understand basic concepts IOT technology and various modules through an in depth knowledge of architectural framework of IoT.           C02-PO3         High         Understand how to design IoT systems appropriately by applying different type of architecture and network models for different types of industrial context.           C03-PO2         High         Acquire knowledge for analysing the challenges of an IoT system and interpre accordingly.           C03-PO7         Medium         Understand the security and safety issues and its impact on the components of a IoT system.           C04-PO10         Low         Develop communication skills through participating presentation.           TEACHING LEARNING STRATEGY         Engagement (hours)           Face-to-Face Learning Lecture         42           Practical / Tutorial / Studio         -           Student-Centred Learning         -           Non-face-to-face learning Revision         42           Practical / Tutorial / Studio         -           Student-Centred Learning         21           Assessment Preparations         21           Student-Centred Learning         21           Revision         3           Total         Teamination      <													
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TEACHING LEARNING STRATEGY         Teaching and Learning Activities       Engagement (hours)         Face-to-Face Learning       42         Practical / Tutorial / Studio       -         Student-Centred Learning       -         Self-Directed Learning       42         Non-face-to-face learning       42         Revision       21         Assessment Preparations       21         Formal Assessment       2         Continuous Assessment       2         Final Examination       3         Total       131         TEACHING METHODOLOGY         Lecture and Discussion, Co-operative and Collaborative Method, Problem Based Method         COURSE SCHEDULE         Week       Lecture       Topics       Assessment Methods         1       Evolution of IoT (Contd.)       3       Evolution of IoT (Contd.)         2       5       Applications of IoT (Contd.)       Class Test 1         3       8       The IoT landscape: architectures       10         3       8       The IoT landscape: wireless networks       Class Test 2	CO3-PO7		IoT system.								nents	of a	
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	14	Introduction to IoT and embedded systems (Contd.)	
	15	Introduction to IoT and embedded systems (Contd.)	
	16	IoT system architectures	
6	17	IoT system architectures: standards	
	18	IoT system architectures: protocols	
	19	IoT system architectures: protocols	
7	20	IoT system architectures: databases	
	21	IoT system architectures: databases	
	22	IoT devices	
8	23	IoT devices (Contd.)	
	24	IoT devices (Contd.)	Mid Term Exam
	25	Event-driven system	
9	26	Event-driven system (Contd.)	
	27	Event-driven system (Contd.)	
	28	IoT network model	
10	29	IoT network model (Contd.)	
	30	IoT network model (Contd.)	
	31	Industrial IoT	
11	32	Industrial IoT (Contd.)	
	33	Industrial IoT (Contd.)	
	34	Security and safety	
12	35	Security and safety: privacy	
	36	Security and safety: dependability	Class Test 3
	37	Security and safety: system security	Class Test 5
13	38	Security and safety: network security	
	39	Security and safety: generic application security	
	40	Security testing of IoT systems	
14	41	Security testing of IoT systems: white-box fuzzing	
	42	Security testing of IoT systems: black-box fuzzing	

Comp	ponents	Grading	СО	Blooms Taxonomy
	Test 1-3	20%	CO1	C1, C2
Continuous	Test 1-5	20%	CO2	C3, C6
Assessment (40%)	Class Participation	5%	CO4	A2
	Mid term	15%	CO2	C3, C6
Final	Exam	60%	CO1	C1, C2
Fillal	Елаш	00%	CO3	C4
Total	Marks	100%		

#### (CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

#### **REFERENCE BOOKS**

1. Internet-of-Things (IoT) Systems: Architectures, Algorithms, Methodologies (1st Edition) by Dimitrios Serpanos and Marilyn Wolf; Springer

 The Internet of Things (1st Edition) by Samuel Greengard; The MIT Press Essential Knowledge series
 Precision: Principles, Practices and Solutions for the Internet of Things (Kindle Edition) by Timothy Chou; eBook

4. Internet of Things for Architects: Architecting IoT solutions by implementing sensors, communication infrastructure, edge computing, analytics, and security (1st Edition) by Perry Lea; Packt

#### **REFERENCE SITE**

### **CSE-460: Internet of Things (IoT) Sessional**

Credit Hours		weeks : 0.75		
nicate, how they				
0		ıral fran	nework	ts for an IoT
T			<u> </u>	
Bloom's Taxonomy	СР	CA	KP	Assessment Methods
C2, C3, P1	1	3	5	PR, Pr, R, Viva
C4, C5	3 1		6	PR, Pr, R, Viva
C3, C6, P4		1 4		PR, Pr, R, Viva
				Pr
	g the technology use nce on different kin nicate, how they the IoT system. that provide gatew ign and develop arc vorld industrial scena Bloom's Taxonomy C2, C3, P1 C4, C5	g the technology used to one on different kinds of nicate, how they store the IoT system.         that provide gateways, stign and develop architectar vorld industrial scenario.         Bloom's Taxonomy       CP         C2, C3, P1       1         C4, C5       3	g the technology used to design a nce on different kinds of compornicate, how they store data a the IoT system.         that provide gateways, sensors, tign and develop architectural frameworld industrial scenario.         Bloom's Taxonomy       CP         C2, C3, P1       1       3         C4, C5       3       1	that provide gateways, sensors, data stign and develop architectural frameworkvorld industrial scenario.Bloom's TaxonomyCPCAKPC2, C3, P1135C4, C5316

## **COURSE CONTENT**

**Applications of IoT:** case studies on a number of industries - power, water, healthcare, transportation, oil and gas, construction, agriculture, gene sequencers, mining and race cars. **The IoT landscape:** devices, wireless networks, cloud, sensors, architectures; **Introduction to IoT and embedded systems:** introductory concept of IoT and big data, cloud computing and edge computing; **IoT system architectures:** IoT-oriented standards, protocols and databases; **IoT devices:** the IoT device design space and platform design; **Event-driven system:** IoT event analysis; **IoT network model:** single-hub network and multi-hub network; **Security and safety:** system security, network security, generic application security, privacy and dependability; **Orientation and usage of modern tools:** programming in C/C++ (for programming the edge device), programming in Python using such frameworks as TensorFlow (for ML-related tasks), containerized apps deployment using Kubernetes, docker, computer networks, Apache Kafka, ElasticSearch, Kibana, Apache Flink, Linux administration and familiarity with Amazon web technologies.

SKILL	MAPPI	NG																
No.		Course Lea	ourse Learning Outcome PROGRAM OUTCO															
		$\begin{array}{c ccccccccccccccccccccccccccccccccccc$				7	8	9	10	11	12							
CO1		nnections among them to design the H H																
COI			ure for an industrial context.				11											
			late appropriate															
CO2 communication protocols for the IoT						Н												
	system.	tem.																
CO3		dern tools to					н	т	м									
0.05		types for the IoT system.																
~~ (		p the comm												-				
CO4			n software	engineering										L				
	session	al.																
(U U;	ah M M	ledium, L-lo																
· ·	*		· ·															
JUSTI	FICATIC	ON FOR CO	<b>J-PO MA</b>	PPING														
Ν	<i>lapping</i>		Level					Jus	tifica	tion	s							
CO1 D	1 002	Ilia	h Iliah	Acquire a s	trong	g leve	l of	knov	ledg	e to	ider	ntify	the c	comp	onent	s and		
COI-PC	D1, PO3	Під	h, High	connections														
CO2-PO	12	Hig	h	Analyse a														
00210	)2	-		understand	whicl	h pro	tocol	s are	appr	opria	ate f	or ar	ı IoT	archi	tectu	e.		
CO2 D			dium,	Design and	deve	lop p	rotot	vpes	for a	n Io'	Гsy	stem	arch	itectu	re to	solv		
CO3-PC	D2, PO3,		v, dium	complex inc														
CO 4 D	210			D 1		• ,•		.11	1	1		• ,•						
CO4-PO		Lov		Develop con	nmu	mean	on si	sins i	nrou	gn p	artic	ipau	ing in	i pres	entati	on.		
TEACI	HING LE	EARNING	STRATE(	GΥ														
		arning Activ	vities									Engagement (hours)						
Face-to-	-Face Lea	0																
	Lecture		.~											-				
		al / Tutorial											21					
Salf Di		-Centred Le	arning									_		-				
Sell-Di	rected Le	ce-to-face le	arning											_				
	Revisio		annig									_						
		nent Prepara	ations											-				
Formal	Assessme											$\uparrow$						
Continuous Assessment 2																		
	Final Pr	roject Asses	sment and	Viva										3				
Total														26	5			
TEACI	HING M	ETHODOL	LOGY															
Lecture	and Disc	ussion, Co-	operative a	nd Collabora	tive I	Metho	od, P	roble	m Ba	sed	Met	hod						
COUR	SE SCHI	EDULE																
W	eek	Lecture			Тор							As	sessn	nent l	Meth	ods		
		1		Introducing IoT technology, its applications and														
	1	2	discussi	discussion on possible innovative project ideas								-						
		3	-								Project, Report, Viva/							
		4		lentifying components (devices, sensors, data									-	rt, Vi	va/			
2 5 storage/cloud, gateways) and relevant connectivity						7	Pre	senta	tion									
		6	NT	· · · · ·		1 .					$\rightarrow$							
	2	7		king, loading							1.	Pro	ject, I	Repo	rt, Vi	va/		
	3	8	protocols to design the for architectural framework							Project, Report, Viva/ Presentation								
1		9	<u> </u>															

	10	Functioning system programming and other	Project, Report, Viva/
4	11	dependencies for the IoT system	Presentation
	12		
	13	Cloud and IoT integration and processing cloud	Project, Report, Viva/
5	14	computing services.	Presentation
	15		
	16	Developing a prototype for the IoT system	Project, Report, Viva/
6	17		Presentation
	18		
	19	Final documentation and project submission	Designet Descent Vive/
7	20		Project, Report, Viva/ Presentation
	21		riesentation

			CO	Blooms Taxonomy			
Components G		Grading	60	Bioonis raxonomy			
Continuous	Report/Documentation	20%	CO1	C2, C3, P1			
			CO2	C4, C5			
			CO3	C3, C6, P4			
Assessment	Class Participation	5%	CO4	A2			
(40%)	Presentation	15%	CO1	C2, C3, P1			
			CO2	C4, C5			
			CO3	C3, C6, P4			
			CO1	C2, C3, P1			
Final Project Assessment and Viva 60%		60%	CO2	C4, C5			
			CO3	C3, C6, P4			
Total Marks 100%							

### (CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

# **REFERENCE BOOKS**

- 1. Internet of Things (A Hands-on-Approach) (1st Edition) by Arshdeep Bagha and Vijay Madisetti; VPT
- 2. Getting Started with the Internet of Things: Connecting Sensors and Microcontrollers to the Cloud (1st Edition) by Cuno Pfister; Maker Media
- 3. Learning Internet of Things (1st Edition) by Peter Waher.

### **REFERENCE SITE**

## **CSE-461: Industrial Revolution**

COUR	SE INFOI	RMATION												
Course		: CSE-461			Lectur			t Ho	urs			3.00		
Course		: Industrial Revolution		(	Credit	Ηοι	urs	-	_	-	:	3.00	)	-
	REQUISIT	E												
	Code: Nil Title: Nil													
CURR	ICULUM	STRUCTURE												
Outcon	ne Based E	ducation (OBE)												
RATIO	ONALE													
trajecto Develo intellig	ory genera opment Goa ence (AI),	luces the fundamentals of i tion, 4 th industrial revolu l (MDG) and its impact on robotics, the Internet of her technologies.	ition. Tl industrie	his co s in 21	ourse l st cer	also ntury	o in [.] It's	trodu a fu	ices sion o	with of ac	h th dvano	e M ces in	lillen n arti	nium ficial
OBJE	CTIVE													
1.	-	in the basics of Industrial rev			-			-						
2.		y and analyse the trend and		gy of	mode	rn co	ompu	iter s	cienc	e ba	ased i	indu	stry.	
LEAR		<b>FCOMES &amp; GENERIC S</b>	KILLS						_			-		
No.		Course Learning Outcome pletion of the course, the stude be able to)	nts will		loom xonoi			СР	C	4	KP		ssess Meth	
CO1	industrial technolog	d the importance of the con- revolution and explore ies related to it.	e the	C1, 0	C2, P1	1, A1	1	1	1		1, 2		Т	
CO2	basic know well as de	dern world problems usin wledge of industrial revolut velop ideas to approach a so rent perspective.	tion as	C4, A	A2, A4 P6	4, P5	5,	2			3, 4		F, '	Г
CO3	Imply the a the soft	ideas of 4IR and use it to d and technical skills requi pocoming challenges.			C4, C6 , A4, .		, 4	3, 5, EP2	3,	5	5,6		ИТ, Ρ	'nR, F
Quiz; A	ASG – Assi	bblems, CA-Complex Activi gnment; Pr – Presentation; F ENT ief overview of Industrial	R - Repo	rt; F –	Final	Exa	ım, N	4T-1	Mid T	`ern	ı Exa	im)		
Major (IoT), l	Fields: Inc Robotics; 4 Global a	lustrial Revolution in the fie IR: Study of Workforce Re and Local aspects of indu	eld of AI adiness,	, gene Soft sl	tic en kills, '	gine Tech	ering nnica	g, 3D 1 ski	) print lls, Ei	ting ntre	, Inte prene	ernet eursh	of Tl ip. <b>S</b>	nings <b>ocial</b>
SKILI	L MAPPIN	G												
					ייים				TCO	ME	C /D	0)		
No.	C	ourse Learning Outcome	1	2	2 PR	4	RAN 5	1 OL	TCO	8	<u>S (P</u> 9	0) 10	11	12
CO1	concept of explore t	nd the importance of the of industrial revolution and he technologies related to it.	Н					-			-	~		
CO2	basic kno as well a	odern world problems using owledge of industrial revolut s develop ideas to approach from different perspective.	tion	Н										

CO3 dev requ	elop a the so	of 4IR and use it to ft and technical skills the upcoming	Н						
(H – High, N									
JUSTIFICA	<b>TION FOR</b>	CO-PO MAPPING							
Mapping	Level	Justifications							
CO1-PO1	High	Understand the breadth and depth of concept industrial	ization.						
CO2-PO2	High	Analyse complex modern problems and understand the	e ways to solve them.						
CO3-PO3		Learn the ideas of 4IRs to imply throughout life an continuous learning process	nd prepare for the depth of						
TEACHING	G LEARNIN	IG STRATEGY							
Teaching and		ctivities	Engagement (hours)						
Face-to-Face	-		40						
	cture ctical / Tuto	ial / Studio	42						
	dent-Centred		-						
Self-Directed	d Learning	~							
	n-face-to-fac	e learning	42						
	vision sessment Pre	parations	21						
Formal Asse			21						
	Continuous Assessment								
	d-Term Exar		1						
	al Examinat	on	3						
Total	~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~	0- 0 0	131						
TEACHING	<b>J METHOI</b>	OLOGY							
Lecture and	Discussion,	Co-operative and Collaborative Method, Problem Base	d Method						
COURSE S	CHEDULE								
Week	Lectu		Assessment Methods						
1	Lec 1	Brief overview of Industrial Revolution							
	Lec 2 Lec 3								
2	Lec 4	History:							
-	Lec 5	1st Industrial Revolution	Class Test-1						
	Lec 6	2nd Industrial Revolution							
3	Lec 7	History:							
	Lec 8	3rd Industrial Revolution							
4	Lec 9 Lec 10	Industrial Revolution in the field of Artificial							
	Lec 10	Intelligence.							
	Lec 12								
5	Lec 13	Industrial Revolution in the field of Internet of							
	Lec 14	Things (IoT).	Class Test-2						
	Lec 15								
6	Lec 16 Lec 17	Industrial Revolution in the field of Computer Technology and Networking.							
	Lec 17								
7	Lec 19	Industrial Revolution in the field of							
	Lec 20	Microcomputers and Robotics.							
	Lec 21		Mid Term Exam						
8	Lec 22	Introduction to 4th Industrial Revolution							
0	Lec 23								

	Lec 24		
9	Lec 25	4IRs	
	Lec 26	Study of Workforce readiness	
	Lec 27	Soft Skills	
10	Lec 28	Technical Skills	
	Lec 29		
	Lec 30		
11	Lec 31	Entrepreneurship	
	Lec 32		
	Lec 33		
12	Lec 34	Global Effects of Industrialization	
	Lec 35	Local Effects of Industrialization	
	Lec 36		
13	Lec 37	MDG and its impact on Industrial Revolution	
	Lec 38		
	Lec 39		Class Test-3
14	Lec 40	Debates	
	Lec 41	Histography	
	Lec 42	Impacts of IR in Computer Science	
	1		

ASSESSMENT STRATEGY

Comp	onents	Grading	СО	Blooms Taxonomy
Continuous	Test 1-3	20%	CO1 CO2	C1, C2 C3, C4
Assessment (40%)	Class Participation	5%	CO3	A2
	Mid term	15%	CO2	C4, P6
Final	Exam	60%	CO1, CO3 CO2	C1-C4, C6 P3, A4
Total	Marks	100%		

### (CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

**REFERENCE BOOKS** 

- 1. Rule, John. 1986. The Labouring Class in Early Industrial England, 1750-1850. London and New York: Longman.
- 2. Wrigley, E. A. 1988. Continuity, Chance and Change: The Character of the Industrial Revolution in England. Cambridge: Cambridge University Press.
- **3.** Aspin, Chris. 1981. The Cotton Industry. Princes Riseborough, Buckinghamshire: Shire Publications.

### **REFERENCE SITE**

## **CSE-462: Industrial Revolution Sessional**

п

COUR	SE INFC	ORMATION													
Course Course		: CSE-462 : Industrial I	Revolution Sessional			e Co Hou	ntact	Hou		: 3.0 wee : 0.7	ks	rs in	alter	native	;
PRE-R	REQUISI	ГЕ			cun	1100	15			. 0. /	15				
Course	Code: CS		ution												
		I STRUCTU													
Outcon	ne Based	Education (O	BE)												
RATIO	ONALE														
The Inc	lustrial Re	evolution Ses	sional course is struct	ured	to oi	rient	with	diffe	erent	indu	strie	es.			
OBJE	CTIVE														
2. To			based on the 4IRs of ge to enhance the learn							nfor	mat	ion c	on the	conc	ept
LEAR	NING OU	UTCOMES &	& GENERIC SKILL	S											
No.	(Upon co	ompletion of th	arning Outcome e course, the students with ble to)	ill be			om's mom		СР	С	ĊA	KF	,	ssess Meth	ment ods
CO1	Develop fundame Revoluti	ental issues ar	understanding of nd challenges of Indu	the Istria			26, P 26	1,	1		1	6		Τ,	Q
CO2		the strengths	s and weaknesses of	many	y (	C3, C6, A4, A5, P6					2	8 ASG,			, T
			Complex Activities, H – Presentation; R - Re											; Q -	
COUR	SE CON	TENT													
Visit to	Differen	t Industries ar	nd apply the knowledg	ge ga	ined	in th	e The	eory	Cou	rse.					
SKILL	MAPPI	NG													
No.	(	Course Learni	ing Outcome	1	2	PI 3	ROG							11	10
			-	1	2	3	4	3	6	/	8	9	10	11	12
CO1	fundam		erstanding of the nd challenges of 1.		Н										
CO2		e the strength y industries.	s and weaknesses					Н							
(H – H	ioh M-N	ledium, L-low	v)												
	*		-PO MAPPING												
Map	oping	Level				Ju	stific	atior	ıs						
CO1	-PO2	High	Able to understar fundamental issues							alys	sis	of (	challe	enges	and
CO2	2-PO5	High	Able to identify th different industries.	e ap	prop	oriate	mod	lern	tools	s or	tec	hniq	ues l	oy vi	siting

Feaching and L	earning Activiti	es			Engagement (hours)	
Face-to-Face L	earning					
Lectur	-				-	
	cal / Tutorial / S				21	
	nt-Centred Learr	ning			-	
Self-Directed L						
	ace-to-face learn	ing			-	
Revisi					-	
	sment Preparatio	ons			-	
Formal Assessr		- 4			2	
	uous Assessmer	nt			2	
	erm Exam				- 2	
Final I Total	Examination				3 26	
	1ETHODOLO	CV			20	
	-operative and C		athod			
COURSE SCH	•					
	Lecture		Topics		Remarks	
<u>Week</u> 1	Lecture	Visit to a 21 st	century Industry as seen fit l	av the	Kemarks	
1	Lab 1 2	Authority.	century industry as seen in t	by the		
3	Lab -1, 2	Discussion on				
3	Lab 3 1	industry.	ing the			
5	Lab -3, 4		century Industry as seen fit l	av the		
3	Lab -5, 6	Authority.	contary maasary as seen ne	sy the		
7	1.00 5,0	Discussion on	ng the			
1	Lab -7, 8	industry.	ing the	3.00 in alternate week		
9		Visit to a 21 st	century Industry as seen fit I	ov the		
,	Lab -9, 10	Authority.	contary mausity as seen net	5 y uie		
11	200 9,10	Visit to a 20 th	century Industry as seen fit	by the		
	Lab -11, 12	Authority.	centary maastry us seen ne	, inc		
13	Lab -13, 14		the experience gained visiting	ng the		
15	Luo 13, 14	industry.	the experience guined visiti	ing the		
ASSESSMEN	Γ STRATEGY					
		C I'	СО	B	looms Taxonomy	
Comp	onents	Grading	001		•	
	Test and	40%	C01		C2, P6	
Continuous	Assignment		CO2		C3, A5	
Assessment	Class	10%	CO3		C4, A2, A1	
(40%)	Participation				~ 1, 112, 111	
	Presentation	10%	CO2		C6, A4, P3	
Final Exam (I	Research Paper	40%	CO1, CO3		C2-C6, P1	
	Juiz)	+070	CO4		P3, A4	

## (CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

100%

## **REFERENCE BOOKS**

Total Marks

## **REFERENCE SITE**

# CSE-465: Cyber and Physical Security

COUR	SE INFORMATION					
Course			ire Conta	ct Hours		3.00
Course		Credi	t Hours		: 3	3.00
	REQUISITE					
	Code: Nil					
	Title: Nil					
	ICULUM STRUCTURE					
Outcon	ne Based Education (OBE)					
RATIC	DNALE					
	ch students the basics of security issues re				sical syst	tems includ
	ial control systems and those considered critica	al infrastructu	re systen	ns.		
OBJE						
	o examine the architecture of a complex syster o identify significant vulnerabilities and three		ly annroi	nriate se	curity te	chnologies :
	nethods to ensure the overall security of the sys		, uppio	prince 30	curry to	ennoiogies
3. T	o study advanced cybersecurity principles and	best practice		lied to d	evelop a	comprehens
	yber defense program for an enterprise against					
LEAR	NING OUTCOMES & GENERIC SKILLS					
No.	Course Learning Outcome (Upon completion of the course, the students	Bloom's	СР	CA	KP	Assessme
	will be able to)	Taxonomy			_	Method
	Apply cybersecurity principles and					T MT
CO1	methods to defend an information system	C1-C2	1		1,3,6	T, MT,
	against cyber threats.Analyse therequirementsofa					
CO2	Analyse the requirements of a comprehensive security plan for an	C4	1		3	T, F, M'
02	organization.	C4	1		5	_,_,_
	Design and customize a comprehensive					
CO3	security plan by integrating network	C3, C6	1		1,3,8	F, MT
	defense tools and measures.					
	Develop communication skill by					D
CO4	presenting topics on cyber and physical	A2		1		Pr
	security.					
(CP-C	omplex Problems, CA-Complex Activities, KF	P-Knowledge	Profile,	Γ – Test:	PR – Pro	oject; O –
	ASG – Assignment; Pr – Presentation; R - Repo					
	SE CONTENT					
	action to the course, Introduction to Cyber ation Security, and Control Theory, Industri					
	s, Introduction to Industrial Control System					
Archite	ecture, Industrial Network Protocols, Example	Industrial C	ontrol Sy	ystem - H	Power De	elivery Syste
	g Industrial Control Systems, Securing Indu					
	ns Security Concepts, Privacy in Cyber-Phys Domains - (e.g., Transportation Systems)	sical Systems	, Threats	s to Cyb	er-Physi	cal Systems
	Jonanis - (c.g., Transportation Systems)					
Other I	MAPPING					
Other I	A MAPPING					
Other I		PR	OGRAM		OMES (P	20)
Other I	Course Learning Outcome	PR 1 2 3	OGRAM 4 5	I OUTCO	OMES (P 8 9	PO) 10 11 1
Other I	Course Learning Outcome	- I I I			,	<i>.</i>

	system	n against cybe	er threats.												
	Analy	se the require	ements of a												
CO2	compi	-	urity plan for an	Н											
CO3	securi		ize a comprehensive egrating network neasures.		М										
CO4		nting topics of	ation skill by a cyber and physical										L		
(H – Hi	gh, M-	Medium, L-lo	ow)												
			<b>D-PO MAPPING</b>												
Mapp	oing	Level				Jus	tifica	ations	3						
CO1- P	-	High	Interpret the principl											ng br	eadth
CO2 - H		High	and depth of knowled Gain depth of knowled	ledge	for a	analy	sing							s of	cyber
CO3 – ]	- PO1     High     security and their execution process.       - PO2     Medium     Gain preliminary experience in complex problem comprehensive security plan.								analysis by designing a						
CO4- P	O10	Low	Demonstrate commu physical security.	inicat	tion a	skill	s by	pres	enti	ng o	on to	opics	as	cybeı	and
TEACI	HING I	LEARNING	STRATEGY												
		earning Activ	vities								E	lngag	gemer	nt (ho	urs)
Face-to		e											10		
	Lectur	re cal / Tutorial	/ Studio										42		
		nt-Centred Le									-				
Self-Di		earning.													
		ace-to-face le	earning										42	2	
	Revis										21				
	Asses	sment Prepar	ations										21		
Formal	Assessi	ment													
	Conti	nuous Assess	ment										2		
	Final	Examination											3		
Total													13	1	
		METHODOI													
Lecture	and Di	scussion, Co-	operative and Collabo	rative	e Met	hod,	Prot	olem	Base	ed M	letho	od			
COUR	SE SCH	HEDULE													
W	eek	Lecture			pics	. ~					Ass	sessm	nent I	Meth	ods
	1 Lec 1 Introduction to C Lec 2				ysica	l Sys	stems	5							
	Lec 3       2     Lec 4     Background on No       Lec 5     and Control Theor       Lec 6				ng, Iı	nfori	natio	n Se	curit	у,	Class Test 1				
	3	Lec 7 Lec 8 Lec 9	Industrial Networks	and l	now t	hey	opera	ate							

4	Lec 10	Industrial Cyber	Security History and Threat	S	
	Lec 11				
	Lec 12				
5	Lec 13	Industrial Control	ol Systems and Operations		
	Lec 14				
	Lec 15				
6	Lec 16	Industrial Netwo	ork Design and Architecture		
	Lec 17				Class Test 2
	Lec 18				
7	Lec 19	Industrial Netwo	ork Protocols		
	Lec 20				
	Lec 21				
8			ial Control System - Power		
	Lec 23	Delivery System	l		
	Lec 24				
9	Lec 25	Hacking Industri	al Control Systems		
	Lec 26	C	·		
	Lec 27				Mid Term Exam
10	Lec 28	Securing Industr	ial Control Systems		
	Lec 29	C			
	Lec 30				
11	Lec 31	Advanced Cyber	-Physical Systems Security		
	Lec 32	Concepts			
	Lec 33				
12	Lec 34	Advanced Cyber	-Physical Systems Security		
		Concepts continu			
	Lec 36				
13		Privacy in Cyber	-Physical Systems		
	Lec 38	<i>. .</i>	5 5		Class Test 3
	Lec 39				Class Test 5
14	Lec 40	Threats to Cyber	-Physical Systems in Other		
<b>T</b>		Domains	- injoical Systems in Other		
	Lec 41 Lec 42				
ASSESSMENT	Г STRATEGY				
Comn	onents	Grading	CO	В	looms Taxonomy
comp		g	CO1		C1, C2
	Test 1 2	200/	CO2		C4
Continuous	Test 1-3	20%	CO3		C3, C6
Assessment					
(40%)	Class	5%	CO4		Δ2

(40%)	Participation	5%	CO4	A2
	Mid term	15%	C01	C1, C2
	Mid term	13%		
			CO1	C1, C2
Final	Exam	600/	CO2	C4
Fillal	Exam	60%	CO3	C3,C6
Total	Marks	100%		

(CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

### **REFERENCE BOOKS**

- 1. Cyber-Physical Security: Protecting Critical Infrastructure at the State and Local Level by Robert M. Clark
- 2. Cyber Security for Cyber Physical Systems 1st ed. 2018 by Saqib Ali.
- 3. Industrial Network Security, Second Edition: Securing Critical Infrastructure Networks for Smart Grid, SCADA, and Other Industrial Control Systems (2nd Edition), by Eric D. Knapp and Joel Thomas Langill

### **REFERENCE SITE**

### **CSE-466:** Cyber and Physical Security Sessional

COURS	E INFORMATION										
Course C Course T		Lecture Cont	act Hours	W	3.00 hrs eeks ).75	s in alternative					
PRE-RE	PRE-REQUISITE										
Course C Course T	Code: Nil Fitle: Nil										
CURRI	CULUM STRUCTURE										
Outcome	e Based Education (OBE)										
RATIO	NALE										
	h students the practical aspects of security is g industrial control systems and those considered					ysical systems					
<b>OBJEC</b>	TIVE										
2. Tou	practice examining the architecture of a complex use methods to identify significant vulnerabilities apply advanced cybersecurity principles to develo	s and threats in				ogram.					
	ING OUTCOMES & GENERIC SKILLS										
No.	Course Learning Outcome (Upon completion of the course, the students will be able to)	Bloom's Taxonomy	СР	CA	KP	Assessment Methods					
CO1	Demonstrate knowledge and understanding of the range of cyber physical and software systems which present potential security	C2, A2		1	8	E, Q					
CO1	hazards										
CO1	v <u>i</u> i v	C3, A5		2	6	ASG, Q					

(CP- Complex Problems, CA-Complex Activities, KP-Knowledge Profile, T – Test ; PR – Project ; Q – Quiz; ASG – Assignment; Pr – Presentation; R - Report; F – Final Exam, MT- Mid Term Exam, E-Evaluation)

### COURSE CONTENT

Concepts and **Principles** of Cyber and Physical security; **Security Breaches** and Defenses in CPS; **Types of attack** and attacker, range of systems; **Security of payment gateways:** Card security, EMV payment systems, GSM and SIM cards; Wired and WiFi network security; **Examples of weak cryptosystems:** GSM, WEP; Infrastructure attacks: smart grids; Hardware Trojans and Trustworthy IC design

		C	I I O			Р	ROC	RAN	M OI	JTC	OM	ES	(PO)			
No.		Course	Learning Outcome	1	2	3	4	5	6	7	8	9	10	11	12	
			nowledge and													
CO1			of the range of cyber				Н									
			oftware systems which ial security hazards													
			d recognize instances o	f												
CO2			ttacks on such systems	1	Н											
<b>CO</b> 2	-	<u> </u>	ate measures to protect													
CO3	syste	ems from	security breaches						Н							
H _ Hi	oh M	- Medium	I-low)													
			R CO-PO MAPPING													
Mappi		Level				Instit	ficati	ons								
Mappi	ng	Level	Will be able to gain	broadth	Justifications eadth & depth of investigation and experimentation b											
CO1-PC	)4	High	demonstrating knowle													
		8	software systems which	ch presei	nt pot	entia	l sec	urity	haza	ards.		-	_	-		
CO2-PC	)2	High	Will be able to do pro				unde	rstan	ding	and	rec	ogni	zing	instan	ces	
		mgn	the principal attacks o				1 .1.	1	. 1 .				. ,			
O3-PO6 High Will develop knowledge and responsibility by taking appropriate protect systems from security breaches											late r	neasui	res			
EACE	IING	LEARN	ING STRATEGY	security	oreac	110.5										
			Activities									Eng	agem	ent (h	our	
		Learning										<u> </u>				
	Lect													-		
			orial / Studio											21		
elf-Dir		Learning	ed Learning											-		
			ace learning											-		
		ision	-											-		
Formal			reparations								_			-		
ormal			ssessment											2		
		ll Examina	•											3		
`otal														26		
EACH	HNG	METHO	DOLOGY													
ecture	and I	Discussion	, Co-operative and Coll	aborativ	e Me	thod,	, Pro	blem	Base	ed M	leth	od				
COURS	SE SC	CHEDUL	E													
Wee		Lab	Topics										R	emark	s	
1		Lab-1,2	Concepts and I	Principle	s of C	Cyber	r and	Phy	sical	secu	ırity	/				
3		Lab-3,4	Security Breac													
5		Lab-5,6	Types of attack							<b>67</b> -			3	:00 hr	s in	
79		Lab-7,8	Card security, H									rds	_	alterna		
9		Lab-9,10	Wired and WiF cryptosystems:			unty;	Exa	inple	s of v	veak				weel	C	
11		Lab-11,12				rids							-			
13		Lab- 13,1					y IC	desig	'n							

### ASSESSMENT STRATEGY

Components Grading			СО	Blooms Taxonomy
			CO1	C2, A2
Continuous	Evaluation and Assignment	30% CO2	CO2	C3, A5
Assessment	Assignment			
(40%)	Class Participation	20%	CO3	P3, A4
	Presentation	10%	CO3	P3, A4
Final Exam (Quiz + Online Test) 40%		CO1, CO2	C2, C3, C4, A2, A5	
Total Marks 100%				

### (CO = Course Outcome, C = Cognitive Domain, P = Psychomotor Domain, A = Affective Domain)

### **REFERENCE BOOKS**

- 1. Cyber Security for Cyber Physical Systems 1st ed. 2018 by Saqib Ali.
- Industrial Network Security, Second Edition: Securing Critical Infrastructure Networks for Smart Grid, SCADA, and Other Industrial Control Systems (2nd Edition), by Eric D. Knapp and Joel Thomas Langill

## **REFERENCE SITE**

# APPENDIX A

## Mission of MIST

MIST is working on the following missions:

- 1. Provide comprehensive education and conduct research in diverse disciplines of science, engineering, technology, and engineering management.
- 2. Produce technologically advanced intellectual leaders and professionals with high moral and ethical values to meet the socio-economic development of Bangladesh and global needs.
- 3. Conduct collaborative research activities with national and international communities for continuous interaction with academia and industry.
- 4. Provide consultancy, advisory, testing, and other related services to government, non-government and autonomous organization including personal for widening practical knowledge and to contribute in sustainable development of the society.

## PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

After completing the B.Sc. in CSE program the graduates are expected to have the following skills:

- 1. Graduates will grow and develop in their chosen profession and/or progress toward an advanced degree by giving innovative solutions to complex problems.
- 2. Graduate will earn respects from others and demonstrate reliability as effective and ethical team members and achieve positions of leadership in an organization and/or on teams.
- 3. Graduates will be able to establish or run sustainable business enterprises along diverse career paths by creating, selecting, applying appropriate and modern technologies, skills and tools.
- 4. Graduates will be able contribute to the educational, cultural, social, technological and economic development of society through the ethical application of their knowledge and skills.

## PROGRAM OUTCOMES (POs)

Program Outcomes (POs) represent the knowledge, skills and attitudes the students should have at the end of a four year engineering program. B.Sc. in CSE program of MIST has 12 Program Outcomes. They are briefly described in the following table.

Serial	PO	Category	Description
1	PO1	Engineering Knowledge	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2	PO2	Problem AnalysisIdentify, formulate, research literature, and analyze complex Engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	
3	PO3	Design/Development of Solutions	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety as well as cultural, societal and environmental concerns.
4	PO4	Investigation	Conduct investigations of complex problems, considering design of experiments, analysis and interpretation of data and synthesis of information to provide valid conclusions.
5	PO5	Modern Tool Usage	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction

			and modeling to complex engineering activities with an understanding of the limitations.	
6	PO6	The Engineer and Society	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal, And cultural issues and the consequent responsibilities relevant to the professional engineering practice.	
7	PO7	Environment and Sustainability	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of need for sustainable development.	
8	PO8	Ethics	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.	
9	PO9	Individual and Team Work		
10	PO10	<b>Communication</b> Communication Communication Communication Communication Communication Communication Communication Communication Communication Communication Communicate effectively on complex engineering activities with the engineering community and with society at large. Some of them are, being able to comprehend and write effective reports and design documentation, make effective presentation and give and receive clear instructions.		
11	PO11	Project management and Finance	Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments	
12	PO12	Lifelong learning	Recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change.	

## Table: List of Program Outcomes

## PEOs MAPPING WITH THE INSTITUTIONAL MISSION

Relationship between the Program educational Outcomes and Mission of MIST is stated below:

No.	PEO Statements	Industrial missions			
		Mission	Mission	Mission	Mission
		Statement-1	Statement-2	Statement-3	Statement-4
PEO-1	Growth and development in their chosen profession and/or progress towards an advanced degree by giving innovative solutions to complex problems.	Yes	No	No	Yes
PEO-2	Demonstrate trust & respect for others and be an effective and ethical team member and thereby achieve positions of leadership in an organization and/or team.	No	Yes	No	No
PEO-3	Graduates will be able to establish and run sustainable business enterprises along diverse career paths by creating, selecting, applying appropriate and modern technologies, skills and tools.	No	Yes	Yes	Yes
PEO-4	Graduates will be able to contribute in to the educational, cultural, social, technological and economic development of society through the ethical application of their knowledge and skills.	No	Yes	Yes	No

### Table: Relationship between PEOs and Mission of MIST

## **RELATIONSHIP BETWEEN THE POS AND PEOS**

Relationship between POs and PEOs of MIST is given in details below:

No.	PO statement	PEO-1	PEO-2	PEO-3	PEO-4
PO-1	Engineering knowledge: Apply the knowledge of		~ -		
	mathematics, science, engineering fundamentals and an engineering specialization to the solution	Yes	No	No	No
<b>DO 3</b>	of complex engineering problems.				
PO-2	Problem analysis: Identify, formulate, research and analyze complex engineering problems and reach substantiated conclusions using the principles of mathematics, the natural sciences	Yes	No	No	No
	and the engineering sciences.				
PO-3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety and of cultural, societal and environmental concerns.	Yes	No	No	No
PO-4	Investigation: Conduct investigations of complex problems, considering experimental design, data analysis and interpretation and information synthesis to provide valid conclusions.	Yes	No	No	No
PO-5	Modern tool usage: Create, select and apply appropriate techniques, resources and modern engineering and IT tools, including prediction and modeling, to complex engineering activities with an understanding of their limitations.	No	No	Yes	No
PO-6	The engineer and society: Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice.	No	Yes	No	Yes
PO-7	Environment and sustainability: Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of and need for sustainable development.	No	No	Yes	Yes
PO-8	Ethics: Apply ethical principles and commit to the professional ethics, responsibilities and the norms of the engineering practice.	No	Yes	No	Yes
PO-9	Individual work and teamwork: Function effectively as an individual and as a member or leader of diverse teams and in multidisciplinary settings.	No	Yes	No	No
PO-10	Communication: Communicate effectively about complex engineering activities with the engineering community and with society at large. Be able to comprehend and write effective reports, design documentation, make effective presentations and give and receive clear instructions.	No	Yes	No	Yes
PO-11	Project management and finance: Demonstrate knowledge and understanding of engineering and management principles and apply these to one's work as a team member or a leader to manage projects in multidisciplinary environments.	No	Yes	Yes	No
PO-12	Life-long learning: Recognize the need for and	Yes	Yes	No	Yes

have the preparation and ability to engage in	
independent, life-long learning in the broadest	
context of technological change.	

### Table: Relationship between PEOs and Mission of MIST

### **KNOWLEDGE PROFILES (KP)**

The Table: Knowledge Profiles defines indicated volume of learning and attributes against which graduates must be able to perform. The table is used to extend and clarify the definition of the Graduate Attributes (see the PO list above).

KP	Category	Description
KP1	Natural Sciences	A systematic, theory-based understanding of the natural sciences
		applicable to the discipline.
KP2	Mathematics	Conceptually-based mathematics, numerical analysis, statistics and formal
		aspects of computer and information science to support analysis and
		modelling applicable to the discipline.
KP3	Engineering	A systematic, theory-based formulation of engineering fundamentals
	Fundamentals	required in the engineering discipline.
KP4	Specialist	Engineering specialist knowledge that provides theoretical frameworks and
	Knowledge	bodies of knowledge for the accepted practice areas in the engineering
		discipline; much is at the forefront of the discipline.
KP5	Engineering Design	Knowledge that supports engineering design in a practice area.
KP6	<b>Engineering Practice</b>	Knowledge of engineering practice (technology) in the practice areas in the
		engineering discipline.
KP7	Societal Roles	Comprehension of the role of engineering in society and identified issues
		in engineering practice in the discipline: ethics and the professional
		responsibility of an engineer to public safety; the impacts of engineering
		activity: economic, social, cultural, environmental and sustainability.
KP8	Research Literature	Engagement with selected knowledge in the research literature of the
		discipline.

#### **Table: Knowledge Profiles**

### **RANGE OF COMPLEX ENGINEERING PROBLEM (CP)**

The Table: Complex Engineering Problem Profiles clarifies the definition of Complex Engineering Problem by establishing seven range, or characteristics, of problem-solving. Based on this list of CP, the attributes of a Complex Engineering Problem is that it must have CP1 and some or all of CP2 to CP7.

u com		
СР	Attributes	Description
CP1	Depth of knowledge required	Cannot be resolved without in-depth engineering knowledge at
		the level of one or more of KP3, KP4, KP5, KP6 or KP8 which
		allows a fundamentals-based, first principles analytical approach.
CP2	Range of conflicting	Involve wide-ranging or conflicting technical, engineering and
	requirements	other issues.
CP3	Depth of analysis required	Have no obvious solution and require abstract thinking,
		originality in analysis to formulate suitable models.
CP4	Familiarity of issues	Involve infrequently encountered issues.
CP5	The extent of applicable codes	Are outside problems encompassed by standards and codes of
		practice for professional engineering.
CP6	The extent of stakeholder	Involve diverse groups of stakeholders with widely varying
	involvement and conflicting	needs.
	requirements	
CP7	Interdependence	Are high-level problems including many component parts or sub-
		problems.

#### **Table: Complex Engineering Problem Profiles**

## RANGE OF COMPLEX ENGINEERING ACTIVITIES (CA)

There are five attributes of activities where students can be involved in when solving Complex Engineering Activities, as defined in the International Engineering Alliance (IEA) document for the Washington Accord graduates (Professional). A Complex Engineering Activity or Project is that which has some or all of the following attributes:

CA	Attributes	Description
CA1	Range of resources	Involve the use of diverse resources (and for this purpose resource
		includes people, money, equipment, materials, information and
		technologies).
CA2	Level of interactions	Require resolution of significant problems arising from interactions
		between wide-ranging or conflicting technical, engineering or other
		issues.
CA3	Innovation	Involve creative use of engineering principles and research-based
		knowledge in novel ways.
CA4	Consequences to society	Have significant consequences in a range of contexts, characterized
	and the environment	by difficulty of prediction and mitigation.
CA5	Familiarity	Can extend beyond previous experiences by applying principles-
		based approaches.

### Table: Range of Complex Engineering Activities

## LEARNING DOMAINS (LD)

The Learing Domain (LD) consists of three sub-domains i.e. cognitive, affective, and psychomotor and their categories. The students will be evaluated through different methods based on the sub-domains. The attributes of the sub-domains are described in the following tables.

#### **Cognitive sub-domain:**

LD	Category	Description	
C1	Remembering	Recognizing or recalling knowledge from memory. Remembering is when memory is used to produce definitions, facts, or lists, or recite or retrieve material.	
C2	Understanding	Constructing meaning from different types of functions be they have written or graphic messages activities like interpreting, exemplifying classifying, summarizing, inferring, comparing, and explaining.	
C3	Applying	Carrying out or using a procedure through executing, or implementing. Applying related and refers to situations where learned material is used through products like models, presentations, interviews or simulations.	
C4	Analyzing	Breaking material or concepts into parts, determining how the parts relate or interrelate to one another or to an overall structure or purpose. Mental actions included in this function are differentiating, organizing, and attributing, as well as being able to distinguish between the components or parts. When one is analyzing he/she can illustrate this mental function by creating spreadsheets, surveys, charts, or diagrams, or graphic representations.	
C5	Evaluating	Making judgments based on criteria and standards through checking and critiquing. Critiques, recommendations, and reports are some of the products that can be created to demonstrate the processes of evaluation. In the newer taxonomy evaluation comes before creating as it is often a necessary part of the precursory behaviour before creating something.	
C6	Creating	Putting elements together to form a coherent or functional whole; reorganizing elements into a new pattern or structure through generating, planning, or producing. Creating requires users to put parts together in a new way or synthesize parts into something new and different a new form or product. This process is the most difficult mental function in the new taxonomy.	

#### **Table: Cognitive Domain**

### Affective sub-domain:

LD	Category	Description
A1	Receiving	This refers to the learner's sensitivity to the existence of stimuli - awareness,
		willingness to receive, or selected attention.
A2	Responding	This refers to the learners' active attention to stimuli and his/her motivation to
		learn – acquiescence, willing responses, or feelings of satisfaction.
A3	Valuing	This refers to the learner's beliefs and attitudes of worth - acceptance,
		preference, or commitment. An acceptance, preference, or commitment to value.
A4	Organization	This refers to the learner's internalization of values and beliefs involving (1) the
		conceptualization of values; and (2) the organization of a value system. As
		values or beliefs become internalized, the leaner organizes them according to
		priority.
A5	Characterization	This refers to the learner's highest of internalization and relates to behaviour that
		reflects (1) a generalized set of values; and (2) a characterization or a philosophy
		about life. At this level, the learner is capable of practising and acting on their
		values or beliefs.

### **Table: Affective Domain**

## **Psychomotor sub-domain:**

LD	Category	Description
P1	Perception	The ability to use sensory cues to guide motor activity. This ranges from sensory
		stimulation, through cue selection, to translation.
P2	Set	Readiness to act. It includes mental, physical, and emotional sets. These three sets
		are dispositions that predetermine a person's response to different situations
		(sometimes called mindsets).
P3	Guided	The early stages in learning a complex skill that includes imitation and trial and
	Response	error. Adequacy of performance is achieved by practicing.
P4	Mechanism	This is the intermediate stage in learning a complex skill. Learned responses have
		become habitual and the movements can be performed with some confidence and
		proficiency.
P5	Complex /	The skilful performance of motor acts that involve complex movement patterns.
	Overt	Proficiency is indicated by a quick, accurate, and highly coordinated performance,
	Response	requiring a minimum of energy. This category includes performing without
		hesitation and automatic performance. For example, players often utter sounds of
		satisfaction or expletives as soon as they hit a tennis ball or throw a football
		because they can tell by the feel of the act what the result will produce.
P6	Adaptation	Skills are well developed and the individual can modify movement patterns to fit
		special requirements.
P7	Origination	Creating new movement patterns to fit a particular situation or specific problem.
		Learning outcomes emphasize creativity based on highly developed skills.

**Table: Psychomotor Domain** 

# **APPENDIX B**

## TYPES OF EXAM AND ASSOCIATED ISSUES

Ser	Exam Type	Term	No of Theory Courses	Max Grading	Assessment Marks	Exam Schedule	Courses	Registration schedule
1	Regular	Spring and Fall	Max 6 Theory	A+	Assessment on 100%	Regular exam	Regular	Regular
2	Retake	Spring and Fall	Courses	B+				
3	Supplementary-I (Fail/ Improvement)	Spring	Max 2 Theory	B+	Assessment on 60%	1 st wk of Spring Term/ Fall Term End Break	Courses of immedia te past term included	5 th wk after completion of Fall Term (Previous Yr)
4	Supplementary –II (Fail/ Improvement)	Fall	Max 1 Theory	B+	Assessment on 60%	1st wk of Fall Term/ Spring Term End Break	Courses of immedia te past term not included	Mid-term break of Spring Term (March)

### Notes:

- *i.* Max 24 Cr hr in one regular term (excluding supplementary exams)
- *ii.* Students may register maximum up-to 07 theory courses in exceptional cases if Dept can accommodate within 24 Cr hr.
- *iii.* Student can register maximum 06 theory courses for Improvement Exam in his whole academic period.
- iv. Supplementary-I exam to be considered as part of previous academic year
- v. Students appearing in Supplementary-I shall not be incl in current Graduation Ceremony

## **APPENDIX C**

## EQUIVALENCE TABLE

	Old course(2019-2021)			New Course (2022-2024)			
Ser.	Course code	Course Title	Cr.	Course code	Course Title	Cr.	
1.	CSE-100	Introduction to Computer Systems Sessional	1.50	-	-	-	
2.	CSE -101	Discrete Mathematics	3.00	CSE -101	Discrete Mathematics	3.00	
3.	CHEM-101	Chemistry	3.00	CHEM-101	Introduction to chemistry for Engineers	3.00	
4.	-	-	-	CHEM-102	Chemistry Sessional	1.50	
5.	EECE-163	Electrical Circuit Analysis	3.00	EECE-163	Electrical Circuit Analysis	3.00	
6.	EECE-164	Electrical Circuit Analysis Sessional	1.50	EECE-164	Electrical Circuit Analysis Sessional	0.75	
7.	HUM-101	Developing English Language Skills I	2.00	LANG-102	Communicative English-I	1.50	
8.	MATH-141	Mathematics-I (Differential and Integral Calculus)	3.00	MATH-101	Differential and Integral Calculus	3.00	
9.	PHY-103	Physics	3.00	PHY-101	Waves and Oscillations, Optics and Modern Physics	3.00	
10.	PHY-104	Physics Sessional	0.75	PHY-102	Physics Sessional	1.50	
11.	Shop-140	Workshop Practice Sessional	0.75	-	-	-	
12.	CSE-201	Digital Logic Design	3.00	CSE-103	Digital Logic Design	3.00	
13.	CSE-202	Digital Logic Design Sessional	1.50	CSE-104	Digital Logic Design Sessional	1.50	
14.	CSE-105	Structured Programming Language	3.00	CSE-105	Structured Programming Language	3.00	
15.	CSE-106	Structured Programming Language Sessional	1.50	CSE-106	Structured Programming Language Sessional	1.50	
16.	EECE-169	Electronic Devices and Circuits	3.00	EECE-169	Electronic Devices and Circuits	3.00	
17.	EECE-170	Electronic Devices and Circuits Sessional	1.50	EECE-170	Electronic Devices and Circuits Sessional	0.75	
18.	HUM-241	Bangladesh Studies	2.00	GEBS-101	Bangladesh Studies	2.00	
19.	MATH-245	Mathematics-III (Vector Analysis, Matrices and Fourier Analysis)	3.00	MATH-105	Vector Analysis, Matrix and Coordinate Geometry	3.00	
20.	ME - 181	Basic Mechanical Engineering	2.00	ME-122	Fundamental of Mechanical Engineering and Robotics Sessional	2.00	
21.	CSE-203	Data Structures and Algorithms-I	3.00	CSE-203	Data Structures and Algorithms-I	3.00	
22.	CSE-204	Data Structures and	1.50	CSE-204	Data Structures and	1.50	

	0	Old course(2019-2021)		New	v Course (2022-2024)	
Ser.	Course code Course Title			Course code	Course Title	Cr.
		Algorithms-I Sessional			Algorithms-I Sessional	
23.	CSE-205	Object Oriented Programming Language	3.00	CSE-205	Object Oriented Programming Language	3.00
24.	CSE-206	Object Oriented Programming Language Sessional-I	1.50	CSE-206	Object Oriented Programming Language Sessional-I	1.50
25.	CSE-217	Theory of computation	3.00	CSE-217	Theory of computation	3.00
26.	EECE-269	Electrical Drives and Instrumentation	3.00	EECE-269	Electrical Drives and Instrumentation	3.00
27.	EECE-270	Electrical Drives and Instrumentation Sessional	0.75	EECE-270	Electrical Drives and Instrumentation Sessional	0.75
28.	HUM-237	Engineering Economics	2.00			
29.	HUM-102	Developing English Language Skills II	1.50	ENG-302	Communicative English-II	1.50
30.	MATH-143	Mathematics-II (Ordinary and Partial Differential Equations and Coordinate Geometry)	3.00	-	-	-
31.	-	-	-	MATH-205	Differential Equations, Laplace Transform and Fourier Transform	3.00
32.	CE-150	Engineering Drawing and CAD Sessional	1.50	CE-250	Engineering Drawing and CAD Sessional	1.50
33.	CSE-323	Computer Architecture	3.00	CSE-213	Computer Architecture	3.00
34.	CSE-214	Numerical Methods Sessional	1.50			
35.	CSE-215	Data Structures and Algorithms-II	3.00	CSE-215	Data Structures and Algorithms-II	3.00
36.	CSE-216	Data Structures and Algorithms-II Sessional	1.50	CSE-216	Data Structures and Algorithms-II Sessional	1.50
37.	CSE-313	Mathematical Analysis for Computer Science	3.00	CSE-219	Mathematical Analysis for Computer Science	2.00
38.	CSE-220	Object Oriented Programming Sessional-II	1.50	CSE-220	Object Oriented Programming Sessional-II	0.75
39.	CSE -224	Advanced Programming Language Sessional	0.75			
40.	CSE-211	Digital Electronics and Pulse Technique	3.00	EECE-279	Digital Electronics and Pulse Technique	3.00
41.	CSE-212	Digital Electronics and Pulse Technique Sessional	0.75	EECE-280	Digital Electronics and Pulse Technique Sessional	0.75
42.	-	-	-	GELM-271	Leadership and Management	2.00
43.	MATH-247	Mathematics-IV (Complex Variable, Laplace Transform and Statistics))	3.00			
44.	-	-	-	MATH-207	Complex Variable and Statistics	3.00
45.	CSE-301	Database Management Systems	3.00	CSE-301	Database Management Systems	3.00
46.	CSE-302	Database Management Systems Sessional	1.50	CSE-302	Database Management Systems Sessional	1.50

	0	Old course(2019-2021)	New Course (2022-2024)			
Ser.	Course code	Course Title	Cr.	Course code	Course Title	Cr.
47.	CSE-303	Compiler	3.00	CSE-303	Compiler	3.00
48.	CSE-304	Compiler Sessional	0.75	CSE-304	Compiler Sessional	0.75
49.	CSE-305	Microprocessors, Micro- controllers and Assembly Language	4.00	CSE-305	Microprocessors, Micro-controllers and Assembly Language	3.00
50.	CSE-306	Microprocessors, Micro- controllers and Assembly Language Sessional	1.50	CSE-306	Microprocessors, Micro-controllers and Assembly Language Sessional	1.50
51.	CSE-307	Operating System	3.00	CSE-307	Operating System	3.00
52.	CSE-308	Operating System Sessional	0.75	CSE-308	Operating System Sessional	0.75
53.	CSE-317	Data Communication	3.00	CSE-317	Data Communication	3.00
54.	CSE-318	Data Communication Sessional	0.75	CSE-318	Data Communication Sessional	0.75
55.	CSE-309	Computer Network	3.00	CSE-309	Computer Network	3.00
56.	CSE-310	Computer Network Sessional	1.50	CSE-310	Computer Network Sessional	1.50
57.	CSE-315	Digital System Design	3.00	CSE-315	Digital System Design	3.00
58.	CSE-316	Digital System Design Sessional	0.75	CSE-316	Digital System Design Sessional	0.75
59.	CSE-319	Software Engineering	3.00	CSE-319	Software Engineering	3.00
60.				CSE-320	Software Engineering Sessional	0.75
61.	CSE-360	Integrated Design Project/Capstone Project-I	1.50	-	-	-
62.	CSE-460	Integrated Design Project/Capstone Project-II	3.00	-	-	-
63.				CSE-364	Software Development Project - I	1.50
64.				GERM-306	Fundamentals of Research Methodology	2.00
65.	HUM-243	Sociology	2.00	GES-301	Fundamentals of Sociology	2.00
66.				GESL-303	Environment, Sustainability and Law	2.00
67.	CSE-350	Industrial Training	1.00	CSE-350	Industrial Training	1.00
68.	CSE-400	Thesis	4.50	CSE-400	Final Year Research Project	6.00
69.	CSE-405	Computer Interfacing	3.00	CSE-405	Computer Interfacing	3.00
70.	-	-	-	CSE-406	Computer Interfacing Sessional	0.75
71.	CSE-415	Human computer Interaction	3.00	CSE-415	Human computer Interaction	3.00
72.	CSE-416	Human computer Interaction Sessional	0.75			
73.	CSE-429	Computer Security	3.00	CSE-429	Computer Security	3.00
74.	-	-	-	CSE-464	Software Development Project-II	1.50
75.	-	-	-	GEEM-401	Engineering Ethics and Moral Philosophy	2.00
76.	CSE-401	Information System Design	3.00	CSE-401	Information System	3.00

	Old course(2019-2021)			New Course (2022-2024)			
Ser.	Course code	Course Title	Cr.	Course code	Course Title	Cr.	
		and Development			Design and Development		
77.	CSE-402	Information System Design and Development Sessional	0.75	-	-	-	
78.	CSE-403	Artificial Intelligence	3.00	CSE-403	Artificial Intelligence	3.00	
79.	CSE-404	Artificial Intelligence Sessional	0.75	CSE-404	Artificial Intelligence Sessional	0.75	
80.	CSE-413	Computer Graphics	3.00	CSE-413	Computer Graphics	3.00	
81.	CSE-414	Computer Graphics Sessional	0.75	CSE-414	Computer Graphics Sessional	0.75	
82.	HUM-415	Financial and Managerial Accounting	2.00	GEPM-411	Project Management and Finance	2.00	
83.	HUM-417	Engineering Management and Ethics	3.00	-	-	-	
84.	CSE-407	Applied Statistics and Queuing Theory	3.00	CSE-407	Applied Statistics and Queuing Theory	3.00	
85.	CSE-419	Advanced Algorithms	3.00	CSE-419	Advanced Algorithms	3.00	
86.	CSE-421	Basic Graph Theory	3.00	CSE-421	Basic Graph Theory	3.00	
87.	CSE-423	Fault Tolerance System	3.00	CSE-423	Fault Tolerance System	3.00	
88.	CSE-425	Basic Multimedia Theory	3.00	CSE-425	Basic Multimedia Theory	3.00	
89.	CSE-427	Digital Image Processing	3.00	CSE-427	Digital Image Processing	3.00	
90.	CSE-431	Object Oriented Software Engineering	3.00	CSE-431	Object Oriented Software Engineering	3.00	
91.	CSE-433	Artificial Neural Networks and Fuzzy Systems	3.00	CSE-433	Artificial Neural Networks and Fuzzy Systems	3.00	
92.	CSE-435	Distributed Algorithms	3.00	CSE-435	Distributed Algorithms	3.00	
93.	CSE-437	Bioinformatics	3.00	CSE-437	Bioinformatics	3.00	
94.	CSE-439	Robotics	3.00	CSE-439	Robotics	3.00	
95.	CSE-447	Telecommunication Engineering	3.00	CSE-447	Telecommunication Engineering	3.00	
96.	CSE-411	VLSI Design	3.00	CSE-411	VLSI Design	3.00	
97.	CSE-412	VLSI Design Sessional	0.75	CSE-412	VLSI Design Sessional	0.75	
98.	CSE-441	Machine Learning	3.00	CSE-441	Machine Learning	3.00	
99.	CSE-442	Machine Learning Sessional	0.75	CSE-442	Machine Learning Sessional	0.75	
100.	CSE-443	Pattern Recognition	3.00	CSE-443	Pattern Recognition	3.00	
101.	CSE-444	Pattern Recognition Sessional	0.75	CSE-444	Pattern Recognition Sessional	0.75	
102.	CSE-453	Data Ware-housing and Data Mining	3.00	-	-	-	
103.	CSE-454	Data Ware-housing and Data Mining Sessional	1.50	-	-	-	
104.	CSE-445	Digital Signal Processing	3.00	CSE-445	Digital Signal Processing	3.00	
105.	CSE-446	Digital Signal Processing Sessional	0.75	CSE-446	Digital Signal Processing Sessional	0.75	
106.	CSE-449	Mobile and Ubiquitous Computing	3.00	CSE-449	Mobile and Ubiquitous Computing	3.00	

	0	ld course(2019-2021)	New Course (2022-2024)			
Ser.	Course code	Course Title	Cr.	Course code	Course Title	Cr.
107.	CSE-450	Mobile and Ubiquitous Computing Sessional	0.75	CSE-450	Mobile and Ubiquitous Computing Sessional	0.75
108.	CSE- 451	Simulation and Modeling	3.00	CSE- 451	Simulation and Modeling	3.00
109.	CSE- 452	Simulation and Modeling Sessional	0.75	CSE- 452	Simulation and Modeling Sessional	0.75
110.	CSE-455	Natural Language Processing using Deep Learning	3.00	CSE-455	Natural Language Processing	3.00
111.	CSE-456	Natural Language Processing using Deep Learning sessional	0.75	CSE-456	Natural Language Processing sessional	0.75
112.	CSE-457	Advanced Database Management Systems	3.00	CSE-457	Advanced Database Systems	3.00
113.	CSE-458	Advanced Database Management Systems Sessional	0.75	CSE-458	Advanced Database Systems Sessional	0.75
114.	-	-		CSE-417	Blockchain and Cryptocurrenct Technology	3.00
115.	-	-		CSE-459	Internet of Things (IoT)	3.00
116.	-	-		CSE-460	Internet of Things (IoT) Sessional	0.75
117.	-	-		CSE-461	Industrial Revolution	3.00
118.	-	-		CSE-462	Industrial Revolution	0.75
119.	-	-		CSE-465	Cyber & Physical Security	3.00
120.	-	-		CSE-466	Cyber & Physical Security Sessional	0.75