POORNIMA
INSTITUTE OF ENGINEERING & TECHNOLOGY

Affiliated to RTU, Kota • Approved by AICTE & UGC under 2(f) • Accredited by NAAC and NBA

2019-20

COS POS ASSESSMENT & ATTAINMENT PROCESS MANUAL

- APPLIED SCIENCES
- COMPUTER ENGINEERING
- CIVIL ENGINEERING
- ELECTRONICS AND COMMUNICATION ENGINEERING
- ELECTRICAL ENGINEERING

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CHAPTER I

Vision and Mission of the Institution

VISION:

To create knowledge-based society with scientific temper through cutting-edge technologies, innovative research and to become valuable resource for enriching mankind.

MISSION:

- To provide an environment that will allow students and faculty members to be skilled in creation and implementation of new ideas.
- To provide platform to improve questioning, observing, testing, analyzing and communication skills.
- To provide qualitative education and generate new knowledge with integration of emerging technologies and research.
- To practice and promote high standard of potential ethics, transparency and accountability.

CHAPTER II.A

Vision and Mission of the Applied Sciences Department

VISION:

To facilitate skills-based learning of Sciences and Engineering through cutting-edge technologies, innovative research to cater needs of the society through integrating human values.

MISSION:

- To provide an environment that facilitates skilled manpower in creation and implementation of new ideas in sciences.
- To provide a platform to improve questioning, observing, testing, analyzing and communication skills.
- To provide qualitative education and generate new knowledge in the sciences and technology domain.
- To provide all measures to maintain professional ethics in life long working.

CHAPTER II.B

Vision and Mission of the Computer Engineering Department

VISION:

To create an environment in which new ideas, research and technology develop and the technocrats and innovators of tomorrow become competent to face the global challenges.

MISSION:

- To develop competent professional with innovative mindset, problem solving, design and implementation skills through excellent under graduate education.
- To provide platform to students so that they can expertise themselves as a computer professional, entrepreneurs or as a manager while fulfilling their ethical and social responsibility in a globally competitive environment.
- To contribute significantly to the research and discovery of new arenas of methods and knowledge in the field of computer engineering.

CHAPTER II.C

Vision and Mission of the Civil Engineering Department

VISION:

To serve the Nation by providing high quality engineering education that enables students to get a profession that can improve the civil infrastructure and social welfare.

MISSION:

- To create enabling environment for excellent teaching, learning and research in the diverse field for sustainable development.
- To draw the best expertise in science and technology so as to provide students with the skills to visualize, synthesize and execute projects in these fields.
- To absorb a vitality of entrepreneurship and innovation in its students.

CHAPTER II.D

Vision and Mission of Electronics and Communication Engineering Department

VISION:

To be a global leader in Electronics and Communication Engineering, pioneering advancements and innovation in the field.

MISSION:

- Excellence in Education: Provide an outstanding learning experience, equipping students with comprehensive knowledge and practical skills in Electronics and Communication Engineering.
- Cutting-edge Research: Conduct innovative research to push the boundaries of knowledge, addressing current and future challenges in communication technology and electronics.
- Collaborative Environment: Foster a culture of interdisciplinary collaboration within and outside the department, facilitating exchange of ideas and fostering creativity.
- Leadership Development: Prepare graduates to be industry-ready leaders, instilling in them values of integrity, professionalism, and a commitment to ethical practices in addressing global engineering challenges.

CHAPTER II.E

Vision and Mission of Electrical Engineering Department

VISION:

To be a leader in the teaching and training of electrical engineering by producing graduates into highly skilled technocrats, who can thrive in their chosen field and engage in creative research and entrepreneurship while making a strong commitment for the betterment of the society.

MISSION:

- To offer cutting-edge tools that supports the attainment of excellence in research and development as well as teaching and learning.
- To give students unique learning experiences and a supportive atmosphere so they can improve their technical, extracurricular, co-curricular, entrepreneurial, soft skill and personality attributes.
- To improve training programs, research facilities and consulting services in order to fill the gap between business and academics.
- To provide students with need-based skill development programs in the ongoing education for the long-term advancement and progress of the society.

CHAPTER II.F

The Process for Defining Vision and Mission of the Department

The following steps are followed to establish Vision and Mission of Department: -

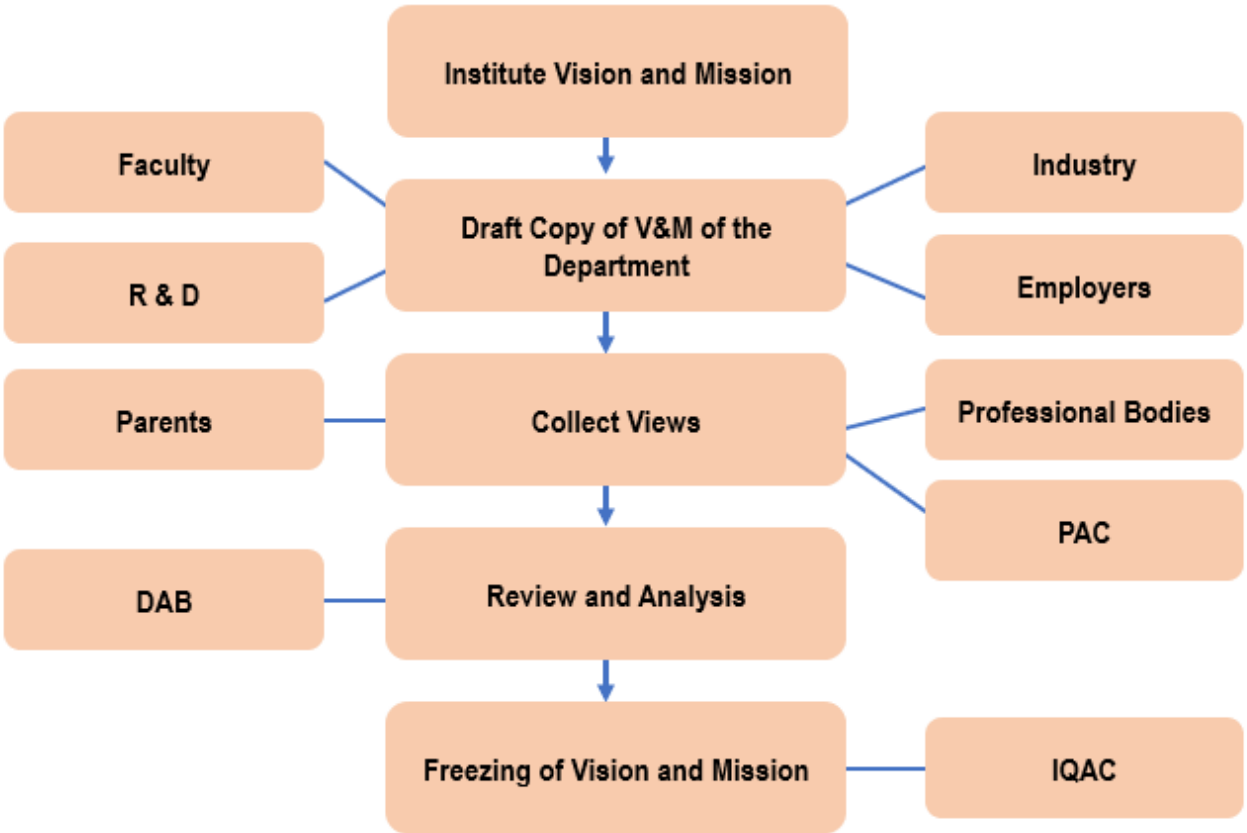
Step 1: The Vision & Mission of the Institute is taken as the basis.

Step 2: The Department conducts brain-storming sessions with the faculty on the skill-set required by the local and global employers, Industry Advances in Technology and R & D, and the draft copy of the Vision and Mission of the Department is drafted.

Step 3: The views from Parents, Professional Bodies, Program Assessment Committee (PAC) on the draft are also collected and incorporated to revise the draft version based on their inputs.

Step 4: The received views from Parents, Professional Bodies, Program Assessment Committee (PAC) are analyzed and reviewed by Department Advisory Board (DAB) to check the consistency with the vision and mission of the institute.

Step 5: After are reviewing, IQAC finalized and freeze the Vision and mission of the department.



CHAPTER III

CO-PO-PSO Definitions and Procedure

Course outcomes (COs):

Course outcomes (COs) are direct statements that describe the essential and enduring disciplinary knowledge, abilities that students should possess and the depth of learning that is expected upon completion of a course. They are clearly specified and communicated. The Course Outcomes are prepared by the course coordinator in consultation with concerned faculty members teaching the same course.

Program Outcomes (POs):

Program outcomes describe what students are expected to know and would be able to do by the time of graduation. These relate to the skills, knowledge, and behaviors that students acquire as they progress through the program.

Program Specific Outcomes (PSOs):
Program Specific Outcomes are statements that describe what the graduates of a specific engineering program should be able to do.

Dissemination of Vision, Mission, Quality policy, COs, POs & PSOs

S.No	Stakeholders	Activities/Meetings	Mode of communication	Period of Interaction
1	Students	Semester Re-opening Day	College website, notice boards, Department Notice boards, Library, Department Magazines, Student induction program, Student awareness workshops, Question Papers, Student profile & Progress Report	Semester wise
		Department Events		Periodically
		Students Counselling Meeting		Quarterly
2	Students	Induction Day	College website, Weekly schedules, Meeting Hall, Notice boards, Student induction program	Yearly once
		Fresher's Day		
3	Parents	Induction day	Tutors and HOD	Yearly Once
4	Industry Experts	R&D Meeting	College website, Presentation by Institute Head	As Required
		MoU Meeting		As Required
5	Academic Experts	Seminar	College website, feedback forms, Conference coordinators, Department event Organizers	Frequently
		Workshop		Semester wise
		Conference		Yearly once
		Guest Lectures		Periodically
6	Faculty Members	Management meeting With Experts	College website, Notice boards, Faculty meetings	Semester wise
		Department meetings	Notice boards, Official E-mail ID	Semester wise

Program Outcomes

Engineering Graduates will be able to:

- **Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
- **Problem Analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
- **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 the public health and safety, and the cultural, societal, and environmental considerations.
- **Conduct Investigations of Complex Problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
- **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.
- **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.
- **Environment and Sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
- **Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
- **Communication:** 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.
- **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.
- **Life-Long Learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

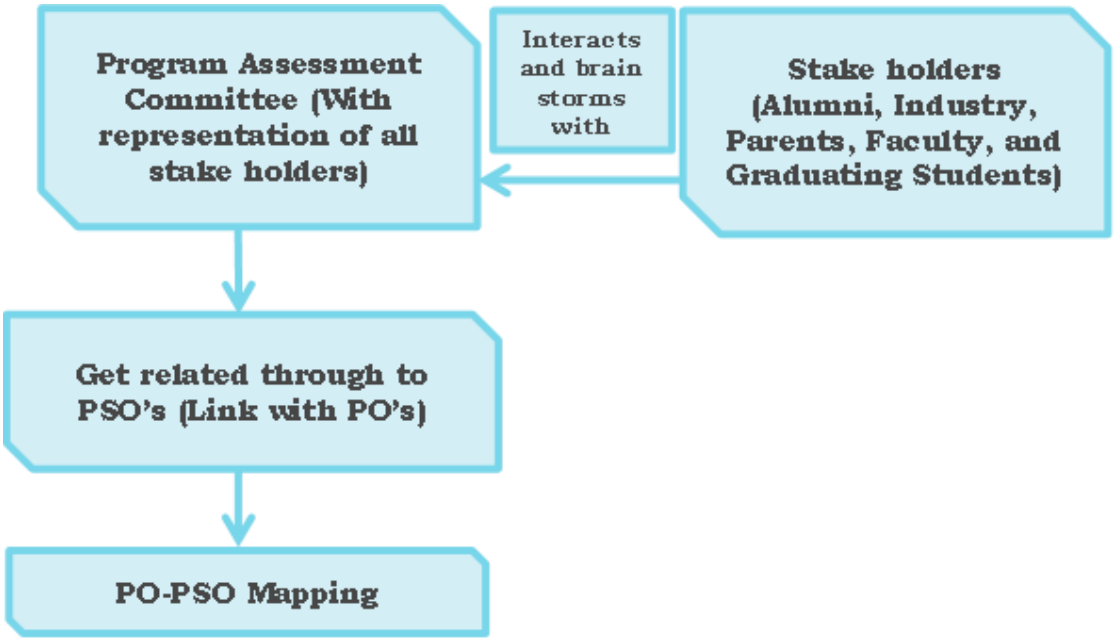
S.No	Graduate Attributes	Program Outcomes
1	**Engineering Knowledge:** Graduate should be able to apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	a) Graduate will demonstrate knowledge in fundamentals of mathematics, science and engineering.
2	**Problem Analysis:** Graduate should be able to Identify, formulate, research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	b) Graduate will demonstrate an ability to identify, formulate and solve problems in key areas of Electrical and Electronics Engineering - design and application of equipment, devices and systems.
3	**Design / Development of Solutions:** Graduate should be able to Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations	c) Graduate will demonstrate an ability to design and conduct experiment, analyze and interpret data in Electrical and Electronics Engineering.
4	**Conduct investigations of complex problems:** Graduate should be able to Use research- based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid Conclusions	d) Graduate will demonstrate ability in conducting investigate ones to solve problems using research-based knowledge and methods to provide logical conclusions
5	**Modern tool usage:** Graduate should be able to 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	e) Graduate will demonstrate skills to use modern engineering and IT tools, software's and equipment to analyze the problems in Electrical and Electronics Engineering
6	**The engineer and society:** Graduate should be able to 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.	f) Graduate will show the understanding of impact of engineering solutions on the society to assess health, safety, legal, and social issues in engineering
7	**Environment & sustainability:** Graduate should be able to Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.	g) Graduate will demonstrate the impact of professional engineering solutions in environmental context and to be able to respond effectively to the needs of sustainable development
8	**Ethics:** Graduate should be able to apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice	h) Graduate will demonstrate knowledge of Professional and ethical responsibilities

9	**Individual and team work:** Graduate should be able to Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings	i) Graduate will demonstrate an ability to work effectively as an individual and as a team member/ leader in multi- Disciplinary areas.
10	**Communication:** Graduate should be able 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 instruction	j) Graduate will be able to critique writing samples (abstract, executive summary, project report) and oral presentations.
11	**Project management and finance:** Graduate should be able to 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 project and in multidisciplinary environments	k) Graduate will demonstrate knowledge of management principles and apply these to manage projects in multidisciplinary environments.
12	**Life-long learning:** Graduate should be able to recognize the need for, and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change	l) Graduate will recognize the need of self-education and ability to engage in life - long learning.

PROGRAM SPECIFIC OUTCOMES

Process for Defining PSOs

The program Assessment committee along with the stake holders define the program specific outcomes after having a brain storming session with the stake holders.



CHAPTER IV

CO-PO-PSO Mapping Procedure

All the courses together must cover all the POs (and PSOs). For a course we map the COs to POs through the CO-PO matrix and to PSOs through the CO-PSO matrix as shown below. The various correlation levels are:

- "1" – Slight (Low) Correlation
- "2" – Moderate (Medium) Correlation
- "3" – Substantial (High) Correlation
- "-" indicates there is no correlation.

There are four levels of outcome such as Course Outcome (CO), Program Outcome (PO), Program Specific Outcome (PSO). Course Outcomes are the statements that declare what students should be able to do at the end of a course. POs are defined by Accreditation Agencies of the country (NBA in India), which are the statements about the knowledge, skills and attitudes, graduate attributes of a formal engineering program should have. Graduates Attributes (GAs) are the components indicative of the graduate's potential to acquire competence to practice at the appropriate level. GAs form a set of individually assessable outcomes of the programme. The Program outcomes reflect the ability of graduates to demonstrate knowledge in fundamentals of Basic Sciences, Humanities and Social Sciences, Engineering Sciences and apply these principles in understanding and practically apply the knowledge in professional core subjects, electives and projects which enables the graduates to be competent at the time of graduation. The graduates must adhere to professional and ethical responsibilities in the pursuit of their careers and also for the benefit of the society. These outcomes also enable the graduate to pursue higher studies and engage in R&D for a successful professional career. The proper definition and the attainment of POs contribute to the attainment of Program Specific Outcome which will help the graduate to perform his/ her duties, professional responsibilities, design, development, production and testing of novel products, ability to deal with finances and project management during his/her early professional career of 3 to 4 years.

Process involved in CO-PO Mapping

The role of CO-PO mapping will be assigned to the faculty as per hierarchy. After the course (subject) allotment from the department, the course in-charge of the course has to write appropriate COs for their corresponding course. It should be narrower and measurable statements. By using the action verbs of learning levels, CO's will be designed. CO statements should describe what the students are expected to know and able to do at the end of each course, which are related to the skills, knowledge and behavior that students will acquire through the course.

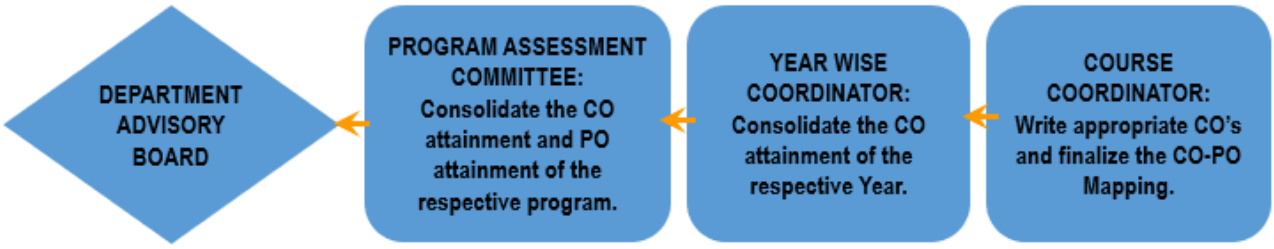


Figure: Hierarchy of faculty involvement

After writing the CO statements, CO will be mapped with PO of the department. If the department is having more than one section in a year or the same course is available for more than one program of the same institute in a semester, the subject expert will be nominated as course coordinator of the corresponding course. The role of the course coordinator is to review the CO statements and the CO-PO mapping which has been done by course in-charge. The year wise coordinator has to consolidate the CO's of the respective year and maintain the documentation of the CO attainment level of the respective year courses as well as documentation of the individual student's extra-curricular and co-curricular activities. These details will hand over to the program coordinator in order to evaluate PO attainment of the individual student as well as individual course at the end of the eighth semester. The Program Assessment Committee (PAC) has to evaluate the attainment of individual student through direct and indirect method after the student completing their program. All these works have to be done under the guidance of Department Advisory Board (DAB).

Identification of curricular gap

At the time of CO-PO mapping, the course in-charge has to identify the curricular gap in the course, based on the recent technological trends as well as feedback received from the stakeholders. After that, the course in-charge has to discuss with DAB about the steps to be taken to bridge the curricular gap. Content beyond the syllabus may be delivered to the students through teaching, arranging guest lectures, industrial visit, in plant training, online quiz, etc.

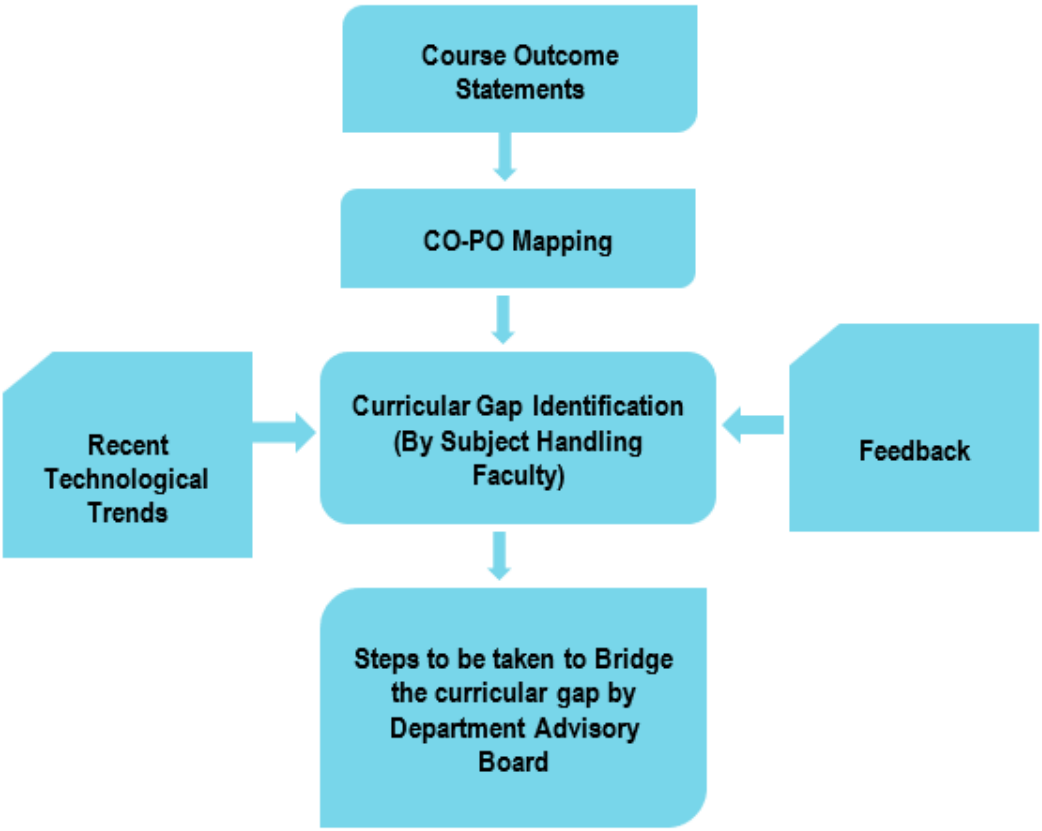


Figure: Identification of curricular gap

Course Outcomes to PO and PSO Mapping

Mapping strength of a course to PO/ PSO can be obtained by taking the average of the CO-PO/ PSO mapping matrices of that course. Program level CO-PO matrix for all the courses including first year courses will be done by the program coordinator.

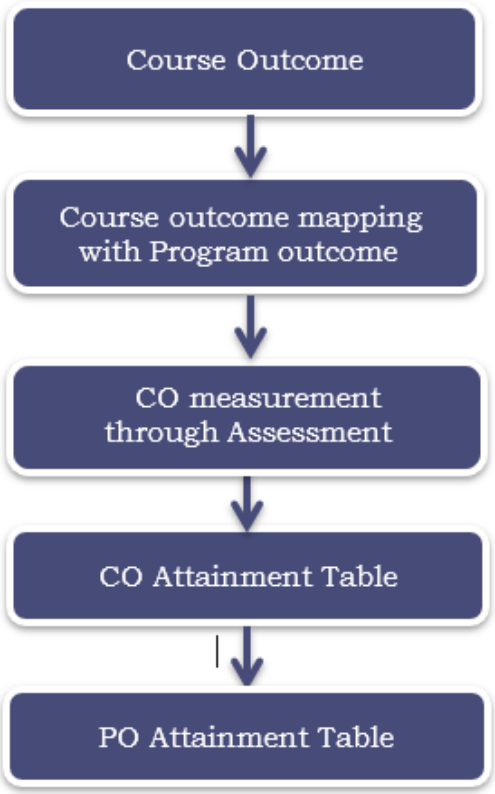


Figure: The process of CO-PO mapping validation

The process of CO-PO mapping validation is given is explained as below:

Step 1: Obtain course outcome.

Step 2: Mapping of Course Outcome with Program Outcome.

Step 3: CO measurement through assessment.

Step 4: Obtain CO attainment table through direct assessment methods.

Step 5: Obtain PO attainment table through direct and indirect assessment methods.

Course Outcomes (COs) relate the skills, knowledge, and behavior that students acquire in their matriculation through the course. These are specific to a course and hence differ from one to the other.

Each CO contributes to attainment of one or more PO(s); and that way to the overall attainment of the PO and associated PSO(s).

The modes of delivery enabling the attainments are:

For Theory Courses:

- Chalk-and-board
- PowerPoint presentations
- Animations

Individual / batch conduct of experiments in laboratories.

Process for CO – PO Mapping for Each Subject

The faculty teaching the subject is responsible for arriving / verifying the CO – PO mapping associated for that subject. This is based on understanding of the four/five COs of that subject and how they influence / impact any of the twelve POs. characterized in terms of a "High" / "Medium" / "Low" designation with scores of 3, 2 and 1 respectively. The above mapping is shared/ discussed/ finalized with the respective department Head and the DAB (Department Advisory Board).

The curriculum comprises of courses related to basic sciences, humanities and social discipline, engineering & technology, professional / open electives, projects and seminars. Each course contributes to learning outcomes reflecting the skills and competence that are required at the time of graduation.

The Program Outcomes (POs) reflect the ability of graduates to demonstrate knowledge in fundamentals of basic sciences, humanities and social discipline, engineering & technology and practically apply the knowledge for the benefit of society. The graduates must adhere to professional and ethical responsibilities in pursuit of their careers. These outcomes also enable the graduate to pursue higher studies and engage in R&D for a successful professional career.

The POs crystallize in the attainment of Program Specific Outcome (PSOs) which will help the graduate to perform his or her duties, professional responsibilities, design, development, production and testing of novel products, ability to deal with finances and project management. These capabilities are reflected in PSOs.

The POs are published and disseminated in the following ways:

- Displayed in the Department and in classroom.
- Explained to students and their parents as part of the induction Program.
- Explained to newly joined faculty and staff members during a staff orientation Program.

CHAPTER V

Assessment Process

Program Assessment at the department level is broadly done under two heads:

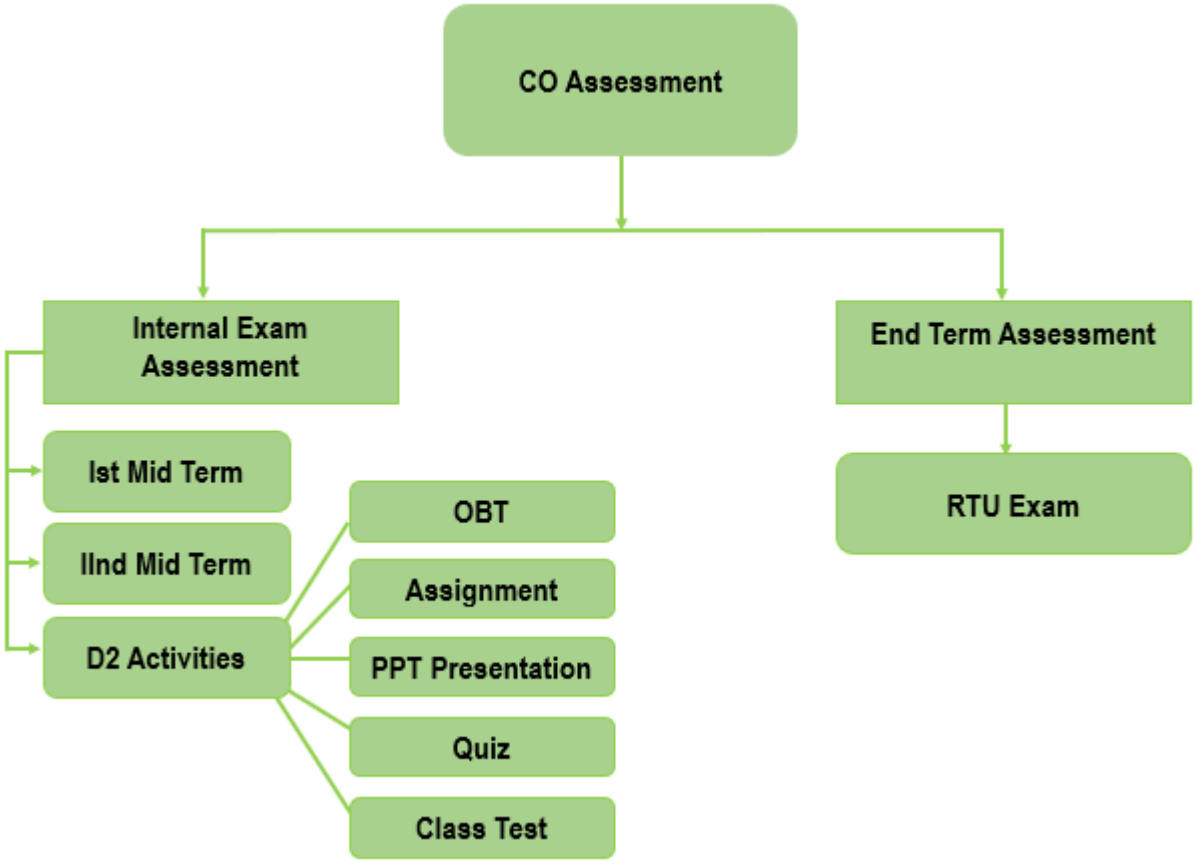
- Direct Assessment (DA), and
- Indirect Assessment (IA)

The tools used for Direct Assessment are as follows:

- Student performance in Mid-semester and End-semester Examinations.
- Student performance in Tutorials / Assignments.
- Student performance in Project Work, Viva-voce, Seminars.

The tools used for Indirect Assessment are as follows:

- Alumni: Survey Questionnaire
- Course Exit Survey
- Exit Feedback: Survey Questionnaire
- Parent: Survey Questionnaire
- Employer's Feedback Form
- Feedback Form on Facilities
- Analysis Of Students Feedback



Within DA, the Internal Assessment of the college is given 30 marks while the remaining 70 marks is for the external assessment. The overall attainment percentage values at the program level are arrived at as weighted average of 80% DA and 20% IA.

The student performance, as measured through the marks scored, is the foundation for direct assessment.

The steps in this direct assessment process are as follows:

- The marks obtained by the students in a class are entered in an MS Excel file. Every question is mapped to a CO which in turn is contributes to one or more POs.
- In the case of Internal Examinations, the first Internal determines the attainment of the first two CO while the second internal exam determines the attainment of the third and fourth.
- The final CO – PO attainment table is populated manually by the faculty taking the respective course, based on the four/five CO attainments obtained at the end of above step i.e., after the two Internal Assessments.
- This process is followed for all courses in any given semester.
- At the end of the four-year program / eight semesters, the subject- wise PO attainments are collated so as to arrive at the average attainment for each PO.

The students have an opportunity to assess, express and communicate the impact of different course delivery formats / mechanisms used by the faculty during the semester, through the Course-end Survey. These are manually assessed by the respective faculty member and the Academic Coordinator / Program Assessment Committee as might be necessary.

Administrative setup for monitoring the attainment of POs and PSOs.

The following administrative setup is put in place to ensure the attainment of POs and PSOs:

- Program Coordinator
- Academic Coordinator
- Program Assessment Committee
- Department Advisory Board

Role and Responsibilities of the Program Coordinator:

- Interacts and maintains liaise on with key stakeholders, students, faculty, department head (HOD) and employer.
- Monitors and reviews the activities of each year in the program independently with course coordinators.
- Schedules program work plan in accordance with specifications of program objectives and outcomes.
- Conducts and interprets various surveys required to assess POs and PSOs.

Role and Responsibilities of the Academic Coordinator:

- Coordinates and supervise the faculty teaching the particular course in the module.
- Responsible for assessment of the course objectives and outcomes.
- Recommend and facilitate workshops, faculty development programs, meetings or conferences to meet the course outcomes.
- Analyzes results of particular course and recommends the Program coordinator and/or Head of the Department to take appropriate action.
- Liaise with students, faculty, program coordinator and Head of the Department to determine priorities and policies.

Role and Responsibilities of the Program Assessment Committee:

- Program Assessment Committee consists of Program Coordinator and faculty representatives.

- Chaired by Program Coordinator, the committee monitors the attainment of POs and PSOs.
- Evaluates program effectiveness and proposes necessary changes.
- Motivates the faculty and students towards attending workshops, developing projects, working models, paper publications and research, assessing course content / delivery.
- Interacts with students, faculty and outside /community agencies (through their representation) in facilitating PSOs. PAC meets at least once in 6 months to review the program and submits report to the Department Advisory Board.

Role and Responsibilities of the Department Advisory Board (DAB):

- DAB consists of head of the department, program coordinators, and the representatives of key stakeholders.
- DAB chaired by head of the department, receives the report of the Program Assessment Committee and monitors the progress of the program, on current and future issues related to programs.
- Reviews, assesses, and monitors the attainment of the departmental PSOs.
- Develops and recommends new or revised program goals and objectives. DAB meets at least once in a year to review the programs.

CO Assessment Tools:

The various assessment tools used to evaluate COs and the frequency with which the assessment processes are carried out are listed. In each course, the level of attainment of each CO is compared with the predefined targets, if is not the course coordinator takes necessary steps for the improvement to reach the target. With the help of CO against PO/PSO mapping, the PO/PSO attainment is calculated by the program coordinator.

Table: Mapping of assessment tools to POs/PSOs with frequency of Assessment

Mode of Assessment	Assessment Tool	Description	Evaluation of course outcomes	Related PO/PSO	Frequency of Assessment
Direct	Theory internal examinations	**Two written examinations are conducted and its average marks are considered**	The questions in the internal examinations and assignment sheets are mapped against COS of respective course.	**PO1 to PO12**	Continuous
Direct	Assignments	**Two assignments are for each given course for continuous assessment average marks are considered**	Internal examinations and assignments are framed in such a way to cover all course outcomes	**PO1 to PO12**	Continuous
Direct	Day to day evaluation in Laboratory	**The day-to-day evaluation is considered**	The final attainment for each CO is calculated by taking average of the % attainment from day-to-day evaluation and internal lab examination	**PO1 to PO12**	Continuous
Direct	Internal Practical Examination	**Internal examination is conducted**		**PO1 to PO12**	Two per semester
Direct	End Semester Examination	**End Examination is conducted**	The questions in the end examinations are mapped against COS of respective course. The questions for end examinations are framed in such a way to cover all course outcomes	**PO1 to PO12**	One per semester

Direct	Industry oriented mini project/summer internship	**To test students' concepts in independent analysis. Two project reviews are conducted**	Two internal project reviews are conducted and average of these two review assessments are considered	**PO1 to PO12**	Minor Project Review in VII Semester
Direct	Project I & Project II	**To test students' concepts in design creative thinking and independent analysis three project reviews are conducted**	Continuous assessment is carried by the project review committee first review emphasizes on literature survey and problem identification, second review on design methodology and the third review on the validation of the model and documentation. The external examiner assessment is considered as another assessment tool for project work. Final CO attainment calculated from final CO attainment is calculated from	**PO1 to PO12**	Minor project-VII semester & Major Project-VIII semester
Direct	Technical Seminar	**To Test the students in knowledge in Recent Technical advancements and their Presentation Skills**	At end of semester a student has to Present the seminar and submit the report	**PO1 to PO12**	VIII Semester
Indirect	Alumni survey	**This survey gives the opinion of the student on the attainment of course outcomes**	At the end of the programme alumni survey is collected from alumni and considered for the PO attainment under indirect assessment.	**PO1 to PO12**	At the end of the program
Indirect	Graduate exit survey	**This survey gives the opinion of the graduate on the attainment of course outcomes**	At the end of the programme exit survey is collected from alumni and considered for the PO attainment under indirect assessment.	**PO1 to PO12**	At the end of the program

Procedure followed while assigning the values by mapping COs to POs.

- Select action verbs for a CO from different Bloom's levels based on the importance of the particular CO for the given course.
- Stick on to single action verbs while composing COs and use for multiple action verbs if the need arises.
- Values to CO-PO (technical POs in particular) matrix are assigned by

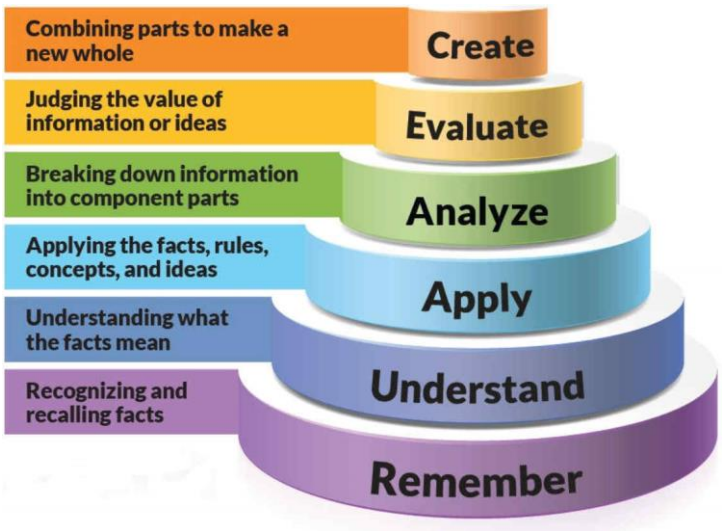
- Judging the importance of the particular CO in relation to the POs. If the CO matches strongly with a particular PO criterion, then 3 is assigned, if it matches moderately then 2 is assigned or less than 1 is assigned else marked with "–" symbol.
- If an action verb used in a CO is repeated at multiple Bloom's levels, then reconsider which Bloom's level is the best fit for that action verb.

Bloom's Taxonomy:

Bloom's Taxonomy is a classification of the different outcomes and skills that educators set for their students (learning outcomes). The taxonomy was proposed in 1956 by Benjamin Bloom, an educational psychologist at the University of Chicago. The terminology has been recently updated to include the following six levels of learning. These 6 levels can be used to structure the learning outcomes, lessons, and assessments of your course.

- **Remembering:** Retrieving, recognizing, and recalling relevant knowledge from long-term memory.
- **Understanding:** Constructing meaning from oral, written, and graphic messages through interpreting, exemplifying, classifying, summarizing, inferring, comparing, and explaining.
- **Applying:** Carrying out or using a procedure for executing, or implementing.
- **Analyzing:** Breaking material into constituent parts, determining how the parts relate to one another and to an overall structure or purpose through differentiating, organizing, and attributing.
- **Evaluating:** Making judgments based on criteria and standards through checking and critiquing.
- **Creating:** Putting elements together to form a coherent or functional whole; reorganizing elements into a new pattern or structure through generating, planning, or producing.

Like other taxonomies, Bloom's is hierarchical, meaning that learning at the higher levels is dependent on having attained prerequisite knowledge and skills at lower levels. You will see Bloom's Taxonomy often displayed as a pyramid graphic to help demonstrate this hierarchy. We have updated this pyramid into a "cake-style" hierarchy to emphasize that each level is built on a foundation of the previous levels.



Attainment Level: Educational attainment refers to the highest level of education that a person has successfully completed. Successful completion of a level of education refers to the achievement of the learning objectives of that level, typically validated through the assessment of acquired knowledge, skills and competencies.

Category-A	Level 3	Level 2	Level 1
Internal (MID I & MID II)/Survey	60 % of students getting > 60% marks	50-60 % of students getting > 60% marks	40-50 % of students getting > 60% marks
Lab/Seminar/Project-Internal	>80%	50-80%	<50%
Lab/Seminar/Project-External	>70%	50-70-%	<50%
RTU	50%-100% Marks	50%-30% Marks	0%-30%
Overall	55-100%	55-40%	<40%

Assessment: A direct assessment program is a program that, in lieu of credit or clock hours as the measure of student learning, utilizes direct assessment of student learning, or recognizes the direct assessment of student learning by others.

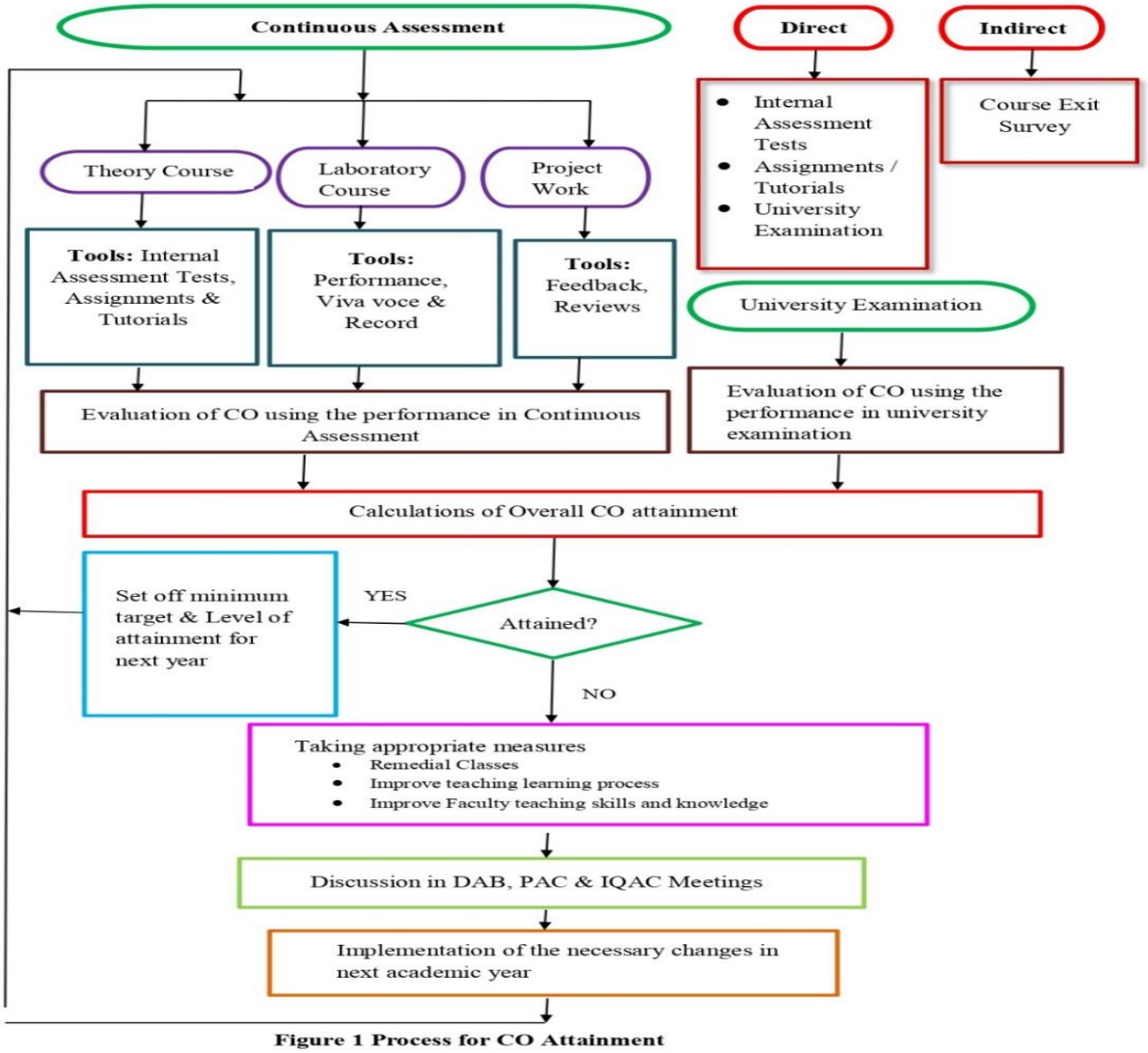


Figure 1 Process for CO Attainment

Evaluation Methods	Process
Internal Assessment Tests	Two Internal Assessment Tests are conducted per semester to evaluate the attainment of course outcomes. Each question is mapped with COs and blooms level.
Assignments & Tutorials	The tutorials and assignments are given to the students based on the subject nature. For four credit papers tutorials are mandatory. Tutorial and Assignment sheets are prepared by the faculty member with COs and levels.
Continuous Assessment & Model Exam (Laboratory Course)	The evaluation criteria for each experiment are based on performance, viva-voce and record mark. The attainment of COs is calculated through continuous assessment and model practical performance.
Project Reviews	• Three reviews are conducted periodically to monitor and evaluate the progress of the project using project rubrics. • Viva-Voce is conducted at the end of the semester as per university norms.
University Examination	At the end of each semester, final examination is conducted for Theory and Laboratory courses by University, in which question paper covers the entire syllabus and all the Cos are covered in the question papers.

Table: Details of Direct Assessment

Theory Courses:

For each theory course, faculty member calculates the course outcome attainment using University Examination and Internal Assessment Test. The attainment level will be calculated based on the average performance levels of both University Examination and Internal Assessment Test. The evaluation process of Internal Assessment Tests/Assignments/Tutorials/Group Discussion is counted for 30%and the remaining 70% will be given for university examination. Based on the level of CO attainment, the faculty member will decide whether to increase the competency level or change the content delivery method, assessment methods to improve attainment level for the course.

Assessment Tool		Marks		Frequency
CO	Internal Assessment Tests	20	30	Twice in a Semester
Attainment	University Examination	80	120	Once in a Semester

Table: Details of CO Attainment

Laboratory Courses:

For laboratory courses, the course outcome will be calculated based on performance, viva-voce, record work and model practical examination with the weightage of 60% for Continuous Internal Assessment and 40 % weightage for University Practical Examination. Based on the CO attainment level, the faculty member will decide whether to increase the competency level or enhance the practical knowledge of the students in order to improve attainment level for the laboratory course.

Assessment Tool		Weightage	Frequency
CO Attainment	Continuous Internal Assessment	60%	Every Week
	University Practical Examination	40%	Once in a Semester

Project Work Assessment:

For project work, Continuous Internal Assessment is based on the performance in the three reviews. The Course Attainment is calculated based on the three reviews and project Viva voce.

- Project review is conducted every month to review the progress of the project and the second review will be conducted in the presence of an industry expert.
- Suggestions are given to the students for their continuous update and improvement. Evaluation of each review is based on the parameters discussed in teaching learning process.

The faculty member will decide the competency level and attainment level for project work considering the average performance level of the students.

PO/PSO Assessment Tools:

Evaluation of attainment of POs and PSOs is based on direct and indirect assessment tools. Direct assessment of POs and PSOs is based on students' performance in Continuous Assessments and University Examination. Indirect assessment is based on Program Exit Survey, Alumni Survey and Course Exit Survey (Theory and Practical).

Direct Assessment:

Using Program Outcomes prescribed by NAAC, the faculty member evaluates the Program Outcomes and Program Specific Outcomes through Internal Assessment Tests, Assignments / Tutorial and Group Discussion. PO will be evaluated by the CO-PO Mapping with the attainment value for each course. For each course, every faculty member decides the competency level and attainment level.

The following table shows the tools and process for direct PO attainment.

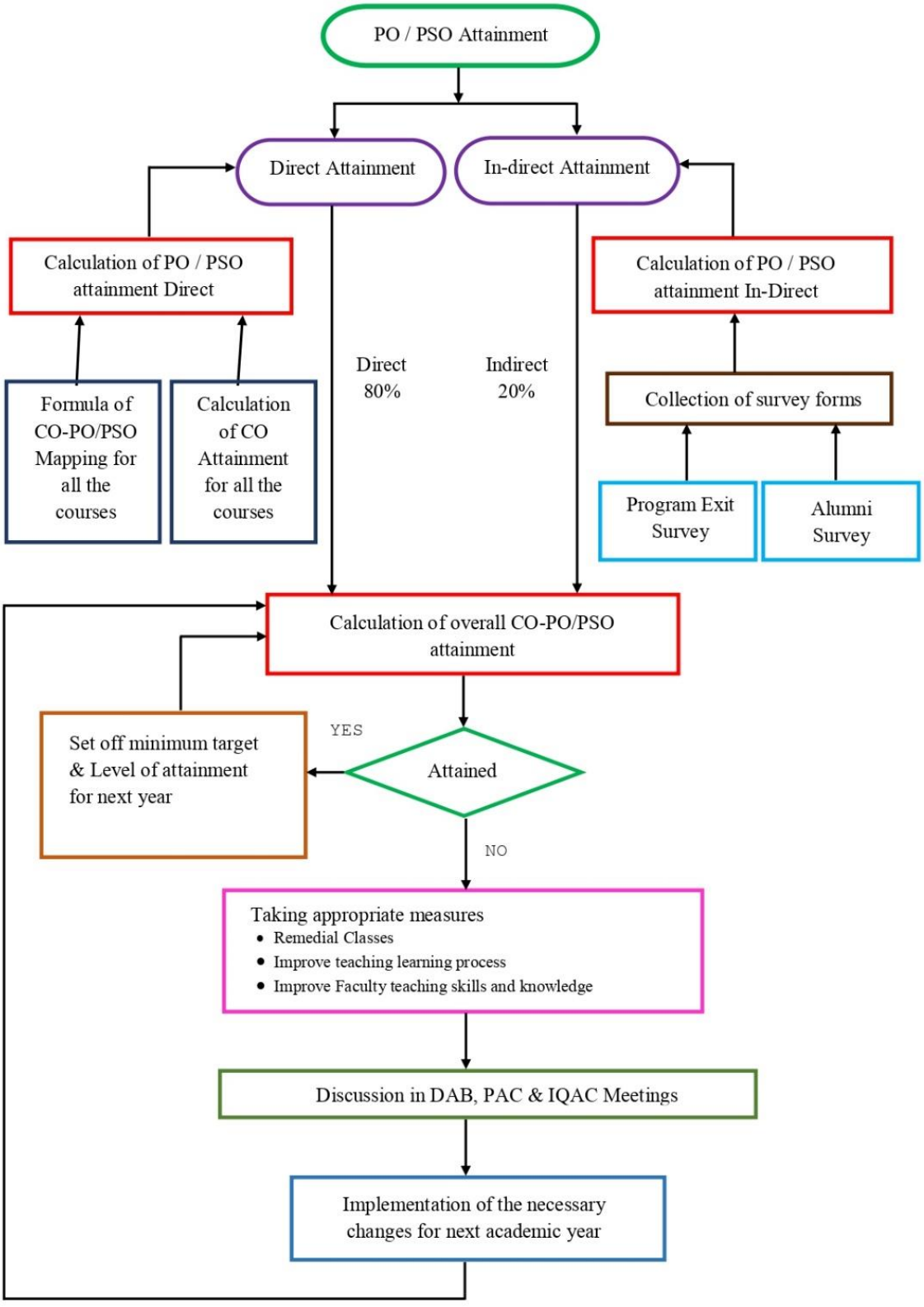


Figure 2 Process for PO/PSO Attainment

PO Attainment	Tools	Process
Direct (CO Attainment)	• Internal Assessment Test Assignments • Tutorials • Online Quiz • University Examination	• Assignments / Tutorials / online quizzes are given periodically for the entire course to attain the specific POs. • Three Internal Assessment Tests are conducted per semester to evaluate the student performance. • University Examination is conducted once in a semester as per University Schedule
	• Performance • Viva Voce • Record • Presentation • Group Discussion	• Student Contribution in laboratory is evaluated based on the performance, Viva Voce, Presentation and Record Work. • University Examination is conducted once in a semester as per University Schedule.
	• Project Reviews	• Students are divided into batches. Each batch consists of three to four students. • Supervisors are allotted for each group. • Zeroth reviews are conducted for the students to identify the area of project. • Three reviews are conducted periodically to monitor and evaluate the progress of the project. • Viva-Voce is conducted at the end of the semester.

Table: Direct Assessment for CO-PO

Indirect Assessment:

The following tools are used to assess the indirect assessment of attainment of COs, POs and PSOs. The assessment tools listed are used for both CO, PO – PSO attainment calculation.

S.No.	Tools used for Assessment processes	Batch…….	Batch…….	Batch…….	Batch…….
POs, PSOs Indirect Assessment Tools					
1	Program Exit Survey	-	-	-	-
2	Alumni Survey	-	-	-	-
CO Attainment Indirect Assessment Tool					
3	Course Exit Survey	-	-	-	-

Table: Indirect Assessment Tools

Course Exit Survey (Theory & Practical):

The course exit survey is process of collecting reviews on each course from the students at the end of each semester. It helps to improve the overall aspect of the course in future semesters. The survey covers the overall view about teaching and learning of the respective course. The survey form reveals the following attributes.

- Course Content- Quality of the content provided, incorporation of Outcome Based Education
- Course Delivery- Experience about the teaching methodologies, ICT tools, NPTEL resource utilization

- Course Assessment- Methodology of evaluation, feedbacks on assignments and tutorials
- General suggestions for improvement

Program Exit Survey:

It is a process of collecting satisfaction survey on the quality of education from the perspective of graduating students upon the completion of their program. Program Exit Survey is structured with 5 liker scale questions. The survey helps in identifying.

- Perception on the overall quality of teaching, learning and mentoring.
- Opinion about the support provided by the program in projects, modern tools and software's.
- Support provided for extra-curricular and co-curricular activities.
- Exposure to the competitive exams and personality development programs.
- Insight on imparting skills like entrepreneurship and societal responsibility through NSS, NGO and Club's Improvement on facilities.

Alumni Survey:

The alumni survey is conducted through the survey questionnaire after graduation towards the achievement of POs and PSOs. Survey form is structured with six sections with respect to,

- Personal information.
- Employment/higher studies/entrepreneurship- details.
- Technical, professional, communication and general skills at present towards RIT contribution.
- Experience at RIT in projects, extra-curricular, co-curricular activities, personality development, sports and NSS facilities.
- Suggestions for further improvement.
- Suggestions for bridging curriculum gap and other valuable inputs.

The following table shows the tools and process for Indirect PO attainment.

PO attainment	Tools	Process
Indirect	Program Exit Survey	On completion of program, feedback is obtained from each student about the entire program experience.
	Alumni Survey	During the alumni meet, graduation day the alumni survey is collected from the graduates based on the various parameters.

Table: Indirect Assessment Process

CHAPTER VI

PROGRAM SPECIFIC OUTCOMES (PSOs)

Session: 2019-20

Program Specific Outcome are broad statements that describe the career and professional accomplishments that the program is preparing graduates to achieve.

Bachelor of Technology Computer Engineering

PSO: 1 Software Development:

The proficiency to understand, apply and analyze the concepts of various fields of computer engineering like programming languages, data structures, algorithms, operating systems, databases, web design, security, networking, cloud computing and open-source platform.

PSO: 2 Computer Based Applied Science:

Understanding and applying knowledge of various computer systems, such as architecture, electronics, and hardware design. This expertise is built upon a solid foundation in both basic and applied science, encompassing areas like mathematics, physics, and electrical engineering.

PSO: 3 Career Skills:

The skills to apply, analyze and evaluate industry best practices by developing innovative projects and acquaintance of attitude required to work professionally, for higher studies and research, and to be an entrepreneur.

Bachelor of Technology Civil Engineering

PSO: 1 Infrastructure Development:

The graduates will have the ability to plan, design and quality execution of construction projects and ability to solve problems in the structural, construction management, hydraulics, geotechnical, transportation and environmental disciplines of civil engineering

PSO: 2 Civil & Basic Sciences:

The ability to acquire fundamental knowledge of mathematics, basic sciences, civil construction drafting software and fundamental of computers.

PSO: 3 Career & Life Adroitness:

Graduates will be able to cognizance of social awareness, interdisciplinary aspects and environmental necessity along with ethical responsibility to have a successful career and to become an entrepreneur.

Bachelor of Technology Electronics and Communication Engineering

PSO: 1 Communication Knowledge:

Graduate possesses the proficiency to understand, analyze, and apply the concepts of various fields of electronics and communication engineering.

PSO: 2 Electronics and Basic Science:

Graduate is able to acquire fundamental knowledge of electronics and communication, mathematics, basic sciences, and computer.

PSO: 3 Career and life Skills:

Graduate is capable of analyzing, evaluating, and applying industry best practices by developing innovative projects, and attaining of attitude required to work professionally, for higher studies, research, and to be an entrepreneur.

Bachelor of Technology Electrical Engineering

PSO: 1 Power Engineering Skills:

Graduate possesses the ability to deal with complex electrical power problems by using modern engineering tools for the benefit of the society and should be able to communicate the same professionally.

PSO: 2 Electrical and Basic Sciences: Graduate possesses the ability to apply fundamental knowledge of electrical power, basic sciences, mathematics, and computation to get the solutions of multi-disciplinary problems.

PSO: 3 Career and Life Skills:

Graduate possesses the skills to be either employable or develop entrepreneurship in the emerging areas like renewable and green energy, electric and hybrid vehicles and smart grids, and will be susceptive to life-long learnings.

CHAPTER VII

COURSE OUTCOMES (COs)
Session: 2019-20

Course outcomes (COs) are direct statements that describe the essential and enduring disciplinary knowledge, abilities that students should possess and the depth of learning that is expected upon completion of a course. They are clearly specified and communicated. The Course Outcomes are prepared by the course coordinator in consultation with concerned faculty members teaching the same course.

Department of Applied Sciences
Common for all branches in first year
Program Name: Applied Sciences

Subject/Code No: Communication Skills & 1FY1-04
Semester: I / II semester
Course Outcome

CO Number	CO Definition
CO1	Comprehend the fundamental Principles, Types, and Methods of good communication.
CO2	Apply the basic structural and grammatical knowledge of the constituents for technical writing.
CO3	Develop the competence in writing skills related to various forms of technical and business communication.
CO4	Understand the genre of prose by reading loudly with correct pronunciation, stress intonation, and articulation of voice along with identifying and describing the connection between Literature and reality.
CO5	Develop the creativity and imagination through value-based genre of poetry by enhancing aesthetic and verbal ability.

Subject/Code No: Human Values & 1FY1-05/2FY1-05
Semester: I / II semester
Course Outcome

CO Number	CO Definition
CO1	Comprehend co-relationship between "Values"; and "skills" to ensure persistent happiness and prosperity.
CO2	Evaluate the coexistence of the Human Being - Harmony in Myself.
CO3	Identify the role of harmony in family, society and universal order.
CO4	Develop and evaluate the holistic perception of harmony at all levels of existence.
CO5	Create harmony in professional and personal lives by understanding Co-existence between human being with nature.

Subject/Code No: Engineering Mathematics-I & 1FY2-01
Semester: I semester
Course Outcome

CO Number	CO Definition
CO1	Learn the concept of calculus to appraise improper integral, surface area and volume of solid of revolution of various laminas.
CO2	Differentiate the different techniques for convergence of sequence and series.
CO3	Analyze continuity, differentiability to solve the periodically extended function over the range using the concept of Fourier series.
CO4	Application of Partial differentiation, problem-solving using concepts and techniques from PDE's.
CO5	Apply the concept of calculus to double integrals and change of variables Application of Multiple integration involving cubes, sphere, theorem of green gauss and stokes.

Subject/Code No: Engineering Mathematics-II & 2FY2-01
Semester: II semester
Course Outcome

CO Number	CO Definition
CO1	Comprehend the computational techniques and algebraic skills essential for the study of systems of linear equations, matrix algebra, Eigen values, Eigen vectors, orthogonality and diagonalization.
CO2	Recognize ODEs and interpret the various methods for solving differential equation of first order and first degree.
CO3	Differentiate the various applications of function of one variable in ODE of higher order.
CO4	Evaluate the multivariable function using the concept of PDEs of first order.
CO5	Apply the various uses of multivariable function and solve by the partial differential equation of higher order.

Subject/Code No: Engineering Physics & 1FY2-02 /2FY2-02
Semester: II semester
Course Outcome

CO Number	CO Definition
CO1	Comprehend the concepts of wave optics and phenomenon of interference and diffraction of light.
CO2	Recognize ODEs and interpret the various methods for solving differential equation of first order and first degree.
CO3	Apply the conceptual knowledge of coherence of light wave in different application of light wave and use in optical fiber communication.
CO4	Synthesize the scientific and engineering principles of materials science to identify the properties of material related to appropriate field of application.
CO5	Apply the laws of electromagnetic theory in propagation of wave and use in communication.

Subject/Code No: Engineering Chemistry &1FY2-03 /2FY2-03
Semester: I / II semester
Course Outcome

CO Number	CO Definition
CO1	Describe the fundamental water quality for domestic and industrial purpose so that students will be able to describe impurities present in water, boiler troubles and removal of impurities.
CO2	Analyse the composition, characteristics and manufacturing methods of various types of solid, liquid and gaseous fuels and calculated calorific value of fuels for Industrial as well as domestic purposes
CO3	Classify the dry and wet corrosion mechanisms and their protection methods. To investigate deterioration of metal through corrosion
CO4	Understand the composition and manufacturing methods of engineering materials namely cement and glass and recognize and estimate various properties of lubricants in several engineering process.
CO5	Generating the generic drugs or medicines for various services in life long purpose by identifying the applications of organic reaction mechanism.

Subject/Code No: Programming for Problem Solving & 1FY3-06/2FY3-06
Semester: I / II semester
Course Outcome

CO Number	CO Definition
CO1	Understand the fundamental concepts of computers, algorithms, flowcharts and problem-solving techniques.
CO2	Translate the algorithms and flowcharts into C programs.
CO3	Analyse the debug process in C programming language and to express in written form.
CO4	Formulate a problem into functions and create modular code that can be reused.
CO5	Develop C programs to demonstrate the applications of derived data types such as arrays, pointers, strings and functions.

Subject/Code No: Basic Mechanical Engineering & 1FY3-07/2FY3-07
Semester: I / II semester
Course Outcome

CO Number	CO Definition
CO1	Understand the concepts of thermodynamics, power plants, machine design, Manufacturing Engineering and Industrial Engineering.
CO2	Receive the basic knowledge of pump and IC engine.
CO3	Comprehend the concept, types and application of refrigerator and air conditioning system and Transmission of Power.
CO4	Explain the different Patterns, Molding, Casting, Forging and Extrusion of Primary Manufacturing Processes.
CO5	Describe the various process and uses of Welding, Brazing, Engineering materials and Heat treatment of steel.

Subject/Code No: Basic Electrical Engineering & 1FY3-08/2FY3-08
Semester: I / II semester
Course Outcome

CO Number	CO Definition
CO1	Evaluate the concept and process of various AC and DC circuit related elements, sources, laws, methods and theorems.
CO2	Explore the knowledge of transformers and its uses in applying the acquired knowledge to solve electrical circuit problem.
CO3	Analyse the characteristics, significance, construction and working of various power electronic devices.
CO4	Understand electromechanical energy conversion process.
CO5	Explore knowledge of protective devices and energy consumption calculations.

Subject/Code No: Basic Civil Engineering & 1FY3-09/2FY3-09

Semester: I / II semester

Course Outcome

CO Number	CO Definition
CO1	Understanding the scope, specialization, and role of civil engineer with impact of infrastructural development on economy of country.
CO2	Explain the Object, Principles & Types of Surveying, Analyses the Linear Measurements of surveying and evaluates the angular measurement through compass and leveling process through the various leveling instrument.
CO3	Analyse the importance of site selection, type of building Layout and Plan with introduction and components of Buildings & their functions.
CO4	Understanding the traffic and road safety and evaluate the Modes of Transportation, Causes of Accidents and Create the Road Safety Measures.
CO5	Classify the different types of pollutions, understand the Rainwater Harvesting, Global warming, Climate Change and solid Waste Management, Analyse the Primary and Secondary air pollutants.

Subject/Code No: Engineering Chemistry Lab & 1/2FY2-21

Semester: I / II semester

Course Outcome

CO Number	CO Definition
CO1	Evaluate the strength of CuSO4.5H2O solution with the help of Hypo solution, Ferrous Ammonium Sulphate solution with the help of K2Cr2O7 solution and NaOH and Na2CO3 in an alkali
CO2	Analyse different properties of lubricating oil.
CO3	Analyse quality of coal by proximate analysis.
CO4	Evaluate various quality parameters of water like harness, DO, Chlorine in water
CO5	Understand about synthesis of generic drugs.

Subject/Code No: Engineering Physics Lab & 1/2FY2-20

Semester: I / II semester

Course Outcome

CO Number	CO Definition
CO1	Understand the fundamental concepts of wave optics through the interference and diffraction experiment
CO2	Analyse the concept of light in dispersive power of material and height of a celestial object.
CO3	Describe and demonstrate the behavior of semiconductor characteristics.
CO4	Applying the knowledge to show the charging and discharging behavior of capacitor with time in form of electrical energy.
CO5	Interpret the properties of Laser light and application in optical communication through optical fiber.

Subject/Code No: Human Values Activities and Sports & 1/2FY1-23
Semester: I / II semester
Course Outcome

CO Number	CO Definition
CO1	Course Introduction-Need, Basic Guidelines, Content and Process for Value Education
CO2	Understanding Harmony in the Human Being - Harmony in Myself
CO3	Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship
CO4	Understanding Harmony in the Nature and Existence - Whole existence as Coexistence
CO5	Implications of the above Holistic Understanding of Harmony on Professional Ethics. Natural acceptance of human values

Subject/Code No: Language Lab &1/ 2FY1-22
Semester: I / II semester
Course Outcome

CO Number	CO Definition
CO1	To understand Phonetic Symbols and Transcriptions
CO2	To enable students to participate in Extempore
CO3	To enable students to participate in Group Discussion
CO4	To improve writing skills of students by Dialogue Writing
CO5	To use LSRW skills successfully for leadership and teamwork to crack GD's and interview

Subject/Code No: Manufacturing Practices Workshop &1/ 2FY3-25
Semester: I / II semester
Course Outcome

CO Number	CO Definition
CO1	Understand various tools, materials, instruments required for workshop operations.
CO2	Apply techniques to perform workshop operations with hand tools and power tools such as center lathe machine, drilling machine using given job drawing.
CO3	Understand application of the hand tools used in fitting, carpentry, foundry, welding shop, machine tools and sheet metal shop
CO4	Write a report related to hand tools and machine tools description referring to library books and laboratory manuals.
CO5	Apply safety consciousness along with team work.

Subject/Code No: Computer Programming Lab & 1/2FY3-24

Semester: I / II semester

Course Outcome

CO Number	CO Definition
CO1	Understand and describe the structure of a C program to explain, write, compile and execute programs using input and output statements.
CO2	Classify and write programs by applying the decision control statements and loop control statements using different operators.
CO3	Formulate, analyze and solve the problem by writing programs using pointers, arrays and strings.
CO4	Design object-based programs by creating new data type using structure and union.
CO5	Understand and use the concept of functions and file operations; moreover, design new functions to solve module driven problems.

Subject/Code No: Basic Civil Engineering Lab & 1/2FY3-27

Semester: I / II semester

Course Outcome

CO Number	CO Definition
CO1	Describe various sanitary fittings and water supply fittings.
CO2	Examine pH, Turbidity, Hardness and Total solids of given water sample.
CO3	Use of EDM and Total Station in the field.
CO4	Investigate the linear and angular measurements of the points on the ground and levelling.
CO5	Students will show an ability to communicate effectively and work as a team member ethically.

Subject/Code No: Basic Electrical Engineering Lab & 1/2FY3-26

Semester: I / II semester

Course Outcome

CO Number	CO Definition
CO1	Utilize a Cathode Ray Oscilloscope (CRO), along with various meters, to identify and observe the functioning of electronic components such as resistors, inductors, capacitors, diodes,diac, triac, transistors, and thyristors.
CO2	Measure the no-load current waveform using an oscilloscope and calculate transformer voltages, currents, power, and efficiency
CO3	Conduct various three-phase transformer connections to Analyse voltage and current relationships, while recording phase shifts between the primary and secondary sides.
CO4	Recognize the operational characteristics, cut-out sections, and speed behavior of DC machines, synchronous machines, single-phase, and three-phase induction machines
CO5	Create a torque-speed curve for a separately excited DC motor, examine the operation of DC-DC converters, DC-AC converters, and DC-AC converters for induction motor speed control, while providing an overview of the components in LT switchgear.

Subject/Code No: Computer Aided Engineering Graphics & 1FY3-28

Semester: I semester

Course Outcome

CO Number	CO Definition
CO1	Discuss the concept of engineering terminology, engineering scales and conic sections.
CO2	Apply the necessary skills in drawing and explaining orthographic projection of points, lines, and planes.
CO3	Understand and Draw projections of solids
CO4	Draw and classify the sections of solids.
CO5	Explain various commands and create drawing in AutoCAD.

Subject/Code No: Computer Aided Machine Drawing & 2FY3-29

Semester: II semester

Course Outcome

CO Number	CO Definition
CO1	Recall and understand the conventional representation of machine components and material, types of lines & dimensioning.
CO2	Explain concept of first and third angle projections and prepare drawing of simple machine elements, sectional views for various parts and assembly.
CO3	Draw and explain various types of temporary and permanent fasteners.
CO4	Draw free hand sketches of lines, materials and various components i.e. bearings, couplings, welded joints, pipe joints, valves etc.
CO5	Differentiate among the various commands and create 2D computer aided drawing software.

Bachelor of Technology Computer Engineering

Program Name: Computer Engineering

Subject/Code No: Advanced Engineering Mathematics/3CS2-01
LTP: 3L+0T+0P Semester: 3rd
Course Outcome

CO Number	CO Definition
CO1	Recall and understand the fundamental concepts of probability and standard distributions which can describe real life phenomenon.
CO2	Analyze the various method of numerical solutions of Normal, Poisson and Binomial probability distribution.
CO3	Formulate the optimization problems in mathematical form with classification.
CO4	Interpret non-linear optimization problems and solve by appropriate methods.
CO5	Demonstrate linear optimization problems and solve by standard methods.

Subject/Code No: Technical Communication/3CS1-02
LTP: 2L+0T+0P Semester: 3rd
Course Outcome

CO Number	CO Definition
CO1	Understand the process of technical communication in terms of LSRW.
CO2	Apply the concept of Technical Materials/Texts in various technical documents.
CO3	Enhance the skills in the process of technical communication in terms of LSRW.
CO4	Implement the basic concepts of technical communication in Technical Reports, articles and their formats.

Subject/Code No: Digital Electronics/3CS3-04
LTP: 3L+0T+0P Semester: 3rd
Course Outcome

CO Number	CO Definition
CO1	Demonstrate basic principles of digital circuits and different number systems
CO2	Distinguish logic expressions and circuits using Boolean laws and K-map
CO3	Differentiate types of digital electronic circuits and also the different logic families involved in the digital system to prepare the most simplified circuits using various mapping and mathematical methods.
CO4	Design various types of memoryless element digital electronic circuits for particular operation within the realm of economic, performance, efficiency, user friendly and environmental constraints.
CO5	Design various types of memory element digital electronic circuits for particular operation within the realm of economic, performance, efficiency, user friendly and environmental constraints.

Subject/Code No: Data Structures and Algorithms/3CS4-05
LTP: 3L+0T+0P Semester: 3rd
Course Outcome

CO Number	CO Definition
CO1	Recognize fundamental Stack operations to address a range of engineering problems.
CO2	Relate the principles of Queues and Linked Lists to offer solutions for computer-based issues.
CO3	Discover different Search and Sorting methods to rationalize their application in diverse
CO4	Practice the concept of Trees and their operations to furnish valid solutions.
CO5	Compare a variety of techniques that can be employed with Graphs and Hashing.

Subject/Code No: Object Oriented Programming/3CS4-06
LTP: 3L+0T+0P Semester: 3rd
Course Outcome

CO Number	CO Definition
CO1	Describe the Object-Oriented Programming paradigm with the concept of objects and classes.
CO2	Explain the memory management techniques using constructors, destructors and pointers
CO3	Classify and demonstrate the various Inheritance techniques.
CO4	Understand how to apply polymorphism techniques on the object-oriented problem.
CO5	Summarize the exception handling mechanism, file handling techniques and Use of generic programming in Object oriented programming

Subject/Code No: Software Engineering/3CS4-07
LTP: 3L+0T+0P Semester: 3rd
Course Outcome

CO Number	CO Definition
CO1	Recognize different software life cycle models and testing techniques to develop real time projects.
CO2	Identify cost estimation and risk analysis in project management.
CO3	Interpret and deduce the engineering process of software requirement analysis.
CO4	Apply procedural design methods to architect software systems.
CO5	Collaborate the concept of object-oriented analysis and design in software development process.

Subject/Code No: Data Structures and Algorithms Lab/3CS4-21
LTP: 0L+0T+3P Semester:3rd
Course Outcome

CO Number	CO Definition
CO1	Recognize fundamental Stack and Queue operations to address a range of engineering
CO2	Relate the principles of Linked Lists to offer solutions for computer-based issues.
CO3	Discover different Search and Sorting methods to rationalize their application in diverse
CO4	Devise diverse operations on non-linear data structures such as trees and graphs.
CO5	Propose a solution for a provided engineering problem utilizing Stack, Queue, Linked List, Tree and Sorting

Subject/Code No: Object Oriented Programming Lab/3CS4-22
LTP: 0L+0T+3P Semester: 3rd
Course Outcome

CO Number	CO Definition
CO1	Create and explain Basic C++ Program using i/o variables and structures.
CO2	Apply object-oriented programming concepts using class and objects
CO3	Design and assess the classes for code reuse
CO4	Analysis and apply the generic classes concepts in programming problem
CO5	Illustrate and evaluate the file Input Output mechanisms

Subject/Code No: Software Engineering Lab/3CS4-23
LTP: 0L+0T+3P Semester: 3rd
Course Outcome

CO Number	CO Definition
CO1	Observe the requirements specification, function-oriented design using Software Analysis and Software Design of given project and relate the use of appropriate CASE tools and other tools in the software life cycle.
CO2	Translate Software Requirements Specification (SRS) for a given problem in IEEE template.
CO3	Select DFD model (level-0, level-1 DFD and Data dictionary) of the project.
CO4	Prepare all Structure and Behavior UML diagram of the given project.
CO5	Test/Evaluate “Project Libre” a project management software tool to manage files.

Subject/Code No: Digital Electronics Lab/3CS4-24
LTP: 0L+0T+3P Semester: 3rd
Course Outcome

CO Number	CO Definition
CO1	Demonstrate the basics of logic gates.
CO2	Demonstrate basic combinational circuits and verify their functionalities.
CO3	Apply the working mechanism and design guidelines of different sequential circuits in the digital system design.
CO4	Construct different types of counters for real time digital systems.
CO5	Distinguish the different types of shift registers.

Subject/Code No: Discrete Mathematics Structure/4CS2-01
LTP: 3L+0T+0P Semester: 4th
Course Outcome

CO Number	CO Definition
CO1	Describe basic concept of Sets, Relations, Functions and Discrete Structure and apply appropriate methods to solve the problems.
CO2	Describe the concept of mathematical logic to create the problem in appropriate form and test for validity of the problem.
CO3	Apply fundamental mathematical concepts such as sets, relations, Combinatorics technique to formulate the problems and solve by appropriate method.
CO4	Interpret the concept of groups, ring and field to analyze the complex problems.
CO5	Demonstrate the model of real-world problems using concept of Graph and solve the problems by standard result and graph algorithms.

Subject/Code No: Managerial Economics and Financial Accounting/4CS1-03
LTP: 2L+0T+0P Semester: 4th
Course Outcome

CO Number	CO Definition
CO1	Recognize and describe the fundamental concepts of Economics and Financial Management and define the meaning of national income, demand, supply, cost, market structure, and balance sheet.
CO2	Calculate and classify the domestic product, national product and elasticity of price on demand and supply.
CO3	Draw the cost graphs, revenue graphs and forecast the impact of change in price in various perfect as well as imperfect market structures.
CO4	Compare the financial statements to interpret the financial position of the firm and evaluate the project investment decisions.
CO5	

Subject/Code No: Microprocessor & Interfaces/4CS3-04
LTP: 3L+0T+0P Semester: 4th
Course Outcome

CO Number	CO Definition
CO1	Classify the basic operations of Microprocessor and microcontroller using their pin and architectural diagram, and also about area of manufacturing and performance.
CO2	Practice of Knowledge about programming proficiency, using various addressing modes and data transfer instructions of microprocessor and microcontroller.
CO3	Evaluate the measures of Assembly Language Programming.
CO4	Discriminate the interfacing of various circuits with microprocessor.
CO5	Compare the different programming logic applications with 8085 microprocessors.

Subject/Code No: Database Management System/4CS4-05:
LTP: 3L+0T+0P Semester: 4th
Course Outcome

CO Number	CO Definition
CO1	Tabulate Database System with the help of Entity Relationship Diagram that visualizes a database system implemented in a real-world scenario.
CO2	Apply data deduction and manipulation techniques using query languages on a variety of databases.
CO3	Use normal forms in the process of enhancing the database schema through refinement techniques.
CO4	Create transaction plans incorporating diverse scheduling types.
CO5	Generalize and assess the effectiveness of concurrency control mechanisms and recovery systems.

Subject/Code No: Theory of Computation/4CS4-06:
LTP: 3L+0T+0PSemester:4th
Course Outcome

CO Number	CO Definition
CO1	Apply the knowledge of different types of grammar; he/she can analyze the all types of grammar and evaluate the relationship among them.
CO2	Differentiate the concept of regular expression and finite automaton and apply the knowledge to compare the procedure for writing regular expression for an automaton or vice versa
CO3	Apply the knowledge of Context Free grammar; he/she can generate the Context free grammar and Pushdown Automaton for evaluating the CFG.
CO4	Apply the knowledge of Turing Machine he/she can analyze the Type-0 grammar and can design and evaluate the Turing Machine
CO5	Apply the knowledge of Pumping Lemma Theorem students can check whether the given grammar Regular grammar/Context Free Grammar or not

Subject/Code No: Data Communication and Computer Networks/4CS4-07
LTP: 3L+0T+0P Semester: 4th
Course Outcome

CO Number	CO Definition
CO1	Able to identify the principles of layered protocol architecture; be able to recognize and generalize the system functions in the correct protocol layer and further illustrate how the layers interact.
CO2	State and cite mathematical problems for data-link and network protocols.
CO3	Use network layer protocols and calculate number of subnets required for a network.
CO4	Compute the reliability of data transfer over transport layer by glossy channel bit errors problem.
CO5	Select and plan for common services, system services, such as name and address lookups, and communications applications.

Subject/Code No: Microprocessor & Interfaces Lab/4CS4-21
LTP: 0L+0T+2PSemester:4th
Course Outcome

CO Number	CO Definition
CO1	Analyze the fundamentals of assembly level programming
CO2	Apply interfacing concept between input and output devices.
CO3	Elaborate the interfacing of various other devices with microprocessor.
CO4	Compose the various programs on different problems using Assembly Language Programming.
CO5	Implement standard microprocessor real time interfaces including digital-to-analog converters and analog-to-digital converters

Subject/Code No: Database Management System Lab/4CS4-22
LTP: 0L+0T+3P Semester: 4th
Course Outcome

CO Number	CO Definition
CO1	Create and execute a database schema for a specified problem domain.
CO2	Manage integrity constraints within a database using a relational database management system (RDBMS).
CO3	Construct and devise a graphical user interface (GUI) application using a fourth-generation programming language (4GL).
CO4	Composing PL/SQL code encompassing stored procedures, stored functions, cursors, and packages.
CO5	Produce SQL and Procedural interfaces to SQL comprehensively.

Subject/Code No: Network Programming Lab/4CS4-23
LTP: 0L+0T+3PSemester:4th
Course Outcome

CO Number	CO Definition
CO1	Identify the functioning of various networking equipment's
CO2	Illustrate the LAN Installation techniques and Configurations techniques
CO3	Solving various Error correcting techniques and framing methods
CO4	Practice the programs for client and server involving UDP/TCP sockets using socket programming.
CO5	Estimate the communication between client and server using Network Simulator.

Subject/Code No: Linux Shell Programming Lab/4CS4-24
LTP: 0L+0T+2P Semester: 4th
Course Outcome

CO Number	CO Definition
CO1	Summarize the concepts and commands in UNIX.
CO2	Construct the directory layout of a typical UNIX system, maintain, and secure UNIX directories
CO3	Illustrate the knowledge to use the several shell quoting mechanisms correctly.
CO4	Construct regular expression using filters and various commands to express the patterns.
CO5	Write simple scripts to develop basic command output.

Subject/Code No: Java Lab/4CS4-25
LTP: 0L+0T+2P Semester: 4th
Course Outcome

CO Number	CO Definition
CO1	Express and restate fundamentals of java, and tools for program designing environments.
CO2	Construct classes and implement the principles of method overloading, inheritance, and access controls within those classes.
CO3	Develop Java packages and incorporate the concept of interfaces, along with importing these packages in Java.
CO4	Formulate the application by managing file operations, handling exceptions, and implementing threads.
CO5	Create applications utilizing Java applets and design various polygons. This task involves the application of knowledge and the synthesis of design skills

Subject/Code No: Information Theory & Coding/5CS3-01
LTP: 2L+0T+0P Semester: 5th
Course Outcome

CO Number	CO Definition
CO1	Solve the theory algebra and linear algebra in source coding
CO2	Create channel performance using information theory
CO3	Manipulate linear block codes for error detection and error correction.
CO4	Modify Cyclic codes for error detection and error correction.
CO5	Discover convolution codes for performance analysis.

Subject/Code No: Compiler Design/5CS4-02
LTP: 3L+0T+0P Semester: 5th
Course Outcome

CO Number	CO Definition
CO1	Illustrate the different phases of compiler to understand it's working.
CO2	Use and execute different types of parsing algorithm
CO3	Distinguish different types of Intermediate code generations.
CO4	Summarize different types of storage organization techniques.
CO5	Dissect the issues in code generator's design and basic block control flow graph.

Subject/Code No: Operating Systems/5CS4-03
LTP: 3L+0T+0P Semester: 5th
Course Outcome

CO Number	CO Definition
CO1	Analyze the concept of Operating Systems, including their essential significance and fundamental operational processes.
CO2	Utilize process scheduling techniques and inter-process communication strategies to evaluate their effectiveness in resolving real-world classical problems.
CO3	Analyzing Memory Management Techniques and Page Replacement Algorithms leads to the formulation of Free Space Management with the concept of virtual memory.
CO4	Evaluate Memory Management Techniques and Page Replacement Algorithms to formulate Free Space Management, integrating virtual memory, and showcasing critical assessment.
CO5	Illustrate understanding of File Systems, Input/output Systems, and diverse disk scheduling algorithms through case studies

Subject/Code No: Computer Graphics & Multimedia/5CS4-04
LTP: 3L+0T+0P Semester: 5th
Course Outcome

CO Number	CO Definition
CO1	Understand and apply basics about computer graphics along with graphics standards.
CO2	Explain and analyses various algorithms to scan, convert the basic geometrical primitives, Area filling.
CO3	Explain, illustrate and design various algorithms for 2D transformations and clipping.
CO4	Understand various color models in computer graphics system and develop animated motions through.
CO5	To understand the fundamentals concepts of parallel and perspective projections and evaluate various algorithms for 3D transformations.

Subject/Code No: Analysis of Algorithm/5CS4-05
LTP: 3L+0T+0P Semester: 5th
Course Outcome

CO Number	CO Definition
CO1	Observe the accuracy and efficiency of the algorithm.
CO2	Associate Dynamic Programming to address real-time challenges.
CO3	Construct and practice different pattern matching algorithms and the assignment problem.
CO4	Estimate the effectiveness of randomized algorithms through Min-Cut, 2-SAT, and similar techniques.
CO5	Anticipate algorithmic tendencies and the notion of diverse algorithm categories.

Subject/Code No: Wireless Communication (Elective)/5CS5-11
LTP: 2L+0T+0P Semester: 5th
Course Outcome

CO Number	CO Definition
CO1	Recognizing Mobile Radio Propagation, Fading, Diversity Concepts and Channel Modeling.
CO2	Relate the concept of cellular system and their technical challenges.
CO3	Correlate the Digital Signaling concept with fading channels.
CO4	Estimate the equalization techniques in wireless communication and error probability in faded channels.
CO5	Summarize the impacts of Design Parameters, Beam Forming and MIMO Systems in wireless communication.

Subject/Code No: Computer Graphics & Multimedia Techniques Lab/5CS4-21
LTP: _0L+0T+2P Semester: 5th
Course Outcome

CO Number	CO Definition
CO1	Understand and apply the various predefined functions for drawing various geometric shapes
CO2	Explain and analyze various algorithms to scan, convert the basic geometrical primitives, transformations, Area filling, clipping
CO3	Explain, illustrate and design various kinds of viewing and Projections.
CO4	Explain, illustrate and design various kinds of clipping techniques
CO5	Define, explain and apply various concepts associated with computer graphics to develop the animated game

Subject/Code No: Compiler Design Lab/5CS4-22
LTP: 0L+0T+2P Semester: 5th
Course Outcome

CO Number	CO Definition
CO1	Recognize the various forms of tokens and lexemes
CO2	Calculate scanning by using the concept of finite state automation, parse
CO3	Arrange intermediate code for various statements in a programming language concept
CO4	Organize the storage for heap structure
CO5	Construct various language patterns using flex tools they are also able to parse.

Subject/Code No: Analysis of Algorithm Lab/5CS4-23
LTP: 0L+0T+2P Semester: 5th
Course Outcome

CO Number	CO Definition
CO1	Observe the complexity of fundamental algorithms.
CO2	Relate sorting algorithms in real-world scenarios.
CO3	Construct a binary search tree using assorted algorithms.
CO4	Test algorithms for finding minimum spanning trees.
CO5	Appraise algorithms for pattern matching.

Subject/Code No: Advance Java Lab/5CS4-24
LTP: L+0T+2P Semester: 5th
Course Outcome

CO Number	CO Definition
CO1	Recognize the foundational principles of Java programming and identify tools used in program design environments.
CO2	Utilize the principles of overloading, inheritance, and access controls in the context of class structures.
CO3	Implement the concept of interfaces and demonstrate the process of importing packages in Java.
CO4	Formulate application designs incorporating file handling, exception management, and multithreading.
CO5	Construct applications through the utilization of applets, and create intricate polygon designs, demonstrating creative and evaluative skills.

Subject/Code No: Digital Image Processing/6CS3-01
LTP: 2L+0T+0P Semester: 6th
Course Outcome

CO Number	CO Definition
CO1	Illustrate the fundamental concepts of Digital Image Processing System
CO2	Demonstrate various transformations and filtering techniques on Images in different domains.
CO3	Distinguish the causes for image degradation and compare the image restoration techniques.
CO4	Distinguish various image compression and segmentation techniques.
CO5	Categorize different image segmentation and representation algorithms and techniques

Subject/Code No: Machine Learning/6CS4-02
LTP: 3L+0T+0P Semester: 6th
Course Outcome

CO Number	CO Definition
CO1	Apply supervised machine learning algorithms to real-time data to generate predictive insights.
CO2	Analyze real-world data with unsupervised machine learning algorithms to identify patterns and make predictions.
CO3	Evaluate different feature extraction and selection methods.
CO4	Identify the different types of semi supervised learning and reinforcement learning algorithms.
CO5	Develop and implement recommender systems and deep learning models to make predictions and recommendations.

Subject/Code No: Information Security System/6CS4-03
LTP: 2L+0T+0P Semester: 6th
Course Outcome

CO Number	CO Definition
CO1	Identify services that enhance the security and its mechanism.
CO2	Classify security attacks on information over network. Describe and apply classical encryption techniques.
CO3	Compare conventional encryption algorithms & public key cryptography, and design Encryption algorithm to provide the Integration and confidentiality of a message.
CO4	Understand the concept of hash function with application and message authentication code in security system
CO5	Classify key management schemes and discuss web security and transport level security protocols.

Subject/Code No: Computer Architecture and Organization/6CS4-04
LTP: 3L+0T+0P Semester: 6th
Course Outcome

CO Number	CO Definition
CO1	Implement register transfer with the help of micro-operations.
CO2	Analyze basic of computer organization, instructions, RISC & CISC characteristics.
CO3	Apply integer and floating type computer arithmetic techniques.
CO4	Analyze basics of memory organization, allocation and management schemes.
CO5	Assess modes of transfer and input output interface, interrupts and DMA processing.

Subject/Code No: Artificial Intelligence/6CS4-05
LTP: 2L+0T+0P Semester: 6th
Course Outcome

CO Number	CO Definition
CO1	Recall and identify distinct approaches in AI, with a specific emphasis on significant techniques such as search algorithms, knowledge representation, planning, and constraint management.
CO2	Elaborate on the current outlook of AI as the examination of agents that receive percepts from the environment and carry out actions in response.
CO3	Experimenting with the recognition of significant challenges encountered by AI and the intricacy involved in solving typical issues within the domain.
CO4	Systematically analyze and evaluate the presented techniques, then strategically employ them to address real-world challenges.
CO5	Create and evaluate advanced AI approaches, exemplified by intelligent systems and expert systems.

Subject/Code No: Cloud Computing/6CS4-06
LTP: 3L+0T+0P Semester: 6th
Course Outcome

CO Number	CO Definition
CO1	Recognize the progression of cloud computing and its practical uses over time
CO2	Evaluate the structure, framework, and various models of cloud computing's design and architecture.
CO3	Measure an appraisal of virtualization technology and data centers, including their applications within the context of cloud computing.
CO4	Write the understanding of security concerning data, data centers, and cloud services.
CO5	Explain cloud services such as AWS and Google App Engine in terms of their integration capabilities with cloud applications.

Subject/Code No: Distributed System/6CS5-11
LTP: 2L+0T+0P Semester: 6th
Course Outcome

CO Number	CO Definition
CO1	Illustration of various architectures used to design distributed systems along with different types of operating systems.
CO2	Analysis of concurrent programming with inter process communication techniques, such as remote method invocation, remote events.
CO3	Evaluation of various distributed file system through case studies.
CO4	Analysis of distributed shared memory models and their failures in distributed computation.
CO5	Analyze various faults and their consequences and replicated data management through exploration different types of Distributed Systems.

Subject/Code No: E Commerce & ERP/6CS5-13
LTP: 2L+0T+0P Semester: 6th
Course Outcome

CO Number	CO Definition
CO1	Describe the Ecommerce and ERP, delving into their respective requisites and the infrastructure needed to support them.
CO2	Examine the necessary infrastructure and software prerequisites to ensure the operational functionality of Ecommerce portals.
CO3	Elaborate on the operational mechanisms of the Internet, web portals, and Ecommerce portals, while highlighting the essential infrastructure requirements.
CO4	Apply the effectiveness of tools and techniques in the realm of digital marketing, considering their resultant impact.
CO5	Construct an XML-based database and formulate an XML application tailored for storing data.

Subject/Code No: Digital Image Processing Lab/6CS4-21
LTP: 0L+0T+3P Semester: 6th
Course Outcome

CO Number	CO Definition
CO1	Apply image enhancement operation and image Arithmetic Operations on a given image
CO2	Demonstrate image restoration and histogram processing on images
CO3	Distinguish and compare various Noise and filtering algorithms on images
CO4	Illustrate image restoration and segmentation techniques on an image
CO5	Apply pattern recognition techniques on images using features extraction

Subject/Code No: Machine Learning Lab/6CS4-22
LTP: 0L+0T+3P Semester: 6th
Course Outcome

CO Number	CO Definition
CO1	Understand the mathematical and statistical prospective of machine learning algorithms through python programming.
CO2	Evaluate the machine learning models pre-processed through various feature engineering algorithms by python programming.
CO3	Design and evaluate the supervised models through python in built functions.
CO4	Design and evaluate the unsupervised models through python in built functions.
CO5	Understand the basic concepts of deep neural network model and design the same.

Subject/Code No: Python Lab/6CS4-23
LTP: 0L+0T+3P Semester: 6th
Course Outcome

CO Number	CO Definition
CO1	List various data types in python and use them to solve basic python programs.
CO2	Describe Conditional statements and Looping structures concepts in python and apply these to create searching and sorting programs.
CO3	Explain usage of List, Tuples, Set, Dictionary and Strings and use these to solve programming problems in different ways.
CO4	Discuss file handling concepts and apply them to create basic data handling programs.
CO5	Understand various built-in python functions and formulate user-defined functions.

Subject/Code No: Mobile Application Development Lab/6CS4-24
LTP: 0L+0T+3P Semester: 6th
Course Outcome

CO Number	CO Definition
CO1	Construct fundamental concepts of Android programming.
CO2	Construct diverse Android applications focusing on layouts and immersive interactive interfaces.
CO3	Build Android applications centered around server less mobile databases such as SQLite.
CO4	Demonstrate an application that records data onto the SD card.
CO5	Design a compact Android Studio application.

Subject/Code No: Cloud Computing/7CS1A
LTP: 3L+0T+0PSemester: 7th
Course Outcome

CO Number	CO Definition
CO1	Recognize the progression of cloud computing and its practical uses over time
CO2	Evaluate the structure, framework, and various models of cloud computing's design and architecture.
CO3	Measure an appraisal of virtualization technology and data centers, including their applications within the context of cloud computing.
CO4	Write the understanding of security concerning data, data centers, and cloud services.
CO5	Explain cloud services such as AWS and Google App Engine in terms of their integration capabilities with cloud applications.

Subject/Code No: Information Security System/7CS2A
LTP: 3L+0T+0P Semester: 7th
Course Outcome

CO Number	CO Definition
CO1	Identify services that enhance the security and its mechanism.
CO2	Classify security attacks on information over network. Describe and apply classical encryption techniques.
CO3	Compare conventional encryption algorithms & public key cryptography, and design Encryption algorithm to provide the Integration and confidentiality of a message.
CO4	Understand the concept of hash function with application and message authentication code in security system
CO5	Classify key management schemes and discuss web security and transport level security protocols.

Subject/Code No: Data Mining & ware Housing/7CS3A
LTP: 3L+0T+0P Semester: 7th
Course Outcome

CO Number	CO Definition
CO1	Apply preprocessing techniques over raw data and provide suitable input for range of data mining algorithms.
CO2	Apply appropriate association rule mining algorithms & statistical measures on data.
CO3	Create solutions to real life problems using different data mining techniques like classification, prediction & clustering.
CO4	Design data warehouse with dimensional modeling
CO5	Apply OLAP operations & discover the knowledge imbibed in the high dimensional system.

Subject/Code No: Computer Aided Design for VLSI/7CS4A
LTP: 3L+0T+0P Semester: 7th
Course Outcome

CO Number	CO Definition
CO1	Analyze digital circuits, incorporating into a VLSI chip. also expected to understand various design methodologies such as custom, semi-custom, standard cell, arrayed logic, sea-of-gates.
CO2	Explore various contemporary techniques for the design, Simulation.
CO3	Apply simulation, synthesis and optimization on digital circuit.
CO4	Design the Layout, routing, placement of a VLSI Chip.
CO5	Optimize performance of h/w through CAD tools with floor planning, placement and routing.

Subject/Code No: Compiler Construction/7CS5A
LTP: 3L+0T+0P Semester: 7th
Course Outcome

CO Number	CO Definition
CO1	Analysis the working of compiler by understanding its different phases.
CO2	Apply and implement different types of Parsing algorithms.
CO3	Evaluate between different types of Intermediate code generations.
CO4	Classify the different storage organization techniques
CO5	Analyze the different issues in the design of the code generator and basic block control flow graph.

Subject/Code No: Advance Database Management Systems/7CS6.1A
LTP: 3L+0T+0P Semester: 7th
Course Outcome

CO Number	CO Definition
CO1	Analyze the processes involved in query optimization which impact on database operation and design
CO2	Analyze the database functions and packages suitable for enterprise database application development and management
CO3	Evaluate alternative designs and architectures for databases.
CO4	Apply the database solutions for data access and its Security measures.
CO5	Create the design of database systems for the solution of an applications.

Subject/Code No: Web Development Lab/7CS7A
LTP: 0L+0T+2P Semester: 7th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition
CO1	Apply the basic knowledge of web development using knowledge of HTML and CSS elements.
CO2	Create student registration form entry using validation through JavaScript.
CO3	Identify basic configuration of Web Servers. Design a dynamic web page using JSP, PHP and ASP
CO4	Analysis and Interpretation for Dynamic Web Page using JSP and JDBC.
CO5	Apply the concept of Session in Web Page and demonstrate the knowledge of Ajax development.

Subject/Code No: VLSI Physical Design Lab/7CS8A
LTP: 0L+0T+3P Semester:7th
Course Outcome

CO Number	CO Definition
CO1	Design digital circuits, incorporating into a VLSI chip.
CO2	Explore various contemporary techniques for the design, Simulation.
CO3	Apply simulation, synthesis and optimization of digital circuit.
CO4	Implementation and Design the Layout, routing, placement of a VLSI Chip.
CO5	Optimize performance of h/w through CAD tools with floor planning, placement and routing.

Subject/Code No: Compiler Design Lab/7CS9A
LTP: 0L+0T+3P Semester: 7th
Course Outcome

CO Number	CO Definition
CO1	Identify different kinds of tokens and lexemes.
CO2	Analyze scanning by using the concept of finite state automation, parse tree.
CO3	Deploy intermediate code for various statements in a programming language concept
CO4	Deploy heap structure for storage
CO5	Deploy various language patterns using lex tools they are also able to parse.

Subject/Code No: Mobile Computing/8CS1A
LTP: 3L+0T+0P Semester:8th
Course Outcome

CO Number	CO Definition
CO1	Analyze the principles of mobile computing technologies and Evaluate Mobility management Techniques.
CO2	Interpret Data dissemination and management and evaluate mobile middleware.
CO3	Assess Service Discovery and Evaluate standardization Methods.
CO4	Apply Mobile IP, Mobile TCP, Database systems in mobile environments, and assess World Wide Web.
CO5	Analyze Ad Hoc networks, evaluate and practice Routing protocols.

Subject/Code No: Digital Image Processing/8CS2A
LTP: 3L+0T+0P Semester: 8th
Course Outcome

CO Number	CO Definition
CO1	Illustrate the fundamental concepts of Digital Image Processing System
CO2	Demonstrate various transformations and filtering techniques on Images in different domains.
CO3	Distinguish the causes for image degradation and compare the image restoration techniques.
CO4	Distinguish various image compression and segmentation techniques.
CO5	Categorize different image segmentation and representation algorithms and techniques

Subject/Code No: Distributed System/8CS3A
LTP: 3L+0T+0P Semester: 8th
Course Outcome

CO Number	CO Definition
CO1	Illustration of various architectures used to design distributed systems along with different types of operating systems.
CO2	Analysis of concurrent programming with inter process communication techniques, such as remote method invocation, remote events.
CO3	Evaluation of various distributed file system through case studies.
CO4	Analysis of distributed shared memory models and their failures in distributed computation.
CO5	Analyze various faults and their consequences and replicated data management through exploration different types of Distributed Systems.

Subject/Code No: Real Time System/8CS4.2A
LTP: 3L+0T+0P Semester: 8th
Course Outcome

CO Number	CO Definition
CO1	Analyze the concepts of Real-Time systems and modeling
CO2	Explore the functionality in real-time systems, their architecture and inner behavior.
CO3	Evaluate the multi-task scheduling algorithms for periodic tasks performance of scheduling.
CO4	Apply scheduling algorithms for a periodic, and sporadic tasks as well as examine the impact of scheduling
CO5	Design of protocols related to real-time communication

Subject/Code No: Unix Network Programming & Simulation Lab/8CS5A
LTP: 0L+0T+3P Semester: 8th
Course Outcome

CO Number	CO Definition
CO1	Analyze the functionality of various distributions of Unix via. BSD, POSIX.
CO2	Develop the programs for client and server involving UDP/TCP sockets using socket programming.
CO3	Evaluate interoperability between IPV4 & IPV6.
CO4	Implement the functionality of FORK function for system call
CO5	Evaluate the communication between client and server using Network Simulator.

Subject/Code No: FPGA LAB/8CS6A
LTP: 0L+0T+3P Semester: 8th
Course Outcome

CO Number	CO Definition
CO1	Design the various continuous, discrete analog and digital signals with the use of sampling and quantization
CO2	Evaluate the various parameters of the different signals
CO3	Design the various filters and calculate the parameter for their characteristics.
CO4	Apply digital design flows for system design and recognize the trade-offs involved Design state machines to control complex systems
CO5	Simulate the transmission and reception of signal of different digital modulation techniques

Subject/Code No: Digital Image Processing Lab/8CS7A
LTP: 0L+0T+2P Semester: 8th
Course Outcome

CO Number	CO Definition
CO1	Apply image enhancement operation and image Arithmetic Operations on a given image
CO2	Demonstrate image restoration and histogram processing on images
CO3	Distinguish and compare various Noise and filtering algorithms on images
CO4	Illustrate image restoration and segmentation techniques on an image
CO5	Apply pattern recognition techniques on images using features extraction

Bachelor of Technology Civil Engineering

Program Name: Civil Engineering
Session: 2019-20

S. No.	Course Code	Course Name	CO No.	Course Outcomes
1	3CE2-01	Advance Engineering Mathematics-I	CO 1	Conduct investigations on interpolation and numerical integration based real world problems.
			CO 2	Analyze the various numerical methods and evaluate solution of problems based on differential equations, polynomial equations and Transcendental equations.
			CO 3	Evaluate Laplace transform and inverse Laplace transforms to solve Initial Value Problem (IVP).
			CO 4	Apply Fourier transforms and inverse Fourier transforms to solve Initial Value Problem (IVP) and Boundary Value Problem (BVP).
			CO 5	Apply Z-transform in discrete system and evaluate solution of problems based on recurrence relations.
2	3CE1-02	Technical Communication	CO 1	Apply basics of grammar, common error in writing and speaking, study of advanced grammar, editing strategies to achieve appropriate technical style of official documents such as Project Reports, Manuals, and Minutes of Meetings.
			CO 2	Investigate, judge and assess their linguistic ability which will get enhanced by Identifying key principles and delivery techniques of effective public speaking (listening, speaking, writing, reading)
			CO 3	Outline Notes and create different kinds of technical documents, plan information collection along with analyzing factors and strategies for Information design and document design in an organization.
			CO 4	Create emails and memos intended for an audience within the same company or team as well as to design Resume, Job Application, and Technical Reports.
			CO 5	Apply and Analyse the relation between load, shear force, bending moment and slope deflection.
3	3CE3-04	Engineering Mechanics	CO 1	Analyse and evaluate Fundamental laws of mechanics.
			CO 2	Evaluate structure by methods of joints and method of section.

			CO 3	Differentiate the concept of Moment of Inertia of any section.
			CO 4	Analyse the principal of virtual works, different types of friction, Spring and their arrangement
			CO 5	Relate stresses and strain for a structure.
4	3CE4-05	Surveying	**CO 1**	Analyse the importance of surveying and apply the methods for measuring angles and directions using various instruments.
			CO 2	Evaluate RL using leveling instruments of a given area.
			CO 3	Analyse the different type of curve in field.
			CO 4	Apply the concept of tachometry and photogrammetric in field.
			CO 5	Create the setting out of work using different instruments (Total station and EDM).
5	3CE4-06	Fluid Mechanics	**CO 1**	Understand various types of fluid and its properties.
			CO 2	Apply & Analyse various pressures at a point in a static fluid, equilibrium condition and stability concept for floating bodies.
			CO 3	Explain types, behaviour and various phenomenon to estimate the fluid discharge.
			CO 4	Apply the concept of Euler, Bernoulli's and momentum equation.
			CO 5	Evaluate the concept of laminar flow through pipes, its characteristics and losses.
6	3CE4-07	Building Materials and Construction	**CO 1**	Understand various types of fluid and its properties.
			CO 2	Apply & Analyse various pressures at a point in a static fluid, equilibrium condition and stability concept for floating bodies.
			CO 3	Explain types, behaviour and various phenomenon to estimate the fluid discharge.
			CO 4	Apply the concept of Euler, Bernoulli's and momentum equation.
			CO 5	Evaluate the concept of laminar flow through pipes, its characteristics and losses.
7	3CE4-08	Engineering Geology	**CO 1**	Understand and evaluate the geology: Branches and Scope of Geology and the concepts of various geological materials and weathering processes.

			CO 2	Analyse and evaluate the properties, behaviour and engineering significance of different type of rocks and minerals.
			CO 3	Interpret and Analyse different type of geological features: Fold, Fault, Joints and Unconformities.
			CO 4	Relate and evaluate Geophysical methods for Subsurface Analysis and understand the site selection parameters for Dam& Tunnel.
			CO 5	Create and evaluate the basic concept of remote sensing & GIS in various fields of Civil Engineering.
8	3CE4-21	Surveying Lab	**CO1**	Use different conventional instruments of measurements in surveying in length, angle, levelling measurements.
			CO2	Apply the procedures involved in field work and to work as a surveying team.
			CO3	Determine the Height of an object by trigonometric levelling
			CO4	Discuss and determine the modern tool of measurement in surveying like EDM, Total station etc.
			CO5	Conduct a survey, collect field data and plot them on a paper
9	3CE4-22	Fluid Mechanics Lab	**CO1**	Able to demonstrate the basic properties and characteristics of incompressible fluid in laboratory.
			CO2	Able to demonstrate fundamental theorems governing fluid flows i.e., continuity, energy and momentum in laboratory.
			CO3	Able to measure different fluid properties using various type of equipment's like measurement of flow, pressure velocity and head loss.
			CO4	Classify the various pressure measuring devices.
10	3CE4-23	Computer Aided Civil Engineering Drawing	**CO1**	Draw Orthographic projections of Lines, Planes, and Solids
			CO2	Construct Isometric Scale, Isometric Projections and Views
			CO3	Draw Sections of various Solids including Cylinders, cones, prisms and pyramids
			CO4	Draw projections of lines, planes, solids, isometric projections and sections of solids including Cylinders, cones, prisms and pyramids using AutoCAD

11	3CE4-24	Civil Engineering Materials Lab	**CO1**	To study about selection criteria and uses of common building stones and dressing of stones.
			CO2	To understand the types and properties of bricks and their determination as per IS code such as water absorption, compressive strength, effloresces, dimension and tolerance test.
			CO3	To know raw material of cements.
			CO4	To study the various properties of material i.e glass, kotastone etc.
12	3CE4-25	Geology Lab	**CO1**	Students should be able to learn the significance of earth and its minerals.
			CO2	Students should be able to learn the significance of rocks and its engineering properties.
			CO3	Students should be able to understand the application of geology knowledge to civil engineering construction.
			CO4	To know about various applications of remote sensing techniques.
13	4CE2-01	Advance Engineering Mathematics-II	**CO 1**	Apply concept of probability and evaluate solutions of real-world problems.
			CO 2	Analyse standard probability distributions and evaluate solutions of real-world problems.
			CO 3	Estimate the relationship between variables of databases of the problems in quantify and qualitative forms and solve problems by methods of correlation, regression and Rank correlation.
			CO 4	Explore the relationship between variables of databases of the problems and evaluate standard form of the problem by the method of least squares (Method of curve fitting).
			CO 5	Conduct investigation on hypothesis testing in statistical problems and evaluate solution of problem in appropriate form.
14	4CE1-03	Managerial Economics & Financial	**CO 1**	Determine the objectives, nature, scope, role & responsibilities of a manager of a business undertaking.
			CO 2	Predict the demand for a product or product mix of a company & to Analyse various factors influencing demand elasticity. Forecast & compute the future sales level of a product by using various quantitative & qualitative techniques and with the help of past sales data.

			CO 3	Differentiate the meaning, importance, sources, & uses of capital in an enterprise and to estimate the working capital requirements.
			CO 4	Know the meaning, importance, steps, methods, uses & limitations of Capital Budgeting & Market Structure.
			CO 5	Interpret, Analyse, discuss & comment on the financial performance of a business unit through liquidity leverage, coverage, turn over & profitability ratios.
15	4CE3-04	Basic Electronics for Civil Engineering Applications	**CO 1**	Understand the concepts of Digital Electronics.
			CO 2	Interpret the Basic Electronics in measurements in Civil Engineering applications.
			CO 3	Analyse and equip with Errors in measurements systems and to expose to Data Acquisition and Processing.
			CO 4	Apply skills of Sensors and to explain Various Sensor Characteristics.
			CO 5	To share them Image processing Tools and Mat lab codes on Images.
16	4CE4-05	Strength of Materials	**CO 1**	Understand and apply the concept of stress and strains and to evaluate stress and strains in different members.
			CO 2	Apply and Analyse the Bending moment, Shear force and Axial thrust diagrams for statically determinate beams and the distribution of bending and shear stresses for simple and composite sections.
			CO 3	Interpret and compare the elementary concepts of torsion, shear stress in solid and hollow circular shafts.
			CO 4	Evaluate the short and long columns subjected to various loading conditions.
			CO 5	Apply and Analyse the relation between load, shear force, bending moment and slope deflection.
17	4CE4-06	Hydraulics Engineering	**CO 1**	Understand dimensional analysis and Analyse the various models, concepts and characteristics of boundary layer and turbulent flow.
			CO 2	Classify steady, unsteady, uniform and non-uniform flow, to apply and evaluate gradually and rapidly varied flow in open channel flow
			CO 3	Identify about the working of hydraulic machines like pumps, turbines: To apply and relate the performance of hydraulic machines

			CO 4	Describe about hydrological phenomenon, unit hydrograph, Analyse the rainfall, and properties of aquifer: to Analyse and estimate the runoff and peak runoff rate.
			CO 5	Apply and estimate water requirement, delta, duty and base and various aspects of Design of Canal: To understand various approaches of cross section of channels and silt control in canals and Analyse Kennedy's theory and Lacey's theory.
18	4CE4-07	Building Planning	**CO 1**	Understand and Analyse the different types of buildings, criteria for location and site selection and the different methods of drawing sun chart and sun shading devices.
			CO 2	Apply and Analyse the Climatic and comfort Consideration using climate modulating devices and evaluate the orientation criteria for tropical climate with the consideration of Building Bye Laws and NBC Regulations.
			CO 3	Evaluate the principles of Planning and different factors affecting planning including Vastu Shastra in Modern Building planning.
			CO 4	Interpret and compare the functional design and Accommodation requirements of different Buildings.
			CO 5	Relate the Services in Buildings.
19	4CE4-08	Concrete Technology	**CO 1**	Apply the knowledge of properties and role of various ingredients like cement, aggregate, admixtures etc. to produce good quality concrete.
			CO 2	Analyse properties of fresh and harden concrete by examining in lab and perform destructive, semi-destructive and non-destructive tests for concrete.
			CO 3	Categorize the concrete manufacturing process and selecting right step by step process to achieve workable, durable of fresh and harden concrete.
			CO 4	Design the concrete mix with suitable chemical admixture; this fulfils the required properties for fresh and hardened concrete.
			CO 5	Create the advance concrete and develop such concrete by adding and manipulating composition.
20	4CE4-21	Material Testing Lab	**CO1**	Explain basic properties of materials.
			CO2	Identify the test to be conducted for different properties of building materials.
			CO3	Test for different properties of building materials.

			CO4	Analyse the test results for different properties.
21	4CE4-22	Hydraulics Engineering Lab	**CO1**	Describe the equipment's used for behaviour and measurement of fluid in hydraulic structure
			CO2	Apply characteristics of Pelton Wheel, hydraulic jump and Centrifugal Pump in civil engineering
			CO3	Analyse the discharge by using various instruments like venturimeter Broad crested weir.
			CO4	Evaluate momentum equation, Manning'& Chezy's coefficient of roughness for the bed of a given flume.
22	4CE4-23	Building Drawing	**CO1**	Create drawing of basic components of buildings.
			CO2	Identify the components of different buildings required as per their functional need.
			CO3	Create drawing of building masonry.
			CO4	Draw the plan, section and elevation of a building
23	4CE4-24	Advanced Surveying Lab	**CO1**	Identify the instruments required for a particular survey problem
			CO2	Device a method to fulfill the desired objective.
			CO3	Conduct the survey experiment using appropriate instruments and procedure.
			CO4	Analyse the data obtained and get the results after necessary computations.
24	4CE4-25	Concrete Lab	**CO1**	Explain the Quality control test on ingredients of concrete
			CO2	Conduct Quality Control test on ingredients of fresh and hardened concrete.
			CO3	Analyse the test on fresh and hardened concrete and Non-destructive test on concrete.
			CO4	Design the concrete mix.
23	5CE3-01	Construction Technology and equipment	CO 1	Implement the basic concept of engineering economics and evaluate cost optimization.
			CO 2	Apply the safety provision in the construction industry.
			CO 3	Analyse the safety in construction and evaluate safety requirements.
			CO 4	Analyse the Construction Planning and Materials Management.
			CO 5	Distinguish the different types of Construction Equipment and their Management.
24	5CE4-02	Structure Analysis- I	CO 1	Calculate the degree of indeterminacy of any structures.

			CO 2	Analyse the indeterminate structures by different kinds of methods.
			CO 3	Analyse the indeterminate structures by different kinds of methods.
			CO 4	Students will get the knowledge of elementary concepts of structural vibration.
			CO 5	Analyse the vibrating structure.
25	5CE4-03	Design of Concrete Structures	CO 1	Analyse the Singly reinforced beam and Design the Singly reinforced beam by Working Stress Method.
			CO 2	Differentiate the Singly reinforced beam & doubly reinforced beam and Design the Doubly reinforced beam by using Limit State Method.
			CO 3	Analyse the beam for flexure, shear, torsion, bond and anchorage and development length.
			CO 4	Categorized and design the one way and two-way concrete slab according IS 456 -2000.
			CO 5	Design the axially loaded, eccentrically loaded short columns, Isolated & Combined foundation.
26	5CE4-04	Geotechnical Engineering	CO 1	Interpret the Objective, scope and outcome of the course. Understand the soil constituents and classification of soil also apply the Engineering and Index properties of soil.
			CO 2	Implement and Analyse the concept of shearing strength of soil, Compaction of soil and vertical and horizontal stresses of soil.
			CO 3	Apply and Analyse the Compressibility of soil, Consolidation characteristics and settlement of soil.
			CO 4	Differentiate the stability of slopes and Earth pressures on soil.
			CO 5	Implement and Analyse the Bearing capacity and Site investigation of soil.
27	5CE4-05	Water Resources Engineering	CO 1	Apply appropriate methods of irrigation technique and evaluate water requirements for crop production.
			CO 2	Evaluate channels for appropriate water application in respective areas.
			CO 3	Design of various dams in respective areas.
			CO 4	Apply various cross-drainage structures in respective areas.
			CO 5	Analyse appropriate hydrological phenomena and estimate watershed yield.

28	5CE5-12	Disaster Management	CO 1	Implement the basic concept of hazard and disaster.
			CO 2	Analyse the Disaster Management Terminology.
			CO 3	Distinguish and Analyse the different types of disasters.
			CO 4	Analyse and demonstrate the disaster management cycle and identify safety tips.
			CO 5	Relate the Disaster management system in India and evaluate the role of society in disaster management.
29	5CE5-13	Town Planning	CO 1	Describe the concept of Town Planning and different terminologies, town planning National Protocols
			CO 2	Discuss town planning methodologies and significant impact on a project
			CO 3	Apply the concept of town planning on real scenarios
			CO 4	Analyse effect of town planning on growth of a city
			CO 5	Conduct case studies of various towns of India
30	5CE5-14	Repair and Rehabilitation of Structures	CO 1	Analyse the sequence of construction activities and methods of construction of various structural elements
			CO 2	Evaluate the conventional and modern materials that are commonly used in Civil Engineering construction
			CO 3	Apply and differentiate various NDT (Non-Destructive Test) techniques.
			CO 4	Differentiate among various Repairing techniques and materials
			CO 5	Conduct the investigation on the case studies of bridges, piers and different concrete structures.
31	5CE5-15	Ground Improvement Technique	CO 1	Understand the fundamental concepts of ground improvement techniques in civil engineering construction activities
			CO 2	Describe the different techniques of ground improvements
			CO 3	Apply knowledge of mathematics, Science and Geotechnical Engineering to solve problems in the field of modification of ground required for construction of Civil Engineering structures.
			CO 4	Illustrate reinforced wall design using steel strip or geo-reinforcement
			CO 5	Use effectively the various methods of ground improvement techniques and outline the solution for problematic soils

32	5CE4-21	CONCRETE STRUCTURES DESIGN	CO1	Assess the bending moment and shear force for beams, columns, slabs and footings.
			CO2	Analyse the design parameters of the flexural members to fulfill the requirements of WSM and Limit state of Collapse for Flexure, shear and torsion.
			CO3	Design of flexural members for flexure, shear, bond, development length & curtailment of bar to fulfill the criteria of Limit State of Collapse for Flexure, shear and Torsion.
			CO4	Analyse and design of column and column footings economically and suitably recommend the appropriate type according to site conditions
33	5CE4-22	Geotechnical Engineering Lab	CO1	Implement and Analyse the properties of soil such as Grain size distribution, specific Gravity, liquid limit, plastic limit and density etc.
			CO2	Classify C-Ø values by unconfined compression Test Apparatus, Direct Shear Test Apparatus and Triaxial Test.
			CO3	Evaluate the differential free swell index, swelling pressure, CBR of soil.
			CO4	Interpret the compressibility parameters of soil by consolidation test, permeability of soil by constant and falling head methods.
34	5CE4-23	Water Resource Engineering Design Lab	CO1	LO1) Explain the basic concept of water resource engineering, canals, dams, well irrigation, cross drainage structure and hydrology.
			CO2	LO2) Apply the water resource concept in irrigation system, canals, diversion head works, dams, well irrigation, cross-drainage structure and hydrology.
			CO3	LO3) Analyse the water requirement of crop, seepage losses in dam, forces acting on dam, run off and rain fall.
			CO4	LO4) Design of canal, surface and subsurface flows, dams like embankment and gravity dam, tube well.
35	6CE03-01	Wind & Seismic Analysis	CO 1	Understand the basic concept of building configuration & differentiate the types of building, shear walls, framed structure and Tube Structure.
			CO 2	Analyse the different types of design load as per Indian Standard Codes 875 Part-I, II & load Flow Concept in a Structure.

			CO 3	Differentiate the Flat, Pitched and Mono slope roof and Analyse the roofs with respect to wind load as per Indian standard code IS 875-III.
			CO 4	Analyse the frame structures for earthquake load as per Indian standard code IS1893-I.
			CO 5	Differentiate the provision for earthquake resistance building as per Indian standard code IS 4326, IS13827, IS13828, IS13920 and IS13935.
36	6CE4-02	Structural Analysis-II	CO 1	Understand among various types of structures and Examine & Produce the Structure by Strain Energy method and Unit Load Method.
			CO 2	Apply the basic principles of SFD & BMD for the rolling loads and mathematical problems with reference to rolling loads and ILD.
			CO 3	Evaluate between types of arches and evaluate the stability of arches.
			CO 4	Analyse the concept of unsymmetrical bending and shear centre.
			CO 5	Analyse and Evaluate the Frame by using three different methods and build & differentiate among these methods.
37	6CE4-03	Environmental Engineering	CO 1	Analyse the various water quality standard, Distinguish the water distribution system and design the various reservoir
			CO 2	Analyse the various water treatment methods, design and apply the various parameters used in the sewer system.
			CO 3	Design the sewerage systems, Analyse the various Sewage characteristics Quality parameters and Distinguish the Standards of disposal in land
			CO 4	Analyse the various treatment method of sewage, Evaluate the various Pollution due to improper disposal of sewage, Distinguish the Wastewater Disposal and Refuse method
			CO 5	Analyse the Quantification of air pollutants, evaluate various control methods measures for Air pollution and noise pollution
38	6CE4-04	Design of Steel Structures	CO 1	Analyse steel sections used in steel structures and the suitable sections for design.

			CO 2	Analyzing the different kinds of connection used in steel structures and being able to create the compression and tension member.
			CO 3	Create the laterally supported and unsupported steel beams and Analyse the gantry girder, plate girder and laterally loaded steel members.
			CO 4	Analyse and apply the different type's column bases.
			CO 5	Analyse and create the truss girder and foot over bridge.
39	6CE4-05	Estimating and Costing	CO 1	To provide the student with the ability to estimate the quantities of item of works involved in buildings and bill of quantities
			CO 2	To provide the student with the ability to estimate the quantities of item of works involved in different projects
			CO 3	To provide the student with the ability to do rate analysis
			CO 4	Preparation of estimates for different works like roads, buildings, earth work, water supply etc.
			CO 5	To provide the student with the ability to valuation of properties
40	6CE5-12	Solid and Hazardous Waste Management	CO 1	Analyse and characterization of solid waste, hazardous waste constituents.
			CO 2	Understand health and environmental issues related to solid waste management.
			CO 3	Apply steps in solid waste management-waste reduction at source, collection techniques, materials and resource recovery/recycling, transport of solid waste
			CO 4	Analyse treatment and disposal techniques, economics of the onsite vs. offsite waste management
			CO 5	Evaluate the effectiveness of a waste-to-energy facility in terms of energy production, emissions, and waste reduction.
41	6CE5-13	Traffic Engineering & Management	CO 1	Understand characteristics of road, road users and vehicle performance with traffic law
			CO 2	Analyse various traffic surveys and their interpretation with applications & significance.
			CO 3	Evaluate various intersections, traffic signs and markings.

			CO 4	Analyse road accidents its causes, effects, prevention, traffic and
			CO 5	Analyse Traffic Management System by Direct and indirect methods.
42	6CE5-14	Bridge Engineering	CO 1	Explain different types of bridges, components and loadings as per Indian standards provisions
			CO 2	Apply the fundamental concept of bridge loadings on Steel and RCC bridges
			CO 3	Analyse the RCC and steel bridges using Courbons and Hendry-Jaegar method
			CO 4	Design of Bearings, Steel and RCC bridges according to IRC codal provisions
			CO 5	Evaluate the impact of environmental factors on the durability of different bridge materials.
43	6CE5-15	Rock Engineering	CO 1	Define the use of rock mass classification systems (RMR & Q).
			CO 2	Explain methods for in situ investigation and laboratory testing of rock matrix and discontinuities.
			CO 3	Apply the knowledge ofthe characteristics and the mechanical properties (strength and failure criteria) of rock mass, rock matrix and discontinuities.
			CO 4	Analyse the stress distribution (isotropic, anisotropic) in situ and around an opening in rock (competent rock, jointed rock mass, blocky rock)
			CO 5	Analyse the potential environmental impact of rock excavation and suggest appropriate mitigation measures.
44	6CE5-16	GIS & Remote Sensing	CO 1	Evaluate Photogrammetric and apply principles of Photogrammetric to create maps and their substitutes
			CO 2	Analyse the basic concept of remote sensing.
			CO 3	Evaluate and Analyse different types of platforms, sensors and their characteristics in Remote Sensing.
			CO 4	Analyse and create the different types of information from different remote sensing data products using various image processing techniques.
			CO 5	Create the basic concept of GIS and Analyse the use of GIS tools for civil engineering purpose.

45	6CE4-21	Environmental Engineering Design And Lab	CO1	Understand the water quality parameters their permissible limits and compute population forecasting water demand
			CO2	Analyse the physical and chemical tests to be conducted for the water before supply.
			CO3	Design of filters, tanks, densification units and transmission system
			CO4	Design of sewer lines, storm water systems, aerobic & anaerobic treatment units
46	6CE4-22	STEEL STRUCTURES DESIGN LAB	CO1	Calculate the plastic moment of different cross section and design of bolted and welded connections
			CO2	Analyse and design the tension, compression & column bases member under axial and combined loading
			CO3	Discuss the pre-engineered buildings, bridges & trusses
			CO4	Identify and Demonstrate the various section of steel structures at field visit
47	6CE4-23	QUANTITY SURVEYING AND COSTING	CO1	Able to prepare preliminary and detailed estimates by various methods.
			CO2	Able to do rate analysis of various items of work
			CO3	Able to evaluate earth work for road, canals ad channels.
			CO4	Able to do Valuation of Buildings and Properties.
48	6CE4-24	Water and Earth Retaining Structure design lab	CO1	Understand concept of coefficient method (IS code) and apply it for analysis and design of continuous beams.
			CO2	Analysis and design of circular domes with u.d.l. & concentrated load at crown
			CO3	Classification of water tanks according to shape and design of rectangular, circular and intze type tanks.
			CO4	Analysis and design of Cantilever Retaining Walls and introduction to counterfort and buttress type retaining walls.
49	6CE4-25	Design of Foundations	CO1	Apply the theoretical knowledge of bearing capacity to design various types of shallow foundation.
			CO2	Understand the design of pile foundation (covering both geotechnical and structural aspects)
			CO3	Discuss the different components of well foundation, its construction and design methods.
			CO4	Use the theoretical knowledge of earth pressure to Analyse and design of various retaining structures.

50	7CE1A	Water Resources Engineering-I	CO 1	Apply and Analyse the functions, advantages of present status of irrigation in India and water harvesting and conservation.
			CO 2	Discuss the role of command area development authority and Canal Irrigation. To Analyse and Evaluate the design of channels, regime and semi theoretical approaches.
			CO 3	Apply and Distribution of Canal Water. To apply and evaluate different stages of rivers, and river training & bank protection works.
			CO 4	Analyse and Apply Water Logging Causes and types of channels lining and design of lined channels.
			CO 5	Use the Hydrology and Hydrologic cycle and evaluate Application to Engineering problems, measurement of rainfall, rain gauge, peak flow, flood frequency method
51	7CE2A	Design of Steel Structures-I	**CO 1**	Apply and Analyse the types of steel, their broad specifications and Plastic analysis of steel structures.
			CO 2	Design the bolted and welded connections under axial and eccentric loadings.
			CO 3	Implement and Analyse the Compression Member.
			CO 4	Classify and design the beams and their connections.
			CO 5	Analyse the column bases, Slab base, gusseted base for axial and eccentric compressive load.
52	7CE3A	Design of Concrete Structures-II	**CO 1**	Compare the concept of Pre-Tension & Post- Tension concrete and students are able to Analyse and Apply the concept of Pre-Tension & Post- Tension on rectangular Prestressed concrete Section.
			CO 2	Classify Torsion and different types of beam and Analyse & Evaluate the three types of Beams by using Indian Standard Code: 456-2000.
			CO 3	Differentiate and apply the types of Tank and Dome using Indian Standard code: 3370-Part2-2009.
			CO 4	Describe the basic concept of Yield Line Theory & its applications & students are able to differentiate, Evaluate and analyse the different types of Retaining walls.

			CO 5	Classify the bridge and Culvert and students are able to apply and analyse the slab culvert and T- Bridge for IRC Loading by using Indian Stand Code: IRC 6-1966 and IRC 21-2000.
53	7CE4A	Transportation engineering-II	**CO 1**	Classify the various permanent way components, features, maintenance, and signal systems.
			CO 2	Apply and design the points and crossings, at surface, elevated and underground railway system conditions.
			CO 3	Design the various geometric attributes and gauge widening in the railway system.
			CO 4	Analyse the several components of airport engineering.
			CO 5	Design airport pavement by using various methods.
54	7CE5A	Application of Numerical Methods in Civil Engineering	**CO 1**	Discuss the decimal and binary number system and understand the concept of Accuracy, Errors and approximations for solution of problems.
			CO 2	Explain basic concepts of iterative methods and apply appropriate iterative methods for numerical solutions of nonlinear equations.
			CO 3	Execute the basic concept of matrices and understand consistency of the system of equations for solving linear systems of equations by direct methods.
			CO 4	Apply the concept of iterative methods and create the approximate solution of the linear system of equations by use of appropriate iterative methods.
			CO 5	Discuss the concept of finite differences, Analyse the various methods and apply knowledge of interpolation for solution of engineering problems.
55	7CE6.1A	Advanced Transportation Engineering	**CO 1**	Classify the different traffic studies and also to apply & Analyse the traffic data by various methods.
			CO 2	Apply the various methods for traffic engineering and also to solve out the problems based on distribution.
			CO 3	Analyse the principles of roads & signals and also design the various roads and signals in traffic engineering.
			CO 4	Analyse the various traffic laws and regulations & also to evaluate the various types of markings and signs.

			CO 5	Evaluate the effect of traffic on the environment and to understand & remember the various road safety measures.
56	7CE7A	Design of Water Resource Structures-I	**LO1**	Explain the basic concept of water resource engineering, canals, dams, well irrigation, cross drainage structure and hydrology.
			LO2	Apply the water resource concept in irrigation system, canals, diversion head works, dams, well irrigation, cross-drainage structure and hydrology.
			LO3	Analyse the water requirement of crop, seepage losses in dam, forces acting on dam, run off and rain fall.
			LO4	Design of canal, surface and subsurface flows, dams like embankment and gravity dam, tube well.
57	7CE8A	Steel Structures Design-I	**LO1**	Analyse steel sections used in steel structures and the suitable sections for design.
			LO2	Analyzing the different kinds of connection used in steel structures and being able to create the compression and tension member.
			LO3	Create the laterally supported and unsupported steel beams and Analyse the gantry girder, plate girder and laterally loaded steel members.
			LO4	Analyse and apply the different type's column bases.
			LO5	Analyse and create the truss girder and foot over bridge.
58	7CE9A	Concrete Structures Design-II	**LO1**	Recall the basics of shear force and bending moment diagram.
			LO2	Analysis and design of beams for flexure, shear and torsion as per codal provisions.
			LO3	Apply checks for collapse and serviceability criteria for design of RC members as per codal provisions.
			LO4	Analysis and design of slab, column and footing as per codal provisions.
59	7CE10A	Application of Numerical Methods in Civil Engineering Lab	**LO1**	Know about how to make engineering easy and more interesting.
			LO2	Understand application of numerical methods.
			LO3	Application of numerical methods to make program in language C.
60	7CETR	Practical Training & Industrial Visit	**LO1**	Participate in the projects in industries during his or her industrial training.

			LO2	Describe use of advanced tools and techniques encountered during industrial training and visit.
			LO3	Interact with industrial personnel and follow engineering practices and discipline prescribed in industry.
			LO4	Develop awareness about general workplace behavior and build interpersonal and team skills.
			LO5	Prepare professional work reports and presentations.
61	7CEPR	Project-I	**CO 1**	Team works to select an engineering problem and its solution
			CO 2	Formulate the problem and design using modern technologies and new software learning
			CO 3	Develop the engineering solutions by considering society and environment
			CO 4	Applying solution considering societal, health, safety, legal and cultural issues
			CO 5	Analysis and explanation of data to provide the valid conclusions.
			CO 6	Use of management principles in project functioning and consider the multidisciplinary environments.
			CO 7	To work effectively in Project as an individual member and team by following the ethical principles
			CO 8	Communicate effectively for various activities with help of reports, presentations and verbal communication that can help in life-long learning.
62	8CE1A	Water Resources Engineering-II	**CO 1**	Classify and design the Regulation of works and Drainage Structure.
			CO 2	Apply and Analyse the surface and subsurface flows, using Bligh's and Khosla's theory, also describe the weirs and barrages.
			CO 3	Implement and Analyse the Embankment Dams and Gravity Dams with the stability and seepage analysis.
			CO 4	Select and evaluate spillways and gates, general features of hydroelectric schemes, elements of power house structure, selection of turbines and cavitations.

			CO 5	Evaluate the impact of water projects on river regimes and environment. To Analyse the Reservoir sedimentation and water shed management using optimization techniques and system approach and G.I.S. and Computer aided irrigation design.
63	8CE2A	Design of Steel Structures-II	**CO 1**	Differentiate the Gantry girder and Roof Truss and also Apply & analyse the Gantry girder and Roof Truss with help of Indian Standard Code: 800-2007, IS: 875-Part-III and understand the application of Tubular Sections.
			CO 2	Classify and evaluate the welded section & bolted Section using Design Specification IS: 800-2007.
			CO 3	Design the bridge, Categorization & Produced the Deck Type Bridge with help of Indian Standard Bridge Rule Code.
			CO 4	Design of bridge and differentiate the Foot over Bridge & Truss Girder Bridge with help of Indian Bridge Rule Code.
			CO 5	Differentiate explanation of the types of tank and analyse among these tank with the help of Indian Standard Code: IS 804-1967, IS 805-1968.
64	8CE3A	PPCM	**CO 1**	Discuss the financial evaluation of the project and also to differentiate the various construction project techniques.
			CO 2	Evaluate the different project management techniques and also Analyse the methods of network for various projects.
			CO 3	Solve the problems related to project cost and time control and also to understand the cost and time for various projects.
			CO 4	Discuss the skills of contract management and also to evaluate the various contracts and tenders
			CO 5	Discover about the safety measures at construction sites and also to remember and understand the various environment and social aspects of construction projects.
65	8CE4.2A	Advance Foundation Engineering	**CO 1**	Discuss the various methods of estimation of bearing capacity of shallow foundation at different loading and water level conditions.
			CO 2	Evaluate the settlement under shallow foundation by various methods available with reference to Indian Standards.

			CO 3	Classify different types of pile with their use, modes of failure and to estimate bearing capacity and settlement of pile foundation at various conditions.
			CO 4	Analyse the behavior of collapsible and expansive soils also designs practices of foundation for these soils.
			CO 5	Classify common types of raft, modes of failure and to measure bearing capacity, settlement of raft and well foundation at various conditions.
66	8CE5A	Design of Water Resource Structures-II	**LO 1**	Classify and design the Regulation of works and Drainage Structure.
			LO 2	Apply and Analyse the surface and subsurface flows, using Bligh's and Khosla's theory, also describe the weirs and barrages.
			LO 3	Implement and Analyse the Embankment Dams and Gravity Dams with the stability and seepage analysis.
			LO 4	Select and evaluate spillways and gates, general features of hydroelectric schemes, elements of power house structure, selection of turbines and cavitation's.
			LO 5	Evaluate the impact of water projects on river regimes and environment. To Analyse the Reservoir sedimentation and water shed management using optimization techniques and system approach and G.I.S. and Computer aided irrigation design.
67	8CE6A	Professional Practice & Estimating	**LO1**	Determine the NPV, IPR and B/C ratio and Understand about the tender and contracts.
			LO2	Understand the drafting of tender and contracts.
			LO3	Understand the contract models – PPP, BOT and BOOT
			LO4	Develop the understanding about dispute settlement and Prepare Bar- chart and Analyse the network by PERT & CPM.
68	8CE7A	Steel Structures Design-II	**LO1**	Calculate the plastic moment of different cross section and design of bolted and welded connections
			LO2	Analyse and design the tension, compression & column bases member under axial and combined loading
			LO3	Discuss the pre-engineered buildings, bridges & trusses
			LO4	Identify and demonstrate the various section of steel structures at field visit
69	8CE8A	Design of Foundations	**LO1**	Understand the significance and determine the load bearing capacity for shallow foundation.

			LO2	Analyse the settlement behaviour of different type of soil.
			LO3	Calculate the load bearing capacity for deep foundation
			LO4	Apply the behaviour of different type of soil under different conditions.
			LO5	Design the various parameters of raft and well foundations
70	8CE9A	Structural Analysis by Matrix Methods	**LO1**	Distinguish statically determinate and redundant structural systems.
			LO2	Analyses a suitable method for the structural system.
			LO3	Calculate the forces in axially loaded member.
			LO4	Know the deflection in axially loaded member.
			LO5	Know the behavior of the frame and truss structure by flexibility and stiffness method
71	8CESM	Seminar	**LO1**	LO1: Discover potential research areas and conduct a survey of several available literatures in the preferred field of study.
			LO2	LO2: Compare and contrast the several existing solutions for research challenge.
			LO3	LO3: Report and present the findings of the study conducted in the preferred domain.
72	8CEPR	Project	**CO 1**	Team works to select an engineering problem and its solution
			CO 2	Formulate the problem and design using modern technologies and new software learning
			CO 3	Develop the engineering solutions by considering society and environment
			CO 4	Applying solution considering societal, health, safety, legal and cultural issues
			CO 5	Analysis and explanation of data to provide the valid conclusions.
			CO 6	Use of management principles in project functioning and consider the multidisciplinary environments.
			CO 7	To work effectively in Project as an individual member and team by following the ethical principles
			CO 8	Communicate effectively for various activities with help of reports, presentations and verbal communication that can help in life-long learning.

Bachelor of Technology Electronics and Communication Engineering

Program Name: B.Tech. in Electronics and Communication Engineering

Subject/Code No: Advanced Engineering Mathematics-I & 3EC2-01
LTP: 3+1+0 Semester: III
Course Outcomes

CO Number	CO Definition
CO1	Elucidate the concepts of Laplace transformation, Fourier transformation, and Z transformation. Describe numerical techniques for deducing unknown values using known data, methodologies for locating roots, and approaches for solving diverse types of differential equations such as ordinary, partial, and simultaneous differential equations.
CO2	Utilization of suitable technology and assessment of the feasibility of various methods for numerically solving problems.
CO3	Examine the underlying principles of Fourier, Laplace, and Z-Transforms. These methodologies can be conducted using formulations based on either the time domain or the transform domain.
CO4	Design electrical circuits, including filters and networks, finds its optimal application in examining transient response phenomena. Likewise, the z-transform plays an essential role in both designing and analyzing digital filters, particularly those with infinite impulse response (IIR). Moreover, spatial, adaptive, inverse, and Wiener filters serve specialized purposes within distinct applications.

Subject/Code No: Managerial Economics and Financial Accounting, 3EC1-03
LTP: 2+0+0 Semester: III
Course Outcomes

CO Number	CO Definition
CO1	Examine economic principles such as demand, supply, market arrangement, and financial administration encompassing concepts like balance sheets.
CO2	Utilization of pertinent methodologies: employment of demand and supply equations, production and cost equations, along with theories of pricing.
CO3	Investigate the interconnections among economic factors through the lens of elasticity, analysis of cash flows, scrutiny of fund flows, and evaluation using ratios.
CO4	Assess tangible challenges faced by businesses by employing capital budgeting methods.

Subject/Code No: Digital System Design 3EC4-04
LTP: 3+0+0
Semester: III Course Outcomes

CO Number	CO Definition
CO1	To introduce the idea of the number system, Boolean Algebra, combinational and sequential circuits, semiconductor memories, and the flow of VLSI design.
CO2	Utilize suitable technology to enhance circuit performance, leading to smoother and faster operations, thereby conserving time and energy.
CO3	Examine the creation process and compromises within different digital electronic categories, aiming to achieve lower power usage and smaller sizes.
CO4	Evaluate both synchronous and asynchronous sequential circuits, and cultivate the skill to design such circuits using VHDL.

Subject/Code No: Signal & Systems, 3EC4-05
LTP: 3+0+0 Semester: III
Course Outcomes

CO Number	CO Definition
CO1	Illustrate the mathematical portrayal and categorizations of signals, linear shift-invariant (LSI) systems, the sampling theorem, and multiple-input multiple-output (MIMO) systems, along with their characteristics.
CO2	Elaborate on the concept of convolution as a means to elucidate the evolution of a linear time-invariant (LTI) system's response over time. This facilitates the analysis of both analog and digital communication systems' behaviors.
CO3	Investigate signals and systems through diverse transform domain techniques such as continuous-time Fourier transform (CTFT), discrete-time Fourier transform (DTFT), Laplace transform, and Z transform.
CO4	Examine the stability, linearity, causality, and time invariance of the system to ascertain its fundamental properties.
CO5	Design and execute the construction of zero-order hold and first-order hold interpolators.

Subject/Code No: Network Theory, 3EC4-06
LTP: 3+1+0 Semester: III
Course Outcomes

CO Number	CO Definition
CO1	Elaborate on and provide insights into different notions encompassing mesh and node analysis, network theorems, frequency domain, time domain, electrical networks, Fourier series, transformations, port networks, and the analysis of filters.
CO2	Grasping the concepts of mesh and node analysis, network theorems, frequency domain, time domain, and electrical networks, along with delving into port networks and studying transient behavior analysis, offers a comprehensive understanding of the dynamics within a network.
CO3	Examine the functioning of electrical networks in relation to parameters and scrutinize the disparities between frequency domain and time domain analyses.
CO4	Assess the distinct parameters characteristic of both A.C. and D.C. networks.

Subject/Code No: Electronics Devices, 3EC4-07
LTP: 3+1+0 Semester: III
Course Outcomes

CO Number	CO Definition
CO1	Comprehend and elucidate the fundamental attributes of semiconductor materials, compound semiconductors, thermistors, P-N diodes, Zener diodes, Schottky diodes, bipolar junction transistors, MOSFETs, LEDs, photodiodes, solar cells, and the process of CMOS fabrication.
CO2	Grasping the concepts of mesh and node analysis, network theorems, frequency domain, time domain, and electrical networks, along with delving into port networks and studying transient behavior analysis, offers a comprehensive understanding of the dynamics within a network.
CO3	Examine and discern modifications in parameters like current, voltage, power, energy, power dissipation, time, and temperature.
CO4	Construct the voltage-current (V-I) characteristics of semiconductor devices, both with and without temperature fluctuations, and formulate the design of a complementary metal-oxide-semiconductor (CMOS) structure through a variety of fabrication steps, including oxidation, deposition, etching, diffusion, and metallization.

Subject/Code No: Electronics Devices Lab, 3EC4-21
LTP: 0+0+2 Semester: III
Course Outcomes

CO Number	CO Definition
CO1	Understand the concepts of semiconductor devices and components such as diodes, BJTs, JFETs, and MOSFETs.
CO2	Elaborate on the operational principles underlying semiconductor devices.
CO3	Create, examine, and assess various components in practical scenarios on a breadboard.
CO4	Analyze outcomes and substantiate them by contrasting them with ideal expectations.

Subject/Code No: Digital System Design Lab, 3EC4-22
LTP: 0+0+2 Semester: III
Course Outcomes

CO Number	CO Definition
CO1	Create, experiment with, and assess different combinational circuits like adders, subtractors, comparators, multiplexers, and demultiplexers.
CO2	Showcase the truth table for different logical expressions utilizing logic gates.
CO3	Recognize diverse digital integrated circuits (ICs) and grasp their functionalities.
CO4	Examine, devise, and execute Flip-Flops through analysis and design.

Subject/Code No: Signal Processing Lab, 3EC4-23
LTP: 0+0+2 Semester: III
Course Outcomes

CO Number	CO Definition
CO1	Understand the fundamental aspects of MATLAB, gain insight into signal basics and their diverse operations.
CO2	Create stochastic signals alongside various continuous and discrete-time signals.
CO3	Construct simple signal processing algorithms and validate them through MATLAB.
CO4	Authenticate random sequences characterized by varied distributions, mean values, and variances.
CO5	Devise, execute, interpret, and analyze experiments, followed by comprehensive data reporting.

Subject/Code No: Computer Programming Lab-I, 3EC3-24
LTP: 0+0+2 Semester: III
Course Outcomes

CO Number	CO Definition
CO1	Understand the significance of structure and abstract data types, along with their fundamental applicability in diverse scenarios.
CO2	Evaluate and distinguish between various algorithms by considering their time complexity.
CO3	Construct linear and non-linear data structures through the utilization of linked lists.
CO4	Comprehend and employ a range of data structures like stacks, queues, trees, graphs, and more, to address diverse computational challenges.
CO5	Develop proficiency in deploying different searching and sorting methods, and make informed decisions regarding their selection based on specific requirements.

Subject/Code No: Industrial Training, 3EC7-30
LTP: 0+0+1 Semester: III
Course Outcomes

CO Number	CO Definition
CO1	Engage in industry projects as part of the industrial training experience.
CO2	Collaborate with professionals from the industry and adhere to established engineering protocols and standards.
CO3	Foster an understanding of typical workplace conduct and cultivate interpersonal and teamwork proficiencies.
CO4	Create well-structured professional reports and deliver effective presentations.

Subject/Code No: Advanced Engineering Mathematics-II, 4EC2-01
LTP: 3+0+0 Semester: IV
Course Outcomes

CO Number	CO Definition
CO1	Demonstrate an understanding of the characteristics of complex numbers, special functions, and linear algebra, and apply this knowledge to address intricate engineering challenges within domains such as signal processing, which finds relevance in telecommunications (cellular phones), radar systems (facilitating airplane navigation), and even biological contexts (studying neural firing events in the brain).
CO2	Categorize complex contour integrals both through direct assessment and with respect to the fundamental theorem. Apply the Cauchy integral theorem in its diverse formulations.
CO3	Distinguish between various methods for solving higher-order differential equations, including Bessel's and Legendre's equations, and explore their practical application in fields such as hydrodynamics, elasticity theory, and the analysis of electrical transmission line loads in the realm of Electronics and Communication Engineering.
CO4	Conduct an in-depth examination of assorted numerical predicaments, employing appropriate technological tools to resolve them. Undertake a comparative evaluation of the feasibility of distinct approaches to numerically solving problems.

Subject/Code No: Technical Communication, 4EC1-02
LTP: 2+0+0 Semester: IV
Course Outcomes

CO Number	CO Definition
CO1	Elaborate on the technical communication process using the LSRW framework.
CO2	Explore the notion of Technical Materials/Texts across diverse technical publications.
CO3	Understand the skill of producing accurate professional documents.
CO4	Analyze the fundamental principles underlying Technical Reports, articles, and their structural arrangements.

Subject/Code No: Analog Circuits, 4EC4-04
LTP: 3+0+0 Semester: IV
Course Outcomes

CO Number	CO Definition
CO1	Evaluate the distinct attributes of BJT, FET, and OP-AMP amplifiers, along with Phase Shift and Hartley oscillators, delving into their inherent traits.
CO2	Illustrate the utility of mathematical equations in these contexts and undertake a comprehensive analysis of BJT, FET, and OP-AMP amplifiers, coupled with Phase Shift and Hartley oscillators, discerning their unique characteristics.
CO3	Explore the domain of Analog Circuits, specifically focusing on transistor amplifiers like BJT, FET, and oscillators including Phase Shift and Hartley. Delve into the application of mathematical equations in the augmentation of transistor-based amplification and oscillation within diverse fields.
CO4	Analyze the unique features of BJT, FET, and OP-AMP amplifiers, alongside Phase Shift and Hartley oscillators, and explore how they manifest in practical scenarios through numerical problem-solving and application-driven designs.

Subject/Code No: Microcontrollers, 4EC4-05
LTP: 3+0+0 Semester: IV
Course Outcomes

CO Number	CO Definition
CO1	Provide an overview of Microprocessors and Microcontrollers.
CO2	Demonstrate the connection of peripheral devices with fundamental and advanced microprocessors and microcontrollers.
CO3	Devise embedded systems to address industrial challenges utilizing elementary and sophisticated microprocessors and microcontrollers.
CO4	Conduct evaluations to enhance the efficiency of hardware devised for industrial issues.

Subject/Code No: Electronics Measurement & Instrumentation, 4EC3-06
LTP: 3+0+0 Semester: IV
Course Outcomes

CO Number	CO Definition
CO1	Elaborate upon and provide insights into diverse notions of Errors, Electronic Apparatus, Measuring Devices, Oscilloscopes, Signal Generators, Analytical Tools, and Transducers. [Comprehension]
CO2	Employ and put into practice the comprehension of electronic measuring devices, Oscilloscopes, Q-Meters, assorted error classifications, Signal generators, Wave Analyzers, and the process of Transducer selection. [Application, Comprehension]
CO3	Compare among the operations of varied instruments in terms of usability and referencing specific parameters. [Analysis] and assess the distinct parameters associated with diverse Instruments and Transducers.
CO4	Make choices regarding the suitable Instruments and Transducers based on specific applications. [Analysis, Design]

Subject/Code No: Analog and Digital Communication, 4EC4-07
LTP: 3+0+0 Semester: IV
Course Outcomes

CO Number	CO Definition
CO1	Understand various analog and digital methods for modulation and demodulation.
CO2	Able to compute various parameters associated with modulation and demodulation strategies.
CO3	Evaluate the effectiveness of modulation and demodulation techniques across different transmission scenarios.
CO4	Design analog and digital communication transmitters and receivers, such as the Viterbi receiver, through design processes.

Subject/Code No: Analog and Digital Communication Lab, 4EC4-21
LTP: 0+0+3 Semester: IV
Course Outcomes

CO Number	CO Definition
CO1	Comprehend various analog modulation techniques to assess their effectiveness and bandwidth utilization.
CO2	Evaluate how a communication system functions when subjected to noise interference.
CO3	Explore pulse modulation systems, examining their operational efficiency.
CO4	Assess diverse digital modulation methods and calculate their bit error rates.
CO5	Design a communication system that integrates both analog and digital modulation methodologies.

Subject/Code No: Analog Circuits Lab, 4EC4-22
LTP: 0+0+3 Semester: IV
Course Outcomes

CO Number	CO Definition
CO1	Elucidate the functioning of transistor amplifiers and oscillators for the purpose of empirically assessing their attributes across various parameters.
CO2	Utilize circuit diagrams to facilitate the practical assessment of these transistor-based systems and oscillators
CO3	Conduct experiments systematically to generate empirical data in a suitable manner.
CO4	Evaluate the gathered experimental data to discern the characteristic traits exhibited by these transistors and oscillators.

Subject/Code No: Microcontrollers Lab, 4EC4-23
LTP: 0+0+3 Semester: IV
Course Outcomes

CO Number	CO Definition
CO1	Retrieve fundamental concepts of digital fundamentals applicable to Microprocessors and microcontrollers.
CO2	Construct diverse systems associated with assembly-level programming of microprocessors and microcontrollers.
CO3	Discriminate and examine the characteristics of Microprocessors & Microcontrollers.
CO4	Elucidate the foundational understanding of microprocessor and microcontroller interfacing, delay establishment, waveform creation, and Interrupt handling.
CO5	Develop proficiency in deploying different searching and sorting methods, and make informed decisions regarding their selection based on specific requirements.

Subject/Code No: Electronics Measurement & Instrumentation Lab, 4EC4-24
LTP: 0+0+3 Semester: IV
Course Outcomes

CO Number	CO Definition
CO1	Comprehension of the core principles of Electronic Instrumentation. Elucidate and recognize devices for measurement.
CO2	Demonstrate the measurement of resistance, inductance, and capacitance through diverse approaches.
CO3	Assess the instrumentation system aligning with sought-after standards, necessities, and outcomes.
CO4	Appraise varying parameters utilizing a range of measuring tools and transducers.

Subject/Code No: Computer Architecture, 5EC3-01
LTP: 2+0+0 Semester: V
Course Outcomes

CO Number	CO Definition
CO1	Understand the principles of computer organization along with fundamental concepts pertaining to processor architecture, memory arrangement, and input-output mechanisms.
CO2	Examine the fundamental framework of a digital computer, including methods for adding and multiplying integers and floating-point figures using two's complement and IEEE floating-point notation. Delve into the organization of input-output systems.
CO3	Critically assess arithmetic operations on both fixed and floating-point numbers within a computer, employing diverse algorithms such as the restoring method, microprogrammed control units, and DMA controllers.
CO4	Formulate designs for elementary and intermediate RISC pipelines, encompassing considerations like the instruction set, functional units, and integral components of computers.

Subject/Code No: Electromagnetics Waves, 5EC4-02
LTP: 3+0+0 Semester: V
Course Outcomes

CO Number	CO Definition
CO1	Introduce the idea of the number system, Boolean Algebra, combinational and sequential circuits, semiconductor memories, and the flow of VLSI design.
CO2	Utilize suitable technology to enhance circuit performance, leading to smoother and faster operations, thereby conserving time and energy.
CO3	Examine the creation process and compromises within different digital electronic categories, aiming to achieve lower power usage and smaller sizes.
CO4	Evaluate both synchronous and asynchronous sequential circuits, and cultivate the skill to design such circuits using VHDL.

Subject/Code No: Control System, 5EC4-03
LTP: 3+0+0 Semester: V
Course Outcomes

CO Number	CO Definition
CO1	Explain the fundamental notion of control systems encompassing both feedback and open-loop configurations. Explore time and frequency-based evaluations of system responses. Delve into state-variable examination, optimal control strategies, and nonlinear control systems.
CO2	Resolve intricacies related to feedback control systems, time-based responses, frequency-based reactions, and state-variable analyses. Employ tools like Routh-stability criterion, root locus, polar plot, bode plot, Nyquist plots, and state models to ascertain stability.
CO3	Assess the performance of diverse control systems by assessing their behavior in time-domain, frequency-domain, and through state-space analysis techniques.
CO4	Formulate suitable compensatory mechanisms for typical control scenarios using both time and frequency response approaches.

Subject/Code No: Digital Signal Processing, 5EC4-04
LTP: 3+0+0 Semester: V
Course Outcomes

CO Number	CO Definition
CO1	Elucidate the notion of sampling and its subsequent reconstruction. [Recall]
CO2	Elaborate on the Z-Transform, DFT, and FFT algorithms. [Comprehension]
CO3	Utilize the Z-Transform, DFT, and FFT algorithms to scrutinize Linear Shift-Invariant (LSI) systems. [Application and Analysis]
CO4	Formulate Infinite Impulse Response (IIR) and Finite Impulse Response (FIR) filters employing distinct techniques tailored for diverse Digital Signal Processing (D.S.P.) applications. [Design]

Subject/Code No: Microwave Theory & Techniques, 5EC4-05
LTP: 3+0+0 Semester: V
Course Outcomes

CO Number	CO Definition
CO1	Introduction to the fundamental ideas and tenets of microwave engineering.
CO2	Acquire insights into the functioning of electromagnetic waves and the construction of both active and passive microwave networks. Additionally, identify the distinct microwave parameters employed within these networks.
CO3	Examine the effectiveness of an impedance tuning network aimed at optimizing the transmission for satellite and RADAR communication.
CO4	Incorporate active and passive microwave components to construct a representative communication system, enabling an assessment of its impact on the human body.

Subject/Code No: Satellite Communication, 5EC5-14 LTP: 2+0+0
Semester: V
Course Outcomes

CO Number	CO Definition
CO1	Introduction to the structure of satellite systems as a mechanism for achieving rapid, extended-range communication.
CO2	Elaborate on diverse facets linked to satellite systems, including orbital equations, satellite subsystems, link budgeting, modulation, and multiple access methods.
CO3	Examine the array of access strategies employed in satellite communication.
CO4	Solve numerical scenarios concerning orbital motion and the formulation of a link budget based on specified parameters and conditions.

Subject/Code No: RF Simulation Lab, 5EC4-21 LTP: 0+0+3
Semester: V
Course Outcomes

CO Number	CO Definition
CO1	Elaborate upon fundamental microwave network theory and the application of scattering matrices.
CO2	Utilizing microwave energy for targeted heating of specific regions or objects enhances the performance of electronic devices.
CO3	Exhibit a comprehensive understanding of essential radio frequency (RF) concepts, RF amplification, and RF filtering.
CO4	Devise RF amplifier configurations employing microwave bipolar junction transistors (BJTs) and microwave field-effect transistors (FETs).
CO5	Create and manufacture microwave components or devices utilizing micro strip technology.

Subject/Code No: Digital Signal Processing Lab, 5EC4-22 LTP: 0+0+3
Semester: V
Course Outcomes

CO Number	CO Definition
CO1	Categorize signals and employ diverse signal manipulations.
CO2	Investigate assorted attributes of digital systems.
CO3	Construct Simulink models and graphical user interfaces (GUIs) for both analog and digital modulation methods.
CO4	Formulate a variety of Digital Signal Processing (DSP) algorithms using the MATLAB software package for distinct transformations.
CO5	Formulate, examine, and execute Analog & Digital filters through MATLAB programming.

Subject/Code No: Microwave Lab, 5EC4-23 LTP: 0+0+3
Semester: V
Course Outcomes

CO Number	CO Definition
CO1	Elaborate upon the fundamental idea behind microwave component mechanisms utilized in wired communication systems.
CO2	Construct linear and non-linear data structures through the utilization of linked lists.
CO3	Investigate the characteristics of distinct microwave parameters, considering their intrinsic traits.
CO4	Formulate an assessment of and design real-time application-oriented microwave waveguides intended for communication purposes.

Subject/Code No: Industrial Training, 5EC7-30 LTP: 0+0+1
Semester: V
Course Outcomes

CO Number	CO Definition
CO1	Engage in industrial projects as part of the industrial training experience.
CO2	Collaborate with professionals in the industry and adhere to established engineering protocols and standards.
CO3	Cultivate understanding of typical workplace conduct and enhance interpersonal and teamwork proficiencies.
CO4	Generate proficient work reports and deliver well-structured presentations.

Subject/Code No: Power Electronics, 6EC3-01 LTP: 2+0+0
Semester: VI
Course Outcomes

CO Number	CO Definition
CO1	Elaborate on the fundamental functioning and contrast the efficiency of different Power Semiconductor Devices, passive components, and switching circuits.
CO2	Elucidate the operation of step-up and step-down choppers, power supplies, and Buck-Boost converters through an understanding of the fundamental operational traits of power semiconductor devices.
CO3	Formulate typical alternative approaches and choose appropriate power converters for the regulation of electric motors and other industrial-grade equipment.
CO4	Design and assess Controlled Converters for both single-phase and three-phase systems, as well as Voltage and Current Source Inverters.

Subject/Code No: Computer Network, 6EC4-02 LTP: 3+0+0
Semester: VI
Course Outcomes

CO Number	CO Definition
CO1	Capable of acquiring and dissecting the principles behind layered protocol architecture; skillful in recognizing and detailing the system functions within the accurate protocol strata, while also explaining the interplay between these layer
CO2	Resolve mathematical quandaries to grasp data-link and network protocols more comprehensively.
CO3	Utilize network layer protocols and compute the requisite count of subnets for a given network.
CO4	Analyze the dependability of data transmission over the transport layer in the context of bit errors within a lossy channel scenario.

Subject/Code No: Fiber Optics Communications, 6EC4-03 LTP: 3+0+0
Semester: VI
Course Outcomes

CO Number	CO Definition
CO1	Understanding the fundamental ideas and fundamental principles of Fiber Optics Communication.
CO2	Acquiring insight into the functioning of fiber optic communication and applying this understanding to construct an optical measurement setup. This arrangement will enable the measurement of various crucial factors, including numerical aperture, dispersion, and attenuation.
CO3	Evaluating the composition of diverse categories of optical transmitters and receivers for the purpose of setting up optical connections.
CO4	Devising systems for WDM and DWDM, and additionally assessing the efficacy of active and passive optical components.

Subject/Code No: Antennas and Propagation, 6EC4-04 LTP: 3+0+0
Semester: VI
Course Outcomes

CO Number	CO Definition
CO1	Elaborate on the fundamental notion of antennas and their practical uses.
CO2	Determine an antenna's radiation pattern to deduce both its physical configuration and the wavelength of the emitted electromagnetic waves.
CO3	Assess the radiation patterns exhibited by different types of antennas.
CO4	Devise a Smart Antenna system tailored for real-time applications.

Subject/Code No: Information Theory and Coding, 6EC4-05 LTP: 3+0+0
Semester: VI
Course Outcomes

CO Number	CO Definition
CO1	Elaborate on the basics of information theory, including concepts like uncertainty, information, entropy, channel capacity, and the necessity of coding.
CO2	Employ coding methods for both sources and channels, such as Huffman, Lempel-Ziv, and Block codes.
CO3	Assess diverse coding and decoding strategies for multiple applications like compression and data transmission.
CO4	Formulate streamlined codes for error detection and correction techniques.

Subject/Code No: Introduction to MEMS (Professional Elective-II), 6EC5-11 LTP: 3+0+0
Semester: VI
Course Outcomes

CO Number	CO Definition
CO1	Grasp the underlying concepts encompassing the basic principles, configuration, production, characteristics, and methodology behind MEMS/NEMS, encompassing Micro devices, Micro systems, and Micromachining methodologies.
CO2	Utilize MEMS technology to craft minute, accurate entities.
CO3	Investigate the impact of scaling on Micro/Nano Sensors within distinct applications.
CO4	Formulate and execute the blueprint and construction of Micro/Nano devices, along with Micro/Nano systems, to address tangible real-world predicaments.

Subject/Code No: Nano Electronics (Professional Elective-II), 6EC5-12 LTP: 3+0+0
Semester: VI
Course Outcomes

CO Number	CO Definition
CO1	Explain and understand the Schrodinger equation, CMOS Scaling, the nano scale MOSFET, Finfets, Vertical MOSFETs, Resonant Tunneling Diode, Coulomb dots, Quantum blockade, Single electron transistors, Carbon nanotube electronics.
CO2	Use different methods to get energy, wave function, propagation constant, and channel length in MOSFETs and CMOS.
CO3	Analyze and identify the changes in the parameters like inter-atomic distance, 2D and 3D structure, Scaling of CMOS.
CO4	Synthesis the structure of CMOS, Finfet, Vertical MOSFET and Carbon nano tubes.

Subject/Code No: Computer Network Lab, 6EC4-21 LTP: 0+0+4
Semester: VI
Course Outcomes

CO Number	CO Definition
CO1	Understand the principles of TCP/IP protocols, layered architecture, as well as LAN, MAN, and WAN setups.
CO2	Apply data structures in networking, incorporating weighted and unweighted graphs.
CO3	Elaborate on the simulation of Queuing Theory.
CO4	Create a LAN Training Kit employing CSMA/CD/CA principles.

Subject/Code No: Antenna and Wave Propagation Lab, 6EC4-22 LTP: 0+0+2
Semester: VI
Course Outcomes

CO Number	CO Definition
CO1	Grasp the fundamental idea behind antenna radiation mechanisms employed in wireless communication.
CO2	Employ various communication modes tailored to specific applications such as mobile and satellite contexts.
CO3	Examine and detect issues within MOS and CMOS devices (such as assessing gate delay, transistor dimensions, power usage, as well as performance under extreme pressure and temperature conditions).
CO4	Investigate the characteristics of diverse antenna types with regards to their inherent parameters.

Subject/Code No: Electronics Design Lab, 6EC4-23 LTP: 0+0+4
Semester: VI
Course Outcomes

CO Number	CO Definition
CO1	Grasp the fundamental principles and practical uses of Op-amp IC (741), 555 timer IC, Cathode Ray Oscilloscope (CRO), breadboard, and function generator.
CO2	Utilize distinct design approaches on a breadboard employing IC-741 and IC-555 for various functionalities.
CO3	Examine the performance of diverse circuit configurations involving IC-741 and IC-555 across a spectrum of applications and inputs.
CO4	Formulate circuit diagrams on a breadboard utilizing IC-741 and IC-555 to cater to distinct application requirements.

Subject/Code No: Power Electronics Lab, 6EC4-24 LTP: 0+0+2
Semester: VI
Course Outcomes

CO Number	CO Definition
CO1	Comprehend AC voltage regulation through TRIAC, antiparallel thyristors, TRIAC and DIAC, in addition to generating pulses using the DSP/FPGA platform.
CO2	Comprehend AC voltage regulation through TRIAC, antiparallel thyristors, TRIAC and DIAC, in addition to generating pulses using the DSP/FPGA platform.
CO3	Explore single-phase bridge converters, single-phase cycloconverters, and single-phase dual converters, alongside direct current (DC) motor speed management.
CO4	Execute experiments encompassing single-phase PWM inverters, buck, boost, and buck-boost regulators.
CO5	Implement velocity regulation of a DC motor employing a chopper, and regulate induction motors via single-phase AC voltage regulators, coupled with open-loop and closed-loop motor control strategies.
CO1	Understand the fundamentals of artificial intelligence (AI) and expert systems.
CO2	Utilize fundamental AI principles in solving problems, making inferences, perceiving information, representing knowledge, and facilitating learning.
CO3	Display competence in employing the scientific method for machine learning models.
CO4	Delve into the fundamentals of Artificial Neural Networks (ANN) and various optimization techniques.

Subject/Code No: Antenna & Wave Propagation /7EC1 LTP: 3+0+0
Semester: VII
Course Outcome

CO Number	CO Definition
CO1	Understand antenna terminology and radiation mechanism of an antenna
CO2	Understand basic concepts of antenna array and design different antenna arrays.
CO3	Design different types of antennas and understand their structures, applications and measurement techniques of different antenna parameters.
CO4	Gain knowledge of different modes of propagation of radio waves.
CO5	Learn about ionosphere propagation and its parameters by analyzing effect of different environmental condition on propagation.

Subject/Code No: Digital Signal Processing/7EC2
LTP: 3+0+0
Semester: VII
Course Outcomes

CO Number	CO Definition
CO1	Understand the DT signal processing techniques.
CO2	Analyze the LTI Systems using different transform methods.
CO3	Understand the block diagram & Structures of FIR & IIR system.
CO4	Design IIR & FIR filter using different methods.

Subject/Code No: Digital Image Processing/7EC3
LTP: 0+0+4
Semester: VII
Course Outcomes

CO Number	CO Definition
CO1	Understand image formation and the role of different color formats.
CO2	Compute the effect of intensity transformations on an image and apply the spatial and frequency domain filtering.
CO3	Describe the techniques for image enhancement and image restoration in a degraded environment.
CO4	Analyze the effect and requirement of morphological operations for an image and its applications.
CO5	Understand the requirement of image compression and image segmentation for solving the real-life problems.

Subject/Code No: Wireless Communication/7EC4
LTP: 0+0+2
Semester: VII
Course Outcomes

CO Number	CO Definition
CO1	Understand how radio signals can be used to carry information in a spectrally efficient manner
CO2	Able to know how radio signals can be used to carry information in a power efficient manner.
CO3	Gain insights into how diversity afforded by radio propagation can be exploited to improve performance.
CO4	Have an understanding of design considerations for how to effectively share spectrum through multiple access.
CO5	Gain knowledge and awareness of the technologies used in Time Division Multiple Access (TDMA), Code Division Multiple Access (CDMA) and Wi-Fi Networks.

Subject/Code No: VLSI Design/7EC5
LTP: 0+0+2
Semester: VII
Course Outcomes

CO Number	CO Definition
CO1	Understand basic MOS transistors with fabrication process and aspects of threshold voltage, with body effect to analyze MOS transistor circuit Model
CO2	Identify different MOS inverter technologies and determine inverter parameters to verify speed and power dissipation analysis.
CO3	Understand the basic physical design and layout issues of simple gates and complex CMOS circuits.
CO4	Design different dynamic CMOS VLSI circuits and have knowledge of memory circuits

Subject/Code No: VHDL/7EC6.2LTP: 1+0+0
Semester: VII
Course Outcomes

CO Number	CO Definition
CO1	Construct test and debug digital network using VHDL
CO2	Apply concepts of programming language with modeling styles
CO3	Analyze Simulation approaches for combinational circuit design.
CO4	Show awareness about synchronous & Asynchronous circuits.
CO5	Use VHDL in Memory organization & design concepts.

Subject/Code No: Signal and Image Processing Lab/7EC7LTP: 2+0+0
Semester: VII
Course Outcomes

CO Number	CO Definition
CO1	Understand the importance of histogram in enhancement of images.
CO2	Represent image in different color formats.
CO3	Perform the morphological operations in analyzing the image structure.
CO4	Apply thresholding and filtering for image enhancement in spatial and frequency domains.
CO5	Design and simulate the digital filters and process digital signals.

Subject/Code No: Wireless Communication Lab/7EC8
LTP: 3+0+0
Semester: VII
Course Outcomes

CO Number	CO Definition
CO1	Measure various antenna radiation characteristics in operating band.
CO2	Analyze the array of rectangular patch antennas.
CO3	Gain the knowledge of satellite communication and Radar technology through experimental setup.
CO4	Calculate the factors that affect the power received by the receiving antenna.

Subject/Code No: Practical Training Seminar/7EC9
LTP: 3+0+0
Semester: VII
Course Outcomes

CO Number	CO Definition
CO1	Get an exposure of real time industry working scenario.
CO2	Identify their interest and future aspects in different industries.
CO3	Correlate the knowledge between theory and practical exposure during training.
CO4	Students become more aware of industry practices and regulations during industrial training.
CO5	Present their ideas for the betterment of engineering society based on industrial training.

Subject/Code No: Project Stage-I/7EC10
LTP: 3+0+0
Semester: VII
Course Outcomes

CO Number	CO Definition
CO1	Acquire documentation, project management and Problem-solving skills.
CO2	Identify, analyze and solve real-life problems.
CO3	Develop Professionalism, team work ability.
CO4	Develop oral as well as written presentation skills.
CO5	Make comprehensive use of the technical knowledge gained from previous courses.

Subject/Code No: IC Technology/8EC1LTP: 3+0+0
Semester: VIII
Course Outcomes

CO Number	CO Definition
CO1	Understand semiconductor crystal growth techniques and wafer preparation steps.
CO2	Learn procedure of doping semiconductor material using diffusion and ion implantation methods and techniques of growing SiO2 layer.
CO3	Gain the knowledge of various chemical vapour deposition and epitaxial layer growth techniques for deposition of any layer of semiconductor or insulator over other semiconductors.
CO4	Understand various pattern transfer and etching methods like photolithography / optical lithography, plasma, dry & wet etching techniques.
CO5	Know VLSI process integration steps and classification of CMOS logic families for basic MOS device.

Subject/Code No: Radar & TV Engineering/8EC2
LTP: 3+0+0
Semester: VIII
Course Outcomes

CO Number	CO Definition
CO1	Gain the knowledge of RADAR working and navigational aids.
CO2	Understand TV standards, different camera and picture tubes for proper transmission and reception of TV signals
CO3	Gain the knowledge of TV signal processing and generation of colour and chrominance signal.
CO4	Learn the designing principle of TV receiver with its working

Subject/Code No: MEMS & Nanotechnology/8EC3
LTP: 3+0+0
Semester: VIII
Course Outcomes

CO Number	CO Definition
CO1	Understand the fundamental principles of Nanotechnology, its approach and electronic structure of nanomaterial's along with the effect of crystal size on density of states and band gap.
CO2	Understand different silicon processing methods and various nanolithography techniques.
CO3	Gain knowledge of different characterization techniques and analyze the properties of nanomaterials.
CO4	Analyze electrical, magnetic, mechanical and optical properties of nanomaterials & find their applications in various fields.

Subject/Code No: Microcontroller & Embedded System/8EC4
LTP: 3+0+0
Semester: VIII
Course Outcomes

CO Number	CO Definition
CO1	Apply Knowledge of basic concepts and Principles of 8051 Microcontroller.
CO2	Will create interest in Design interfacing Circuits like Traffic light interfacing, Elevator interfacing, seven segment & LCD interfacing.
CO3	It will enhance ability of students to identify Assembly language programming and Embedded c language with the help of Modern tool.
CO4	Apply Knowledge of Embedded system, SOC, and RTOS in various Engineering Problem Analysis.

Subject/Code No: RF Fabrication Lab/8EC5
LTP: 3+0+0
Semester: VIII
Course Outcomes

CO Number	CO Definition
CO1	Understand the designing, fabrication and measurement of different planar transmission lines.
CO2	Design microwave couplers, filters, dividers on CST software.
CO3	Fabricate microwave components and measure the reflection coefficient parameter with CST.
CO4	Design and fabricate RF amplifier using microwave BJT.

Subject/Code No: Industrial Electronics & Management/8EC6
LTP: 3+0+0
Semester: VIII
Course Outcomes

CO Number	CO Definition
CO1	Learn objectives of industrial firms like profit maximization, higher dividends for shareholders etc. Importance of economy of scale and organizational needs, seeking cooperation of society in investment.
CO2	Understand the importance of Labour Legislations and need for promoting dignity of labour. Understand production management.
CO3	Comprehend principles of management and organization staffing, directing, controlling, coordination and Decision making.
CO4	Gain knowledge of new industrial policy like critical analysis, role of technology and entrepreneurship in industrial development etc.

Subject/Code No: VLSI & Optical Fiber Lab/8EC7
LTP: 3+0+0
Semester: VIII
Course Outcomes

CO Number	CO Definition
CO1	Understand basic operating principles of single mode, multimode fibers, light sources, detectors, amplifiers and passive optical devices.
CO2	Interpret the losses in optical fiber such as dispersion, scattering, absorption, nonlinear effects, fiber alignment and splicing.
CO3	Design and simulate the schematic and layouts of various digital CMOS logic circuits using EDA tool.
CO4	Design and simulate different combinational and sequential circuits using VHDL language.

Subject/Code No: Project Stage-II/ 8ECPR
LTP: 3+0+0
Semester: VIII
Course Outcomes

CO Number	CO Definition
CO1	Acquire System integration skills, hardware software interfacing.
CO2	Design and test an electronic circuit with specified needs.
CO3	Apply project management skills (scheduling work, procuring parts, and documenting expenditures and working within the confines of a deadline).
CO4	Develop and demonstrate troubleshooting ability in electronic technology.
CO5	Communicate technical information by means of written and oral reports.

Subject/Code No: Seminar/8ECSM
LTP: 3+0+0
Semester: VIII
Course Outcomes

CO Number	CO Definition
CO1	Acquire surveying ability to identify need of invention.
CO2	Identify and analyze the solution to existing problem.
CO3	Develop an ability of explanation of complex technology in a logical and convincing way.
CO4	Develop good communication and presentation skill.

Bachelor of Technology Electrical Engineering

Program – Electrical Engineering

Subject/Code No: Advance Mathematics / 3EE2-01 Semester: 3rd
Course Outcome Mapping with Program Outcome

CO Number	CO Definition
CO1	Explain the concept of operators, finite differences and interpolation.
CO2	Apply Numerical methods to solve first order Ordinary Differential Equations and Algebraic and Transcendental equations.
CO3	Use Laplace Transforms and Fourier transform in engineering applications.
CO4	Determine the solution of difference equations by use of Z transform.
CO5	Understand complex variables, analytic function, Conformal Transformations.

Subject/Code No: Technical Communication/3EE1-02 Semester: 3rd
Course Outcome Mapping with Program Outcome

CO Number	CO Definition
CO1	Grasp the attributes of technical writing and recognize the significance of intent, readership, and category in conveying information within technical domains.
CO2	Retrieve the steps of planning, composing, refining, polishing, and evaluating technical and business papers through both personal and cooperative writing processes.
CO3	Develop precise, succinct technical manuscripts that adeptly employ writing style, grammatical correctness, and organizational structure to establish coherent understanding with the reader.
CO4	Investigate, assess, integrate, and employ information to generate technical analyses.

Subject/Code No: - Power generation Process/3EE3-04 Semester: 3rd
Course Outcome Mapping with Program Outcome

CO Number	CO Definition
CO1	Understand various aspects of electrical generation, different type of power plant and their advantage-disadvantages & their relative efficiencies.
CO2	Acquire knowledge of solar, wind and tidal power plant and their impact on environment, sustainable energy and Indian energy scene.
CO3	Analyze various type of load curves and terminology related to load and their significance and methods of power factor improvement.
CO4	Apply techniques to evaluate generation cost, depreciation reserve and Acquire knowledge of different method of energy cost reduction.

Subject/Code No: Electrical Circuit Analysis/3EE3-05 Semester: 3rd
Course Outcome Mapping with Program Outcome

CO Number	CO Definition
CO1	Practice the fundamental concepts in circuit theory followed by an analytical understanding of transient and steady state stability concepts along with the transformations from time domain to frequency domain.
CO2	Select the fundamental concepts, theorems, transforms for computing the values of system parameters, stability states, and current & voltage values in a particular branch or node.
CO3	Assess the circuit and phasor diagrams, network interconnections, steady state stabilities, and gain or phase margins.
CO4	Design theoretically converter/electronic circuits based on rated value of current, voltage and loads.

Subject/Code No: Analog Electronics/3EE4-06 Semester: 3rd
Course Outcome Mapping with Program Outcome

CO Number	CO Definition
CO1	Recall and understand the working principle of PN junction diode and its applications.
CO2	Understand the working of BJT and its applications.
CO3	Understand the working of JFET and MOSFET.
CO4	Analyze and design of Differential, multi-stage and operational amplifiers.

Subject/Code No: Electrical Machine - I/3EE4-07 Semester: 3rd
Course Outcome Mapping with Program Outcome

CO Number	CO Definition
CO1	Demonstrate fundamental principles and regulations concerning the magnetic circuits in
CO2	DC machines and Transformers.
CO3	Deduce the control methodologies and traits of DC Machines and Transformers.
CO4	Evaluate the comparable circuitry of both DC machines and transformers.

Subject/Code No: Electromagnetic Field/3EE4-08 Semester: 3rd
Course Outcome Mapping with Program Outcome

CO Number	CO Definition
CO1	Showcase the principles and principles governing electric, magnetic, and time-varying fields.
CO2	Engage in a discussion concerning the arrangement of charges, conditions at boundaries, as well as the Laplace, Poisson, and Maxwell's equations, all aimed at finding solutions.
CO3	Explore the response of dielectric and conductive materials within electromagnetic fields by employing conditions related to electric and magnetic driving forces.
CO4	Calculate parameters like capacitance, inductance, mutual inductance, electronic wave characteristics, electric field strength, electric flux density, magnetic flux density, and conditions for plane waves to address real-time issues.

Subject/Code No: Analog Electronics Lab/3EE4-21 Semester: 3rd
Course Outcome Mapping with Program Outcome

CO Number	CO Definition
CO1	Access and analyze the gain-frequency characteristics of BJT amplifier with and without negative feedback in the emitter circuit and determine bandwidths, gain bandwidth products and gains at 1 kHz with and without negative feedback. Derive output for load regulation, ripple factor by learning basics of series and shunt voltage regulators.
CO2	Analyze the characteristics of small signal amplifier using FET; measure variation of output power & distortion with load, for a push pull amplifier
CO3	Record, observe and analyze the effect of variation in R & C on oscillator frequency in case of Wein bridge oscillator and transistor phase shift oscillator.

Subject/Code No: Electrical Machine- I Lab/3EE4-22 Semester: 3rd
Course Outcome Mapping with Program Outcome

CO Number	CO Definition
CO1	Determine the parameters of equivalent circuit for transformer for different tests (open circuit & short circuit test, sumpner's back-to-back test) and its performance parameters i.e. voltage regulation and efficiency. Apply direct loading method on single phase transformer and determine its efficiency and voltage regulation.
CO2	Determine the parameters of equivalent circuit for delta-delta connected three phase transformers through heat run test. Verify the condition of parallel operation of transformer for load sharing analysis.
CO3	Convert three phases to two phase supply using scott connection. Control the speed of dc shunt motor for above the base speed and below the base speed using field current control and armature voltage control methods respectively and plot their performance characteristic (speed versus field current/ armature voltage)

Subject/Code No: Electrical Circuit Design Lab/3EE4-23 Semester: 3rd
Course Outcome Mapping with Program Outcome

CO Number	CO Definition
CO1	Record and analyze data sheet reading. Use tool requiring cognitive knowledge and apply this knowledge for soldering-de soldering processes.
CO2	Simulate different circuits (bipolar junction transistor, unijunction transistor, half and full bridge rectifier, regulated power supply, multivibrator) and validate their characteristic on breadboard.
CO3	Evaluate real time quantities using sensors in different processes (proximity, accelerometer, pressure etc.)
CO4	Implement hardware of different control circuits (temperature control and dc motor speed control).

Subject/Code No: Industrial Training 3EE7-30 Semester: 3rd
Course Outcome Mapping with Program Outcome

CO Number	CO Definition
CO1	Demonstrate competency in the field of electrical engineering through problem identification, formulation and solution.
CO2	Develop the ability to work as an individual and in group with the capacity to be a leader or manager as well as an effective team member.
CO3	Implement skills effectively in oral and written communication, including report writing and power point presentations using multimedia tools.
CO4	Analyze industrial problems as a part of industrial training curriculum.
CO5	Acquire practical understanding of theoretical aspects by participating in industrial projects.

Subject/Code No: Biology/4EE2-01 Semester: 4th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition
CO1	Improve the overall scenario by learning the correlation of Biology with engineering majors, as biological systems are considered to be very much efficient.
CO2	Use the disciplinary skills towards designing or improving the biological systems and engineering systems in future by getting a basic understanding of genetics and classifications.
CO3	Assist to the development of new systems like nanotechnology, bioelectronics, smart electronics and artificial intelligence by having an understanding of fundamentals of biology in relation to bimolecular, enzymes, Proteins etc.
CO4	Develop an understanding of analogies between biological and electronic substrates, information processes and transport mechanisms.

Subject/Code No: Managerial Economics and Financial Accounting/4EE1-03 Semester: 4th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition
CO1	Discuss the concepts of economics like demand, supply, market structure and financial management like balance sheet.
CO2	Apply the economic functions and theories like: demand & supply functions, production & cost functions & pricing theories
CO3	Analyze the relationship between economic variables using the concept of elasticity, cash flow analysis, fund flow analysis and ratio analysis.
CO4	Evaluate the real-life problems of business organizations using capital budgeting techniques.

Subject/Code No: Electronic Measurement & Instrumentation/4EE3-04 Semester: 4th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition
CO1	Comprehend the operational mechanisms and categorization of measurement devices alongside their practical uses.
CO2	Apply the principles of operation in showcasing how wattmeter's and energy meter's function.
CO3	Analyze and assess the effectiveness of AC/DC Potentiometers in terms of their performance
CO4	Classify the diverse forms of resistors employed for measurement applications.
CO5	Evaluate the features and attributes of different AC bridges that have been designed.

Subject/Code No: Electrical Machine - II/4EE4-05 Semester: 4th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition
CO1	Explain the fundamental concepts, principles and analysis of AC rotating machines.
CO2	Analyze performance of Induction & Synchronous machine in addition to revolving magnetic field theory.
CO3	Design of winding type required for production of revolving magnetic field.
CO4	Interpret the behavior of AC machines using phasor, equivalent circuits and its characteristics

Subject/Code No: Power Electronics/4EE4-06 Semester: 4th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition
CO1	Illustrate the characteristics of power diodes, thyristors (SCRs), IGBTs, MOSFETs, and IGBTs, as well as gate triggering methods of SCRs
CO2	Evaluate the waveforms of single phase and three phase-controlled rectifiers for R and RL loads.
CO3	Evaluate an appropriate DC-DC converter based on the output application requirements.
CO4	Simulate an inverter circuit that uses PWM to smooth the output waveform.

Subject/Code No: Digital Electronics Lab/4EE4-23 Semester: 4th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition
CO1	Enhance comprehension of the numerical system and its implementation within digital electronics. Contrast various logic family variants.
CO2	Conduct practical investigations on adders, subtractors, multiplexers, and demultiplexers to corroborate their truth tables.
CO3	Devise diverse sequential circuits while considering factors like switching speed, throughput/latency, gate count, area, energy usage, and power consumption.
CO4	Incorporate memory components into assorted digital circuit configurations for practical real-world utilization.

Subject/Code No: Measurement Lab/4EE3-24 Semester: 4th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition
CO1	Elaborate the basics of measurement of electrical quantities
CO2	Find the voltage, current and resistance of electrical circuit using potentiometer
CO3	Evaluate the unknown resistance and inductance in electrical circuits using ac bridges
CO4	Calibrate a single-phase energy meter by phantom loading at different power factors.

Subject/Code No: Electrical Materials/5EE-301 Semester: 5th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition
CO1	Learn about the concepts of Bonding and types of solids, Crystalline state and their defects, Classical theory of electrical and thermal conduction in solids, temperature dependence of resistivity, skin effect, Hall effect.
CO2	Acquire knowledge of Dielectric Properties of Insulators in Static and Alternating field, Properties of Ferro-Electric materials, Polarization, Piezoelectricity, Frequency dependence of Electronic and Ionic Polarizability, Complex dielectric constant of non-dipolar solids, dielectric losses.
CO3	Apply concepts of Magnetization of matter, Magnetic Material Classification, Ferromagnetic Origin, Curie-Weiss Law, Soft and Hard Magnetic Materials, Superconductivity and its origin, Zero resistance and Meissner Effect, critical current density.

Subject/Code No: POWER SYSTEM-I/5EE402 Semester: 5th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition
CO1	Understand the overall framework of the power system while taking various faults and their mitigation measures into account.
CO2	Illustrate various electrical characteristics of transmission lines in transient, sub-transient, and steady state stability modes.
CO3	Interpret the integration of distributed generation with grid while taking into account the protection system in real-time projects.
CO4	Estimate the electrical machines parameters & insulation requirements under different stability modes.

Subject/Code No: Control System/5EE4-03 Semester: 5th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition
CO1	Utilize the core principles of both linear and nonlinear control systems to mathematically express their characteristics.
CO2	Compare and contrast the temporal and spectral reactions of systems that are Linear Time Invariant, examining their behaviors and properties.
CO3	Evaluate the state space parameters within conventional control systems, considering their significance and impact.

Subject/Code No: Microprocessor/ 5EE4-04 Semester: 5th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition
CO1	Elaborate the fundamental concepts of 8051 architecture, programming instructions, and 8051 interfacing schemes.
CO2	Indicate the programming knowledge for external devices interfacing and serial communication
CO3	Understand the memory expansion and interfacing of peripheral device such as ADC, DAC, timers, counters, etc.
CO4	Develop 8051 programs for controlling external/interfacing devices for solving a particular task/problem.

Subject/Code No: Electrical Machine Design/5EE4-05 Semester: 5th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition
CO1	Interpret the characteristics of engineering materials used for electrical machine designing.
CO2	Infer the performance characteristics of electrical Machines with the specified constraints.
CO3	Relate electrical machine models in computer aided design software.
CO4	Interpret the design of windings & core of electrical machines.

Subject/Code No: Restructured Power System/5EE5-11 Semester: 5th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition
CO1	Discover the restructuring process, reasons and objectives of deregulation, market & pricing models, and congestion management.
CO2	Categorize electricity market models, congestion management methods, ancillary services, and transmission pricing.
CO3	Compare methods of congestion management, market models & pricing schemes to identify the best options.
CO4	Prepare theoretically a restructured model of existing power system by taking into account network congestion, best pricing model, and ancillary services.

Subject/Code No: Power System - I Lab/5EE4-21 Semester: 5th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition
CO1	Illustrate the basic layouts of hydro, thermal, nuclear and gas power plants.
CO2	Distinguish the parameters of the feeders, distributors, and EHV transmission lines.
CO3	Evaluate the dielectric strength of transformer oil, insulating materials & insulators.
CO4	Create a probability tool to forecast load for short-, medium-, and long-term planning.

Subject/Code No: Control System Lab/5EE4-22 Semester: 5th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition
CO1	Analyze the output response of a given system for different test signals.
CO2	Design the 1st order and 2nd order circuits for transient response analysis.
CO3	Identify the frequency response of various compensating networks.
CO4	Investigate the various approaches for controller parameter tuning.
CO5	Device the stability of control system using Bode plots

Subject/Code No: Microprocessor Lab/5EE4-23 Semester: 5th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition
CO1	Demonstrate the functions, operations, and memory structure and hardware units of 8085 microprocessor kit.
CO2	Evaluate different waveforms using 8253 / 8254 programmable timer.
CO3	Build and demonstrate assembly level programs for transferring data to specified output ports in serial and parallel fashion.
CO4	Fabricate 8-bit LED/LCD interface to 8085 microprocessor kit using 8155 and 8255.
CO5	Develop programs to perform addition, subtraction, division, block transfer, searching, sorting, etc using assembly language.

Subject/Code No: System Programming Lab/5EE4-24 Semester: 5th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition
CO1	Simulate the basic of MATLAB features and syntaxes in mathematical Programming.
CO2	Solve various basic electrical and electronic problems in MATLAB environment
CO3	Execute the single-phase induction machine Torque- speed characteristics and transformer test in MATLAB Simulink.
CO4	Design Single Phase Full Wave Diode Bridge Rectifier with LC Filter in MATLAB Simulink.
CO5	Evaluate the importance of MATLAB in research by simulation work

Subject/Code No: Industrial Training/5EE7-30 Semester: 5th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition
CO1	Recognize industrial methodologies and fields in collaboration with industry experts
CO2	Investigate sophisticated tools and methods employed in industrial processing.
CO3	Enhance understanding of overall workplace etiquette and foster interpersonal and teamwork proficiencies.
CO4	Construct adept presentations and professional work documents
CO5	Build the professional presentations and work reports.

Subject/Code No: Computer Architecture/6EE3-01 Semester: 6th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition
CO1	Explain the structure, memory hierarchy, and input-output arrangement of computers, incorporating details about a 16-bit and 32-bit microprocessor.
CO2	Explore the various addressing modes, programming models, instruction-level pipelining, and the role of memory management units.
CO3	Evaluate the effectiveness of a multi-bus organization, the significance of interrupts and interrupt controllers, the utilization of real mode addressing, and the implementation of dynamic scheduling.
CO4	Discuss the interplay between data types, microinstructions, memory classifications, interface circuits, and instruction sets in the context of computer system design.

Subject/Code No: Power System - II/6EE4-02 Semester: 6th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition
CO1	Manipulate the power flow equations to analyze the voltage and frequency issues of system.
CO2	Examine the system stability and contingency by observing the system voltage and frequency.
CO3	Interpret the power and demand side management in the prospect of optimum utilization of electrical energy by dynamic pricing strategy.
CO4	Summarize different case studies on power system to assess system security.

Subject/Code No: Power System Protection/6EE4-03 Semester: 6th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition
CO1	Understand the fundamentals of fault analysis, power system protection and the components involved in power system protection.
CO2	Describe the concepts of under-frequency, under-voltage and df/dt relays, wide area measurement system and over current protection.
CO3	Summarize the protection schemes for power system components.
CO4	Understand the implementation of the digital protection scheme with the help of signal processing techniques.

Subject/Code No: Electrical Energy Conversion and Auditing/6EE4-04 Semester: 6th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition
CO1	Illustrate the energy landscape, energy approach, regulations pertaining to energy, ensuring energy stability, and the enhancement of energy utilization.
CO2	Examine methods for conserving energy and technologies that promote efficiency in the creation of electrical and industrial machinery.
CO3	Assess the pricing structure, conduct energy audits, manage energy consumption, and appraise the energy equilibrium within a company or entity.
CO4	Devise strategies for optimizing energy usage, enhancing power factor, and replacing fuels and energy sources.

Subject/Code No: Electric Drives/6EE4-05 Semester: 6th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition
CO1	Elaborate on the intricate principles behind DC and AC drives, delve into the nuances of scalar and vector control methods for alternating current motors, and explore the operation of drives across multiple quadrants.
CO2	Investigate the interconnection between power electronics and robust control systems knowledge, examining how these domains synergize to achieve meticulous speed regulation for both AC and DC motors.
CO3	Formulate the closed-loop control architecture of DC drives and expound upon the design intricacies inherent in achieving vector control for AC drives.
CO4	Assess and scrutinize the array of application-oriented precision speed control techniques tailored for both AC and DC motor, considering their effectiveness and suitability in different scenarios.

Subject/Code No: Power System Planning. /6EE5-11 Semester: 6th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition
CO1	Brief about the basic structure of Indian power sector with organizing & monitoring bodies.
CO2	Select the Reliability Planning Criteria for Generation, Transmission and Distribution.
CO3	Evaluate the factors affecting load dispatch and modeling of Generation Sources.
CO4	Estimate the Objectives of Transmission Planning with Network Reconfiguration.

Subject/Code No: Electrical and Hybrid Vehicles. /6EE5-13 Semester: 6th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition
CO1	Illustrate diverse electric vehicle configurations and their constituent elements, outline hybrid vehicle setups, dimension components appropriately, and implement effective energy management strategies.
CO2	Assess the operational characteristics of electric and hybrid electric vehicles.
CO3	Devise hybrid vehicle and battery electric vehicle designs incorporating refined strategies for managing energy efficiently.
CO4	Assess the drive train configurations in both electric and hybrid electric vehicles.

Subject/Code No: Power System - II Lab/6EE4-21 Semester: 6th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition
CO1	Evaluate the various parameters of a power system network (min 3 bus) using different load flow techniques.
CO2	Investigate the transient stability of power system network (min 3 buses).
CO3	Find optimal power flow with the help of analytical and iterative methods.
CO4	Design a power system network (min 3 bus) and analyze the severity of various types of faults.

Subject/Code No: Electric Drives Lab/6EE4-22 Semester: 6th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition
CO1	Differentiate the testing of firing circuits in three phase-controlled bridge converters.
CO2	Examine the operation of three phase fully and half controlled converters for different types of loads experimentally.
CO3	Demonstrate the speed control methods of AC & DC motors.
CO4	Illustrate operation and analysis of different converters with reference to control strategy.
CO5	Analyze power quality aspects of three-phase controlled converters by calculating different parameters for different loads.

Subject/Code No: Power System Protection Lab/6EE4-23 Semester: 6th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition
CO1	Determine fault type, fault impedance and fault location during single line to ground fault, line-to line fault and double line to ground fault.
CO2	Explain the operation of micro-controller based over current relay in DMT type and IDMT type.
CO3	Analyze and discuss the operation of micro-controller based under voltage relay, and micro-controller based over voltage relay.
CO4	Explain the operation of micro-controller based un-biased single-phase differential relay.

Subject/Code No: Modeling and simulation lab/6EE4-24 Semester: 6th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition
CO1	Acquire proficiency in the software tools essential for the simulation of machinery and power systems. Apply this knowledge practically.
CO2	Examine and contrast the operational effectiveness of electrical machinery when working alongside reactive power compensation equipment.
CO3	Assess the functionality of Flexible AC Transmission System (FACTS) controllers based on their suitability for power system applications.
CO4	Devise a proficient Single Machine Infinite Bus (SMIB) model that incorporates a FACTS controller, employing MATLAB software as the platform for design.

Subject/Code No: Power System Planning/7EE1
Semester: 7th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition
CO1	Students will be able to understand the structure and forecasting of power system.
CO2	Students will be able to understand various government policies related to power system interconnection.
CO3	Students will be able to calculate load and state estimation in power system.
CO4	Students will be able to understand various environment effects of different power plants.
CO5	Students will be able to understand operating, maintenance and expansion of power plants.

Subject/Code No: Power System Analysis/7EE2
Semester: 7th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition
CO1	Students will be able to understand per unit quantities and admittance model for three phase system.
CO2	Students will be able to understand symmetrical fault analysis and Impedance model for three phase system.
CO3	Students will be able to understand symmetrical components and fault analysis.
CO4	Students will be able to understand the concepts of Unsymmetrical Fault Analysis
CO5	Students will be able to understand the concepts of load flow analysis.

Subject/Code No: Artificial Intelligence Techniques/7EE3
Semester: 7th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition
CO1	Students will be able to understand the concepts of knowledge representation along with control strategies.
CO2	Students will be able to understand the concepts of artificial neural network and perceptron learning algorithms.
CO3	Students will be able to understand the basic concepts and algorithms in learning ANN.
CO4	Students will be able to understand the concepts of fuzzy Logic, defuzzification, and Genetic Algorithm.
CO5	Students will be able to understand the concepts of Artificial Intelligence and knowledge based Expert systems.

Subject/Code No: Non-Conventional Energy Sources/7EE4
Semester: 7th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition
CO1	Students will be able to understand the basic concepts of conventional and non-conventional energy sources.
CO2	Students will be able to understand basic concept of various solar collectors along with generation of solar energy.
CO3	Students will be able to understand basic principle of wind energy conversion and various basic electrical wind generation schemes.
CO4	Students will be able to understand the concepts of geothermal energy along with its applications.
CO5	Students will be able to understand the basic requirement of nuclear fission and nuclear fusion along plasma confinement.

Subject/Code No: Power System Engineering/7EE5
Semester: 7th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition
CO1	Students will be able to understand the concepts of various curves of thermal generating units and economics operation of power system.
CO2	Students will be able to understand the concepts of various types of power system stability.
CO3	Students will be able to understand the concepts of transient stability and its application under basic power system disturbances.
CO4	Students will be able to understand the concepts of various types of excitation systems and their control along with advantages and problems of inter connected power systems.
CO5	Students will be able to understand the principle of tap changing transformer along with basic concepts of series compensation of transmission lines.

Subject/Code No: Computer Aided Design of Electrical Machines/7EE6.2
Semester: 7th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition
CO1	Students will be able to understand the basic principles of electrical machine design and magnetic circuit calculation.
CO2	Students will be able to understand the concepts of heating, cooling and various ratings of electrical machines
CO3	Students will be able to understand the computer aided design of transformers with optimization concepts.
CO4	Students will be able to understand the computer aided design of synchronous machines along with its flow charts.
CO5	Students will be able to understand the computer aided design of induction machines along with its flow charts.

Subject/Code No: Power System Planning lab/7EE7
Semester: 7th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition
CO1	Students will be able to understand the various components used in power systems and various planning tools of power systems.
CO2	Students will be able to model the electrical forecasting technique.
CO3	Students will be able to understand the concept of Transmission and distribution planning.
CO4	Students will be able to understand the concept of tariff and rural electrification.
CO5	Students will be aware about the status of national and regional planning for power system.

Subject/Code No: Power System Modelling and Simulation Lab/7EE8
Semester: 7th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition
CO1	Student will be able to simulate swing equation in MATLAB.
CO2	Student will be able to model synchronous and induction machines.
CO3	Student will be able simulate various circuits using circuit maker.
CO4	Student will be able to model and simulate synchronous machine with PSS and FACTS controllers.
CO5	Student will be able to understand FACTS Controller designs with FACT devices for SMIB system

Subject/Code No: Industrial Economics and Management/7EE9
Semester: 7th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition
CO1	Student will be able to understand the various aspects of management principles.
CO2	Student will be able to understand the various aspects of production and project management.
CO3	Student will be able to understand the process of human resource management.
CO4	Student will be able to understand the process of finance and account management.
CO5	Student will be able to understand the concepts of Banking sector, roles of commercial bank, RBI, principle and sources of taxation.

Subject/Code No: Practical Training and Industrial Visit/7EE10
Semester: 7th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition
CO1	Student will get an exposure of real time industry working scenario.
CO2	Student will be able to identify their interest and future aspects in different industries.
CO3	Student will be able to correlate the knowledge between theory and practical exposure during training.
CO4	Students become more aware of industry practices and regulations during industrial training.
CO5	Students will able to present their ideas based on industrial training and entrepreneurship development.

Subject/Code No: Project – I /7EEPR
Semester: 7th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition
CO1	Student will be able to analyze problem occurred during the completion of a project.
CO2	Student will learn about how the given task can be completed within time as a team.
CO3	Student will be able to work on a project with analyzing optimal cost for completion without compromising the efficiency.
CO4	Student will have hands on practice on various equipment's.
CO5	Students will be able to strengthen the research and development in recent technologies.

Subject/Code No: EHV AC/DC Transmission/8EE1
Semester: 8th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition
CO1	Students will be able to understand the concepts of EHV AC transmission systems.
CO2	Students will be able to understand the concepts and various methods of load frequency control.
CO3	Students will be able to understand the various methods of voltage control and static VAR compensators.
CO4	Students will be able to understand the various types of FACTS controllers.
CO5	Students will be able to understand the concepts of HVDC Transmission and their applications.

Subject/Code No: Electrical Drives and Their Control/8EE2
Semester: 8th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition
CO1	Students will be able to understand the dynamics of electric drives with drive parameters.
CO2	Students will be able to understand the concepts of DC drives along with braking and speed control strategies.
CO3	Students will be able to understand the concepts of induction motor drives along with braking and speed control techniques from voltage source.
CO4	Students will be able to understand the concepts of speed control of induction motor drive.
CO5	Students will be able to understand the concepts of synchronous motor drive under VSI and CSI.

Subject/Code No: Protection of Power System/8EE3
Semester: 8th
Course Outcome Mapping with Program outcome

CO Number	CO Definition
CO1	Students will be able to understand the various types of fault along with construction and errors in CTs and PTs.
CO2	Students will be able to understand the concepts of various types of over current directional over current relay along with protection schemes.
CO3	Students will be able to understand the concepts of stator and rotor protection of generator.
CO4	Students will be able to understand the concepts of various types of transformer and busbar protections.
CO5	Students will be able to understand the concepts of various types of transmission line protection.

Subject/Code No: Facts Devices and Their Control/8EE4
Semester: 8th
Course Outcome Mapping with Program outcome

CO Number	CO Definition
CO1	Students will be able to understand the concepts of power flow control of AC transmission line along with various types of FACTS.
CO2	Students will be able to understand the various topologies of voltage source converters and static shunt compensators.
CO3	Students will be able to understand the concepts of static series compensators with its applications.
CO4	Students will be able to understand the concepts of static voltage and phase angle regulators.
CO5	Students will be able to understand the concepts of unified power flow controller and interline power flow controller along with its applications.

Subject/Code No: Computer Based Power System Lab/8EE5
Semester: 8th
Course Outcome Mapping with Program outcome

CO Number	CO Definition
CO1	Student will be able to understand and verify the various fault analysis using MATLAB.
CO2	Student will be able to understand and verify load flow analysis by different techniques using MATLAB.
CO3	Student will be able to understand the concepts of voltage and overload security analysis using MATLAB.
CO4	Student will be able to understand the concept of economic load dispatch with different methods.
CO5	Student will be able to understand the transient stability analysis using MATLAB.

Subject/Code No: Electrical Drives and Their Control Lab/8EE6
Semester: 8th
Course Outcome Mapping with Program outcome

CO Number	CO Definition
CO1	Students will be able to understand the concepts of firing circuits in converters at different load conditions.
CO2	Students will be able to understand the concept and testing of 3 phase ac voltage regulators.
CO3	Students will be able to understand the concept of speed control of different types of dc motors.
CO4	Students will be able to understand the concept of speed control of different types of ac motors.
CO5	Students will be able to understand the concepts of different types of three phase converters.

Subject/Code No: High Voltage Engineering Lab/8EE7
Semester: 8th
Course Outcome Mapping with Program outcome

CO Number	CO Definition
CO1	Students will be able to test the various parameters of transformer oil.
CO2	Students will be able to test the various parameters of insulating materials and study their applications.
CO3	Students will be able to understand the process of direct and indirect testing of circuit breakers.
CO4	Students will be able to understand high voltage testing of different electrical equipment.
CO5	Students will be able to design an EHV transmission line.

Subject/Code No: Project – II/8EEPR
Semester: 8th
Course Outcome Mapping with Program outcome

CO Number	CO Definition
CO1	Students are able to implement engineering skills in a real-world environment.
CO2	Students are able to function on multi-disciplinary teams.
CO3	Students are able to identify, formulate, and solve engineering problems.
CO4	Student knows how to design an efficient system with optimum criteria and within given time limit.
CO5	Students gain exposure to principles of leadership, project management and thus improve their marketability.

Subject/Code No: Seminar/8EESM
Semester: 8th
Course Outcome Mapping with Program outcome

CO Number	CO Definition
CO1	Students will be able to give presentation on recent topics.
CO2	Students will be able to enhance their communication skills and confidence level.
CO3	Students will be able to improve their knowledge about contemporary issues.
CO4	Students will be able to accumulate knowledge based on different learning tools such as literature review and web searching.
CO5	Student will be able to develop the overall personality

CHAPTER VIII
Program wise CO-PO Mapping
Session: 2019-20
Common for all branches in first year
Department of Applied Sciences

Subject/Code No: Communication Skills & 1FY1-03 LTP: 2+0+0
Semester: I / II semester
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Comprehend the fundamental Principles, Types, and Methods of good communication.	2	-	-	-	2	2	-	2	2	3	-	2
CO2	Apply the basic structural and grammatical knowledge of the constituents for technical writing.	1	-	-	-	3	1	-	1	1	3	-	3
CO3	Develop the competence in writing skills related to various forms of technical and business communication	1	-	-	-	3	1	-	1	1	3	-	3
CO4	Understand the genre of prose by reading loudly with correct pronunciation, stress intonation, and articulation of voice along with identifying and describing the connection between Literature and reality.	-	-	-	-	1	1	-	1	1	3	-	3
CO5	Develop the creativity and imagination through value-based genre of poetry by enhancing aesthetic and verbal ability.	-	-	-	-	1	1	-	1	1	3	-	3

Subject/Code No: Human Values & 1FY1-05/2FY1-05 LTP: 2+0+0
Semester: I / II semester
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Comprehend co-relationship between "Values"; and "skills" to ensure persistent happiness and prosperity.	-	-	-	-	-	3	2	3	-	-	-	3
CO2	Evaluate the coexistence of the Human Being - Harmony in Myself.	-	-	-	-	-	2	2	2	-	-	-	3
CO3	Identify the role of harmony in family, society and universal order.	-	-	-	-	-	2	1	2	-	-	-	3
CO4	Develop and evaluate the holistic perception of harmony at all levels of existence.	-	-	-	-	-	1	3	3	-	-	-	3
CO5	Create harmony in professional and personal lives by understanding Co-existence between human being with nature.	-	2	-	-	-	-	3	3	-	-	-	2

Subject/Code No: ENGINEERING MATHEMATICSI &1FY2-01 LTP: 3+1+0
Semester: I semester
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Learn the concept of calculus to appraise improper integral, surface area and volume of solid of revolution of various laminas.	3	2	2	1	1	1	1	-	-	-	-	2
CO2	Differentiate the different techniques for convergence of sequence and series.	3	2	2	2	1	1	1	-	-	-	-	2
CO3	Analyze continuity, differentiability to solve the periodically extended function over the range using the concept of Fourier series.	2	2	2	2	1	1	-	-	-	-	-	1
CO4	Application of Partial differentiation, problem-solving using concepts and techniques from PDE's.	2	2	2	2	1	1	-	-	-	-	-	2
CO5	Apply the concept of calculus to double integrals and change of variables Application of Multiple integration involving cubes, sphere, theorem of green gauss and stokes	2	2	2	2	2	2	-	-	-	-	-	2

Subject/Code No: ENGINEERING MATHEMATICS-II & 2FY2-01 LTP: 3+1+0
Semester: II semester
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Comprehend the computational techniques and algebraic skills essential for the study of systems of linear equations, matrix algebra, Eigen values, Eigen vectors, orthogonality and diagonalization.	3	2	2	1	1	1	1	-	-	-	-	2
CO2	Recognize ODEs and interpret the various methods for solving differential equation of first order and first degree.	3	2	2	2	1	1	1	-	-	-	-	2
CO3	Differentiate the various applications of function of one variable in ODE of higher order.	2	2	2	2	1	1	-	-	-	-	-	1
CO4	Evaluate the multivariable function using the concept of PDEs of first order.	2	2	2	2	1	1	-	-	-	-	-	2
CO5	Apply the various uses of multivariable function and solve by the partial differential equation of higher order.	2	2	2	2	2	2	-	-	-	-	-	2

Subject/Code No: Engineering Physics &1FY2-02 /2FY2-02 LTP: 3+1+0
Semester: I / II semester
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Comprehend the concepts of wave optics and phenomenon of interference and diffraction of light.	3	3	2	-	-	-	-	-	-	-	-	1
CO2	Recognize ODEs and interpret the various methods for solving differential equation of first order and first degree.	3	3	2	-	-	-	-	-	-	-	-	1
CO3	Apply the conceptual knowledge of coherence of light wave in different application of light wave and use in optical fiber communication.	3	3	2	-	-	-	-	-	-	-	-	1
CO4	Synthesize the scientific and engineering principles of materials science to identify the properties of material related to appropriate field of application.	3	2	1	1	-	-	-	-	-	-	-	1
CO5	Apply the laws of electromagnetic theory in propagation of wave and use in communication.	3	3	2	-	-	-	-	-	-	-	-	1

Subject/Code No: Engineering Chemistry &1FY2-03 /2FY2-03 LTP: 3+1+0
Semester: I / II semester
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Describe the fundamental water quality for domestic and industrial purpose so that students will be able to describe impurities present in water, boiler troubles and removal of impurities.	3	2	-	1	-	2	1	-	1	-	-	1
CO2	Analyze the composition, characteristics and manufacturing methods of various types of solid, liquid and gaseous fuels and calculated calorific value of fuels for Industrial as well as domestic purposes	3	2	-	1	-	2	1	-	1	-	-	1
CO3	Classify the dry and wet corrosion mechanisms and their protection methods. To investigate deterioration of metal through corrosion	2	1	-	2	-	2	2	1	-	-	-	2
CO4	Understand the composition and manufacturing methods of engineering materials namely cement and glass and recognize and estimate various properties of lubricants in several engineering process.	2	1	-	-	-	2	3	1	1	-	1	2
CO5	Generating the generic drugs or medicines for various services in life long purpose by identifying the applications of organic reaction mechanism.	2	1	-	-	-	2	2	1	1	-	1	3

Subject/Code No: Programming for Problem Solving & 1FY3-06/2FY3-06 LTP: 2+0+0
Semester: I / II semester
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Understand the fundamental concepts of computers, algorithms, flowcharts and problem-solving techniques.	2	2	2	2	-	2	-	-	-	-	-	2
CO2	Translate the algorithms and flowcharts into C programs.	3	3	-	-	-	-	-	-	-	-	-	-
CO3	Analyze the debug process in C programming language and to express in written form.	-	3	-	3	-	-	-	-	-	-	-	-
CO4	Formulate a problem into functions and create modular code that can be reused.	1	1	1	1	1	-	-	-	2	-	1	-
CO5	Develop C programs to demonstrate the applications of derived data types such as arrays, pointers, strings and functions.	1	2	1	2	-	-	-	-	3	-	1	-

Subject/Code No: Basic Mechanical Engineering & 1FY3-07/2FY3-07 LTP: 3+1+0
Semester: I / II semester
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Understand the concepts of thermodynamics, power plants, machine design, Manufacturing Engineering and Industrial Engineering.	3	2	2	2	-	2	-	-	-	-	-	2
CO2	Receive the basic knowledge of pump and IC engine.	3	2	2	2	-	2	-	-	-	-	-	2
CO3	Comprehend the concept, types and application of refrigerator and air conditioning system and Transmission of Power.	3	2	2	2	-	2	-	-	-	-	-	2
CO4	Explain the different Patterns, Molding, Casting, Forging and Extrusion of Primary Manufacturing Processes.	3	2	2	2	-	2	-	-	-	-	-	1
CO5	Describe the various process and uses of Welding, Brazing, Engineering materials and Heat treatment of steel.	3	2	2	2	-	2	-	-	-	-	-	1

Subject/Code No: Basic Electrical Engineering & 1FY3-08/2FY3-08 LTP: 3+1+0
Semester: I / II semester
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Evaluate the concept and process of various AC and DC circuit related elements, sources, laws, methods and theorems.	2	2	2	2	-	2	-	-	-	-	-	-
CO2	Explore the knowledge of transformers and its uses in applying the acquired knowledge to solve electrical circuit problem.	3	3	3	3	-	3	-	-	-	-	-	-
CO3	Analyze the characteristics, significance, construction and working of various power electronic devices.	3	3	3	3	-	3	-	-	-	-	-	-
CO4	Understand electromechanical energy conversion process.	3	3	3	3	-	3	-	-	-	-	-	-
CO5	Explore knowledge of protective devices and energy consumption calculations.	3	3	3	3	-	3	-	-	-	-	-	-

Subject/Code No: Basic Civil Engineering & 1FY3-09/2FY3-09 LTP: 2+0+0
Semester: I / II semester
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Understanding the scope, specialization, and role of civil engineer with impact of infrastructural development on economy of country.	-	-	3	1	-	3	1	-	-	-	-	3
CO2	Explain the Object, Principles & Types of Surveying, analyzes the Linear Measurements of surveying and evaluates the angular measurement through compass and leveling process through the various leveling instrument.	2	-	-	-	2	2	-	-	-	-	2	-
CO3	Analyze the importance of site selection, type of building Layout and Plan with introduction and components of Buildings & their functions.	2	-	-	-	-	2	2	-	-	-	-	-
CO4	Understanding the traffic and road safety and evaluate the Modes of Transportation, Causes of Accidents and Create the Road Safety Measures.	-	-	3	-	-	3	-	-	-	-	-	2
CO5	Classify the different types of pollutions, understand the Rainwater Harvesting, Global warming, Climate Change and solid Waste Management, analyze the Primary and Secondary air pollutants.	-	-	-	-	-	-	3	-	3	-	-	-

Subject/Code No: Engineering Chemistry Lab & 1/2FY2-21 LTP:0+0+2
Semester: I / II semester
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Evaluate the strength of CuSO3.5H2O solution with the help of Hypo solution, Ferrous Ammonium Sulphate solution with the help of K2Cr2O7 solution and NaOH and Na2CO3 in an alkali	2	-	-	-	-	2	2	2	2	-	-	2
CO2	Analyze different properties of lubricating oil.	2	3	-	-	-	2	2	-	-	-	-	2
CO3	Analyze quality of coal by proximate analysis.	3	3	-	-	-	-	-	-	-	-	-	-
CO4	Evaluate various quality parameters of water like harness, DO, Chlorine in water	2	2	-	-	-	2	-	2	2	-	-	2
CO5	Understand about synthesis of generic drugs.	3	-	-	-	-	-	-	-	-	-	-	3

Subject/Code No: Engineering Physics Lab &1/2FY2-20 LTP:0+0+2
Semester: I / II semester
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Understand the fundamental concepts of wave optics through the interference and diffraction experiment	3	2	1	-	-	-	-	-	2	-	-	-
CO2	Analyze the concept of light in dispersive power of material and height of a celestial object.	3	2	1	-	-	-	-	-	2	-	-	-
CO3	Describe and demonstrate the behavior of semiconductor characteristics.	3	3	2	-	-	-	-	-	2	-	-	-
CO4	Applying the knowledge to show the charging and discharging behavior of capacitor with time in form of electrical energy.	3	3	2	-	-	-	-	-	2	-	-	-
CO5	Interpret the properties of Laser light and application in optical communication through optical fiber.	3	3	2	-	-	-	-	-	2	-	-	-

Subject/Code No: Human Values Activities and Sports & 1/2FY1-23 LTP:0+0+2
Semester: I / II semester
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Course Introduction-Need, Basic Guidelines, Content and Process for Value Education	-	-	3	-	-	-	-	-	-	-	-	-
CO2	Understanding Harmony in the Human Being - Harmony in Myself	-	-	3	-	-	3	3	3	3	3	3	-
CO3	Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship	-	-	3	-	-	3	3	3	3	3	3	3
CO4	Understanding Harmony in the Nature and Existence - Whole existence as Coexistence	-	-	3	-	-	3	3	3	3	3	-	3
CO5	Implications of the above Holistic Understanding of Harmony on Professional Ethics. Natural acceptance of human values	-	-	3	-	-	3	3	3	3	3	3	3

Subject/Code No: Language Lab &1/ 2FY1-22 LTP:0+0+2
Semester: I / II semester
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	To understand Phonetic Symbols and Transcriptions	-	-	-	-	-	-	-	-	-	-	3	3
CO2	To enable students to participate in Extempore	-	2	3	-	2	-	-	-	-	2	-	2
CO3	To enable students to participate in Group Discussion	-	3	3	-	-	-	-	-	-	3	-	3
CO4	To improve writing skills of students by Dialogue Writing	-	3	3	-	-	-	-	-	-	3	-	3
CO5	To improve writing skills of students by Dialogue Writing	-	2	3	-	2	-	-	-	-	2	-	2

Subject/Code No: Manufacturing Practices Workshop &1/ 2FY3-25 LTP:0+0+3
Semester: I / II semester
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Understand various tools, materials, instruments required for workshop operations.	-	-	-	-	-	-	-	-	-	-	3	3
CO2	Apply techniques to perform workshop operations with hand tools and power tools such as center lathe machine, drilling machine using given job drawing.	3	2	2	-	2	-	-	-	2	-	-	2
CO3	Understand application of the hand tools used in fitting, carpentry, foundry, welding shop, machine tools and sheet metal shop	3	2	2	-	2	-	-	-	-	-	-	2
CO4	Write a report related to hand tools and machine tools description referring to library books and laboratory manuals.	2	2	-	-	2	-	-	-	2	3	-	2
CO5	Apply safety consciousness along with team work.	2	-	-	-	-	-	-	-	3	2	-	-

Subject/Code No: Computer Programming Lab &1/2FY3-24 LTP:0+0+3
Semester: I / II semester
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Understand and describe the structure of a C program to explain, write, compile and execute programs using input and output statements.	3	2	2	2	-	-	-	-	-	-	-	2
CO2	Classify and write programs by applying the decision control statements and loop control statements using different operators.	3	3	2	3	-	-	-	-	-	-	2	-
CO3	Classify and write programs by applying the decision control statements and loop control statements using different operators.	2	3	2	-	-	-	-	-	2	-	2	-
CO4	Design object-based programs by creating new data type using structure and union.	-	3	1	3	-	-	-	-	3	-	1	-
CO5	Understand and use the concept of functions and file operations; moreover, design new functions to solve module driven problems.	2	2	2	3	-	-	-	-	-	-	2	-

Subject/Code No: Basic Civil Engineering Lab &1/2FY3-27 LTP: 0+0+2
Semester: I / II semester
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Describe various sanitary fittings and water supply fittings.	-	1	-	-	-	2	-	2	3	-	-	2
CO2	Examine pH, Turbidity, Hardness and Total solids of given water sample.	-	-	-	-	-	2	3	2	-	2	-	2
CO3	Use of EDM and Total Station in the field.	-	-	-	-	-	2	-	2	-	-	-	3
CO4	Investigate the linear and angular measurements of the points on the ground and levelling.	-	-	-	-	-	2	2	2	3	2	-	2
CO5	Students will show an ability to communicate effectively and work as a team member ethically.	-	-	-	-	-	2	2	2	3	2	-	2

Subject/Code No: Basic Electrical Engineering Lab &1/2FY3-26 LTP: 0+0+2
Semester: I / II semester
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Utilize a Cathode Ray Oscilloscope (CRO), along with various meters, to identify and observe the functioning of electronic components such as resistors, inductors, capacitors, diodes,diac, triac, transistors, and thyristors.	3	3	3	-	-	-	-	-	-	-	-	3
CO2	Measure the no-load current waveform using an oscilloscope and calculate transformer voltages, currents, power, and efficiency	3	3	3	-	-	-	-	-	-	-	-	3
CO3	Conduct various three-phase transformer connections to analyze voltage and current relationships, while recording phase shifts between the primary and secondary sides.	3	3	3	-	-	-	-	-	-	-	-	3
CO4	Recognize the operational characteristics, cut-out sections, and speed behavior of DC machines, synchronous machines, single-phase, and three-phase induction machines	3	3	3	-	-	-	-	-	-	-	-	3
CO5	Create a torque-speed curve for a separately excited DC motor, examine the operation of DC-DC converters, DC-AC converters, and DC-AC converters for induction motor speed control, while providing an overview of the components in LT switchgear.	3	3	3	-	-	-	-	-	-	-	-	3

Subject/Code No: Computer Aided Engineering Graphics & 1FY3-28 LTP:0+0+2
Semester: I semester
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Discuss the concept of engineering terminology, engineering scales and conic sections.	2	-	-	-	3	2	-	-	3	2	-	2
CO2	Apply the necessary skills in drawing and explaining orthographic projection of points, lines, and planes.	2	-	3	-	3	2	-	-	-	-	-	3
CO3	Understand and Draw projections of solids	3	2	3	2	3	-	-	-	-	-	-	-
CO4	Draw and classify the sections of solids.	3	2	3	2	3	-	-	-	-	-	-	-
CO5	Explain various commands and create drawing in AutoCAD.	2	-	3	-	3	-	-	-	-	-	-	2

Subject/Code No: Computer Aided Machine Drawing & 2FY3-29 LTP: 0+0+2
Semester: II semester
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Recall and understand the conventional representation of machine components and material, types of lines & dimensioning.	2	-	-	-	3	2	-	-	3	2	-	2
CO2	Explain concept of first and third angle projections and prepare drawing of simple machine elements, sectional views for various parts and assembly.	2	-	3	-	3	2	-	-	-	-	-	3
CO3	Draw and explain various types of temporary and permanent fasteners.	3	2	3	2	3	-	-	-	-	-	-	-
CO4	Draw free hand sketches of lines, materials and various components i.e. bearings, couplings, welded joints, pipe joints, valves etc.	3	2	3	2	3	-	-	-	-	-	-	-
CO5	Differentiate among the various commands and create 2D computer aided drawing software.	2	-	3	-	3	-	-	-	-	-	-	2

Bachelor of Technology Computer Engineering

Program Name: Computer Engineering

Subject/Code No: Advanced Engineering Mathematics/3CS2-01
LTP:3L+0T+0P Semester: 3rd
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Recall and understand the fundamental concepts of probability and standard distributions which can describe real life phenomenon.	3	3		2	-	-	-	-	-	2	-	2
CO2	Analyze the various methods of numerical solutions of Normal, Poisson and Binomial probability distribution.	3	3	2	2	-	-	-	-	-	2	-	2
CO3	Formulate the optimization problems in mathematical form with classification.	3	3	3	3	-	-	-	-	-	-	-	3
CO4	Interpret non-linear optimization problems and solve by appropriate methods.	2	2	3	3	-	-	-	-	-	-	-	2
CO5	Demonstrate linear optimization problems and solve by standard methods.	3	3	3	3	-	-	-	-	-	-	-	3

Subject/Code No: Technical Communication/3CS1-02
LTP: 2L+0T+0P Semester: 3rd
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Understand the process of technical communication in terms of LSRW.	-	-	-	-	-	-	-	-	1	3		1
CO2	Apply the concept of Technical Materials/Texts in various technical documents.	-	-	-	-	-	-	-	-	-	3		1
CO3	Enhance the skills in the process of technical communication in terms of LSRW.	-	-	-	-	-	-	-	-	1	3		1
CO4	Implement the basic concepts of technical communication in Technical Reports, articles and their formats.	-	-	-	-	-	-	-	-	-	3		2

Subject/Code No: Digital Electronics/3CS3-04
LTP: 3L+0T+0P Semester: 3rd
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Demonstrate basic principles of digital circuits and different number systems	3	3	3	2	1	-	-	-	-	-	-	1
CO2	Distinguish logic expressions and circuits using Boolean laws and K-map	3	3	2	2	1	-	-	-	-	-	-	1
CO3	Differentiate types of digital electronic circuits and also the different logic families involved in the digital system to prepare the most simplified circuits using various mapping and mathematical methods.	3	3	3	1	1	1	-	-	-	-	-	1
CO4	Design various types of memoryless element digital electronic circuits for particular operation within the realm of economic, performance, efficiency, user friendly and environmental constraints.	3	3	3	1	1	1	-	-	-	-	-	1
CO5	Design various types of memory element digital electronic circuits for particular operation within the realm of economic, performance, efficiency, user friendly and environmental constraints.	3	3	3	1	1	1	-	-	-	-	-	1

Subject/Code No: Data Structures and Algorithms/3CS4-05
LTP: 3L+0T+0P Semester: 3rd
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Recognize fundamental Stack operations to address a range of engineering problems.	3	2	2	2	2		1	1	1	-	-	-
CO2	Relate the principles of Queues and Linked Lists to offer solutions for computer-based issues.	1	1	1	1	1	1	1	1	1	-	1	1
CO3	Discover different Search and Sorting methods to rationalize their application in diverse scenarios.	2	2	2	2	2	2	1		1	-	1	1
CO4	Practice the concept of Trees and their operations to furnish valid solutions.	2	2	2	1	1	2	1	-	-	-	-	1
CO5	Compare a variety of techniques that can be employed with Graphs and Hashing.	2	2	2	2	1	1	-	-	1	-	-	1

Subject/Code No: Object Oriented Programming/3CS4-06
LTP: 3L+0T+0P Semester: 3rd
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Describe the Object-Oriented Programming paradigm with the concept of objects and classes.	3	2	2	2	2	-	-	-	-	-	-	-
CO2	Explain the memory management techniques using constructors, destructors and pointers	2	2	2	2	2	-	-	-	-	-	-	-
CO3	Classify and demonstrate the various Inheritance techniques.	3	3	2	2	2	-	-	-	-	-	-	-
CO4	Understand how to apply polymorphism techniques on the object-oriented problem.	3	3	2	2	2	-	-	-	-	-	-	-
CO5	Understand how to apply polymorphism techniques on the object-oriented problem.	3	3	2	2	2	-	-	-	-	-	-	-

Subject/Code No: Software Engineering/3CS4-07
LTP: 3L+0T+0P Semester: 3rd
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Recognize different software life cycle models and testing techniques to develop real time projects.	2	3	1	-	-	-	-	1	2	-	1	1
CO2	Identify cost estimation and risk analysis in project management.	1	2	-	-	2	-	-	-	1	-	2	1
CO3	Interpret and deduce the engineering process of software requirement analysis.	1	2	-	-	-	2	-	-	1	-	1	1
CO4	Apply procedural design methods to architect software systems.	-	-	3	2	1	-	-	-		1	1	1
CO5	Collaborate the concept of object-oriented analysis and design in software development process.	-	-	3	2		-	-	-	2	-	-	1

Subject/Code No: Data Structures and Algorithms Lab/3CS4-21
LTP: 0L+0T+3P Semester: 3rd
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Recognize fundamental Stack and Queue operations to address a range of engineering problems.	3	3	3	1	1	-	-	-	-	-	-	1
CO2	Relate the principles of Linked Lists to offer solutions for computer-based issues.	3	3	3	3	-	-	-	-	-	-	-	-
CO3	Discover different Search and Sorting methods to rationalize their application in diverse scenarios.	3	2	2	3	-	-	-	-	-	-	-	-
CO4	Devise diverse operations on non-linear data structures such as trees and graphs.	3	3	2	2	-	-	-	-	-	-	-	-
CO5	Propose a solution for a provided engineering problem utilizing Stack, Queue, Linked List, Tree and Sorting	3	3	3	-	-	-	-	-	-	-	-	-

Subject/Code No: Object Oriented Programming Lab/3CS4-22
LTP: 0L+0T+3P Semester: 3rd
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Create and explain Basic C++ Program using i/o variables and structures.	3	2	-	-	2	-	-	-	-	-	-	-
CO2	Apply object-oriented programming concepts using class and objects	3	3	2	-	3	-	-	-	-	-	-	-
CO3	Design and assess the classes for code reuse	3	3	2	-	3	-	-	-	-	-	-	-
CO4	Analysis and apply the generic classes concepts in programming problem	3	2	2	-	3	-	-	-	-	-	-	-
CO5	Illustrate and evaluate the file Input Output mechanisms	3	2	2	2	3	-	-	-	-	-	-	-

Subject/Code No: Software Engineering Lab/3CS4-23
LTP: 0L+0T+3P Semester: 3rd
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Observe the requirements specification, function-oriented design using Software Analysis and Software Design of given project and relate the use of	3	2	-	-	-	-	-	-	-	-	-	-
CO2	appropriate CASE tools and other tools in the software life cycle.												
CO3	Translate Software Requirements Specification (SRS) for a given problem in IEEE template.	2	2	-	-	-	-	-	-	2	2	2	2
CO4	Select DFD model (level-0, level-1 DFD and Data dictionary) of the project.	2	2	2	-	-	-	-	-	-	-	-	-
CO5	Prepare all Structure and Behavior UML diagram of the given project.	-	2	2	2	2	-	-	-	-	-	-	-

Subject/Code No: Digital Electronics Lab/3CS4-24
LTP: 0L+0T+3P Semester: 3rd
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Demonstrate the basics of logic gates	2	2	2	-	-	-	-	-	2	2	-	2
CO2	Demonstrate basic combinational circuits and verify their functionalities	3	2	2	-	2	-	-	-	2	2	-	2
CO3	Apply the working mechanism and design guidelines of different sequential circuits in the digital system design	2	2	3	-	2	-	-	-	2	2	-	2
CO4	Construct different types of counter for real time digital systems	2	2	3	-	2	-	-	-	2	2	-	2
CO5	Distinguish the different types of shift registers	2	2	2	-	2	-	-	-	2	2	-	2

Subject/Code No: Discrete Mathematics Structure/4CS2-01
LTP: 3L+0T+0P Semester: 4th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Describe basic concept of Sets, Relations, Functions and Discrete Structure and apply appropriate methods to solve the problems.	2	2	3	3	-	-	-	-	-	-	-	3
CO2	Describe the concept of mathematical logic to create the problem in appropriate form and test for validity of the problem.	2	2	3	2	-	-	-	-	-	-	-	2
CO3	Apply fundamental mathematical concepts such as sets, relations, Combinatorics technique to formulate the problems and solve by appropriate method.	3	2	2	2	-	-	-	-	-	-	-	2
CO4	Interpret the concept of groups, ring and field to analyze the complex problems.	3	3	3		-	-	-	-	-	-	-	3
CO5	Demonstrate the model of real-world problems using concept of Graph and solve the problems by standard result and graph algorithms.	3	3	3	3	-	-	-	-	-	-	-	3

Subject/Code No: Managerial Economics and Financial Accounting/4CS1-03
LTP: 2L+0T+0P Semester: 4th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Recognize and describe the fundamental concepts of Economics and Financial Management and define the meaning of national income, demand, supply, cost, market structure, and balance sheet.	-	3	-	3	-	2	2	1	-	-	-	2
CO2	Calculate and classify the domestic product, national product and elasticity of price on demand and supply.	-	1	3	2	-	1	1	-	-	-	2	2
CO3	Draw the cost graphs, revenue graphs and forecast the impact of change in price in various perfect as well as imperfect market structures.	-	1	3	2	-	1	-	1	1	-	2	1
CO4	Compare the financial statements to interpret the financial position of the firm and evaluate the project investment decisions.	-	3	3	3	-	-	-	-	1	-	3	1

Subject/Code No: Microprocessor & Interfaces/4CS3-04
LTP: 3L+0T+0P Semester: 4th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Classify the basic operations of Microprocessor and microcontroller using their pin and architectural diagram, and also about area of manufacturing and performance.	3	3	2	2	3	-	-	-	-	-	-	-
CO2	Practice of Knowledge about programming proficiency, using various addressing modes and data transfer instructions of microprocessor and microcontroller.	3	2	2		3	-	-	-	-	-	-	2
CO3	Evaluate the measures of Assembly Language Programming.	3	3	2	2	2	-	-	-	-	-	-	-
CO4	Discriminate the interfacing of various circuits with microprocessor.	3	3	3	1	2	-	-	-	-	-	-	-
CO5	Compare the different programming logic applications with 8085 microprocessors.	3	3	2	2	2	-	-	-	-	-	-	-

Subject/Code No: Database Management System/4CS4-05
LTP: 3L+0T+0P Semester: 4th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Tabulate Database System with the help of Entity Relationship Diagram that visualizes a database system implemented in a real-world scenario.	3	2	2	-	1	-	-	-	-	1	2	-
CO2	Apply data deduction and manipulation techniques using query languages on a variety of databases.	3	2	3	-	3	-	-	-	-	-	-	-
CO3	Use normal forms in the process of enhancing the database schema through refinement techniques.	3	2	-	3	-	-	-	-	-	-	-	-
CO4	Create transaction plans incorporating diverse scheduling types.	2	2	1	-	-	-	-	-	-	-	-	-
CO5	Generalize and assess the effectiveness of concurrency control mechanisms and recovery systems.	3	3	2	-	-	-	-	-	-	-	-	-

Subject/Code No: Theory of Computation/4CS4-06: LTP: 3L+0T+0P
Semester: 4th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Apply the knowledge of different types of grammar; he/she can analyze the all types of grammar and evaluate the relationship among them.	3	2	-	-	2	-	-	1	1	2	-	2
CO2	Differentiate the concept of regular expression and finite automaton and apply the knowledge to compare the procedure for writing regular expression for an automaton or vice versa	2	2	-	-	1	-	-	1	2	2	-	2
CO3	Apply the knowledge of Context Free grammar; he/she can generate the Context free grammar and Pushdown Automaton for evaluating the CFG.	3	3	-	-	2	-	-	1	1	2	-	2
CO4	Apply the knowledge of Turing Machine he/she can analyze the Type-0 grammar and can design and evaluate the Turing Machine	3	3	-	-	1	-	-	-	-	2	-	2
CO5	Apply the knowledge of Pumping Lemma Theorem students can check whether the given grammar Regular grammar/Context Free Grammar or not	3	2	-	-	1	-	-	-	-	2	-	2

Subject/Code No: Data Communication and Computer Networks/4CS4-07 LTP: 3L+0T+0P
Semester: 4th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Able to identify the principles of layered protocol architecture; be able to recognize and generalize the system functions in the correct protocol layer and further illustrate how the layers interact.	2	2	1	-	-	2	1	-	2	-	-	1
CO2	State and cite mathematical problems for data-link and network protocols.	1	2	-	2	-	2	-	-	-	1	-	2
CO3	Use network layer protocols and calculate number of subnets required for a network.	3	2	2	1	2	1	2	1	-	-	-	1
CO4	Compute the reliability of data transfer over transport layer by glossy channel bit errors problem.	2	-	1	-	-	2	1		-	-	-	1
CO5	Select and plan for common services, system services, such as name and address lookups, and communications applications.	2	-	-	-	-	1	-	1	-	-	1	1

Subject/Code No: Microprocessor & Interfaces Lab/4CS4-21
LTP: 0L+0T+2P Semester: 4th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Analyze the fundamentals of assembly level programming	3	2	2	-	2	-	-	-	-	-	-	2
CO2	Apply interfacing concept between input and output devices.	3	3	3	-		-	-	-	-	-	-	-
CO3	Elaborate the interfacing of various other devices with microprocessor.	3	3	-	-		-	-	-	-	-	-	-
CO4	Compose the various programs on different problems using Assembly Language Programming.	3	3	3	-		-	-	-	-	-	-	3
CO5	Implement standard microprocessor real time interfaces including digital-to-analog converters and analog-to-digital converters	3	3	-	-		-	-	-	-	-	-	-

Subject/Code No: Database Management System Lab/4CS4-22
LTP: 0L+0T+3P Semester: 4th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Create and execute a database schema for a specified problem domain	3	2	2	-	-	-	-	-	-	-	-	-
CO2	Manage integrity constraints within a database using a relational database management system (RDBMS),	3	2	2	-	-	-	-	-	-	-	-	-
CO3	Construct and devise a graphical user interface (GUI) application using a fourth-generation programming language (3GL).	3	2	2	-	-	-	-	-	2	-	-	-
CO4	Composing PL/SQL code encompassing stored procedures, stored functions, cursors, and packages.	3	-	-	-	3	-	-	-	-	-	-	-
CO5	Produce SQL and Procedural interfaces to SQL comprehensively.	3	2	-	-	-	-	-	-	2	-	-	-

Subject/Code No: Network Programming Lab/4CS4-23
LTP: 0L+0T+3P Semester: 4th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Identify the functioning of various networking equipment's	2	-	-	-	-	2	-	-	-	-	2	2
CO2	Illustrate the LAN Installation techniques and Configurations techniques	2	2	-	-	2	-	-	-	-	-	2	-
CO3	Solving various Error correcting techniques and framing methods	1	1	1	1	-	-	-	-	-	1	1	-
CO4	Practice the programs for client and server involving UDP/TCP sockets using socket programming.	2	2	2	-	-	-	-	-	-	-	-	2
CO5	Estimate the communication between client and server using Network Simulator.	3	3	-	-	-	-	-	-	-	-	-	-

Subject/Code No: Linux Shell Programming Lab/4CS4-24
LTP: 0L+0T+2P Semester: 4th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Summarize the concepts and commands in UNIX.	3	3	3	-	-	-	-	-	3	-	-	-
CO2	Construct the directory layout of a typical UNIX system, maintain, and secure UNIX directories and files.	3	3	3	3	-	-	-	-	-	-	-	-
CO3	Illustrate the knowledge to use the several shell quoting mechanisms correctly.	2	2	3	2	-	-	-	-	-	-	-	-
CO4	Construct regular expression using filters and various commands to express the patterns.	2	2	3	2	2	-	-	-	-	-	-	-
CO5	Write simple scripts to develop basic command output	3	3	3	3	-	-	-	-	-	-	-	-

Subject/Code No: Java Lab/4CS4-25
LTP: 0L+0T+2P Semester: 4th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Express and restate fundamentals of java, and tools for program designing environments.	3	-	3	-	3	-	-	-	-	-	-	-
CO2	Construct classes and implement the principles of method overloading, inheritance, and access controls within those classes.	2	3	2	2	2	-	-	-	-	-	-	-
CO3	Develop Java packages and incorporate the concept of interfaces, along with importing these packages in Java.	2	3	3	-	2	-	-	-	-	-	-	-
CO4	Formulate the application by managing file operations, handling exceptions, and implementing threads.	-	3	3	-	3	-	-	-	-	-	-	-
CO5	Create applications utilizing Java applets and design various polygons. This task involves the application of knowledge and the synthesis of design skills	-	3	3	-	3	-	-	-	-	-	-	-

Subject/Code No: Information Theory & Coding/5CS3-01
LTP: 2L+0T+0P Semester: 5th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Solve the theory algebra and linear algebra in source coding	3	1	3	3	3	-	-	-	-	-	-	-
CO2	Create channel performance using information theory	3	3	2	2	2	-	-	-	-	-	-	-
CO3	Manipulate linear block codes for error detection and error correction.	2	3	2	3	3	-	-	-	-	-	-	-
CO4	Modify Cyclic codes for error detection and error correction.	3	1	3	3	3	-	-	-	-	-	-	-
CO5	Discover convolution codes for performance analysis.	2	1	1	2	2	-	-	-	-	-	-	-

Subject/Code No: Compiler Design/5CS4-02
LTP: 3L+0T+0P Semester: 5th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Illustrate the different phases of compiler to understand it's working.	3	3	3	-	1	-	-	-	-	-	-	1
CO2	Use and execute different types of parsing algorithm	1	2	3	1	1	1	-	-	-	-	-	1
CO3	Distinguish different types of Intermediate code generations.	1	2	3	2	1	-	-	-	-	-	-	-
CO4	Summarize different types of storage organization techniques.	1	3	3	1	-	-	1	-	-	-	1	-
CO5	Dissect the issues in code generator's design and basic block control flow graph.	1	3	3	1	3	-	-	-	-	-	-	1

Subject/Code No: Operating Systems/5CS4-03
LTP: 3L+0T+0P Semester: 5th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Analyze the concept of Operating Systems, including their essential significance and fundamental operational processes.	3	2	2	2	-	-	-	-	-	1	-	1
CO2	Utilize process scheduling techniques and inter-process communication strategies to evaluate their effectiveness in resolving real-world classical problems	3	3	1	2	1	-	-	-	-	-	2	1
CO3	Analyzing Memory Management Techniques and Page Replacement Algorithms leads to the formulation of Free Space Management with the concept of virtual memory.	3	2	2	2	2	1	-	-	-	-	2	-
CO4	Evaluate Memory Management Techniques and Page Replacement Algorithms to formulate Free Space Management, integrating virtual memory, and showcasing critical assessment.	3	1	1	1	1	1	-	-	-	-	1	-
CO5	Illustrate understanding of File Systems, Input / Output Systems, and diverse disk scheduling algorithms through case studies	1	2	1	2	-	1	-	-	-	1	2	-

Subject/Code No: Computer Graphics & Multimedia/5CS4-04
LTP: 3L+0T+0P Semester: 5th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Understand and apply basics about computer graphics along with graphics standards.	3	3	2	2	1	-	-	-	-	-	-	-
CO2	Explain and analyses various algorithms to scan, convert the basic geometrical primitives, Area filling.	3	3	2	1	-	-	-	-	-	-	-	-
CO3	Explain, illustrate and design various algorithms for 2D transformations and clipping.	3	3	2	1	-	-	-	-	-	-	-	-
CO4	Understand various color models in computer graphics system and develop animated motions through	3	3	2	1	-	-	-	-	-	-	-	-
CO5	To understand the fundamentals concepts of parallel and perspective projections and evaluate various algorithms for 3D transformations.	3	3	2	1	-	-	-	-	-	-	-	-

Subject/Code No: Analysis of Algorithm/5CS4-05
LTP: 3L+0T+0P Semester: 5th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Observe the accuracy and efficiency of the algorithm.	3	2	2	2	1	1	1	-	2	-	-	-
CO2	Associate Dynamic Programming to address real-time challenges.	1	2	1	1	1	2	1	-	1	-	-	1
CO3	Construct and practice different pattern matching algorithms and the assignment problem.	2	2	1	1	2	1	1	-	1	-	1	1
CO4	Estimate the effectiveness of randomized algorithms through Min-Cut, 2-SAT, and similar techniques.	2	2	2	2	2	-	1		1	-	-	-
CO5	Anticipate algorithmic tendencies and the notion of diverse algorithm categories.	3	2	3	2	3	-	-	-	-	-	-	-

Subject/Code No: Wireless Communication (Elective)/5CS5-11
LTP: 2L+0T+0P Semester: 5th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Recognizing Mobile Radio Propagation, Fading, Diversity Concepts and Channel Modeling.	2	3	3		2							2
CO2	Relate the concept of cellular system and their technical challenges.	3	3	3	3								3
CO3	Correlate the Digital Signaling concept with fading channels.	3	3	3		3							
CO4	Estimate the equalization techniques in wireless communication and error probability in faded channels.	3	3	3									
CO5	Summarize the impacts of Design Parameters, Beam Forming and MIMO Systems in wireless communication.	3	3	3		3							

Subject/Code No: Computer Graphics & Multimedia Techniques Lab/5CS4-21
LTP: _0L+0T+2P Semester: 5th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Understand and apply the various predefined functions for drawing various geometric shapes	3	2	2		2							
CO2	Explain and analyze various algorithms to scan, convert the basic geometrical primitives, transformations, Area filling, clipping	3	2	2		2							
CO3	Explain, illustrate and design various kinds of viewing and Projections.	3	3	3									
CO4	Explain, illustrate and design various kinds of clipping techniques	3	3	3									
CO5	Define, explain and apply various concepts associated with computer graphics to develop the animated game	3	3	3									

Subject/Code No: Compiler Design Lab/5CS4-22
LTP: 0L+0T+2P Semester: 5th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Recognize the various forms of tokens and lexemes	3	3	3						3			
CO2	Calculate scanning by using the concept of finite state automation, parse	2	2	3		2				2			
CO3	Arrange intermediate code for various statements in a programming language concept	3	3	3						3			
CO4	Organize the storage for heap structure	3	3	3	3								
CO5	Construct various language patterns using flex tools they are also able to parse.	2	2	3	2					2			

Subject/Code No: Analysis of Algorithm Lab/5CS4-23
LTP: 0L+0T+2P Semester: 5th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Observe the complexity of fundamental algorithms.	3	3	2	2								
CO2	Relate sorting algorithms in real-world scenarios.	3	2	3	2								
CO3	Construct a binary search tree using assorted algorithms.	3	3		3								
CO4	Test algorithms for finding minimum spanning trees.	3		3									
CO5	Appraise algorithms for pattern matching.	3		3	3								

Subject/Code No: Advance Java Lab/5CS4-24
LTP: L+0T+2P Semester: 5th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Recognize the foundational principles of Java programming and identify tools used in program design environments.	3		3									
CO2	Utilize the principles of overloading, inheritance, and access controls in the context of class structures.	3											
CO3	Implement the concept of interfaces and demonstrate the process of importing packages in Java.	3				3							
CO4	Formulate application designs incorporating file handling, exception management, and multithreading.	3		3									
CO5	Construct applications through the utilization of applets, and create intricate polygon designs, demonstrating creative and evaluative skills.	3	2	2									

Subject/Code No: Digital Image Processing/6CS3-01
LTP: 2L+0T+0P Semester: 6th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Illustrate the fundamental concepts of Digital Image Processing System	3	3	3		2							2
CO2	Demonstrate various transformations and filtering techniques on Images in different domains.	3	3	2	2	1							1
CO3	Distinguish the causes for image degradation and compare the image restoration techniques.	3	3	3	1	1							1
CO4	Distinguish various image compression and segmentation techniques.	3	3	3	1	1							1
CO5	Categorize different image segmentation and representation algorithms and techniques	3	3	2	2	2							2

Subject/Code No: Machine Learning/6CS4-02
LTP: 3L+0T+0P Semester: 6th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Apply supervised machine learning algorithms to real-time data to generate predictive insights.	3	2	3	1	3							1
CO2	Analyze real-world data with unsupervised machine learning algorithms to identify patterns and make predictions.	3	2	3	1	3							1
CO3	Evaluate different feature extraction and selection methods.	3	2	2	1	3							
CO4	Identify the different types of semi supervised learning and reinforcement learning algorithms.	3	2	3	1	3							1
CO5	Develop and implement recommender systems and deep learning models to make predictions and recommendations.	3	2	2		3							1

Subject/Code No: Information Security System/6CS4-03
LTP: 2L+0T+0P Semester: 6th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Identify services that enhance the security and its mechanism.	3	1	1		1		1		1			1
CO2	Classify security attacks on information over network. Describe and apply classical encryption techniques.	2	2	1	2	1	1						2
CO3	Compare conventional encryption algorithms & public key cryptography, and design Encryption algorithm to provide the Integration and confidentiality of a message.	3	1	3	1	1			1				3
CO4	Understand the concept of hash function with application and message authentication code in security system	3	2		2	2							3
CO5	Classify key management schemes and discuss web security and transport level security protocols.	3	2	2			2						3

Subject/Code No: Computer Architecture and Organization/6CS4-03
LTP: 3L+0T+0P Semester: 6th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Implement register transfer with the help of micro-operations.	2	3	3									1
CO2	Analyze basic of computer organization, instructions, RISC& CISC characteristics.	3	1	2									1
CO3	Apply integer and floating type computer arithmetic techniques.	2	2	2	2								
CO4	Analyze basics of memory organization, allocation and management schemes.	2	3	3	1								1
CO5	Assess modes of transfer and input output interface, interrupts and DMA processing.	2	2	2	2								1

Subject/Code No: Artificial Intelligence/6CS4-05
LTP: 2L+0T+0P Semester:6th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Recall and identify distinct approaches in AI, with a specific emphasis on significant techniques such as search algorithms, knowledge representation, planning, and constraint management.	3	1	2	2	1		1					1
CO2	Elaborate on the current outlook of AI as the examination of agents that receive percepts from the environment and carry out actions in response.	3	3		3	1							
CO3	Experimenting with the recognition of significant challenges encountered by AI and the intricacy involved in solving typical issues within the domain.	3	1	3		3			1				
CO4	Systematically analyze and evaluate the presented techniques, then strategically employ them to address real-world challenges.	1	1	1				1	1			1	
CO5	Create and evaluate advanced AI approaches, exemplified by intelligent systems and expert systems.	1	3	3		1			3				3

Subject/Code No: Cloud Computing/6CS4-06
LTP: 3L+0T+0P Semester: 6th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Recognize the progression of cloud computing and its practical uses over time	3	3	2			3					1	1
CO2	Evaluate the structure, framework, and various models of cloud computing's design and architecture.	3	2	2		1	1					2	2
CO3	Measure an appraisal of virtualization technology and data centers, including their applications within the context of cloud computing.	3	2	2		1	2					2	1
CO4	Write the understanding of security concerning data, data centers, and cloud services.	3	2	2		1	2					1	1
CO5	Explain cloud services such as AWS and Google App Engine in terms of their integration capabilities with cloud applications.	3	2	1		3	1						1

Subject/Code No: Distributed System/6CS5-11
LTP: 2L+0T+0P Semester: 6th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Illustration of various architectures used to design distributed systems along with different types of operating systems.	3	3	2	2								2
CO2	Analysis of concurrent programming with inter process communication techniques, such as remote method invocation, remote events.	3	1	3	1								1
CO3	Evaluation of various distributed file system through case studies.	3	3	1	1	1							1
CO4	Analysis of distributed shared memory models and their failures in distributed computation.	3	3	3	1								1
CO5	Analyze various faults and their consequences and replicated data management through exploration different types of Distributed Systems.	3	3		3	1							1

Subject/Code No: E Commerce & ERP/6CS5-13
LTP: 2L+0T+0P Semester: 6th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Describe the Ecommerce and ERP, delving into their respective requisites and the infrastructure needed to support them.	3	1					3	3				3
CO2	Examine the necessary infrastructure and software prerequisites to ensure the operational functionality of Ecommerce portals.	3					1	3	3				3
CO3	Elaborate on the operational mechanisms of the Internet, web portals, and Ecommerce portals, while highlighting the essential infrastructure requirements.	3	3					3				1	3
CO4	Apply the effectiveness of tools and techniques in the realm of digital marketing, considering their resultant impact.	3	3					3					3
CO5	Construct an XML-based database and formulate an XML application tailored for storing data.	3	3					2					3

Subject/Code No: Digital Image Processing Lab/6CS4-21
LTP: 0L+0T+3P Semester: 6th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Apply image enhancement operation and image Arithmetic Operations on a given image	2	2	2		2				2			2
CO2	Demonstrate image restoration and histogram processing on images	2	2	2	2	2				2		2	2
CO3	Distinguish and compare various Noise and filtering algorithms on images	2	2	2	2	2				2			2
CO4	Illustrate image restoration and segmentation techniques on an image	2	2	2	2	2				2		2	2
CO5	Apply pattern recognition techniques on images using features extraction	2	2	2		2				2			2

Subject/Code No: Machine Learning Lab/6CS4-22
LTP: 0L+0T+3P Semester: 6th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Understand the mathematical and statistical prospective of machine learning algorithms through python programming.		3		3	3							3
CO2	Evaluate the machine learning models pre-processed through various feature engineering algorithms by python programming.		3		3	3							3
CO3	Design and evaluate the supervised models through python in built functions.	3	3	3									
CO4	Design and evaluate the unsupervised models through python in built functions.	3	3	3									3
CO5	Understand the basic concepts of deep neural network model and design the same.	3	2	3		2							

Subject/Code No: Python Lab/6CS4-23
LTP: 0L+0T+3P Semester:6th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	List various data types in python and use them to solve basic python programs.	3	3		2	3							
CO2	Describe Conditional statements and Looping structures concepts in python and apply these to create searching and sorting programs.	3	3		2	2							
CO3	Explain usage of List, Tuples, Set, Dictionary and Strings and use these to solve programming problems in different ways.	3	3		2	3							
CO4	Discuss file handling concepts and apply them to create basic data handling programs.	3	3			3							
CO5	Understand various built-in python functions and formulate user-defined functions.	3	3			3							

Subject/Code No: Mobile Application Development Lab/6CS4-24
LTP: 0L+0T+3P Semester: 6th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Construct fundamental concepts of Android programming.	3	3	3		2							
CO2	Construct diverse Android applications focusing on layouts and immersive interactive interfaces.	3	3	3		2							
CO3	Build Android applications centered around server less mobile databases such as SQLite.	3	3	3		2							
CO4	Demonstrate an application that records data onto the SD card.	3	2	3		2							
CO5	Design a compact Android Studio application.	3	2	3		2							

Subject/Code No: Cloud Computing/7CS1A LTP: 3L+0T+0P Semester: 7th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Recognize the progression of cloud computing and its practical uses over time	3	3	3			2					2	1
CO2	Evaluate the structure, framework, and various models of cloud computing's design and architecture.	3	3	3		1	1					2	2
CO3	Measure an appraisal of virtualization technology and data centers, including their applications within the context of cloud computing.	3	3	3		1	2					2	1
CO4	Write the understanding of security concerning data, data centers, and cloud services.	3	2	2		1	2					1	1
CO5	Explain cloud services such as AWS and Google App Engine in terms of their integration capabilities with cloud applications.	3	2	1		3	1						1

Subject/Code No: Information Security System/7CS2A LTP: 3L+0T+0P Semester: 7th

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Identify services that enhance the security and its mechanism.	3	1	1		1		1		1			1
CO2	Classify security attacks on information over network. Describe and apply classical encryption techniques.	2	2	1	2	1	1						2
CO3	Compare conventional encryption algorithms & public key cryptography, and design Encryption algorithm to provide the Integration and confidentiality of a message.	3	1	3	1	1			1				2
CO4	Understand the concept of hash function with application and message authentication code in security system	3	2		2	2							2
CO5	Classify key management schemes and discuss web security and transport level security protocols.	3	2	2			2						2

Subject/Code No: Data Mining & Ware Housing/7CS3A

LTP: 3L+0T+0P Semester: 7th

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Apply preprocessing techniques over raw data and provide suitable input for range of data mining algorithms.	3	3	1		1							
CO2	Apply appropriate association rule mining algorithms & statistical measures on Data.	3	3	1		1							
CO3	Create solutions to real life problems using different data mining techniques like classification, prediction & clustering.	3	3	2		1							
CO4	Design data warehouse with dimensional modeling	3	2	3		1							
CO5	Apply OLAP operations & discover the knowledge imbibed in the high dimensional system.	3	3	2		1							

Subject/Code No: Computer Aided Design for VLSI/7CS3A

LTP: 3L+0T+0P Semester: 7th

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Analyze digital circuits, incorporating into a VLSI chip also expected to understand various design methodologies such as custom, semi-custom, standard cell, arrayed logic, sea-of-gates.	3	3	1									
CO2	Explore various contemporary techniques for the design, Simulation.	3	3				1						
CO3	Apply simulation, synthesis and optimization on digital circuit.	3	2	2		1							
CO4	Design the Layout, routing, placement of a VLSI Chip.	2	3	3		1							
CO5	Optimize performance of h/w through CAD tools with floor planning, placement and routing.	2	3	3		1							

Subject/Code No: Compiler Construction/7CS5A
LTP: 3L+0T+0P Semester: 7th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Analysis the working of compiler by understanding its different phases.	3	3		2								
CO2	Apply and implement different types of Parsing algorithms.	3	3		2								
CO3	Evaluate between different types of Intermediate code generations.	3	2		1								1
CO4	Classify the different storage organization techniques	3	3		1								
CO5	Analyze the different issues in the design of the code generator and basic block control flow graph.	3	3		1								

Subject/Code No: Advance Database Management Systems/7CS6.1A
LTP: 3L+0T+0P Semester: 7th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Analyze the processes involved in query optimization which impact on database operation and design	3	2	2		1							
CO2	Analyze the database functions and packages suitable for enterprise database	3	2	2		1							
CO3	Analyze the database functions and packages suitable for enterprise database application development and management	3	2	2		1							
CO4	Apply the database solutions for data access and its Security measures.	3	2	2		1							
CO5	Create the design of database systems for the solution of an applications.	3	2	2		1							

Subject/Code No: Web Development Lab/7CS7A
LTP: 0L+0T+2P Semester:7th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Apply the basic knowledge of web development using knowledge of HTML and CSS elements.	1		1		1				1			
CO2	Create student registration form entry using validation through JavaScript.	1		1		1				1			
CO3	Identify basic configuration of Web Servers. Design a dynamic web page using JSP, PHP and ASP	1		1		1				1			
CO4	Analysis and Interpretation for Dynamic Web Page using JSP and JDBC.	1		1		1							
CO5	Apply the concept of Session in Web Page and demonstrate the knowledge of Ajax development.	1		1		1							

Subject/Code No: VLSI Physical Design Lab/7CS8A
LTP: 0L+0T+3P Semester: 7th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Design digital circuits, incorporating into a VLSI chip.			2		2							
CO2	Explore various contemporary techniques for the design, Simulation.		3			1							
CO3	Apply simulation, synthesis and optimization of digital circuit.			3			1						
CO4	Implementation and Design the Layout, routing, placement of a VLSI Chip.			3				1					
CO5	Optimize performance of h/w through CAD tools with floor planning, placement and routing.			3		2							

Subject/Code No: Compiler Design Lab/7CS9A
LTP: 0L+0T+3P Semester: 7th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Identify different kinds of tokens and lexemes.	2	2										
CO2	Analyze scanning by using the concept of finite state automation, parse tree.	2	2										
CO3	Deploy intermediate code for various statements in a programming language concept	2	1				1						1
CO4	Deploy heap structure for storage		1						2				1
CO5	Deploy various language patterns using lex tools they are also able to parse.		1				1						1

Subject/Code No: Mobile Computing/8CS1A
LTP: 3L+0T+0P Semester:8th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Analyze the principles of mobile computing technologies and Evaluate Mobility management Techniques.	3	3	2									
CO2	Interpret Data dissemination and management and evaluate mobile middleware.	3	2	2									
CO3	Assess Service Discovery and Evaluate standardization Methods.	3	2	2									
CO4	Apply Mobile IP, Mobile TCP, Database systems in mobile environments, and assess World Wide Web.	3	2	2	1								
CO5	Analyze Ad Hoc networks, evaluate and practice Routing protocols.	3	2	2	1								

Subject/Code No: Digital Image Processing/8CS2A
LTP: 3L+0T+0P Semester: 8th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Illustrate the fundamental concepts of Digital Image Processing System	2	2	2		1							1
CO2	Demonstrate various transformations and filtering techniques on Images in different domains.	3	3	2	2	1							1
CO3	Distinguish the causes for image degradation and compare the image restoration techniques.	3	2	2	1	1							1
CO4	Distinguish various image compression and segmentation techniques.	3	2	2	1	1							1
CO5	Categorize different image segmentation and representation algorithms and techniques	2	2	1	1	1							1

Subject/Code No: Distributed System/8CS3A
LTP: 3L+0T+0P Semester: 8th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Illustration of various architectures used to design distributed systems along with different types of operating systems.	3	3	1	1								1
CO2	Analysis of concurrent programming with inter process communication techniques, such as remote method invocation, remote events.	3	2	2	1								1
CO3	Evaluation of various distributed file system through case studies.	2	2	1	1	1							1
CO4	Analysis of distributed shared memory models and their failures in distributed computation.	2	2	2	1								1
CO5	Analyze various faults and their consequences and replicated data management through exploration different types of Distributed Systems.	2	2		2	1							1

Subject/Code No: Real Time System/8CS3.2A
LTP: 3L+0T+0P Semester: 8th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Analyze the concepts of Real-Time systems and modeling	3	2		3								
CO2	Explore the functionality in real-time systems, their architecture and inner behavior.	3	2		3								
CO3	Evaluate the multi-task scheduling algorithms for periodic tasks performance of scheduling.	3	2		1	1							
CO4	Apply scheduling algorithms for aperiodic, and sporadic tasks as well as examine the impact of scheduling	3	3		2	1							
CO5	Design of protocols related to real-time communication	2		3	2	1							

Subject/Code No: Unix Network Programming & Simulation Lab/8CS5A
LTP: 0L+0T+3P Semester: 8th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Analyze the functionality of various distributions of Unix via. BSD, POSIX.	1	1	3	1								
CO2	Develop the programs for client and server involving UDP/TCP sockets using socket programming.		1	3									
CO3	Evaluate interoperability between IPV3& IPV6.	1		3									
CO4	Implement the functionality of FORK function for system call	1		3	1								
CO5	Evaluate the communication between client and server using Network Simulator.	1		2	1								

Subject/Code No: FPGA LAB/8CS6A
LTP: 0L+0T+3P Semester: 8th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Design the various continuous, discrete analog and digital signals with the use of sampling and quantization	1	1	3	1								
CO2	Evaluate the various parameters of the different signals		1	3									
CO3	Design the various filters and calculate the parameter for their characteristics.	1		3									
CO4	Apply digital design flows for system design and recognize the trade-offs involved Design state machines to control complex systems	1		3	1								
CO5	Simulate the transmission and reception of signal of different digital modulation techniques	1		2	1								

Subject/Code No: Digital Image Processing Lab/8CS7A
LTP: 0L+0T+2P Semester: 8th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Apply image enhancement operation and image Arithmetic Operations on a given image	1	1	1		1				1			1
CO2	Demonstrate image restoration and histogram processing on images	2	2	2									
CO3	Distinguish and compare various Noise and filtering algorithms on images	2				1							
CO4	Illustrate image restoration and segmentation techniques on an image	1				1							
CO5	Apply pattern recognition techniques on images using features extraction	1				1				1			1

Bachelor of Technology Civil Engineering

Program Name: Civil Engineering
(Session: 2019-20)

S. No.	Course Code	Course Name	CO No.	Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	3CE2-01	Advance Engineering Mathematics-I	CO 1	Conduct investigations on interpolation and numerical integration based real world problems.	2	2	-	-	-	-	-	-	-	1	-	1
			CO 2	Analyze the various numerical methods and evaluate solution of problems based on differential equations, polynomial equations and Transcendental equations.	2	1	1	1	-	-	-	-	-	-	-	1
			CO 3	Evaluate Laplace transform and inverse Laplace transforms to solve Initial Value Problem (IVP).	2	2	1	1	-	-	-	-	-	-	-	1
			CO 4	Apply Fourier transforms and inverse Fourier transforms to solve Initial Value Problem (IVP) and Boundary Value Problem (BVP).	2	2	1	1	-	-	-	-	-	-	-	1
			CO 5	Apply Z-transform in discrete system and evaluate solution of problems based on recurrence relations.	2	2	1	1	-	-	-	-	-	-	-	1
2	3CE1-02	Technical Communication	CO 1	Apply basics of grammar, common error in writing and speaking, study of advanced grammar, editing strategies to achieve appropriate technical style of official documents such as Project Reports, Manuals, and Minutes of Meetings.	-	-	-	-	-	-	-	-	1	2	-	1
			CO 2	Investigate, judge and assess their linguistic ability which will get enhanced by Identifying key principles and delivery techniques of effective public speaking (listening, speaking, writing, reading)	-	-	-	-	-	-	-	-	1	2	-	2
			CO 3	Outline Notes and create different kinds of technical documents, plan information collection along with analyzing factors and strategies for Information design and document design in an organization.	-	-	-	-	-	-	-	-	1	1	-	2
			CO 4	Create emails and memos intended for an audience within the same company or team as well as to design Resume, Job Application, and Technical Reports.	-	-	-	-	-	-	-	-	1	2	-	2
			CO 5	Apply and analyze the relation between load, shear force, bending moment and slope deflection.	-	-	-	-	-	-	-	-	1	2	-	3

3	3CE3-03	Engineering Mechanics	CO 1	Analyze and evaluate Fundamental laws of mechanics.	3	2	-	-	-	-	-	-	-	-	-	-
			CO 2	Evaluate structure by methods of joints and method of section.	2	3	-	-	-	-	-	-	-	-	-	-
			CO 3	Differentiate the concept of Moment of Inertia of any section.	2	2	-	-	-	-	-	-	-	-	-	-
			CO 4	Analyze the principal of virtual works, different types of friction, Spring and their arrangement	3	2	-	-	-	-	-	-	-	-	-	-
			CO 5	Relate stresses and strain for a structure.	2	2	-	-	-	-	-	-	-	-	-	-
4	3CE3-05	Surveying	CO 1	Analyze the importance of surveying and apply the methods for measuring angles and directions using various instruments.	2	1	-	-	-	-	-	-	-	-	-	-
			CO 2	Evaluate RL using levelling instruments of a given area.	1	2	2	-	-	-	-	-	-	-	-	-
			CO 3	Analyze the different type of curve in field.	2	-	2	2	-	-	-	-	-	-	-	-
			CO 4	Apply the concept of tachometry and photogrammetric in field.	1	-	1	2	-	-	-	-	-	-	-	-
			CO 5	Create the setting out of work using different instruments (Total station and EDM).	1	2	1	1	-	-	-	-	-	-	-	-
5	3CE3-06	Fluid Mechanics	CO 1	Understand various types of fluid and its properties.	3	3	-	-	-	-	-	-	-	-	-	-
			CO 2	Apply &analyze various pressures at a point in a static fluid, equilibrium condition and stability concept for floating bodies.	2	2	2	-	-	-	-	-	-	-	-	-
			CO 3	Explain types, behaviour and various phenomenon to estimate the fluid discharge.	2	-	2	3	-	-	-	-	-	-	-	-
			CO 4	Apply the concept of Euler, Bernoulli's and momentum equation.	2	-	2	2	-	-	-	-	-	-	-	-
			CO 5	Evaluate the concept of laminar flow through pipes, its characteristics and losses.	2	2	2	1	-	-	-	-	-	-	-	-
6	3CE3-07	Building Materials and Construction	CO 1	Understand various types of fluid and its properties.	3	2	-	-	-	-	-	-	-	-	-	-
			CO 2	Apply &analyze various pressures at a point in a static fluid, equilibrium condition and stability concept for floating bodies.	2	3	-	2	-	-	-	-	-	-	-	-
			CO 3	Explain types, behaviour and various phenomenon to estimate the fluid discharge.	3	2	2	-	-	-	-	-	-	-	-	-
			CO 4	Apply the concept of Euler, Bernoulli's and momentum equation.	2	-	2	2	-	-	-	-	-	-	-	-
			CO 5	Evaluate the concept of laminar flow through pipes, its characteristics and losses.	2	2	1	2	-	-	-	-	-	-	-	-

7	3CE3-08	Engineering Geology	CO 1	Understand and evaluate the geology: Branches and Scope of Geology and the concepts of various geological materials and weathering processes.	3	2	2	1	-	-	-	-	-	-	-	-
			CO 2	Analyze and evaluate the properties, behaviour and engineering significance of different type of rocks and minerals.	3	2	2	1	-	-	-	-	-	-	-	-
			CO 3	Interpret and analyze different type of geological features: Fold, Fault, Joints and Unconformities.	3	2	2	1	-	-	-	-	-	-	-	-
			CO 4	Relate and evaluate Geophysical methods for Subsurface Analysis and understand the site selection parameters for Dam& Tunnel.	2	2	1	-	-	1	-	-	-	-	-	-
			CO 5	Create and evaluate the basic concept of remote sensing & GIS in various fields of Civil Engineering.	1	1	1	-	1	-	-	-	-	-	-	1
8	3CE3-21	Surveying Lab	CO1	Use different conventional instruments of measurements in surveying in length, angle, levelling measurements.	2	2	-	-	-	-	1	-	2	2	-	2
			CO2	Apply the procedures involved in field work and to work as a surveying team.	2	2	-	-	-	-	1	-	2	2	-	2
			CO3	Determine the Height of an object by trigonometric levelling	2	2	1	-	-	-	1	-	2	2	-	2
			CO4	Discuss and determine the modern tool of measurement in surveying like EDM, Total station etc.	2	2	1	-	2	-	1	-	1	2	-	2
			CO5	Conduct a survey, collect field data and plot them on a paper	2	3	2	-	2	-	1	-	1	2	-	2
9	3CE3-22	Fluid Mechanics Lab	CO1	Able to demonstrate the basic properties and characteristics of incompressible fluid in laboratory.	2	1	-	-	-	1	-	-	2	2	2	3
			CO2	Able to demonstrate fundamental theorems governing fluid flows i.e., continuity, energy and momentum in laboratory.	2	1	-	-	-	2	-	-	2	2	2	3
			CO3	Able to measure different fluid properties using various type of equipments like measurement of flow, pressure velocity and head loss.	2	1	-	-	-	1	-	-	2	2	2	3
			CO4	Classify the various pressure measuring devices.	1	1	-	-	-	1	-	-	2	2	2	2
10	3CE3-23	Computer Aided Civil Engineering Drawing	CO1	Draw Orthographic projections of Lines, Planes, and Solids	1	-	2	-	3	-	-	-	-	-	-	2
			CO2	Construct Isometric Scale, Isometric Projections and Views	1	-	2	-	3	-	-	-	-	-	-	2
			CO3	Draw Sections of various Solids including Cylinders, cones, prisms and pyramids	1	-	2	-	3	-	-	-	-	-	-	2
			CO4	Draw projections of lines, planes, solids, isometric projections and sections of solids including Cylinders,	1	2	2	-	3	1	1	-	-	-	-	2

				cones, prisms and pyramids using AutoCAD												
10	3CE3-23	Computer Aided Civil Engineering Drawing	CO1	Draw Orthographic projections of Lines, Planes, and Solids	1	-	2	-	3	-	-	-	-	-	-	2
			CO2	Construct Isometric Scale, Isometric Projections and Views	1	-	2	-	3	-	-	-	-	-	-	2
			CO3	Draw Sections of various Solids including Cylinders, cones, prisms and pyramids	1	-	2	-	3	-	-	-	-	-	-	2
			CO4	Draw projections of lines, planes, solids, isometric projections and sections of solids including Cylinders, cones, prisms and pyramids using AutoCAD	1	2	2	-	3	1	1	-	-	-	-	2
11	3CE3-24	Civil Engineering Materials Lab	CO1	To study about selection criteria and uses of common building stones and dressing of stones.	1	1	-	-	-	1	1	-	2	2	3	2
			CO2	To understand the types and properties of bricks and their determination as per IS code such as water absorption, compressive strength, effloresces, dimension and tolerance test.	1	1	-	-	-	1	1	1	2	2	3	2
			CO3	To know raw material of cements.	1	1	-	-	-	1	1	1	2	2	3	2
			CO4	To study the various properties of material i.e glass, kotastone etc.	1	1	-	-	-	1	1	-	2	2	2	2
12	3CE3-25	Geology Lab	CO1	Students should be able to learn the significance of earth and its minerals.	2	1	-	-	-	1	-	-	2	2	2	3
			CO2	Students should be able to learn the significance of rocks and its engineering properties.	1	1	-	-	-	1	-	-	2	2	3	2
			CO3	Students should be able to understand the application of geology knowledge to civil engineering construction.	1	-	-	-	-	2	1	-	2	2	3	2
			CO4	To know about various applications of remote sensing techniques.	1	1	-	-	3	2	1	-	2	2	2	3
13	4CE2-01	Advance Engineering Mathematics-II	CO 1	Apply concept of probability and evaluate solutions of real-world problems.	2	2	-	-	-	-	-	-	-	1	-	2
			CO 2	Analyze standard probability distributions and evaluate solutions of real-world problems.	1	2	1	-	-	-	-	-	-	-	-	1
			CO 3	Estimate the relationship between variables of databases of the problems in quantify and qualitative forms and solve problems by methods of correlation, regression and Rank correlation.	3	1	-	1	-	-	-	-	-	-	-	1
			CO 4	Explore the relationship between variables of databases of the problems and evaluate standard form of the problem by the method of least squares (Method of curve fitting).	2	2	-	-	-	-	-	-	-	-	-	2

			CO 5	Conduct investigation on hypothesis testing in statistical problems and evaluate solution of problem in appropriate form.	2	3	-	-	-	-	-	-	-	-	-	2
14	4CE1-03	Managerial Economics & Financial	CO 1	Determine the objectives, nature, scope, role &responsibilities of a manager of a business undertaking.	2	2	2	-	-	-	-	-	-	-	-	-
			CO 2	Predict the demand for a product or product mix of a company & to analyze various factors influencing demand elasticity. Forecast & compute the future sales level of a product by using various quantitative & qualitative techniques and with the help of past sales data.	3	2	-	-	-	-	-	-	2	-	-	-
			CO 3	Differentiate the meaning, importance, sources, & uses of capital in an enterprise and to estimate the working capital requirements.	2	2	2	-	3	-	-	-	-	-	-	-
			CO 4	Know the meaning, importance, steps, methods, uses & limitations of Capital Budgeting & Market Structure.	3	-	-	-	3	-	-	-	-	-	-	3
			CO 5	Interpret, analyze, discuss & comment on the financial performance of a business unit through liquidity leverage, coverage, turn over & profitability ratios.	3	-	-	3	-	-	-	-	-	-	-	3
15	4CE3-03	Basic Electronics for Civil Engineering Applications	CO 1	Understand the concepts of Digital Electronics.	3	1	-	-	-	-	-	-	-	-	-	-
			CO2	Interpret the Basic Electronics in measurements in Civil Engineering applications.	3	2	-	-	-	-	-	-	-	-	-	-
			CO 3	Analyze and equip with Errors in measurements systems and to expose to Data Acquisition and Processing.	3	2	-	-	-	-	-	-	-	-	-	-
			CO 4	Apply skills of Sensors and to explain Various Sensor Characteristics.	3	-	-	-	-	-	-	-	-	-	-	-
			CO 5	To share them Image processing Tools and Mat lab codes on Images.	3	-	-	-	1	-	-	-	-	-	-	-
16	4CE3-05	Strength of Materials	CO 1	Understand and apply the concept of stress and strains and to evaluate stress and strains in different members.	3	2	1	-	-	-	-	-	-	-	-	-
			CO 2	Apply and analyze the Bending moment, Shear force and Axial thrust diagrams for statically determinate beams and the distribution of bending and shear stresses for simple and composite sections.	2	3	1	-	-	-	-	-	-	-	-	-
			CO 3	Interpret and compare the elementary concepts of torsion, shear stress in solid and hollow circular shafts.	2	2	-	-	-	-	-	-	-	-	-	-
			CO 4	Evaluate the short and long columns subjected to various loading conditions.	3	2	-	-	-	-	-	-	-	-	-	-

			CO 5	Apply and analyze the relation between load, shear force, bending moment and slope deflection.	2	2	1	-	-	-	-	-	-	-	-	-
17	4CE3-06	Hydraulics Engineering	CO 1	Understand dimensional analysis and analyze the various models, concepts and characteristics of boundary layer and turbulent flow.	3	3	-	-	-	-	-	-	-	1	-	1
			CO 2	Classify steady, unsteady, uniform and non-uniform flow, to apply and evaluate gradually and rapidly varied flow in open channel flow	2	3	-	-	-	-	-	-	-	-	-	1
			CO 3	Identify about the working of hydraulic machines like pumps, turbines: To apply and relate the performance of hydraulic machines	3	3	-	-	-	-	-	-	-	-	-	3
			CO 4	Describe about hydrological phenomenon, unit hydrograph, analyze the rainfall, and properties of aquifer: to analyze and estimate the runoff and peak runoff rate.	3	2	2	-	-	-	-	-	-	1	-	1
			CO 5	Apply and estimate water requirement, delta, duty and base and various aspects of Design of Canal: To understand various approaches of cross section of channels and silt control in canals and analyze Kennedy's theory and Lacey's theory.	3	3	2	-	-	-	-	-	-	-	-	2
18	4CE3-07	Building Planning	CO 1	Understand and analyze the different types of buildings, criteria for location and site selection and the different methods of drawing sun chart and sun shading devices.	3	-	-	-	-	-	2	-	-	-	-	-
			CO 2	Apply and analyze the Climatic and comfort Consideration using climate modulating devices and evaluate the orientation criteria for tropical climate with the consideration of Building Bye Laws and NBC Regulations.	2	2	-	-	-	-	-	-	-	-	-	1
			CO 3	Evaluate the principles of Planning and different factors affecting planning including VastuShastra in Modern Building planning.	2	3	-	-	-	-	-	-	-	-	-	1
			CO 4	Interpret and compare the functional design and Accommodation requirements of different Buildings.	2	2	-	-	-	-	-	-	-	-	-	2
			CO 5	Relate the Services in Buildings.	2	2	-	-	-	-	-	-	-	-	-	2
19	4CE3-08	Concrete Technology	CO 1	Apply the knowledge of properties and role of various ingredients like cement, aggregate, admixtures etc. to produce good quality concrete.	3	3	-	-	-	-	-	-	-	-	-	1
			CO 2	Analyze properties of fresh and harden concrete by examining in lab and perform destructive, semi-destructive and non-destructive tests for concrete.	3	2	-	-	2	-	-	-	-	-	-	1

			CO 3	Categorize the concrete manufacturing process and selecting right step by step process to achieve workable, durable of fresh and harden concrete.	2	3	-	-	-	-	-	-	-	-	3	2
			CO 4	Design the concrete mix with suitable chemical admixture; this fulfils the required properties for fresh and hardened concrete.	2	2	2	-	-	-	-	-	-	-	-	1
			CO 5	Create the advance concrete and develop such concrete by adding and manipulating composition.	3	-	2	3	-	-	-	-	-	-	-	1
20	4CE3-21	Material Testing Lab	CO1	Explain basic properties of materials.	2	1	-	-	-	-	2	-	-	2	-	2
			CO2	Identify the test to be conducted for different properties of building materials.	2	2	1	-	-	-	2	-	-	2	-	2
			CO3	Test for different properties of building materials.	2	2	1	-	-	-	1	-	-	2	-	2
			CO4	Analyze the test results for different properties.	2	2	2	-	-	-	-	-	-	2	-	2
21	4CE3-22	Hydraulics Engineering Lab	CO1	Describe the equipment's used for behaviour and measurement of fluid in hydraulic structure	2	1	-	-	-	-	1	-	1	2	-	2
			CO2	Apply characteristics of Pelton Wheel, hydraulic jump and Centrifugal Pump in civil engineering	2	3	-	-	-	-	1	-	1	2	-	2
			CO3	Analyze the discharge by using various instruments like venturimeter Broad crested weir.	2	3	-	2	-	-	1	-	1	2	-	2
			CO4	Evaluate momentum equation, Manning'& Chezy's coefficient of roughness for the bed of a given flume.	-	-	-	-	-	-	-	-	-	-	-	-
22	4CE3-23	Building Drawing	CO1	Create drawing of basic Components of buildings.	1	2	-	-	-	-	-	-	-	-	-	2
			CO2	Identify the components of different buildings required asper their functional need.	1	2	2	-	-	-	-	-	-	-	-	2
			CO3	Conduct the survey experiment using appropriate instruments and procedure.	1	2	2	2	2	1	-	-	-	-	-	2
			CO4	Analyze the data obtained and get the results after necessary computations.	1	2	2	2	2	1	-	-	-	-	-	2
23	4CE3-24	Advanced Surveying Lab	CO1	Identify the instruments required for a particular survey problem	1	2	-	-	-	-	-	-	-	-	-	2
			CO2	Device a method to fulfill the desired objective.	1	2	2	-	-	-	-	-	-	-	-	2
			CO3	Conduct the survey experiment using appropriate instruments and procedure.	1	2	2	2	2	1	-	-	-	-	-	2
			CO4	Analyze the data obtained and get the results after necessary computations.	1	2	2	2	2	1	-	-	-	-	-	2

24	3CE3-25	Concrete Lab	CO1	Explain the Quality control test on ingredients of concrete.	2	1	-	-	-	-	1	-	-	2	-	2
			CO2	Conduct Quality Control test on ingredients of fresh and hardened concrete.	2	2	-	-	-	-	1	-	2	2	-	2
			CO3	Analyze the test on fresh and hardened concrete and Non-destructive test on concrete.	3	2	-	-	2	-	1	-	2	2	-	2
			CO4	Design the concrete mix.	2	3	2	2	-	1	1	-	2	2	-	2
25	5CE3-01	Construction Technology and equipment	CO 1	Implement the basic concept of engineering economics and evaluate cost optimization.	2	-	-	-	-	-	-	-	-	-	-	-
			CO 2	Apply the safety provision in the construction industry.	-	2	-	-	-	2	-	-	-	-	-	-
			CO 3	Analyze the safety in construction and evaluate safety requirements.	-	-	2	1	-	-	1	-	-	-	-	-
			CO 4	Analyze the Construction Planning and Materials Management.	1	-	-	-	-	-	-	-	-	-	-	-
			CO 5	Distinguish the different types of Construction Equipment and their Management.	-	-	-	-	1	-	-	-	-	-	-	-
26	5CE3-02	Structure Analysis- I	CO 1	Calculate the degree of indeterminacy of any structures.	3	2	-	1	-	-	-	-	-	-	-	-
			CO 2	Analyze the indeterminate structures by different kinds of methods.	3	2	-	-	-	-	-	-	-	-	-	-
			CO 3	Analyze the indeterminate structures by different kinds of methods.	3	2	-	1	-	-	-	-	-	-	-	-
			CO 4	Students will get the knowledge of elementary concepts of structural vibration.	3	2	-	1	-	-	-	-	-	-	-	-
			CO 5	Analyze the vibrating structure.	3	2	-	2	-	-	-	-	-	-	-	-
27	5CE3-03	Design of Concrete Structures	CO 1	Analyze the Singly reinforced beam and Design the Singly reinforced beam by Working Stress Method.	2	3	2	-	-	-	-	-	-	-	-	-
			CO 2	Differentiate the Singly reinforced beam & doubly reinforced beam and Design the Doubly reinforced beam by using Limit State Method.	2	3	2	-	-	-	-	-	-	-	-	-
			CO 3	Analyze the beam for flexure, shear, torsion, bond and anchorage and development length.	1	3	2	-	-	-	-	-	-	-	-	-
			CO 4	Categorized and design the one way and two-way concrete slab according IS 356 -2000.	1	3	2	-	-	-	-	-	-	-	-	-
			CO 5	Design the axially loaded, eccentrically loaded short columns, Isolated & Combined foundation.	1	3	2	-	-	-	-	-	-	-	-	-

28	5CE3-03	Geotechnical Engineering	CO 1	Interpret the Objective, scope and outcome of the course. Understand the soil constituents and classification of soil also apply the Engineering and Index properties of soil.	3	2	1	-	-	-	-	-	-	-	-	-
			CO 2	Implement and analyze the concept of shearing strength of soil, Compaction of soil and vertical and horizontal stresses of soil.	3	2	-	-	-	-	-	-	-	-	-	-
			CO 3	Apply and analyze the Compressibility of soil, Consolidation characteristics and settlement of soil.	2	1	1	-	-	-	-	-	-	-	-	-
			CO 4	Differentiate the stability of slopes and Earth pressures on soil.	1	2	-	-	-	-	-	-	-	-	-	-
			CO 5	Implement and analyze the Bearing capacity and Site investigation of soil.	2	-	2	-	-	-	-	-	-	-	-	-
29	5CE3-05	Water Resources Engineering	CO 1	Apply appropriate methods of irrigation technique and evaluate water requirements for crop production.	3	2	-	-	-	-	1	-	-	-	-	-
			CO 2	Evaluate channels for appropriate water application in respective areas.	3	1	2	-	-	-	-	-	-	-	-	-
			CO 3	Design of various dams in respective areas.	3	2	-	2	-	-	-	-	-	-	-	-
			CO 4	Apply various cross-drainage structures in respective areas.	3	2	-	1	-	-	-	-	-	-	-	-
			CO 5	Analyze appropriate hydrological phenomena and estimate watershed yield.	3	1	-	1	-	-	-	-	-	-	-	-
30	5CE5-12	Disaster Management	CO 1	Implement the basic concept of hazard and disaster.	3	2	1	-	-	-	-	-	-	-	-	-
			CO 2	Analyze the Disaster Management Terminology.	3	-	-	-	2	1	-	-	-	-	-	-
			CO 3	Distinguish and analyze the different types of disasters.	-	-	-	-	3	-	-	-	-	-	-	-
			CO 4	Analyze and demonstrate the disaster management cycle and identify safety tips.	-	3	-	-	-	-	-	-	-	-	-	-
			CO 5	Relate the Disaster management system in India and evaluate the role of society in disaster management.	-	-	-	3	-	-	-	-	-	-	-	-
31	5CE5-13	Town Planning	CO 1	Describe the concept of Town Planning and different terminologies, town planning National Protocols	3	2	1	-	-	-	-	-	-	-	-	-
			CO 2	Discuss town planning methodologies and significant impact on a project	3	-	-	-	2	1	-	-	-	-	-	-
			CO 3	Apply the concept of town planning on real scenarios	-	-	-	-	3	-	-	-	-	-	-	-
			CO 4	Analyze effect of town planning on growth of a city	-	3	-	-	-	-	-	-	-	-	-	-
			CO 5	Conduct case studies of various towns of India	-	-	-	3	-	-	-	-	-	-	-	-

32	5CE5-13	Repair and Rehabilitation of Structures	CO 1	Analyze the sequence of construction activities and methods of construction of various structural elements	3	2	1	-	-	-	-	-	-	-	-	-
			CO 2	Evaluate the conventional and modern materials that are commonly used in Civil Engineering construction	3	-	-	-	2	1	-	-	-	-	-	-
			CO 3	Apply and differentiate various NDT (Non-Destructive Test) techniques.	-	-	-	-	3	-	-	-	-	-	-	-
			CO 4	Differentiate among various Repairing techniques and materials	-	3	-	-	-	-	-	-	-	-	-	-
			CO 5	Conduct the investigation on the case studies of bridges, piers and different concrete structures.	-	-	-	3	-	-	-	-	-	-	-	-
33	5CE5-15	Ground Improvement Technique	CO 1	Understand the fundamental concepts of ground improvement techniques in civil engineering construction activities	2	3	1	-	-	-	-	-	-	-	-	-
			CO 2	Describe the different techniques of ground improvements	2	3	1	-	-	-	-	-	-	-	-	-
			CO 3	Apply knowledge of mathematics, Science and Geotechnical Engineering to solve problems in the field of modification of ground required for construction of Civil Engineering structures.	2	3	1	-	-	-	-	-	-	-	-	-
			CO 4	Illustrate reinforced wall design using steel strip or geo-reinforcement	2	3	1	-	-	-	-	-	-	-	-	-
			CO 5	Use effectively the various methods of ground improvement techniques and outline the solution for problematic soils	2	3	1	-	-	-	-	-	-	-	-	-
34	5CE3-21	CONCRETE STRUCTURES DESIGN	CO1	Assess the bending moment and shear force for beams, columns, slabs and footings.	2	-	-	-	-	-	-	-	-	-	-	1
			CO2	Analyze the design parameters of the flexural members to fulfill the requirements of WSM and Limit state of Collapse for Flexure, shear and torsion.	2	-	2	3	-	-	-	-	-	-	-	2
			CO3	Design of flexural members for flexure, shear, bond, development length & curtailment of bar to fulfill the criteria of Limit State of Collapse for Flexure, shear and Torsion.	2	2	2	3	-	-	-	-	-	-	-	2
			CO4	Analyze and design of column and column footings economically and suitably recommend the appropriate type according to site conditions	2	2	2	3	-	-	-	-	-	-	-	2
35	5CE3-22	Geotechnical Engineering Lab	CO1	Implement and analyze the properties of soil such as Grain size distribution, specific Gravity, liquid limit, plastic limit and density etc.	1	-	-	-	-	-	-	-	-	-	-	2
			CO2	Classify C-Ø values by unconfined compression Test Apparatus, Direct Shear Test Apparatus and Triaxial Test.	1	-	-	2	-	-	-	-	-	-	-	2

			CO3	Evaluate the differential free swell index, swelling pressure, CBR of soil.	1	2	2	2	1	-	-	-	-	-	-	2
			CO4	Interpret the compressibility parameters of soil by consolidation test, permeability of soil by constant and falling head methods.	1	2	2	2	1	-	-	-	-	-	-	2
36	5CE3-23	Water Resource Engineering Design Lab	CO1	LO1) Explain the basic concept of water resource engineering, canals, dams, well irrigation, cross drainage structure and hydrology.	1	2	-	-	-	-	-	-	-	-	-	1
			CO2	LO2) Apply the water resource concept in irrigation system, canals, diversion head works, dams, well irrigation, cross-drainage structure and hydrology.	2	2	2	-	-	-	-	-	-	-	-	1
			CO3	LO3) Analyze the water requirement of crop, seepage losses in dam, forces acting on dam, run off and rain fall.	2	2	2	2	-	-	-	-	-	-	-	2
			CO4	LO3) Design of canal, surface and subsurface flows, dams like embankment and gravity dam, tube well.	2	2	2	2	-	-	-	-	-	-	-	2
37	6CE03-01	Wind & Seismic Analysis	CO 1	Understand the basic concept of building configuration & differentiate the types of building, shear walls, framed structure and Tube Structure.	2	3	1	-	-	-	-	-	-	-	-	-
			CO 2	Analyze the different types of design load as per Indian Standard Codes 875 Part-I, II & load Flow Concept in a Structure.	1	3	1	-	-	-	-	-	-	-	-	-
			CO 3	Differentiate the Flat, Pitched and Mono slope roof and analyze the roofs with respect to wind load as per Indian standard code IS 875-III.	1	3	2	-	-	-	-	-	-	-	-	-
			CO 4	Analyze the frame structures for earthquake load as per Indian standard code IS1893-I.	1	3	1	-	-	-	-	-	-	-	-	-
			CO 5	Differentiate the provision for earthquake resistance building as per Indian standard code IS 3326, IS13827, IS13828, IS13920 and IS13935.	1	3	-	-	-	-	-	-	-	-	-	-
38	6CE3-02	Structural Analysis-II	CO 1	Understand among various types of structures and Examine & Produce the Structure by Strain Energy method and Unit Load Method.	2	3	-	1	-	-	-	-	-	-	-	-
			CO 2	Apply the basic principles of SFD & BMD for the rolling loads and mathematical problems with reference to rolling loads and ILD.	1	3	-	1	-	-	-	-	-	-	-	-
			CO 3	Evaluate between types of arches and evaluate the stability of arches.	-	2	-	-	-	-	-	-	-	-	-	-
			CO 4	Analyze the concept of unsymmetrical bending and shear centre.	-	1	-	-	-	-	-	-	-	-	-	-

			CO 5	Analyze and Evaluate the Frame by using three different methods and build & differentiate among these methods.	-	1	-	-	-	-	-	-	-	-	-	-
39	6CE3-03	Environmental Engineering	CO 1	Analyze the various water quality standard, Distinguish the water distribution system and design the various reservoir	-	-	2	2	-	2	1	-	-	-	-	-
			CO 2	Analyze the various water treatment methods, design and apply the various parameters used in the sewer system.	-	3	2	1	1	-	-	-	-	-	-	-
			CO 3	Design the sewerage systems, analyze the various Sewage characteristics Quality parameters and Distinguish the Standards of disposal in land	-	-	2	2	-	2	1	-	-	-	-	-
			CO 4	Analyze the various treatment method of sewage, Evaluate the various Pollution due to improper disposal of sewage, Distinguish the Wastewater Disposal and Refuse method	-	-	-	3	1	2	2	-	-	-	-	-
			CO 5	Analyze the Quantification of air pollutants, evaluate various control methods measures for Air pollution and noise pollution	-	-	-	3	-	2	2	-	-	-	-	-
40	6CE3-03	Design of Steel Structures	CO 1	Analyze steel sections used in steel structures and the suitable sections for design.	2	2	2	-	-	-	-	-	-	-	-	-
			CO 2	Analyzing the different kinds of connection used in steel structures and being able to create the compression and tension member.	2	3	3	-	-	-	-	-	-	-	-	-
			CO 3	Create the laterally supported and unsupported steel beams and analyze the gantry girder, plate girder and laterally loaded steel members.	2	2	3	1	-	-	-	-	-	-	-	-
			CO 4	Analyze and apply the different type's column bases.	2	2	2	-	-	-	-	-	-	-	-	-
			CO 5	Analyze and create the truss girder and foot over bridge.	2	2	2	-	-	-	-	-	-	-	-	-
41	6CE3-05	Estimating and Costing	CO 1	To provide the student with the ability to estimate the quantities of item of works involved in buildings and bill of quantities	3	3	1	-	-	1	-	-	-	-	-	-
			CO 2	To provide the student with the ability to estimate the quantities of item of works involved in different projects	-	-	-	-	2	1	-	3	-	2	3	1
			CO 3	To provide the student with the ability to do rate analysis	-	-	3	-	-	-	1	-	-	-	-	-
			CO 4	Preparation of estimates for different works like roads, buildings, earth work, water supply etc.	-	-	-	-	-	1	-	-	-	2	1	-
			CO 5	To provide the student with the ability to valuation of properties	2	2	-	-	-	-	-	-	1	1	-	-

42	6CE5-12	Solid and Hazardous Waste Management	CO 1	Analyze and characterization of solid waste, hazardous waste constituents.	-	-	-	-	-	2	2	-	-	-	-	-
			CO 2	Understand health and environmental issues related to solid waste management.	-	-	-	-	-	2	2	-	-	1	-	-
			CO 3	Apply steps in solid waste management-waste reduction at source, collection techniques, materials and resource recovery/recycling, transport of solid waste	-	-	-	-	-	2	2	-	-	1	-	-
			CO 4	Analyze treatment and disposal techniques, economics of the onsite vs. offsite waste management	-	-	-	-	-	2	2	-	-	1	-	-
			CO 5	Evaluate the effectiveness of a waste-to-energy facility in terms of energy production, emissions, and waste reduction.	-	-	-	-	-	-	-	-	-	-	-	-
43	6CE5-13	Traffic Engineering & Management	CO 1	Understand characteristics of road, road users and vehicle performance with traffic law	1	3	-	-	-	-	-	-	1	-	-	-
			CO 2	Analyze various traffic surveys and their interpretation with applications & significance.	1	1	1	-	-	-	-	-	-	-	-	-
			CO 3	Evaluate various intersections, traffic signs and markings.	1	1	1	-	-	-	-	-	-	-	1	-
			CO 4	Analyze road accidents its causes, effects, prevention, traffic and	1	2	2	-	-	-	1	-	-	-	-	-
			CO 5	Analyze Traffic Management System by Direct and indirect methods.	1	1	-	-	-	-	-	-	-	-	2	-
44	6CE5-13	Bridge Engineering	CO 1	Explain different types of bridges, components and loadings as per Indian standards provisions	**1**	**-**	**-**	**-**	**-**	**1**	**1**	**-**	**-**	**-**	**-**	**-**
			CO 2	Apply the fundamental concept of bridge loadings on Steel and RCC bridges	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
			CO 3	Analyze the RCC and steel bridges using Courbons and Hendry-Jaegar method	**-**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
			CO 4	Design of Bearings, Steel and RCC bridges according to IRC codal provisions	**-**	**-**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
			CO 5	Evaluate the impact of environmental factors on the durability of different bridge materials.	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
45	6CE5-15	Rock Engineering	CO 1	Define the use of rock mass classification systems (RMR & Q).	**3**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
			CO 2	Explain methods for in situ investigation and laboratory testing of rock matrix and discontinuities.	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
			CO 3	Apply the knowledge of the characteristics and the mechanical properties (strength and failure criteria) of rock mass, rock matrix and discontinuities.	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

			CO 4	Analyse the stress distribution (isotropic, anisotropic) in situ and around an opening in rock (competent rock, jointed rock mass, blocky rock)	3	2	1	-	-	-	-	-	-	-	-	-
			CO 5	Analyze the potential environmental impact of rock excavation and suggest appropriate mitigation measures.	-	-	-	-	-	-	-	-	-	-	-	-
46	6CE5-16	GIS & Remote Sensing	CO 1	Evaluate Photogrammetric and apply principles of Photogrammetric to create maps and their substitutes	3	1	1	-	1	-	-	-	1	-	-	-
			CO 2	Analyze the basic concept of remote sensing.	2	1	1	-	-	1	-	-	-	-	-	-
			CO 3	Evaluate and analyze different types of platforms, sensors and their characteristics in Remote Sensing.	2	1	1	-	-	-	-	-	-	-	-	-
			CO 3	Analyze and create the different types of information from different remote sensing data products using various image processing techniques.	2	1	1	1	-	-	-	-	-	-	-	-
			CO 5	Create the basic concept of GIS and analyze the use of GIS tools for civil engineering purpose.	1	1	1	1	1	1	-	-	-	-	-	-
47	6CE3-21	Environmental Engineering Design And Lab	CO1	Understand the water quality parameters their permissible limits and compute population forecasting water demand	1	2	-	-	-	-	-	-	-	-	-	1
			CO2	Analyze the physical and chemical tests to be conducted for the water before supply.	2	2	2	-	-	-	-	-	-	-	-	1
			CO3	Design of filters, tanks, densification units and transmission system	2	2	2	2	-	-	-	-	-	-	-	2
			CO4	Design of sewer lines, storm water systems, aerobic & anaerobic treatment units	-	-	-	-	-	-	-	-	-	-	-	-
48	6CE3-22	Steel Structures Design Lab	CO1	Calculate the plastic moment of different cross section and design of bolted and welded connections	2	2	2	-	-	-	-	-	-	-	-	-
			CO2	Analyze and design the tension, compression & column bases member under axial and combined loading	2	3	3	-	-	-	-	-	-	-	-	1
			CO3	Discuss the pre-engineered buildings, bridges & trusses	2	2	3	1	-	-	-	-	-	-	-	1
			CO4	Identify and demonstrate the various section of steel structures at field visit	-	-	-	-	-	-	-	-	-	-	-	-
49	6CE3-23	Quantity Surveying And Costing	CO1	Able to prepare preliminary and detailed estimates by various methods.	3	3	1	-	-	1	-	-	-	-	-	-
			CO2	Able to do rate analysis of various items of work	2	1	-	-	2	1	-	3	-	2	3	1
			CO3	Able to evaluate earth work for road, canals ad channels.	2	2	3	-	-	-	1	-	-	-	-	1
			CO4	Able to do Valuation of Buildings and Properties.	2	2	-	-	-	1	-	-	-	2	1	-

50	6CE3-23	Water and Earth Retaining Structure design lab	CO1	Understand concept of coefficient method (IS code) and apply it for analysis and design of continuous beams.	2	-	-	-	-	-	-	-	-	-	-	1
			CO2	Analysis and design of circular domes with u.d.l. & concentrated load at crown	2	1	2	3	-	-	-	-	-	-	-	1
			CO3	Classification of water tanks according to shape and design of rectangular, circular and intze type tanks.	2	2	2	3	-	-	1	-	-	-	-	2
			CO4	Analysis and design of Cantilever Retaining Walls and introduction to counterfort and buttress type retaining walls.	-	-	-	-	-	-	-	-	-	-	-	-
51	6CE3- 25	DESIGN OF FOUNDATIONS	CO1	Apply the theoretical knowledge of bearing capacity to design various types of shallow foundation.	2	2	2	-	-	-	-	-	-	-	-	-
			CO2	Understand the design of pile foundation (covering both geotechnical and structural aspects)	2	3	3	-	-	-	-	-	-	-	-	1
			CO3	Discuss the different components of well foundation, its construction and design methods.	2	2	3	1	-	-	-	-	-	-	-	1
			CO4	Use the theoretical knowledge of earth pressure to analyze and design of various retaining structures.	-	-	-	-	-	-	-	-	-	-	-	-
52	7CE1A	Water Resources Engineering-I	CO 1	Apply and analyze the functions, advantages of present status of irrigation in India and water harvesting and conservation.	3	-	-	-	-	-	1	-	-	-	-	-
			CO 2	Discuss the role of command area development authority and Canal Irrigation. To Analyze and Evaluate the design of channels, regime and semi theoretical approaches.	1	2	1	-	-	-	-	-	-	-	-	1
			CO 3	Apply and Distribution of Canal Water. To apply and evaluate different stages of rivers, and river training & bank protection works.	1	3	1	-	-	-	-	-	-	-	-	1
			CO 4	Analyze and Apply Water Logging Causes and types of channels lining and design of lined channels.	1	2	1	-	-	-	-	-	-	-	-	1
			CO 5	Use the Hydrology and Hydrologic cycle and evaluate Application to Engineering problems, measurement of rainfall, rain gauge, peak flow, flood frequency method	1	1	1	-	-	-	-	-	-	-	-	1
53	7CE2A	Design of Steel Structures-I	CO 1	Apply and analyze the types of steel, their broad specifications and Plastic analysis of steel structures.	2	1	3	-	-	-	-	-	-	-	-	1
			CO 2	Design the bolted and welded connections under axial and eccentric loadings.	1	2	3	-	-	-	-	-	-	-	-	1
			CO 3	Implement and analyze the Compression Member.	1	2	3	-	-	-	-	-	-	-	-	1

			CO 4	Classify and design the beams and their connections.	1	2	3	-	-	-	-	-	-	-	-	1
			CO 5	Analyze the column bases, Slab base, gusseted base for axial and eccentric compressive load.	1	2	3	-	-	-	-	-	-	-	-	1
54	7CE3A	Design of Concrete Structures-II	CO 1	Compare the concept of Pre-Tension & Post- Tension concrete and students are able to Analyze and Apply the concept of Pre-Tension & Post- Tension on rectangular Prestressed concrete Section.	1	3	2	-	-	-	-	-	-	-	-	-
			CO 2	Classify Torsion and different types of beams and Analyse & Evaluate the three types of Beams by using Indian Standard Code: 356-2000.	1	3	2	-	-	-	-	-	-	-	-	-
			CO 3	Differentiate and apply the types of Tanks and Dome using Indian Standard code: 3370-Part2-2009.	1	3	2	-	-	-	-	-	-	-	-	-
			CO 4	Describe the basic concept of Yield Line Theory & its applications & students are able to differentiate, Evaluate and analyse the different types of Retaining walls.	1	3	2	-	-	-	-	-	-	-	-	-
			CO 5	Classify the bridge and Culvert and students are able to apply and analyse the slab culvert and T- Bridge for IRC Loading by using Indian Stand Code: IRC 6-1966 and IRC 21-2000.	1	3	1	-	-	-	-	-	-	-	-	-
55	7CE3A	Transportation engineering-II	CO 1	Classify the various permanent way components, features, maintenance, and signal systems.	-	-	-	-	-	3	2	-	1	-	-	-
			CO 2	Apply and design the points and crossings, at surface, elevated and underground railway system conditions.	-	-	3	-	-	-	2	-	-	-	2	-
			CO 3	Design the various geometric attributes and gauge widening in the railway system.	-	-	3	-	-	1	1	-	-	-	-	-
			CO 4	Analyze the several components of airport engineering.	-	-	-	-	-	2	2	-	1	-	-	-
			CO 5	Design airport pavement by using various methods.	-	-	3	3	-	-	-	-	-	-	-	-
56	7CE5A	Application of Numerical Methods in Civil Engineering	CO 1	Discuss the decimal and binary number system and understand the concept of Accuracy, Errors and approximations for solution of problems.	2	2	-	-	-	-	-	-	-	2	-	1
			CO 2	Explain basic concepts of iterative methods and apply appropriate iterative methods for numerical solutions of nonlinear equations.	2	2	-	-	-	-	-	-	-	-	-	2
			CO 3	Execute the basic concept of matrices and understand consistency of the system of equations for solving linear systems of equations by direct methods.	2	2	-	2	-	-	-	-	-	-	-	1

			CO 4	Apply the concept of iterative methods and create the approximate solution of the linear system of equations by use of appropriate iterative methods.	1	2	-	2	-	-	-	-	-	-	-	1
			CO 5	Discuss the concept of finite differences, analyze the various methods and apply knowledge of interpolation for solution of engineering problems.	1	1	1	1	-	-	-	-	-	-	-	1
57	7CE6.1A	Advanced Transportation Engineering	CO 1	Classify the different traffic studies and also to apply &analyze the traffic data by various methods.	2	3	-	-	-	-	-	-	-	2	-	1
			CO 2	Apply the various methods for traffic engineering and also to solve out the problems based on distribution.	1	2	2	-	-	-	-	-	-	-	-	2
			CO 3	Analyze the principles of roads & signals and also design the various roads and signals in traffic engineering.	1	1	2	2	-	-	-	-	-	-	-	1
			CO 4	Analyze the various traffic laws and regulations & also to evaluate the various types of markings and signs.	2	1	2	2	-	-	-	-	-	-	-	1
			CO 5	Evaluate the effect of traffic on the environment and to understand & remember the various road safety measures.	1	2	2	1	-	-	-	-	-	-	-	1
58	7CE7A	Design of Water Resource Structures-I	LO1	Explain the basic concept of water resource engineering, canals, dams, well irrigation, cross drainage structure and hydrology.	1	2										1
			LO2	Apply the water resource concept in irrigation system, canals, diversion head works, dams, well irrigation, cross-drainage structure and hydrology.	2	2	2									1
			LO3	Analyze the water requirement of crop, seepage losses in dam, forces acting on dam, run off and rain fall.	2	2	2	2								2
			LO4	Design of canal, surface and subsurface flows, dams like embankment and gravity dam, tube well.	2	2	2	2								2
59	7CE8A	Steel Structures Design-I	LO1	Analyze steel sections used in steel structures and the suitable sections for design.	2	2	2	-	-	-	-	-	-	-	-	-
			LO2	Analyzing the different kinds of connection used in steel structures and being able to create the compression and tension member.	2	3	3	-	-	-	-	-	-	-	-	-
			LO3	Create the laterally supported and unsupported steel beams and analyze the gantry girder, plate girder and laterally loaded steel members.	2	2	3	1	-	-	-	-	-	-	-	-
			LO4	Analyze and apply the different type's column bases.	2	2	2	-	-	-	-	-	-	-	-	-

			LO5	Analyze and create the truss girder and foot over bridge.	2	2	2	-	-	-	-	-	-	-	-	-
60	7CE9A	Concrete Structures Design-II	LO1	Recall the basics of shear force and bending moment diagram.	3	2										
			LO2	Analysis and design of beams for flexure, shear and torsion as per codal provisions.	2		2									
			LO3	Apply checks for collapse and serviceability criteria for design of RC members as per codal provisions.	2	3	3									
			LO4	Analysis and design of slab, column and footing as per codal provisions.												
61	7CE10A	Application of Numerical Methods in Civil Engineering Lab	LO1	Know about how to make engineering easy and more interesting.	3		3									
			LO2	Understand application of numerical methods.	2	3	2									
			LO3	Application of numerical methods to make program in language C.	3		3									
62	7CETR	Practical Training & Industrial Visit	LO1	Participate in the projects in industries during his or her industrial training.	2	-	-	-	2	-	3	3	3	2	-	2
			LO2	Describe use of advanced tools and techniques encountered during industrial training and visit.	2	-	-	-	2	-	3	3	3	2	-	2
			LO3	Interact with industrial personnel and follow engineering practices and discipline prescribed in industry.	2	-	-	-	2	-	3	3	3	2	-	2
			LO4	Develop awareness about general workplace behavior and build interpersonal and team skills.	2	-	-	-	2	-	3	3	3	2	-	2
			LO5	Prepare professional work reports and presentations.	2	-	-	-	2	-	3	3	3	2	-	2
63	7CEPR	Project-I	CO 1	Team work to select an engineering problem and its solution	2	2	—	—	—	3	—	3	—	—	—	—
			CO 2	Formulate the problem and design using modern technologies and new software learning	1	—	—	—	—	—	—	3	3	3	—	—
			CO 3	Develop the engineering solutions by considering society and environment	2	—	—	—	—	—	—	2	3	3	—	—
			CO4	Applying solution considering societal, health, safety, legal and cultural issues	2	1	—	—	—	—	—	—	2	2	—	—
			CO 5	Analysis and explanation of data to provide the valid conclusions.	2	—	—	—	—	1	—	—	2	2	—	—
			CO 6	Use of management principles in project functioning and consider the multidisciplinary environments.	—	—	—	—	—	—	—	—	—	—	3	2
			CO 7	To work effectively in Project as an individual member and team by following the ethical principles	—	—	—	—	—	—	—	3	3	—	—	—
			CO 8	Communicate effectively for various activities with help of reports, presentations and verbal	—	—	—	—	—	—	—	—	—	3	—	2

				communication that can help in life-long learning.													
64	8CE1A	Water Resources Engineering-II	CO 1	Classify and design the Regulation of works and Drainage Structure.	2	2	1	2	-	-	-	-	1	-	-	-
			CO 2	Apply and analyze the surface and subsurface flows, using Bligh's and Khosla's theory, also describe the weirs and barrages.	2	-	3	2	-	-	-	-	-	-	-	-
			CO 3	Implement and analyze the Embankment Dams and Gravity Dams with the stability and seepage analysis.	2	-	-	-	-	-	-	-	2	-	-	2
			CO4	Select and evaluate spillways and gates, general features of hydroelectric schemes, elements of power house structure, selection of turbines and cavitation's.	-	1	-	2	-	2	-	-	-	-	-	2
			CO 5	Evaluate the impact of water projects on river regimes and environment. To analyze the Reservoir sedimentation and water shed management using optimization techniques and system approach and G.I.S. and Computer aided irrigation design.	-	-	-	-	2	2	2	-	-	-	-	-
65	8CE2A	Design of Steel Structures-II	CO 1	Differentiate the Gantry girder and Roof Truss and also Apply & analyse the Gantry girder and Roof Truss with help of Indian Standard Code: 800-2007, IS: 875-Part-III and understand the application of Tubular Sections.	2	2	2	1	-	-	-	-	-	-	-	-
			CO 2	Classify and evaluate the welded section & bolted Section using Design Specification IS: 800-2007.	2	3	2	1	-	-	-	-	-	-	-	-
			CO 3	Design the bridge, Categorization & Produced the Deck Type Bridge with help of Indian Standard Bridge Rule Code.	1	2	2	1	-	-	-	-	-	-	-	-
			CO4	Design of bridge and differentiate the Foot over Bridge & Truss Girder Bridge with help of Indian Bridge Rule Code.	2	3	2	-	-	-	-	-	-	-	-	-
			CO 5	Differentiate explanation of the types of tank and analyse among these tank with the help of Indian Standard Code: IS 803-1967, IS 805-1968.	2	2	2	1	-	-	-	-	-	-	-	-
66	8CE3A	PPCM	CO 1	Discuss the financial evaluation of the project and also to differentiate the various construction project techniques.	3	3	-	-	-	-	-	-	-	-	-	-
			CO 2	Evaluate the different project management techniques and also analyze the methods of network for various projects.	2	3	-	-	-	-	-	-	-	-	-	1
			CO 3	Solve the problems related to project cost and time control and also to understand the cost and time for various projects.	2	2	-	-	-	-	-	-	-	-	-	1

			CO4	Discuss the skills of contract management and also to evaluate the various contracts and tenders	2	2	-	-	-	-	-	-	-	-	-	1
			CO 5	Discover about the safety measures at construction sites and also to remember and understand the various environment and social aspects of construction projects.	2	3	-	-	-	-	-	-	-	-	-	1
67	8CE3.2A	Advance Foundation Engineering	CO 1	Discuss the various methods of estimation of bearing capacity of shallow foundation at different loading and water level conditions.	2	-	1	-	1	1	-	-	-	-	-	1
			CO 2	Evaluate the settlement under shallow foundation by various methods available with reference to Indian Standards.	1	3	2	-	1	1	-	-	-	-	-	1
			CO 3	Classify different types of pile with their use, modes of failure and to estimate bearing capacity and settlement of pile foundation at various conditions.	1	3	2	-	1	1	-	-	-	-	-	1
			CO4	Analyze the behavior of collapsible and expansive soils also design practices of foundation for these soils.	1	3	1	-	1	1	-	-	-	-	-	1
			CO 5	Classify common types of raft, modes of failure and to measure bearing capacity, settlement of raft and well foundation at various conditions.	1	2	1	-	1	1	-	-	-	-	-	1
68	8CE5A	Design of Water Resource Structures-II	LO 1	Classify and design the Regulation of works and Drainage Structure.	2	2	1	2	-	-	-	-	1	-	-	-
			LO 2	Apply and analyze the surface and subsurface flows, using Bligh's and Khosla's theory, also describe the weirs and barrages.	2	-	3	2	-	-	-	-	-	-	-	-
			LO 3	Implement and analyze the Embankment Dams and Gravity Dams with the stability and seepage analysis.	2	-	-	-	-	-	-	-	2	-	-	2
			LO4	Select and evaluate spillways and gates, general features of hydroelectric schemes, elements of power house structure, selection of turbines and cavitations.	-	1	-	2	-	2	-	-	-	-	-	2
			LO 5	Evaluate the impact of water projects on river regimes and environment. To analyze the Reservoir sedimentation and water shed management using optimization techniques and system approach and G.I.S. and Computer aided irrigation design.	-	-	-	-	2	2	2	-	-	-	-	-
69	8CE6A	Professional Practice & Estimating	LO1	Determine the NPV, IPR and B/C ratio and Understand about the tender and contracts.	3	3	1	-	-	1	-	-	-	-	-	-
			LO2	Understand the drafting of tender and contracts.	2	1	-	-	2	1	-	3	-	2	3	1
			LO3	Understand the contract models – PPP, BOT and BOOT	2	2	3	-	-	-	1	-	-	-	-	1

			LO4	Develop the understanding about dispute settlement and Prepare Bar-chart and analyze the network by PERT & CPM.												
70	8CE7A	Steel Structures Design-II	LO1	Calculate the plastic moment of different cross section and design of bolted and welded connections	2	2	2	-	-	-	-	-	-	-	-	
			LO2	Analyze and design the tension, compression & column bases member under axial and combined loading	2	3	3	-	-	-	-	-	-	-	-	1
			LO3	Discuss the pre-engineered buildings, bridges & trusses	2	2	3	1	-	-	-	-	-	-	-	1
			LO4	Identify and demonstrate the various section of steel structures at field visit												
71	8CE8A	Design of Foundations	LO1	Understand the significance and determine the load bearing capacity for shallow foundation.	3											
			LO2	Analyse the settlement behaviour of different type of soil.		2	3									
			LO3	Calculate the load bearing capacity for deep foundation		2	3									
			LO4	Apply the behaviour of different type of soil under different conditions.	3	2	3									
			LO5	Design the various parameters of raft and well foundations		2	3	3								
72	8CE9A	Structural Analysis by Matrix Methods	LO1	Distinguish statically determinate and redundant structural systems.	3		3									
			LO2	Analyses a suitable method for the structural system.	2	3	2									
			LO3	Calculate the forces in axially loaded member.	2		2									
			LO4	Know the deflection in axially loaded member.	2		2									
			LO5	Know the behavior of the frame and truss structure by flexibility and stiffness method	3	3	3									
73	8CESM	Seminar	LO1	LO1: Discover potential research areas and conduct a survey of several available literatures in the preferred field of study.	2	2	-	-	-	-	-	-	-	-	3	-
			LO2	LO2: Compare and contrast the several existing solutions for research challenge.	1	3	-	-	-	-	-	-	-	-	2	-
			LO3	LO3: Report and present the findings of the study conducted in the preferred domain.	1	3	-	-	-	-	-	-	-	-	2	-
74	8CEPR	Project	CO 1	Team work to select an engineering problem and its solution	2	2	—	—	—	3	—	3	—	—	—	—
			CO 2	Formulate the problem and design using modern technologies and new software learning	1	—	—	—	—	—	—	3	3	3	—	—
			CO 3	Develop the engineering solutions by considering society and environment	2	—	—	—	—	—	—	2	3	3	—	—

			CO 4	Applying solution considering societal, health, safety, legal and cultural issues	2	1	—	—	—	—	—	—	2	2	—	—
			CO 5	Analysis and explanation of data to provide the valid conclusions.	2	—	—	—	—	1	—	—	2	2	—	—
			CO 6	Use of management principles in project functioning and consider the multidisciplinary environments.	—	—	—	—	—	—	—	—	—	—	3	2
			CO 7	To work effectively in Project as an individual member and team by following the ethical principles	—	—	—	—	—	—	—	3	3	—	—	—
			CO 8	Communicate effectively for various activities with help of reports, presentations and verbal communication that can help in life-long learning.	—	—	—	—	—	—	—	—	—	3	—	2

Bachelor of Technology Electronics and Communication Engineering

Program Name: Electronics and Communication Engineering

Subject/Code No: Advanced Engineering Mathematics-I & 3EC2-01 LTP: 3+1+0 Semester: III
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Elucidate the concepts of Laplace transformation, Fourier transformation, and Z transformation. Describe numerical techniques for deducing unknown values using known data, methodologies for locating roots, and approaches for solving diverse types of differential equations such as ordinary, partial, and simultaneous differential equations.	2	2	2	2	2	-	-	-	-	-	-	-
CO2	Utilization of suitable technology and assessment of the feasibility of various methods for numerically solving problems.	2	2	2	-	2	-	-	-	-	-	-	-
CO3	Examine the underlying principles of Fourier, Laplace, and Z-Transforms. These methodologies can be conducted using formulations based on either the time domain or the transform domain.	2	2	-	1	2	-	-	-	-	-	-	-
CO4	Design electrical circuits, including filters and networks, finds its optimal application in examining transient response phenomena. Likewise, the z-transform plays an essential role in both designing and analyzing digital filters, particularly those with infinite impulse response (IIR). Moreover, spatial, adaptive, inverse, and Wiener filters serve specialized purposes within distinct applications.	2	2	2	-	2	1	-	-	-	-	-	-

Subject/Code No: Managerial Economics and Financial Accounting, 3EC1-03 LTP: 2+0+0 Semester: III
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Examine economic principles such as demand, supply, market arrangement, and financial administration encompassing concepts like balance sheets.	-	3	1	3	1	-	-	-	-	-	3	-
CO2	Utilization of pertinent methodologies: employment of demand and supply equations, production and cost equations, along with theories of pricing.	-	-	2	1	3	-	-	-	-	-	3	1
CO3	Investigate the interconnections among economic factors through the lens of elasticity, analysis of cash flows, scrutiny of fund flows, and evaluation using ratios.	-	2	2	2	2	-	-	-	-	-	2	1
CO4	Assess tangible challenges faced by businesses by employing capital budgeting methods.	-	-	3	3	3	-	-	-	-	-	3	-

Subject/Code No: Digital System Design, 3EC3-03 LTP: 3+0+0 Semester: III
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	To introduce the idea of the number system, Boolean Algebra, combinational and sequential circuits, semiconductor memories, and the flow of VLSI design.	2	1	2	2	3	-	-	-	-	-	-	1
CO2	Utilize suitable technology to enhance circuit performance, leading to smoother and faster operations, thereby conserving time and energy.	2	2	2	2	2	-	-	-	-	-	-	1
CO3	Examine the creation process and compromises within different digital electronic categories, aiming to achieve lower power usage and smaller sizes.	2	2	1	2	-	-	-	-	-	-	-	-
CO4	Evaluate both synchronous and asynchronous sequential circuits, and cultivate the skill to design such circuits using VHDL.	1	2	2	1	2	-	-	-	-	-	-	1

Subject/Code No: Signal & Systems, 3EC3-05 LTP: 3+0+0 Semester: III

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Illustrate the mathematical portrayal and categorizations of signals, linear shift-invariant (LSI) systems, the sampling theorem, and multiple-input multiple-output (MIMO) systems, along with their characteristics.	2	2	2	2	1	-	-	-	-	-	-	1
CO2	Elaborate on the concept of convolution as a means to elucidate the evolution of a linear time-invariant (LTI) system's response over time. This facilitates the analysis of both analog and digital communication systems' behaviors.	2	2	1	2	1	-	-	-	-	-	-	1
CO3	Investigate signals and systems through diverse transform domain techniques such as continuous-time Fourier transform (CTFT), discrete-time Fourier transform (DTFT), Laplace transform, and Z transform.	3	2	2	3	3	-	-	-	-	-	-	1
CO4	Examine the stability, linearity, causality, and time invariance of the system to ascertain its fundamental properties.	2	3	1	3	-	-	-	-	-	-	-	1
CO5	Design and execute the construction of zero-order hold and first-order hold interpolators.	-	3	3	-	-	-	-	-	-	-	-	-

Subject/Code No: Network Theory, 3EC3-06 LTP: 3+1+0 Semester: III

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Elaborate on and provide insights into different notions encompassing mesh and node analysis, network theorems, frequency domain, time domain, electrical networks, Fourier series, transformations, port networks, and the analysis of filters.	1	2	1	2	2	-	-	-	-	-	-	1
CO2	Grasping the concepts of mesh and node analysis, network theorems, frequency domain, time domain, and electrical networks, along with delving into port networks and studying transient behavior analysis, offers a comprehensive understanding of the dynamics within a network.	1	1	1	1	1	-	-	-	-	-	-	1
CO3	Examine the functioning of electrical networks in relation to parameters and scrutinize the disparities between frequency domain and time domain analyses.	1	2	-	2	2	-	-	-	-	-	-	-

Subject/Code No: Electronics Devices, 3EC3-07 LTP: 3+1+0 Semester: III

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Comprehend and elucidate the fundamental attributes of semiconductor materials, compound semiconductors, thermistors, P-N diodes, Zener diodes, Schottky diodes, bipolar junction transistors, MOSFETs, LEDs, photodiodes, solar cells, and the process of CMOS fabrication.	2	2	1	2	-	-	-	-	-	-	-	1
CO2	Grasping the concepts of mesh and node analysis, network theorems, frequency domain, time domain, and electrical networks, along with delving into port networks and studying transient behavior analysis, offers a comprehensive understanding of the dynamics within a network.	2	2	1	2	2	-	-	-	-	-	-	1
CO3	Examine and discern modifications in parameters like current, voltage, power, energy, power dissipation, time, and temperature.	2	3	-	3	-	-	-	-	-	-	-	1
CO4	Construct the voltage-current (V-I) characteristics of semiconductor devices, both with and without temperature fluctuations, and formulate the design of a complementary metal-oxide-semiconductor (CMOS) structure through a variety of fabrication steps, including oxidation, deposition, etching, diffusion, and metallization.	2	2	2	1	-	-	-	-	-	-	-	-

Subject/Code No: Electronics Devices Lab, 3EC3-21 LTP: 0+0+2 Semester: III

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Understand the concepts of semiconductor devices and components such as diodes, BJTs, JFETs, and MOSFETs.	2	3	-	3	-	-	-	-	-	-	-	-
CO2	Elaborate on the operational principles underlying semiconductor devices.	-	3	-	3	-	-	-	-	-	-	-	-
CO3	Create, examine, and assess various components in practical scenarios on a breadboard.	-	3	-	3	3	-	-	-	-	-	-	-
CO4	Analyze outcomes and substantiate them by contrasting them with ideal expectations.	-	3	-	3	-	-	-	-	-	-	-	-

Subject/Code No: Digital System Design Lab, 3EC3-22 LTP: 0+0+2 Semester: III
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Create, experiment with, and assess different combinational circuits like adders, sub tractors, comparators, multiplexers, and DE multiplexers.	3	3	-	3	-	-	-	-	-	-	-	-
CO2	Showcase the truth table for different logical expressions utilizing logic gates.	-	3	-	-	-	-	-	-	-	-	-	-
CO3	Recognize diverse digital integrated circuits (ICs) and grasp their functionalities.	-	3	-	3	-	-	-	-	-	-	-	-
CO4	Examine, devise, and execute Flip-Flops through analysis and design.	-	3	3	3	-	-	-	-	-	-	-	-

Subject/Code No: Signal Processing Lab, 3EC3-23 LTP: 0+0+2 Semester: III
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Understand the fundamental aspects of MATLAB, gain insight into signal basics and their diverse operations.	-	3	-	3	-	-	-	-	-	-	-	-
CO2	Create stochastic signals alongside various continuous and discrete-time signals.	-	3	-	3	-	-	-	-	-	-	-	-
CO3	Construct simple signal processing algorithms and validate them through MATLAB.	-	3	-	-	3	-	-	-	-	-	-	-
CO4	Authenticate random sequences characterized by varied distributions, mean values, and variances.	-	3	-	-	-	-	-	-	-	-	-	-
CO5	Devise, execute, interpret, and analyze experiments, followed by comprehensive data reporting.	-	3	-	3	-	-	-	-	-	-	-	-

Subject/Code No: Computer Programming Lab-I, 3EC3-24 LTP: 0+0+2 Semester: III
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Understand the significance of structure and abstract data types, along with their fundamental applicability in diverse scenarios.	-	3	-	-	-	-	-	-	-	-	-	3
CO2	Evaluate and distinguish between various algorithms by considering their time complexity.	-	-	-	3	-	-	-	-	-	-	-	3
CO3	Construct linear and non-linear data structures through the utilization of linked lists.	-	-	-	-	3	-	-	-	-	-	-	3
CO4	Comprehend and employ a range of data structures like stacks, queues, trees, graphs, and more, to address diverse computational challenges.	-	3	-	3	-	-	-	-	-	-	-	-
CO5	Develop proficiency in deploying different searching and sorting methods, and make informed decisions regarding their selection based on specific requirements.	-	3	3	-	-	-	-	-	-	-	-	-

Subject/Code No: Industrial Training, 3EC7-30 LTP: 0+0+1 Semester: III
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Engage in industry projects as part of the industrial training experience.	3	-	-	-	-	-	-	-	-	-	-	-
CO2	Collaborate with professionals from the industry and adhere to established engineering protocols and standards.	3	-	-	-	-	-	-	-	-	-	-	-
CO3	Foster an understanding of typical workplace conduct and cultivate interpersonal and teamwork proficiencies.	-	3	-	3	-	-	-	-	-	-	-	-
CO4	Create well-structured professional reports and deliver effective presentations.	-	-	-	-	-	-	-	3	-	3	-	-

Subject/Code No: Advanced Engineering Mathematics-II, 4EC2-01 LTP: 3+0+0 Semester: IV
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Demonstrate an understanding of the characteristics of complex numbers, special functions, and linear algebra, and apply this knowledge to address intricate engineering challenges within domains such as signal processing, which finds relevance in telecommunications (cellular phones), radar systems (facilitating airplane navigation), and even biological contexts (studying neural firing events in the brain).	2	2	-	-	-	2	-	-	-	-	-	-
CO2	Categorize complex contour integrals both through direct assessment and with respect to the fundamental theorem. Apply the Cauchy integral theorem in its diverse formulations.	-	3	-	3	3	-	-	-	-	-	-	-
CO3	Distinguish between various methods for solving higher-order differential equations, including Bessel's and Legendre's equations, and explore their practical application in fields such as hydrodynamics, elasticity theory, and the analysis of electrical transmission line loads in the realm of Electronics and Communication Engineering.	2	2	-	-	2	2	-	-	-	-	-	-
CO4	Conduct an in-depth examination of assorted numerical predicaments, employing appropriate technological tools to resolve them. Undertake a comparative evaluation of the feasibility of distinct approaches to numerically solving problems.	-	2	2	2	2	-	-	-	-	-	-	-

Subject/Code No: Technical Communication, 4EC1-02 LTP: 2+0+0 Semester: IV

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Elaborate on the technical communication process using the LSRW framework.	-	-	-	-	3	-	-	3	-	3	-	-
CO2	Explore the notion of Technical Materials/Texts across diverse technical publications.	1	3	-	2	-	-	-	3	-	-	-	-
CO3	Understand the skill of producing accurate professional documents.	-	3	-	-	-	-	-	3	-	3	-	-
CO4	Analyze the fundamental principles underlying Technical Reports, articles, and their structural arrangements.	1	2	-	2	-	-	-	2	-	2	-	-

Subject/Code No: Analog Circuits, 4EC3-03 LTP: 3+0+0 Semester: IV

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Evaluate the distinct attributes of BJT, FET, and OP-AMP amplifiers, along with Phase Shift and Hartley oscillators, delving into their inherent traits.	2	2	-	2	-	-	-	-	-	-	-	-
CO2	Illustrate the utility of mathematical equations in these contexts and undertake a comprehensive analysis of BJT, FET, and OP-AMP amplifiers, coupled with Phase Shift and Hartley oscillators, discerning their unique characteristics.	1	2	-	2	-	2	-	-	-	-	-	-
CO3	Explore the domain of Analog Circuits, specifically focusing on transistor amplifiers like BJT, FET, and oscillators including Phase Shift and Hartley. Delve into the application of mathematical equations in the augmentation of transistor-based amplification and oscillation within diverse fields.	1	2	-	1	-	2	-	-	-	-	-	-
CO4	Analyze the unique features of BJT, FET, and OP-AMP amplifiers, alongside Phase Shift and Hartley oscillators, and explore how they manifest in practical scenarios through numerical problem-solving and application-driven designs.	-	2	2	-	-	2	-	-	-	-	-	-

Subject/Code No: Microcontrollers, 4EC3-05 LTP: 3+0+0 Semester: IV

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Provide an overview of Microprocessors and Microcontrollers.	2	3	-	1	1	-	-	-	-	-	-	-
CO2	Demonstrate the connection of peripheral devices with fundamental and advanced microprocessors and microcontrollers.	2	2	2	2	2	-	-	-	-	-	-	-
CO3	Devise embedded systems to address industrial challenges utilizing elementary and sophisticated microprocessors and microcontrollers.	2	2	2	2	2	2	1	-	-	-	-	-
CO4	Conduct evaluations to enhance the efficiency of hardware devised for industrial issues.	2	2	2	2	-	2	1	-	-	-	-	-

Subject/Code No: Electronics Measurement & Instrumentation, 4EC3-06 LTP: 3+0+0 Semester: IV
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Elaborate upon and provide insights into diverse notions of Errors, Electronic Apparatus, Measuring Devices, Oscilloscopes, Signal Generators, Analytical Tools, and Transducers. [Comprehension]	2	2	2	2	2	-	-	-	-	-	-	-
CO2	Employ and put into practice the comprehension of electronic measuring devices, Oscilloscopes, Q-Meters, assorted error classifications, Signal generators, Wave Analyzers, and the process of Transducer selection. [Application, Comprehension]	1	2	2	2	1	-	-	-	-	-	-	-
CO3	Compare among the operations of varied instruments in terms of usability and referencing specific parameters. [Analysis] and assess the distinct parameters associated with diverse Instruments and Transducers.	1	2	-	2	1	-	-	-	-	-	-	-
CO4	Make choices regarding the suitable Instruments and Transducers based on specific applications. [Analysis, Design]	2	2	2	2	2	-	-	-	-	-	-	-

Subject/Code No: Analog and Digital Communication, 4EC3-07 LTP: 3+0+0 Semester: IV
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Understand various analog and digital methods for modulation and demodulation.	2	2	-	2	-	-	-	-	-	-	-	-
CO2	Able to compute various parameters associated with modulation and demodulation strategies.	1	2	1	2	1	-	-	-	-	-	-	-
CO3	Evaluate the effectiveness of modulation and demodulation techniques across different transmission scenarios.	2	3	-	3	-	-	-	-	-	-	-	-
CO4	Design analog and digital communication transmitters and receivers, such as the Viterbi receiver, through design processes.	1	2	2	2	1	-	-	-	-	-	-	-

Subject/Code No: Analog and Digital Communication Lab, 4EC3-21 LTP: 0+0+3 Semester: IV
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Comprehend various analog modulation techniques to assess their effectiveness and bandwidth utilization.	-	3	-	3	-	-	-	-	-	-	-	-
CO2	Evaluate how a communication system functions when subjected to noise interference.	-	3	-	3	-	-	-	-	-	-	-	-
CO3	Explore pulse modulation systems, examining their operational efficiency.	-	3	-	3	-	-	-	-	-	-	-	-
CO4	Assess diverse digital modulation methods and calculate their bit error rates.	-	3	-	3	-	-	-	-	-	-	-	-
CO5	Design a communication system that integrates both analog and digital modulation methodologies.	-	-	3	3	-	-	-	-	-	-	-	-

Subject/Code No: Analog Circuits Lab, 4EC3-22 LTP: 0+0+3 Semester: IV
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Elucidate the functioning of transistor amplifiers and oscillators for the purpose of empirically assessing their attributes across various parameters.	-	3	-	3	-	-	-	-	-	-	-	-
CO2	Utilize circuit diagrams to facilitate the practical assessment of these transistor-based systems and oscillators	-	3	-	3	3	-	-	-	-	-	-	-
CO3	Conduct experiments systematically to generate empirical data in a suitable manner.	-	3	1	3	-	-	-	-	-	-	-	-
CO4	Evaluate the gathered experimental data to discern the characteristic traits exhibited by these transistors and oscillators.	3	3	-	3	-	-	-	-	-	-	-	-

Subject/Code No: Microcontrollers Lab, 4EC3-23 LTP: 0+0+3 Semester: IV
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Retrieve fundamental concepts of digital fundamentals applicable to Microprocessors and microcontrollers.	-	3	-	3	-	-	-	-	-	-	-	-
CO2	Construct diverse systems associated with assembly-level programming of microprocessors and microcontrollers.	2	3	3	-	-	-	-	-	-	-	-	-
CO3	Discriminate and examine the characteristics of Microprocessors & Microcontrollers.	-	3	-	3	-	-	-	-	-	-	-	-
CO4	Elucidate the foundational understanding of microprocessor and microcontroller interfacing, delay establishment, waveform creation, and Interrupt handling.	-	3	-	3	-	-	-	-	-	-	-	-
CO5	Develop proficiency in deploying different searching and sorting methods, and make informed decisions regarding their selection based on specific requirements.	-	3	3	-	3	-	-	-	-	-	-	-

Subject/Code No: Electronics Measurement & Instrumentation Lab, 4EC3-24 LTP: 0+0+3 Semester: IV
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Comprehension of the core principles of Electronic Instrumentation. Elucidate and recognize devices for measurement.	-	3	-	-	3	-	-	-	-	-	-	-
CO2	Demonstrate the measurement of resistance, inductance, and capacitance through diverse approaches.	3	3	-	-	-	-	-	-	-	-	-	-
CO3	Assess the instrumentation system aligning with sought-after standards, necessities, and outcomes.	-	3	-	3	-	-	-	-	-	-	-	-
CO4	Appraise varying parameters utilizing a range of measuring tools and transducers.	-	-	3	3	3	-	-	-	-	-	-	-

Subject/Code No: Computer Architecture, 5EC3-01 LTP: 2+0+0 Semester: V
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Understand the principles of computer organization along with fundamental concepts pertaining to processor architecture, memory arrangement, and input-output mechanisms.	3	3	-	2	-	-	-	-	-	-	-	-
CO2	Examine the fundamental framework of a digital computer, including methods for adding and multiplying integers and floating-point figures using two's complement and IEEE floating-point notation. Delve into the organization of input-output systems.	2	3	-	2	-	-	-	-	-	-	-	-
CO3	Critically assess arithmetic operations on both fixed and floating-point numbers within a computer, employing diverse algorithms such as the restoring method, microprogrammed control units, and DMA controllers.	-	2	-	3	3	-	-	-	-	-	-	-
CO4	Formulate designs for elementary and intermediate RISC pipelines, encompassing considerations like the instruction set, functional units, and integral components of computers.	-	3	3	-	-	-	-	-	-	-	-	-

Subject/Code No: Electromagnetics Waves, 5EC3-02 LTP: 3+0+0 Semester: V
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Introduce the idea of the number system, Boolean Algebra, combinational and sequential circuits, semiconductor memories, and the flow of VLSI design.	-	2	3	-	2	-	-	-	-	-	-	-
CO2	Utilize suitable technology to enhance circuit performance, leading to smoother and faster operations, thereby conserving time and energy.	-	2	2	-	2	-	-	-	-	-	-	-
CO3	Examine the creation process and compromises within different digital electronic categories, aiming to achieve lower power usage and smaller sizes.	-	2	2	2	-	-	-	-	-	-	-	-
CO4	Evaluate both synchronous and asynchronous sequential circuits, and cultivate the skill to design such circuits using VHDL.	1	2	2	1	2	-	-	-	-	-	-	-

Subject/Code No: Control System, 5EC3-03 LTP: 3+0+0 Semester: V
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Explain the fundamental notion of control systems encompassing both feedback and open-loop configurations. Explore time and frequency-based evaluations of system responses. Delve into state-variable examination, optimal control strategies, and nonlinear control systems.	1	2	1	2	-	-	-	-	-	-	-	-
CO2	Resolve intricacies related to feedback control systems, time-based responses, frequency-based reactions, and state-variable analyses. Employ tools like Routh-stability criterion, root locus, polar plot, bode plot, Nyquist plots, and state models to ascertain stability.	1	2	1	2	2	-	-	-	-	-	-	-
CO3	Assess the performance of diverse control systems by assessing their behavior in time-domain, frequency-domain, and through state-space analysis techniques.	1	2	-	2	2	-	-	-	-	-	-	-
CO4	Formulate suitable compensatory mechanisms for typical control scenarios using both time and frequency response approaches.	-	2	2	-	2	-	-	-	-	-	-	-

Subject/Code No: Digital Signal Processing, 5EC3-03 LTP: 3+0+0 Semester: V
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Elucidate the notion of sampling and its subsequent reconstruction. [Recall]	1	2	2	2	-	-	-	-	-	-	-	-
CO2	Elaborate on the Z-Transform, DFT, and FFT algorithms. [Comprehension]	1	2	2	-	2	-	-	-	-	-	-	-
CO3	Utilize the Z-Transform, DFT, and FFT algorithms to scrutinize Linear Shift-Invariant (LSI) systems. [Application and Analysis]	1	2	2	-	2	-	-	-	-	-	-	-
CO4	Formulate Infinite Impulse Response (IIR) and Finite Impulse Response (FIR) filters employing distinct techniques tailored for diverse Digital Signal Processing (D.S.P.) applications. [Design]	1	1	2	1	2	-	-	-	-	-	-	-

Subject/Code No: Microwave Theory & Techniques, 5EC3-05 LTP: 3+0+0 Semester: V
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Introduction to the fundamental ideas and tenets of microwave engineering.	2	3	1	-	-	-	-	-	-	-	-	-
CO2	Acquire insights into the functioning of electromagnetic waves and the construction of both active and passive microwave networks. Additionally, identify the distinct microwave parameters employed within these networks.	1	2	2	2	-	-	-	-	-	-	-	-
CO3	Examine the effectiveness of an impedance tuning network aimed at optimizing the transmission for satellite and RADAR communication.	-	2	2	2	-	2	-	-	-	-	-	-
CO4	Incorporate active and passive microwave components to construct a representative communication system, enabling an assessment of its impact on the human body.	-	2	2	2	1	2	-	-	-	-	-	-

Subject/Code No: Satellite Communication, 5EC5-13 LTP: 2+0+0 Semester: V
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Introduction to the structure of satellite systems as a mechanism for achieving rapid, extended-range communication.	1	2	3	-	-	3	-	-	-	-	-	-
CO2	Elaborate on diverse facets linked to satellite systems, including orbital equations, satellite subsystems, link budgeting, modulation, and multiple access methods.	-	2	2	2	2	2	-	-	-	-	-	-
CO3	Examine the array of access strategies employed in satellite communication.	-	3	-	2	-	3	-	-	-	-	-	-
CO4	Solve numerical scenarios concerning orbital motion and the formulation of a link budget based on specified parameters and conditions.	-	3	3	2	-	-	-	-	-	-	-	-

Subject/Code No: RF Simulation Lab, 5EC3-21 LTP: 0+0+3 Semester: V
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Elaborate upon fundamental microwave network theory and the application of scattering matrices.	-	3	2	-	3	-	-	-	-	-	-	-
CO2	Utilizing microwave energy for targeted heating of specific regions or objects enhances the performance of electronic devices.	-	3	-	3	3	-	-	-	-	-	-	-
CO3	Exhibit a comprehensive understanding of essential radio frequency (RF) concepts, RF amplification, and RF filtering.	-	3	-	3	-	-	-	-	-	-	-	-
CO4	Devise RF amplifier configurations employing microwave bipolar junction transistors (BJTs) and microwave field-effect transistors (FETs).	-	3	3	3	-	-	-	-	-	-	-	-
CO5	Create and manufacture microwave components or devices utilizing microstrip technology.	-	-	3	-	3	-	-	-	-	-	-	-

Subject/Code No: Digital Signal Processing Lab, 5EC3-22 LTP: 0+0+3 Semester: V
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Categorize signals and employ diverse signal manipulations.	-	3	-	3	-	-	-	-	-	-	-	-
CO2	Investigate assorted attributes of digital systems.	-	3	-	3	-	-	-	-	-	-	-	-
CO3	Construct Simulink models and graphical user interfaces (GUIs) for both analog and digital modulation methods.	2	-	3	-	3	-	-	-	-	-	-	-
CO4	Formulate a variety of Digital Signal Processing (DSP) algorithms using the MATLAB software package for distinct transformations.	-	-	3	-	3	-	-	-	-	-	-	-
CO5	Formulate, examine, and execute Analog & Digital filters through MATLAB programming.	-	-	3	-	3	-	-	-	-	-	-	-

Subject/Code No: Microwave Lab, 5EC3-23 LTP: 0+0+3 Semester: V
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Elaborate upon the fundamental idea behind microwave component mechanisms utilized in wired communication systems.	2	3	-	-	-	-	-	-	-	-	-	-
CO2	Construct linear and non-linear data structures through the utilization of linked lists.	-	-	3	-	3	-	-	-	-	-	-	-
CO3	Investigate the characteristics of distinct microwave parameters, considering their intrinsic traits.	-	3	-	3	-	-	-	-	-	-	-	-
CO4	Formulate an assessment of and design real-time application-oriented microwave waveguides intended for communication purposes.	-	3	3	3	-	-	-	-	-	-	-	-

Subject/Code No: Industrial Training, 5EC7-30 LTP: 0+0+1 Semester: V
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Engage in industrial projects as part of the industrial training experience.	-	2	-	2	-	1	1	-	2	-	-	-
CO2	Collaborate with professionals in the industry and adhere to established engineering protocols and standards.	2	-	1	-	-	2	-	-	2	-	-	-
CO3	Cultivate understanding of typical workplace conduct and enhance interpersonal and teamwork proficiencies.	-	3	-	-	-	-	-	-	3	-	-	-
CO4	Generate proficient work reports and deliver well-structured presentations.	-	-	-	-	-	-	-	3	3	-	3	-

Subject/Code No: Power Electronics, 6EC3-01 LTP: 2+0+0 Semester: VI
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Elaborate on the fundamental functioning and contrast the efficiency of different Power Semiconductor Devices, passive components, and switching circuits.	1	3	-	3	-	-	-	-	-	-	-	-
CO2	Elucidate the operation of step-up and step-down choppers, power supplies, and Buck-Boost converters through an understanding of the fundamental operational traits of power semiconductor devices.	1	2	-	2	2	-	-	-	-	-	-	-
CO3	Formulate typical alternative approaches and choose appropriate power converters for the regulation of electric motors and other industrial-grade equipment.	-	3	3	3	-	-	-	-	-	-	-	-
CO4	Design and assess Controlled Converters for both single-phase and three-phase systems, as well as Voltage and Current Source Inverters.	-	3	3	3	-	-	-	-	-	-	-	-

Subject/Code No: Computer Network, 6EC3-02 LTP: 3+0+0 Semester: VI
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Capable of acquiring and dissecting the principles behind layered protocol architecture; skillful in recognizing and detailing the system functions within the accurate protocol strata, while also explaining the interplay between these layer	1	2	2	2	-	-	-	-	-	-	-	-
CO2	Resolve mathematical quandaries to grasp data-link and network protocols more comprehensively.	1	2	2	2	-	-	-	-	-	-	-	-
CO3	Utilize network layer protocols and compute the requisite count of subnets for a given network.	-	2	1	2	2	-	-	-	-	-	-	-
CO4	Analyze the dependability of data transmission over the transport layer in the context of bit errors within a lossy channel scenario.	2	2	1	2	-	-	-	-	-	-	-	-

Subject/Code No: Fiber Optics Communications, 6EC3-03 LTP: 3+0+0 Semester: VI
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Understanding the fundamental ideas and fundamental principles of Fiber Optics Communication.	2	2	-	2	-	2	-	-	-	-	-	-
CO2	Acquiring insight into the functioning of fiber optic communication and applying this understanding to construct an optical measurement setup. This arrangement will enable the measurement of various crucial factors, including numerical aperture, dispersion, and attenuation.	2	2	2	2	-	-	-	-	-	-	-	-
CO3	Evaluating the composition of diverse categories of optical transmitters and receivers for the purpose of setting up optical connections.	1	2	2	2	-	-	-	-	-	-	-	-
CO4	Devising systems for WDM and DWDM, and additionally assessing the efficacy of active and passive optical components.	1	3	3	3	1	-	-	-	-	-	-	-

Subject/Code No: Antennas and Propagation, 6EC3-03 LTP: 3+0+0 Semester: VI
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Elaborate on the fundamental notion of antennas and their practical uses.	2	2	-	-	-	2	-	-	-	-	-	-
CO2	Determine an antenna's radiation pattern to deduce both its physical configuration and the wavelength of the emitted electromagnetic waves.	-	2	2	2	-	-	1	-	-	-	-	-
CO3	Assess the radiation patterns exhibited by different types of antennas.	1	2	-	2	-	1	1	-	-	-	-	-
CO4	Devise a Smart Antenna system tailored for real-time applications.	2	2	2	2	-	2	-	-	-	-	-	-

Subject/Code No: Information Theory and Coding, 6EC3-05 LTP: 3+0+0 Semester: VI
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Elaborate on the basics of information theory, including concepts like uncertainty, information, entropy, channel capacity, and the necessity of coding.	1	2	-	2	2	-	-	-	-	-	-	-
CO2	Employ coding methods for both sources and channels, such as Huffman, Lempel-Ziv, and Block codes.	1	2	-	2	2	-	-	-	-	-	-	-
CO3	Assess diverse coding and decoding strategies for multiple applications like compression and data transmission.	1	3	3	3	3	-	-	-	-	-	-	-
CO4	Formulate streamlined codes for error detection and correction techniques.	1	2	2	2	2	-	-	-	-	-	-	-

Subject/Code No: Introduction to MEMS (Professional Elective-II), 6EC5-11 LTP: 3+0+0
Semester: VI Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Grasp the underlying concepts encompassing the basic principles, configuration, production, characteristics, and methodology behind MEMS/NEMS, encompassing Micro devices, Micro systems, and Micromachining methodologies.	1	3	-	3	-	-	-	-	-	-	-	-
CO2	Utilize MEMS technology to craft minute, accurate entities.	1	2	2	2	2	-	-	-	-	-	-	-
CO3	Investigate the impact of scaling on Micro/Nano Sensors within distinct applications.	2	2	-	2	-	2	-	-	-	-	-	-
CO4	Formulate and execute the blueprint and construction of Micro/Nano devices, along with Micro/Nano systems, to address tangible real-world predicaments.	2	2	2	2	-	2	-	-	-	-	-	-

Subject/Code No: Nano Electronics (Professional Elective-II), 6EC5-12LTP: 3+0+0
Semester: VI Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Explain and understand the Schrodinger equation, CMOS Scaling, the nano scale MOSFET, Finfets, Vertical MOSFETs, Resonant Tunneling Diode, Coulomb dots, Quantum blockade, Single electron transistors, Carbon nanotube electronics.	1	3	-	3	-	-	-	-	-	-	-	-
CO2	Use different methods to get energy, wave function, propagation constant, and channel length in MOSFETs and CMOS.	1	2	2	2	-	-	-	-	-	-	-	-
CO3	Analyze and identify the changes in the parameters like inter-atomic distance, 2D and 3D structure, Scaling of CMOS.	2	2	3	2	-	-	-	-	-	-	-	-
CO4	Synthesis the structure of CMOS, Finfet, Vertical MOSFET and Carbon nano tubes.	2	2	2	2	-	-	-	-	-	-	-	-

Subject/Code No: Computer Network Lab, 6EC3-21 LTP: 0+0+3 Semester: VI
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Understand the principles of TCP/IP protocols, layered architecture, as well as LAN, MAN, and WAN setups.	1	3	-	3	-	-	-	-	-	-	-	-
CO2	Apply data structures in networking, incorporating weighted and unweighted graphs.	-	3	-	-	3	3	-	-	-	-	-	-
CO3	Elaborate on the simulation of Queuing Theory.	-	3	-	3	-	-	-	-	-	-	-	-

Subject/Code No: Antenna and Wave Propagation Lab, 6EC3-22 LTP: 0+0+2 Semester: VI
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Grasp the fundamental idea behind antenna radiation mechanisms employed in wireless communication.	3	3	-	-	-	-	-	-	-	-	-	-
CO2	Employ various communication modes tailored to specific applications such as mobile and satellite contexts.	-	3	-	-	-	3	-	-	-	-	-	-
CO3	Examine and detect issues within MOS and CMOS devices (such as assessing gate delay, transistor dimensions, power usage, as well as performance under extreme pressure and temperature conditions).	-	3	-	3	-	-	-	-	-	-	-	-
CO4	Investigate the characteristics of diverse antenna types with regards to their inherent parameters.	3	-	-	3	-	-	-	-	-	-	-	-

Subject/Code No: Electronics Design Lab, 6EC3-23 LTP: 0+0+3 Semester: VI
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Grasp the fundamental principles and practical uses of Op-amp IC (731), 555 timer IC, Cathode Ray Oscilloscope (CRO), breadboard, and function generator.	3	3	-	-	3	-	-	-	-	-	-	-
CO2	Utilize distinct design approaches on a breadboard employing IC-731 and IC-555 for various functionalities.	2	3	3	-	3	-	-	-	-	-	-	-
CO3	Examine the performance of diverse circuit configurations involving IC-731 and IC-555 across a spectrum of applications and inputs.	3	3	-	-	3	-	-	-	-	-	-	-
CO4	Formulate circuit diagrams on a breadboard utilizing IC-731 and IC-555 to cater to distinct application requirements.	2	-	2	2	2	-	-	-	-	-	-	-

Subject/Code No: Power Electronics Lab, 6EC3-24 LTP: 0+0+2 Semester: VI

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Comprehend AC voltage regulation through TRIAC, antiparallel thyristors, TRIAC and DIAC, in addition to generating pulses using the DSP/FPGA platform.	3	-	-	-	3	-	-	-	-	-	-	-
CO2	Comprehend AC voltage regulation through TRIAC, antiparallel thyristors, TRIAC and DIAC, in addition to generating pulses using the DSP/FPGA platform.	3	-	-	-	3	-	-	-	-	-	-	-
CO3	Explore single-phase bridge converters, single-phase cycloconverters, and single-phase dual converters, alongside direct current (DC) motor speed management.	2	3	-	-	-	-	-	-	-	-	-	-
CO4	Execute experiments encompassing single-phase PWM inverters, buck, boost, and buck-boost regulators.	3	-	3	-	-	-	-	-	-	-	-	-
CO5	Implement velocity regulation of a DC motor employing a chopper, and regulate induction motors via single-phase AC voltage regulators, coupled with open-loop and closed-loop motor control strategies.	-	-	-	3	3	-	-	-	-	-	-	-

Course Name: 7EC01A: Antenna & Wave Propagation

CO-PO Mapping Matrix of Course

CO Number	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	-	-	-	-	-	-	-	-	-	-
CO2	1	-	2	3	3	-	-	-	-	-	-	-
CO3	2	3	3	3	3	-	-	-	-	2	-	-
CO4	2	-	-	-	-	-	2	-	-	-	-	-
CO5	2	-	-	-	-	-	2	-	-	-	-	-

Course Name: 7EC02A: Digital Signal Processing

CO-PO Mapping Matrix of Course

CO Number	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	-	-	-	-	-	-	-	-	-	1
CO2	2	-	2	2	3	-	-	-	-	-	-	1
CO3	2	2	2	2	3	-	-	-	-	2	-	1
CO4	2	1	-	-	-	-	2	-	-	-	-	1
CO5	2	-	-	-	-	-	2	-	-	-	-	1

Course Name: 7EC03A: Digital Image Processing
CO-PO Mapping Matrix of Course

CO Number	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	-	-	-	2	-	-	-	1	-	-
CO2	3	2	-	2	-	-	-	-	-	-	1	-
CO3	-	-	2	-	2	-	-	-	-	1	-	-
CO4	-	-	-	-	-	2	-	-	-	-	-	2
CO5	2	-	-	-	-	3	2	-	-	-	-	-

Course Name: 7EC04A: Wireless Communication
CO-PO Mapping Matrix of Course

CO Number	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	3	-	1	-	-	-	-	-	2
CO2	2	3	2	3	-	-	-	-	-	-	-	-
CO3	3	1	2	2	1	-	-	-	-	-	-	-
CO4	3	1	3	1	1	-	-	-	-	-	-	1
CO5	2	2	1	2	1	-	-	-	-	-	--	-

Course Name: 7EC05A: VLSI Design
CO-PO Mapping Matrix of Course

CO Number	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	1	-	3	-	-	-	-	-	2
CO2	3	2	2	-	-	2	-	-	-	-	-	2
CO3	3	3	2	1	-	3	-	-	-	-	-	2
CO4	3	2	3	-	-	2	-	-	-	-	-	2
CO5	3	2	3	2	3	-	-	-	-	-	-	3

Course Name: 7EC06A: VHDL
CO-PO Mapping Matrix of Course

CO Number	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	3	1	-	-	-	-	-	-
CO2	2	2	3	2	2	2	1	-	-	-	-	2
CO3	2	2	2	3	2	-	-	-	-	-	-	-
CO4	3	2	1	2	1	-	-	-	-	-	-	-
CO5	2	2	2	3	1	-	-	-	-	-	-	1

Course Name: 7EC07A: Signal and Image Processing Lab CO-PO Mapping Matrix of Course

CO Number	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	3	-	-	-	-	-	-	-
CO2	3	3	3	2	3	-	-	-	-	-	-	-
CO3	3	3	3	2	3	-	-	-	-	-	-	-
CO4	3	3	3	3	3	-	-	-	-	-	-	-
CO5	3	3	3	2	3	-	-	-	-	-	-	-

Course Name: 7EC08A: Wireless Communication Lab
CO-PO Mapping Matrix of Course

CO Number	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	2	3	1	-	-	-	-	-	1
CO2	3	2	3	2	2	2	1	-	-	-	-	1
CO3	3	2	2	2	2	-	-	-	-	-	-	1
CO4	3	2	2	2	1	-	-	-	-	-	-	1
CO5	2	2	2	2	1	-	-	-	-	-	-	1

Course Name: 7EC09A: Practical Training Seminar
CO-PO Mapping Matrix of Course

CO Number	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	-	-	-	-	1
CO2	-	-	-	-	-	-	-	-	-	-	-	2
CO3	2	-	-	-	2	-	-	-	-	-	-	-
CO4	-	-	2	-	3	-	-	-	-	-	-	2
CO5	2	2	-	-	-	3	-	-	-	3	1	2

Course Name: 7EC10A: Project Stage-I
CO-PO Mapping Matrix of Course

CO Number	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	-	-	3	-	-	-	-	3	2
CO2	3	3	-	3	-	3	-	-	-	-	-	-
CO3	3	-	3	-	2	3	-	-	3	3	3	3
CO4	3	-	3	-	2	3	-	-	3	3	3	3
CO5	3	-	2	-	2	3	-	-	3	3	3	3

Course Name: 8EC01A: IC Technology
CO-PO Mapping Matrix of Course

CO Number	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	1	-	3	-	-	-	-	-	2
CO2	3	2	2	-	-	2	-	-	-	-	-	2
CO3	3	3	2	1	-	3	-	-	-	-	-	2
CO4	3	2	3	-	-	2	-	-	-	-	-	2
CO5	3	2	3	2	3	-	-	-	-	-	-	3

Course Name: 8EC02A: Radar & TV Engineering **CO-PO Mapping Matrix of Course**

CO Number	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	2	-	-	2	-	-	-	1	3	1
CO2	3	1	-	3	-	2	-	-	-	1	-	1
CO3	3	-	2	-	2	2	-	-	3	2	3	1
CO4	3	-	2	-	2	2	-	-	3	3	3	1
CO5	3	-	2	-	2	3	-	-	2	3	2	1

Course Name: 8EC03A: MEMS & Nanotechnology
CO-PO Mapping Matrix of Course

CO Number	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	2	-	-
CO2	3	-	-	-	-	-	-	-	-	1	-	-
CO3	3	-	-	-	-	-	-	-	-	1	-	-
CO4	3	2	-	-	2	-	-	-	-	1	-	-
CO5	3	-	-	-	-	-	-	-	-	1	-	-

Course Name: 8EC04A: Microcontroller & Embedded System
CO-PO Mapping Matrix of Course

CO Number	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	-	2	2	2	-	-	-	-	2
CO2	2	2	3	2	2	2	-	-	-	2	2	3
CO3	2	2	2	2	3	2	2	-	2	2	-	3
CO4	3	3	2	2	2	2	2	2	2	-	2	3
CO5	3	3	2	2	2	-	-	-	2	3	-	2

Course Name: 8EC05A: RF Fabrication Lab
CO-PO Mapping Matrix of Course

CO Number	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	2	-	2	2	-	-	-	-	2	2
CO2	-	-	3	-	2	-	-	-	-	-	-	-
CO3	-	2	2	-	-	-	-	-	-	2	-	2
CO4	2	-	1	-	-	-	-	-	-	-	1	-
CO5	-	2	3	-	3	2	-	-	-	-	-	-

Course Name: 8EC06A: Industrial Electronics & Management
CO-PO Mapping Matrix of Course

CO Number	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	1	-	-	-	1	2	3	2	3	1	1
CO2	-	1	-	-	-	1	2	3	2	3	1	1
CO3	-	1	-	-	-	1	2	3	2	3	1	1
CO4	-	1	-	-	-	1	2	3	2	3	1	1
CO5	-	1	-	-	-	1	2	3	2	3	1	1

Course Name: 8EC07A: VLSI & Optical Fiber Lab
CO-PO Mapping Matrix of Course

CO Number	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	1	1	2	1	-	-	-	-	-	2
CO2	2	1	1	2	2	2	-	-	-	-	-	1
CO3	2	2	3	2	2	1	-	-	-	-	-	2
CO4	2	2	2	3	1	2	-	-	-	-	-	-
CO5	2	1	3	2	1	1	-	-	-	-	-	-

Course Name: 8EC08A: Project Stage-II
CO-PO Mapping Matrix of Course

CO Number	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	-	-	3	-	-	-	-	3	2
CO2	3	3	-	3	-	3	-	-	-	-	-	-
CO3	3	-	3	-	2	3	-	-	3	3	3	3
CO4	3	-	3	-	2	3	-	-	3	3	3	3
CO5	3	-	2	-	2	3	-	-	3	3	3	3

Course Name: 8EC09A: Seminar
CO-PO Mapping Matrix of Course

CO Number	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	2	2	-	-	-	-	-	-	-	-
CO3	3	-	-	2	-	-	-	-	-	2	-	-
CO4	-	-	-	-	-	-	-	-	-	3	-	-
CO5	3	-	-	-	-	-	-	-	-	3	-	-

Department of Electrical Engineering

Program Name: Electrical Engineering

Subject/Code No: Advance Mathematics / 3EE2-01 Semester: 3rd
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Explain the concept of operators, finite differences and interpolation	-	2	2	2	2	1	-	-	-	-	-	-
CO2	Apply Numerical methods to solve first order Ordinary Differential Equations and Algebraic and Transcendental equations	2	2	2	1	2	-	-	-	-	-	-	2
CO3	Apply Numerical methods to solve first order Ordinary Differential Equations and Algebraic and Transcendental equations	2	2	2	1	2	-	-	-	-	-	-	2
CO4	Use Laplace Transforms and Fourier transform in engineering applications.	3	3	3	2	-	-	-	-	-	-	-	-
CO5	Understand complex variables, analytic function, Conformal Transformations.	3	2	1	2	-	-	-	-	-	2	1	-

Subject/Code No: Technical Communication/3EE1-02 Semester: 3rd
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Grasp the attributes of technical writing and recognize the significance of intent, readership, and category in conveying information within technical domains.	2	2	-	-	-	-	-	-	-	1	1	1
CO2	Retrieve the steps of planning, composing, refining, polishing, and evaluating technical and business papers through both personal and cooperative writing processes	2	2	2	1	-	-	-	-	-	2	-	1
CO3	Develop precise, succinct technical manuscripts that adeptly employ writing style, grammatical correctness, and organizational structure to establish coherent understanding with the reader.	2	2	-	2	-	3	2	-	-	2	-	2
CO4	Investigate, assess, integrate, and employ information to generate technical analyses.	2	-	-	3	-	-	-	-	-	3	-	2

Subject/Code No: - Power generation Process/3EE3-03 Semester: 3rd
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Understand various aspects of electrical generation, different type of power plant and their advantage- disadvantages & their relative efficiencies.	2	1	2	-	-	-	2	-	-	-	-	2
CO2	Acquire knowledge of solar, wind and tidal power plant and their impact on environment, sustainable energy and Indian energy scene.	2	1	3	-	-	-	3	-	-	-	-	3
CO3	Analyze various type of load curves and terminology related to load and their significance and methods of power factor improvement.	2	2	3	-	-	-	2	-	2	-	-	-
CO4	Apply techniques to evaluate generation cost, depreciation reserve and Acquire knowledge of different method of energy cost reduction.	3	3	3	-	-	-	3	-	-	-	-	3

Subject/Code No: Electrical Circuit Analysis/3EE3-05 Semester: 3rd
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Practice the fundamental concepts in circuit theory followed by an analytical understanding of transient and steady state stability concepts along with the transformations from time domain to frequency domain.	2	2	2	2	-	-	-	-	-	-	-	2
CO2	Select the fundamental concepts, theorems, transforms for computing the values of system parameters, stability states, and current & voltage values in a particular branch or node.	2	2	2	2	-	-	-	-	-	-	-	2
CO3	Assess the circuit and phasor diagrams, network interconnections, steady state stabilities, and gain or phase margins.	2	2	2	2	-	-	-	-	-	-	-	2
CO4	Design theoretically converter/electronic circuits based on rated value of current, voltage and loads.	-	2	2	3	-	-	-	3	-	-	2	2

Subject/Code No: Analog Electronics/3EE3-06 Semester: 3rd
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Recall and understand the working principle of PN junction diode and its applications.	1	2	2	2	-	-	-	-	1	1	-	-
CO2	Understand the working of BJT and its applications.	1	1	2	2	2	1	-	-	-	1	-	2
CO3	Understand the working of JFET and MOSFET	2	3	3	2	2	2	-	-	-	-	-	-
CO4	Analyze and design of Differential, multi-stage and operational amplifiers	1	2	3	3	2	1	-	-	-	-	-	-
CO5	perform tasks like switching, amplification, voltage regulation, filtering, and control, as well as include controllers and comparator circuits	1	2	2	2	2	1	-	-	-	-	-	-

Subject/Code No: Electrical Machine - I/3EE3-07 Semester: 3rd
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Demonstrate fundamental principles and regulations concerning the magnetic circuits in DC machines and Transformers.	2	2	2	-	1	-	-	-	-	-	-	1
CO2	Deduce the control methodologies and traits of DC Machines and Transformers.	2	2	2	-	-	-	-	-	-	-	-	-
CO3	Evaluate the comparable circuitry of both DC machines and transformers.	3	-	3	-	-	-	-	-	-	-	-	-
CO4	Generate a summary encompassing the performance, various connection types, and testing approaches for DC machines and Transformers across diverse load conditions.	2	-	2	1	-	-	-	-	-	-	-	2

Subject/Code No: Electromagnetic Field/3EE3-08 Semester: 3rd
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Showcase the principles and principles governing electric, magnetic, and time-varying fields.	3	3	-	2	-	-	-	-	-	-	-	-
CO2	Engage in a discussion concerning the arrangement of charges, conditions at boundaries, as well as the Laplace, Poisson, and Maxwell's equations, all aimed at finding solutions.	3	3	-	3	-	-	-	-	-	-	-	-
CO3	Explore the response of dielectric and conductive materials within electromagnetic fields by employing conditions related to electric and magnetic driving forces.	3	3	-	2	-	-	-	-	-	-	-	-
CO4	Calculate parameters like capacitance, inductance, mutual inductance, electronic wave characteristics, electric field strength, electric flux density, magnetic flux density, and conditions for plane waves to address real-time issues.	2	2	-	2	-	-	-	-	-	-	-	-

Subject/Code No: Analog Electronics Lab/3EE3-21 Semester: 3rd
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Access and analyze the gain-frequency characteristics of BJT amplifier with and without negative feedback in the emitter circuit and determine bandwidths, gain bandwidth products and gains at 1 kHz with and without negative feedback. Derive output for load regulation, ripple factor by learning basics of series and shunt voltage regulators.	-	3	-	2	-	-	-	-	-	-	-	2
CO2	Analyze the characteristics of small signal amplifier using FET; measure variation of output power & distortion with load, for a push pull amplifier	-	2	2	-	-	-	-	3	3	2	-	2
CO3	Record, observe and analyze the effect of variation in R & C on oscillator frequency in case of Wein bridge oscillator and transistor phase shift oscillator.	-	-	3	-	-	-	-	3	3	-	3	-

Subject/Code No: Electrical Machine- I Lab/3EE3-22 Semester: 3rd
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Determine the parameters of equivalent circuit for transformer for different tests (open circuit & short circuit test, sumpner's back-to-back test) and its performance parameters i.e. voltage regulation and efficiency. Apply direct loading method on single phase transformer and determine its efficiency and voltage regulation.	1	2	-	2	-	-	-	2	2	2	-	2
CO2	Determine the parameters of equivalent circuit for delta-delta connected three phase transformers through heat run test. Verify the condition of parallel operation of transformer for load sharing analysis.	-	2	-	2	-	-	-	2	3	2	-	1
CO3	Convert three phases to two phase supply using scott connection. Control the speed of dc shunt motor for above the base speed and below the base speed using field current control and armature voltage control methods respectively and plot their performance characteristic (speed versus field current/ armature voltage)	-	2	-	3	-	-	-	2	2	2	-	2

Subject/Code No: Electrical circuit design Lab/3EE3-23 Semester: 3rd
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Record and analyze data sheet reading. Use tool requiring cognitive knowledge and apply this knowledge for soldering-de soldering processes	3	3	2	1	-	-	-	1	1	1	-	-
CO2	Simulate different circuits (bipolar junction transistor, unijunction transistor, half and full bridge rectifier, regulated power supply, multivibrator) and validate their characteristic on breadboard.	2	2	2	-	-	-	-	2	2	2	-	2
CO3	Evaluate real time quantities using sensors in different processes (proximity, accelerometer, pressure etc.)	2	2	2	1	-	2	-	-	-	-	-	2
CO4	Implement hardware of different control circuits (temperature control and dc motor speed control).	3	3	2	-	-	-	-	-	-	3	-	-

Subject/Code No: Industrial Training 3EE7-30 Semester: 3rd
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Demonstrate competency in the field of electrical engineering through problem identification, formulation and solution	-	2	3	3	2	1	-	-	-	-	-	-
CO2	Develop the ability to work as an individual and in group with the capacity to be a leader or manager as well as an effective team member.	-	2	3	3	2	1	-	-	-	-	-	-
CO3	Implement skills effectively in oral and written communication, including report writing and power point presentations using multimedia tools.	-	2	3	3	2	1	-	-	-	-	-	-
CO4	Analyze industrial problems as a part of industrial training curriculum.	-	-	2	1	1	-	-	-	-	-	-	1
CO5	Acquire practical understanding of theoretical aspects by participating in industrial projects.	-	2	3	3	2	1	-	-	-	-	-	-

Subject/Code No: Biology/4EE2-01 Semester: 3th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Improve the overall scenario by learning the correlation of Biology with engineering majors, as biological systems are considered to be very much efficient.	-	2	2	2	-	-	3	-	-	-	-	2
CO2	Use the disciplinary skills towards designing or improving the biological systems and engineering systems in future by getting a basic understanding of genetics and classifications.	2	2	1	2	-	-	-	-	1	-	-	-
CO3	Assist to the development of new systems like nanotechnology, bioelectronics, smart electronics and artificial intelligence by having an understanding of fundamentals of biology in relation to bimolecular, enzymes, Proteins etc.	1	1	1	1	1	1	2	-	-	-	-	-
CO4	Develop an understanding of analogies between biological and electronic substrates, information processes and transport mechanisms.	2	2	2	2	-	-	3	-	-	-	-	-

Subject/Code No: Managerial Economics and Financial Accounting/4EE1-03 Semester: 3th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Discuss the concepts of economics like demand, supply, market structure and financial management like balance sheet.	-	-	-	3	-	-	-	-	3	2	-	3
CO2	Apply the economic functions and theories like: demand & supply functions, production & cost functions & pricing theories	-	-	-	3	-	-	-	-	3	2	-	3
CO3	Analyze the relationship between economic variables using the concept of elasticity, cash flow analysis, fund flow analysis and ratio analysis.	-	-	-	2	-	-	-	-	2	2	-	2
CO4	Evaluate the real-life problems of business organizations using capital budgeting techniques.	-	-	-	3	-	-	-	-	3	3	-	3

Subject/Code No: Electronic Measurement & Instrumentation/4EE3-03 Semester: 3th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Comprehend the operational mechanisms and categorization of measurement devices alongside their practical uses.	3	3	-	-	-	-	-	-	-	-	-	3
CO2	Apply the principles of operation in showcasing how wattmeters and energy meter's function.	3	3	-	-	-	-	-	-	-	-	-	3
CO3	Analyze and assess the effectiveness of AC/DC Potentiometers in terms of their performance	3	3	-	-	-	-	-	-	-	-	-	2
CO4	Classify the diverse forms of resistors employed for measurement applications.	3	3	-	-	-	-	-	-	-	-	-	3
CO5	Evaluate the features and attributes of different AC bridges that have been designed.	3	3	-	-	-	-	-	-	-	-	-	3

Subject/Code No: Electrical Machine - II/4EE3-05 Semester: 3th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Explain the fundamental concepts, principles and analysis of AC rotating machines.	2	2	2	2	2	-	-	-	-	1	-	2
CO2	Analyze performance of Induction & Synchronous machine in addition to revolving magnetic field theory.	2	2	2	2	2	-	-	-	-	1	-	2
CO3	Design of winding type required for production of revolving magnetic field.	2	2	2	2	2	-	-	-	-	1	-	2
CO4	Interpret the behavior of AC machines using phasor, equivalent circuits and its characteristics	2	2	2	2	2	-	-	-	-	1	-	1

Subject/Code No: Power Electronics/4EE3-06 Semester: 3th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Illustrate the characteristics of power diodes, thyristors (SCRs), IGBTs, MOSFETs, and IGBTs, as well as gate triggering methods of SCRs	1	2	1	-	-	-	-	-	-	-	-	2
CO2	Evaluate the waveforms of single phase and three phase-controlled rectifiers for R and RL loads.	2	2	2	-	-	-	-	-	-	-	-	2
CO3	Evaluate an appropriate DC-DC converter based on the output application requirements.	2	2	2	-	-	-	-	-	-	-	-	2
CO4	Simulate an inverter circuit that uses PWM to smooth the output waveform.	1	2	1	-	-	-	-	-	-	-	-	2

Subject/Code No: Digital Electronics Lab/4EE3-23 Semester: 3th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Enhance comprehension of the numerical system and its implementation within digital electronics. Contrast various logic family variants.	3	3	3	2	-	-	-	2	-	-	-	-
CO2	Conduct practical investigations on adders, subtractors, multiplexers, and demultiplexers to corroborate their truth tables.	3	3	3	-	-	-	-	3	-	-	-	-
CO3	Devise diverse sequential circuits while considering factors like switching speed, throughput/latency, gate count, area, energy usage, and power consumption.	3	3	2	2	-	-	-	2	2	-	-	-
CO4	Incorporate memory components into assorted digital circuit configurations for practical real-world utilization.	3	3	3	-	-	-	-	-	3	-	-	-

Subject/Code No: Measurement Lab/4EE3-24 Semester: 3th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Elaborate the basics of measurement of electrical quantities	3	3	-	-	-	-	-	-	-	-	-	-
CO2	Find the voltage, current and resistance of electrical circuit using potentiometer	3	3	-	-	-	-	-	-	-	-	-	-
CO3	Evaluate the unknown resistance and inductance in electrical circuits using ac bridges	3	3	-	-	-	-	-	2	2	2	-	2
CO4	Calibrate a single-phase energy meter by phantom loading at different power factors.	3	3	-	-	-	-	-	3	3	-	-	-

Subject/Code No: Electrical Materials/5EE3-01 Semester: 5th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Learn about the concepts of Bonding and types of solids, Crystalline state and their defects, Classical theory of electrical and thermal conduction in solids, temperature dependence of resistivity, skin effect, Hall effect.	3	3	1	1	-	-	-	-	-	-	-	3
CO2	Acquire knowledge of Dielectric Properties of Insulators in Static and Alternating field, Properties of Ferro-Electric materials, Polarization, Piezoelectricity, Frequency dependence of Electronic and Ionic Polarizability, Complex dielectric constant of non-dipolar solids, dielectric losses.		2	-	-	-	-	2	-	-	-	-	2
CO3	Apply concepts of Magnetization of matter, Magnetic Material Classification, Ferromagnetic Origin, Curie-Weiss Law, Soft and Hard Magnetic Materials, Superconductivity and its origin, Zero resistance and Meissner Effect, critical current density.	3	3	1	1	-	-	-	-	-	1	-	3
CO4	Acquire knowledge of Conductivity of metals Ohm's law and relaxation time of electrons, collision time and mean free path, electron scattering and resistivity of metals.	3	2	2	-	-	-	-	-	2	-	2	-

Subject/Code No: Power System-I/5EE3-02 Semester: 5th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Understand the overall framework of the power system while taking various faults and their mitigation measures into account.	3	3	2	-	-	-	-	-	-	-	-	-
CO2	Illustrate various electrical characteristics of transmission lines in transient, sub-transient, and steady state stability modes.	2	2	2	2	-	-	-	-	-	-	-	2
CO3	Interpret the integration of distributed generation with grid while taking into account the protection system in real-time projects.	2	2	2	1	-	-	-	-	-	-	-	-
CO4	Estimate the electrical machines parameters &insulation requirements under different stability modes.	2	2	2	2	2	2	-	-	-	-	-	-

Subject/Code No: Control System/5EE3-03 Semester: 5th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Utilize the core principles of both linear and nonlinear control systems to mathematically express their characteristics.	1	2	2	2	2	2	-	-	-	-	-	-
CO2	Compare and contrast the temporal and spectral reactions of systems that are Linear Time Invariant, examining their behaviors and properties.	2	2	1	1	-	-	-	-	-	1	-	2
CO3	Evaluate the state space parameters within conventional control systems, considering their significance and impact.	2	2	1	1	-	-	-	-	-	1	-	2
CO4	Devise diverse controllers by employing different stability criteria and requirements, addressing various conditions and specifications.	2	2	1	2	-	-	-	-	-	1	-	2

Subject/Code No: Microprocessor/ 5EE3-04 Semester: 5th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Elaborate the fundamental concepts of 8051 architecture, programming instructions, and 8051 interfacing schemes.	2	2	2	-	-	-	-	-	-	-	-	2
CO2	Indicate the programming knowledge for external devices interfacing and serial communication	1	1	1	-	-	-	-	-	-	-	1	2
CO3	Understand the memory expansion and interfacing of peripheral device such as ADC, DAC, timers, counters, etc.	2	2	1	2	-	-	-	-	-	-	-	2
CO4	Develop 8051 programs for controlling external/interfacing devices for solving a particular task/problem.	1	2	1	1	-	-	-	-	-	-	-	2

Subject/Code No: Electrical Machine Design/5EE3-05 Semester: 5th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Interpret the characteristics of engineering materials used for electrical machine designing.	2	2	1	-	-	-	-	-	-	-	-	1
CO2	Infer the performance characteristics of electrical Machines with the specified constraints.	2	2	2	-	-	-	-	-	-	-	2	2
CO3	Relate electrical machine models in computer aided design software.	2	2	2	-	2	-	-	-	-	-	-	2
CO4	Interpret the design of windings & core of electrical machines.	2	2	1	-	-	1	1	1	-	-	-	1

Subject/Code No: Restructured Power System/5EE5-11 Semester: 5th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Discover the restructuring process, reasons and objectives of deregulation, market & pricing models, and congestion management.	3	-	3	-	-	2	2	3	-	-	-	-
CO2	Categorize electricity market models, congestion management methods, ancillary services, and transmission pricing.	3	3	3	-	-	2	2	-	-	-	-	-
CO3	Compare methods of congestion management, market models & pricing schemes to identify the best options.	2	2	1	2	-	2	2	2	-	-	-	-
CO4	Prepare theoretically a restructured model of existing power system by taking into account network congestion, best pricing model, and ancillary services.	2	-	2	2	-	2	2	1	-	-	-	-

Subject/Code No: Power System - I Lab/5EE3-21 Semester: 5th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Illustrate the basic layouts of hydro, thermal, nuclear and gas power plants.	3	2	2	-	-	-	-	-	3	3	-	-
CO2	Distinguish the parameters of the feeders, distributors, and EHV transmission lines.	3	3	2	2	-	-	-	-	3	-	-	-
CO3	Evaluate the dielectric strength of transformer oil, insulating materials & insulators.	3	3	3	-	-	-	-	-	-	-	-	3
CO4	Create a probability tool to forecast load for short-, medium-, and long-term planning.	3	3	3	-	-	-	-	-	-	-	-	-

Subject/Code No: Microprocessor Lab/5EE3-23 Semester: 5th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Demonstrate the functions, operations, and memory structure and hardware units of 8085 microprocessor kit.	2	2	2	3	2	2	-	-	-	-	-	-
CO2	Evaluate different waveforms using 8253 / 8253 programmable timer.	3	3	3	-	3	-	-	-	-	-	-	-
CO3	Build and demonstrate assembly level programs for transferring data to specified output ports in serial and parallel fashion.	3	3	3	-	-	-	-	-	-	-	-	-
CO4	Fabricate 8-bit LED/LCD interface to 8085 microprocessor kit using 8155 and 8255.	3	3	3	-	-	-	-	-	-	-	-	-
CO5	Develop programs to perform addition, subtraction, division, block transfer, searching, sorting, etc using assembly language.	3	-	-	-	-	-	-	-	-	-	3	3

Subject/Code No: System Programming Lab/5EE3-24 Semester: 5th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Simulate the basic of MATLAB features and syntaxes in mathematical Programming.	1	1	-	2	2	-	-	-	-	-	-	2
CO2	Solve various basic electrical and electronic problems in MATLAB environment	1	1	2	2	-	-	1	1	-	-	-	2
CO3	Execute the single-phase induction machine Torque- speed characteristics and transformer test in MATLAB Simulink.	2	2	2	1	-	-	-	-	-	-	-	2
CO4	Design Single Phase Full Wave Diode Bridge Rectifier with LC Filter in MATLAB Simulink.	2	2	2	-	-	2	2	-	-	-	-	2
CO5	Evaluate the importance of MATLAB in research by simulation work	2	2	2	-	-	-	1	1	-	-	2	-

Subject/Code No: Industrial Training/5EE7-30 Semester: 5th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Recognize industrial methodologies and fields in collaboration with industry experts	3	3	3	-	-	-	-	-	-	-	-	-
CO2	Investigate sophisticated tools and methods employed in industrial processing.	3	3	-	-	-	-	-	-	-	-	-	-
CO3	Enhance understanding of overall workplace etiquette and foster interpersonal and teamwork proficiencies.	3	3	3	-	-	-	-	-	-	-	-	-
CO4	Construct adept presentations and professional work documents	3	3	3	-	-	-	-	-	-	-	-	-
CO5	Build the professional presentations and work reports.	3	3	3	-	-	-	-	-	-	-	-	-

Subject/Code No: Computer Architecture/6EE3-01 Semester: 6th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Explain the structure, memory hierarchy, and input-output arrangement of computers, incorporating details about a 16-bit and 32-bit microprocessor.	2	2	2	2	-	-	-	-	-	-	-	-
CO2	Explore the various addressing modes, programming models, instruction-level pipelining, and the role of memory management units.	2	2	2	-	-	-	-	-	1	2	-	-
CO3	Evaluate the effectiveness of a multi-bus organization, the significance of interrupts and interrupt controllers, the utilization of real mode addressing, and the implementation of dynamic scheduling.	2	2	2	-	-	-	-	-	-	-	2	2
CO4	Discuss the interplay between data types, microinstructions, memory classifications, interface circuits, and instruction sets in the context of computer system design.	2	2	2	1	-	-	-	1	-	1	-	2

Subject/Code No: Power System - II/6EE3-02 Semester: 6th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Manipulate the power flow equations to analyze the voltage and frequency issues of system.	2	2	2	1	-	-	-	-	-	-	-	-
CO2	Examine the system stability and contingency by observing the system voltage and frequency.	2	2	2	2	-	-	-	-	-	-	-	-
CO3	Interpret the power and demand side management in the prospect of optimum utilization of electrical energy by dynamic pricing strategy.	2	2	2	1	-	-	-	-	-	-	-	-
CO4	Summarize different case studies on power system to assess system security.	1	2	2	2	3	2	-	-	-	-	-	-

Subject/Code No: Power System Protection/6EE3-03 Semester: 6th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Understand the fundamentals of fault analysis, power system protection and the components involved in power system protection.	2	2	1	-	-	2	1	-	-	-	-	2
CO2	Describe the concepts of under-frequency, under-voltage and df/dt relays, wide area measurement system and over current protection.	2	2	1	-	-	1	1	-	-	-	-	2
CO3	Summarize the protection schemes for power	2	2	1	-	-	1	1	-	-	-	-	2
CO4	Understand the implementation of the digital protection scheme with the help of signal processing techniques.	3	3	2	-	-	2	2	-	-	-	-	-

Subject/Code No: Electrical Energy Conversion and Auditing/6EE3-04 Semester: 6th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Illustrate the energy landscape, energy approach, regulations pertaining to energy, ensuring energy stability, and the enhancement of energy utilization.	-	-	-	-	-	2	2	2	-	-	-	2
CO2	Examine methods for conserving energy and technologies that promote efficiency in the creation of electrical and industrial machinery.	2	2	-	1	-	2	1	2	-	-	-	2
CO3	Assess the pricing structure, conduct energy audits, manage energy consumption, and appraise the energy equilibrium within a company or entity	3	3	1	2	-	2	-	1	-	-	-	-
CO4	Devise strategies for optimizing energy usage, enhancing power factor, and replacing fuels and energy sources.	3	3	1	2	-	-	-	2	-	-	-	-

Subject/Code No: Electric Drives/6EE3-05 Semester: 6th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Elaborate on the intricate principles behind DC and AC drives, delve into the nuances of scalar and vector control methods for alternating current motors, and explore the operation of drives across multiple quadrants.	2	2	1	2	1	-	-	-	-	-	-	-
CO2	Investigate the interconnection between power electronics and robust control systems knowledge, examining how these domains synergize to achieve meticulous speed regulation for both AC and DC motors.	1	2	2	2	1	1	-	-	-	-	-	-
CO3	Formulate the closed-loop control architecture of DC drives and expound upon the design intricacies inherent in achieving vector control for AC drives.	1	2	2	2	2	2	-	-	-	-	-	-
CO4	Assess and scrutinize the array of application-oriented precision speed control techniques tailored for both AC and DC motor, considering their effectiveness and suitability in different scenarios.	1	3	3	3	-	-	-	-	-	-	-	-

Subject/Code No: Power System Planning. /6EE5-11 Semester: 6th
Course Outcome Mapping with Program Outcomes

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Evaluate the various parameters of a power system network (min 3 bus) using different load flow techniques.	2	2	3	2	-	-	-	-	-	-	-	-
CO2	Investigate the transient stability of power system network (min 3 buses).	3	3	3	-	-	-	-	-	-	-	-	-
CO3	Find optimal power flow with the help of analytical and iterative methods.	3	3	3	-	-	-	-	-	-	-	-	-
CO4	Design a power system network (min 3 bus) and analyze the severity of various types of faults.	3	3	3	-	-	-	-	-	-	-	-	-
CO5	Comprehend the necessity of limits of voltage and overload in power system and perform the voltage and overload security analysis of power system network	2	2	1	1	3	2	-	-	-	-	-	-

Subject/Code No: Power System - II Lab/6EE3-21 Semester: 6th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Brief about the basic structure of Indian power sector with organizing & monitoring bodies.	2	2	2	1	2	1	-	-	-	-	-	-
CO2	Select the Reliability Planning Criteria for Generation, Transmission and Distribution.	-	2	3	3	2	1	-	-	-	-	-	-
CO3	Evaluate the factors affecting load dispatch and modeling of Generation Sources.	3	3	2	2	-	-	-	-	-	-	-	-
CO4	Estimate the Objectives of Transmission Planning with Network Reconfiguration.	1	3	3	3	2	-	-	-	-	-	-	-
CO5	Brief about the basic structure of Indian power sector with organizing & monitoring bodies.	2	2	2	1	2	1	-	-	-	-	-	-

Subject/Code No: Electric Drives Lab/6EE3-22 Semester: 6th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Differentiate the testing of firing circuits in three phase-controlled bridge converters.	2	2	2	-	-	2	2	2	-	-	-	-
CO2	Examine the operation of three phase fully and half controlled converters for different types of loads experimentally.	3	3	3	-	-	2	1	-	-	-	-	-
CO3	Demonstrate the speed control methods of AC & DC motors	3	-	3	-	-	3	-	3	-	-	-	-
CO4	Illustrate operation and analysis of different converters with reference to control strategy.	3	3	3	-	-	3	-	-	-	-	-	-
CO5	Analyze power quality aspects of three-phase controlled converters by calculating different parameters for different loads.	3	3	3	-	-	3	-	-	-	-	-	-

Subject/Code No: Power System Protection Lab/6EE3-23 Semester: 6th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Determine fault type, fault impedance and fault location during single line to ground fault, line-to line fault and double line to ground fault.	3	3	3	-	-	-	-	-	-	-	-	-
CO2	Explain the operation of micro-controller based over current relay in DMT type and IDMT type.	2	3	3	3	-	-	-	-	-	-	-	-
CO3	Analyze and discuss the operation of micro-controller based under voltage relay, and micro-controller based over voltage relay.	3	3	-	-	-	-	-	-	-	-	-	-
CO4	Explain the operation of micro-controller based un-biased single-phase differential relay.	3	3	3	-	-	-	-	-	-	-	-	-
CO5	Determine fault type, fault impedance and fault location during single line to ground fault, line-to line fault and double line to ground fault.	3	3	3	-	-	-	-	-	-	-	-	-

Subject/Code No: Modeling and simulation lab/6EE3-24 Semester: 6th
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Acquire proficiency in the software tools essential for the simulation of machinery and power systems. Apply this knowledge practically.	3	3	3	-	-	-	-	-	-	-	-	-
CO2	Examine and contrast the operational effectiveness of electrical machinery when working alongside reactive power compensation equipment.	2	3	3	3	-	-	-	-	-	-	-	-
CO3	Assess the functionality of Flexible AC Transmission System (FACTS) controllers based on their suitability for power system applications.	3	3	-	-	-	-	-	-	-	-	-	-
CO4	Devise a proficient Single Machine Infinite Bus (SMIB) model that incorporates a FACTS controller, employing MATLAB software as the platform for design.	3	3	3	-	-	-	-	-	-	-	-	-
CO5	Acquire proficiency in the software tools essential for the simulation of machinery and power systems. Apply this knowledge practically.	3	3	3	-	-	-	-	-	-	-	-	-

Power System Planning
Course Articulation Matrix
Semester 7

CO Number	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	3	-	3	1	2	-	-	-	-	-
CO2	-	3	2	-	2	1	2	-	-	-	1	-
CO3	1	3	1	-	2	-	-	-	1	-	-	-
CO4	2	-	2	-	3	-	2	-	-	-	1	-
CO5	1	-	2	-	2	-	2	-	-	-	1	-

Power System Analysis
Course Articulation Matrix
Semester 7

CO Number	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	1	0	-	2	2	1	-	-	-	-	2
CO2	2	1	1	2	-	1	-	-	2	2	1	-
CO3	2	2	1	1	-	-	2	-	-	-	-	1
CO4	1	3	1	-	-	1	2	-	-	-	-	1
CO5	2	1	3	-	-	-	2	-	-	-	-	1

Artificial Intelligence Techniques
Course Articulation Matrix
Semester 7

CO Number	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	-	-	1	-	-	-	-	-	-	-
CO2	2	-	3	-	1	-	-	-	-	-	-	
CO3	-	-	3	-	1	-	-	-	-	-	-	-
CO4	1	-	2	-	3	-	-		-	-	-	-
CO5	-	3	2	-	1	-	-	-	-	-	-	-

Non-Conventional Energy Sources
Course Articulation Matrix
Semester 7

CO Number	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	1	-	-	3	2	-	1	1	1	1
CO2	1	-	-	-	1	3	2	-	1	-	1	1
CO3	1	-	-	-	1	-	2	-	1	-	1	1
CO4	1	-*	-	-	1	-	2	-	-	-	1	-
CO5	1	-	-	-	1	-	2	-	2	-	-	-

Power System Engineering
Course Articulation Matrix
Semester 7

CO Number	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	2	3	2	1	-	-	1	1	-	-
CO2	1	2	2	-	2	1	-	-	-	1	2	-
CO3	2	1	1	2	2	3	-	-	-	-	1	-
CO4	3	3	2	1	2	-	3	-	-	1	1	-
CO5	2	1	2	-	1	1	-	-	-	-	2	-

Computer Aided Design of Electrical Machines
Course Articulation Matrix
Semester 7

CO Number	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	2	2	-	-	-	-	-	-	1
CO2	2	1	3	1	2	1	2	-	-	-	3	2
CO3	2	2	3	1	1	3	1	-	-	-	-	2
CO4	1	2	-	2	2	2	2	-	3	3	-	1
CO5	1	2	-	3	2	-	1	1	1	3	1	2

EHV AC/DC Transmission
Course Articulation Matrix
Semester 8

CO Number	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	3	-	-	2	2	-	-	-	-	-	-
CO2	2	3	2	-	-	1	-	-	-	-	-	-
CO3	3	3	2	-	2	1	-	-	-		-	-
CO4	2	1	1	-	3	1	-	-	-	-	-	-
CO5	2	3	-	-	2	2	1	-	-	-	-	-

Electrical Drives and Their Control
Course Articulation Matrix
Semester 8

CO Number	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	2	-	1	1	1	-	-	1	1	-
CO2	3	2	1	-	2	1	1	-	-	1	2	-
CO3	2	2	3	1	3	1	2	-	-	-	1	2
CO4	3	2	3	1	2	-	1	1	-	-	1	1
CO5	3	2	2	-	1	1	1	-	-	-	2	-

Protection of Power System
Course Articulation Matrix
Semester 8

CO Number	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	-	-	2	2	-	-	-	2	2
CO2	2	2	2	-	-	1	-	-	-		--	1
CO3	3	2	2	1	1	1	1	2	-	-	-	-
CO4	2	1	-	2	-	-	2	-	-	-	-	1
CO5	2	1	3	-	-	-	3	-	-	-	1	2

Facts Devices and Their Control
Course Articulation Matrix
Semester 8

CO Number	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	3	3	-	-	-	-	-	-	-	-	-
CO2	1	2	-	-	2	-	-	-	-	-	-	-
CO3	1	-	2	-	2	2	-	-	-	-	-	-
CO4	2	1	-	1	-	-	-	-	-	-	-	-
CO5	1	-	-	-	2	-	-	-	-	-	-	-

Power System Planning Lab
Lab Articulation Matrix
Semester 8

CO Number	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	-	2	2	-	-	-	-	-	1
CO2	2	1	3	1	2	2	1	-	-	-	3	2
CO3	2	2	3	1	1	3	1	-	-	-	-	2
CO4	1	2	-	2	2	2	2	-	3	3	-	1
CO5	1	2	-	3	2	-	1	-	-	3	-	2

Power System Modelling and Simulation Lab
Lab Articulation Matrix
Semester 8

CO Number	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	-	-	-	-	-	-	-	-	-	-
CO2	2	2	-	-	1	3	-	--	-	-	-	-
CO3	1	3	-	2		2	-	-	-	-	-	-
CO4	1	2	-	2	2	2	2	-	3	3	-	1
CO5	1	2	-	3	2	-	1	-	-	3	-	2

Electrical Drives and Their Control Lab
Lab Articulation Matrix
Semester 8

CO Number	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3		2	2		2	-	-	-	-	2
CO2	3	2	2	3	3	2	3	-	-	-	-	3
CO3	1	2	3	3	1	2	3	-	-	-	3	3
CO4	1	2	-	2	1	2	2	-	2	2	-	2
CO5	1	2	-	3	2	-	1	-	-	3	-	2

High Voltage Engineering Lab
Lab Articulation Matrix
Semester 8

CO Number	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	1	3	-	-	-	-	-	-	-	-	1
CO2	2	2	1	2	-	-	-	-	-	-	-	2
CO3	3	2	3	1		-	3	-	-	-	3	3
CO4	2	1	1	-	-	-	-	-	-	-	-	1
CO5	2	1	2	-	-	-	-	-	-	-	-	1

CHAPTER IX

Program wise CO-PSO Mapping
Session: 2019-20

Department of Computer Engineering
Program Name: Computer Engineering

Subject/Code No: Advanced Engineering Mathematics/3CS2-01
LTP: 3L+0T+0P Semester: 3rd
Course Outcome Mapping with Program Specific Outcome

CO Number	CO Definition	PSO1	PSO2	PSO3
CO1	Recall and understand the fundamental concepts of probability and standard distributions which can describe real life phenomenon.		3	2
CO2	Analyze the various method of numerical solutions of Normal, Poisson and Binomial probability distribution.		3	2
CO3	Formulate the optimization problems in mathematical form with classification.		3	2
CO4	Interpret non-linear optimization problems and solve by appropriate methods.		3	2
CO5	Demonstrate linear optimization problems and solve by standard methods.		3	2

Subject/Code No: Technical Communication/3CS1-02
LTP: 2L+0T+0P Semester: 3rd
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO1	PSO2	PSO3
CO1	Understand the process of technical communication in terms of LSRW.		1	2
CO2	Apply the concept of Technical Materials/Texts in various technical documents.		1	2
CO3	Enhance the skills in the process of technical communication in terms of LSRW.		1	2
CO4	Implement the basic concepts of technical communication in Technical Reports, articles and their formats.		1	2

Subject/Code No: Digital Electronics/3CS3-04
LTP: 3L+0T+0P Semester: 3rd
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Demonstrate basic principles of digital circuits and different number systems	3	3	2
CO2	Distinguish logic expressions and circuits using Boolean laws and K-map	3	3	1
CO3	Differentiate types of digital electronic circuits and also the different logic families involved in the digital system to prepare the most simplified circuits using various mapping and mathematical methods.	3	3	2
CO4	Design various types of memoryless element digital electronic circuits for particular operation within the realm of economic, performance, efficiency, user friendly and environmental constraints.	2	3	2
CO5	Design various types of memory element digital electronic circuits for particular operation within the realm of economic, performance, efficiency, user friendly and environmental constraints.	3	3	-

Subject/Code No: Data Structures and Algorithms/3CS4-05
LTP: 3L+0T+0P Semester: 3rd
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO1	PSO2	PSO3
CO1	Recognize fundamental Stack operations to address a range of engineering problems.	3	2	3
CO2	Relate the principles of Queues and Linked Lists to offer solutions for computer-based issues.	3	3	2
CO3	Discover different Search and Sorting methods to rationalize their application in diverse scenarios.	3	3	3
CO4	Practice the concept of Trees and their operations to furnish valid solutions.	2	3	2
CO5	Compare a variety of techniques that can be employed with Graphs and Hashing.	3	1	3

Subject/Code No: Object Oriented Programming/3CS4-06
LTP: 3L+0T+0P Semester: 3rd
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Describe the Object-Oriented Programming paradigm with the concept of objects and classes.	3	2	2
CO2	Explain the memory management techniques using constructors, destructors and pointers	3	2	2
CO3	Classify and demonstrate the various Inheritance techniques.	3	2	2
CO4	Understand how to apply polymorphism techniques on the object-oriented problem.	3	2	2
CO5	Summarize the exception handling mechanism, file handling techniques and Use of generic programming in Object oriented programming	3	2	2

Subject/Code No: Software Engineering/3CS4-07
LTP: 3L+0T+0P Semester: 3rd
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Recognize different software life cycle models and testing techniques to develop real time projects.	1	2	2
CO2	Identify cost estimation and risk analysis in project management.	2	3	2
CO3	Interpret and deduce the engineering process of software requirement analysis.	2	1	3
CO4	Apply procedural design methods to architect software systems.	2	1	3
CO5	Collaborate the concept of object-oriented analysis and design in software development process.	3	2	2

Subject/Code No: Data Structures and Algorithms Lab/3CS4-21
LTP: 0L+0T+3P Semester: 3rd
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Recognize fundamental Stack and Queue operations to address a range of engineering problems.	3	3	2
CO2	Relate the principles of Linked Lists to offer solutions for computer-based issues.	3	3	3
CO3	Discover different Search and Sorting methods to rationalize their application in diverse scenarios.	3	3	2
CO4	Devise diverse operations on non-linear data structures such as trees and graphs.	2	3	3
CO5	Propose a solution for a provided engineering problem utilizing Stack, Queue, Linked List, Tree and Sorting	3	3	2

Subject/Code No: Object Oriented Programming Lab/3CS4-22
LTP: 0L+0T+3P Semester: 3rd
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Create and explain Basic C++ Program using i/o variables and structures.	3	2	3
CO2	Apply object-oriented programming concepts using class and objects	3	2	3
CO3	Design and assess the classes for code reuse	3	2	3
CO4	Analysis and apply the generic classes concepts in programming problem	3	2	3
CO5	Illustrate and evaluate the file Input Output mechanisms	3	2	3

Subject/Code No: Software Engineering Lab/3CS4-23
LTP: 0L+0T+3P Semester: 3rd
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Observe the requirements specification, function-oriented design using Software Analysis and Software Design of given project and relate the use of appropriate CASE tools and other tools in the software life cycle.	3	2	2
CO2	Translate Software Requirements Specification (SRS) for a given problem in IEEE template.	2	1	3
CO3	Select DFD model (level-0, level-1 DFD and Data dictionary) of the project.	2	1	3
CO4	Prepare all Structure and Behavior UML diagram of the given project.	2	2	2
CO5	Test/Evaluate "Project Libre" a project management software tool to manage files.	1	1	3

Subject/Code No: Digital Electronics Lab/3CS4-24
LTP: 0L+0T+3P Semester: 3rd
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Demonstrate the basics of logic gates	1	3	2
CO2	Demonstrate basic combinational circuits and verify their functionalities	1	3	2
CO3	Apply the working mechanism and design guidelines of different sequential circuits in the digital system design	2	3	2
CO4	Construct different types of counters for real time digital systems	2	3	2
CO5	Distinguish the different types of shift registers	2	3	2

Subject/Code No: Discrete Mathematics Structure/4CS2-01
LTP: 3L+0T+0P Semester: 4th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Describe basic concept of Sets, Relations, Functions and Discrete Structure and apply appropriate methods to solve the problems.	1	3	2
CO2	Describe the concept of mathematical logic to create the problem in appropriate form and test for validity of the problem.	1	3	2
CO3	Apply fundamental mathematical concepts such as sets, relations, Combinatorics technique to formulate the problems and solve by appropriate method.	1	3	2
CO4	Interpret the concept of groups, ring and field to analyze the complex problems.	1	3	2
CO5	Demonstrate the model of real-world problems using concept of Graph and solve the problems by standard result and graph algorithms.	1	3	2

Subject/Code No: Managerial Economics and Financial Accounting/4CS1-03
LTP: 2L+0T+0P Semester: 4th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Recognize and describe the fundamental concepts of Economics and Financial Management and define the meaning of national income, demand, supply, cost, market structure, and balance sheet.	3	1	
CO2	Calculate and classify the domestic product, national product and elasticity of price on demand and supply.	3	1	
CO3	Draw the cost graphs, revenue graphs and forecast the impact of change in price in various perfect as well as imperfect market structures.	3	2	
CO4	Compare the financial statements to interpret the financial position of the firm and evaluate the project investment decisions.	2	2	

Subject/Code No: Microprocessor & Interfaces/4CS3-04
LTP: 3L+0T+0P Semester: 4th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Classify the basic operations of Microprocessor and microcontroller using their pin and architectural diagram, and also about area of manufacturing and performance.	2	3	3
CO2	Practice of Knowledge about programing proficiency, using various addressing modes and data transfer instructions of microprocessor and microcontroller.	3	2	3
CO3	Evaluate the measures of Assembly Language Programming.	2	3	3
CO4	Discriminate the interfacing of various circuits with microprocessor.	2	3	3
CO5	Compare the different programming logic applications with 8085 microprocessor.	3	2	3

Subject/Code No: Database Management System/4CS4-05:
LTP: 3L+0T+0P Semester: 4th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Tabulate Database System with the help of Entity Relationship Diagram that visualizes a database system implemented in a real-world scenario.	3		1
CO2	Apply data deduction and manipulation techniques using query languages on a variety of databases.	3	2	1
CO3	Use normal forms in the process of enhancing the database schema through refinement techniques.	3	1	
CO4	Create transaction plans incorporating diverse scheduling types.	3		
CO5	Generalize and assess the effectiveness of concurrency control mechanisms and recovery systems.	2	1	1

Subject/Code No: Theory of Computation/4CS4-06:
LTP: 3L+0T+0P Semester: 4th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Apply the knowledge of different types of grammar; he/she can analyze the all types of grammar and evaluate the relationship among them.	2	3	2
CO2	Differentiate the concept of regular expression and finite automaton and apply the knowledge to compare the procedure for writing regular expression for an automaton or vice versa	2	2	2
CO3	Apply the knowledge of Context Free grammar; he/she can generate the Context free grammar and Pushdown Automaton for evaluating the CFG	1	1	2
CO4	Apply the knowledge of Turing Machine he/she can analyze the Type-0 grammar and can design and evaluate the Turing Machine	1	2	2
CO5	Apply the knowledge of Pumping Lemma Theorem students can check whether the given grammar Regular grammar/Context Free Grammar or not	2	1	3

Subject/Code No: Data Communication and Computer Networks/4CS4-07
LTP: 3L+0T+0P Semester: 4th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Able to identify the principles of layered protocol architecture; be able to recognize and generalize the system functions in the correct protocol layer and further illustrate how the layers interact.	2	2	3
CO2	State and cite mathematical problems for data-link and network protocols.	1	1	2
CO3	Use network layer protocols and calculate number of subnets required for a network.	1	3	1
CO4	Compute the reliability of data transfer over transport layer by glossy channel bit errors problem.	2	2	1
CO5	Select and plan for common services, system services, such as name and address lookups, and communications applications.	1	1	3

Subject/Code No: Microprocessor & Interfaces Lab/4CS4-21
LTP: 0L+0T+2P Semester: 4th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Analyze the fundamentals of assembly level programming	2	2	3
CO2	Apply interfacing concept between input and output devices.	2	2	3
CO3	Elaborate the interfacing of various other devices with microprocessor.	1	1	3
CO4	Compose the various programs on different problems using Assembly Language Programming.	2	2	3
CO5	Implement standard microprocessor real time interfaces including digital-to-analog converters and analog-to-digital converters	1	1	3

Subject/Code No: Database Management System Lab/4CS4-22
LTP: 0L+0T+3P Semester: 4th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Create and execute a database schema for a specified problem domain	3		1
CO2	Manage integrity constraints within a database using a relational database management system (RDBMS),	3		1
CO3	Construct and devise a graphical user interface (GUI) application using a fourth-generation programming language (3GL).	3		
CO4	Composing PL/SQL code encompassing stored procedures, stored functions, cursors, and packages.	3		1
CO5	Produce SQL and Procedural interfaces to SQL comprehensively.	3		1

Subject/Code No: Network Programming Lab/4CS4-23
LTP: 0L+0T+3P Semester: 4th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Identify the functioning of various networking equipment's	1	3	2
CO2	Illustrate the LAN Installation techniques and Configurations techniques	2	1	1
CO3	Solving various Error correcting techniques and framing methods	2	3	1
CO4	Practice the programs for client and server involving UDP/TCP sockets using socket programming.	1	1	3
CO5	Estimate the communication between client and server using Network Simulator.	2	1	3

Subject/Code No: Linux Shell Programming Lab/4CS4-24
LTP: 0L+0T+2P Semester: 4th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Summarize the concepts and commands in UNIX.	2	2	2
CO2	Construct the directory layout of a typical UNIX system, maintain, and secure UNIX directories and files.	3	2	2
CO3	Illustrate the knowledge to use the several shell quoting mechanisms correctly.	3	2	2
CO4	Construct regular expression using filters and various commands to express the patterns.	3	2	2
CO5	Write simple scripts to develop basic command output	2	2	2

Subject/Code No: Java Lab/4CS4-25
LTP: 0L+0T+2P Semester: 4th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Express and restate fundamentals of java, and tools for program designing environments.	2	2	1
CO2	Construct classes and implement the principles of method overloading, inheritance, and access controls within those classes.	2	2	1
CO3	Develop Java packages and incorporate the concept of interfaces, along with importing these packages in Java.	2	2	1
CO4	Formulate the application by managing file operations, handling exceptions, and implementing threads.	2	2	1
CO5	Create applications utilizing Java applets and design various polygons. This task involves the application of knowledge and the synthesis of design skills	2	2	1

Subject/Code No: Information Theory & Coding/5CS3-01
LTP: 2L+0T+0P Semester: 5th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Solve the theory algebra and linear algebra in source coding	1	1	1
CO2	Create channel performance using information theory	2	3	2
CO3	Manipulate linear block codes for error detection and error correction.	2	2	2
CO4	Modify Cyclic codes for error detection and error correction.	2	1	1
CO5	Discover convolution codes for performance analysis.	2	1	2

Subject/Code No: Compiler Design/5CS4-02
LTP: 3L+0T+0P Semester: 5th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Illustrate the different phases of compiler to understand it's working.	2	2	2
CO2	Use and execute different types of parsing algorithm	3	2	3
CO3	Distinguish different types of Intermediate code generations.	3	2	3
CO4	Summarize different types of storage organization techniques.	3	3	2
CO5	Dissect the issues in code generator's design and basic block control flow graph.	2	3	3

Subject/Code No: Operating Systems/5CS4-03
LTP: 3L+0T+0P Semester: 5th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Analyze the concept of Operating Systems, including their essential significance and fundamental operational processes.	3	1	2
CO2	Utilize process scheduling techniques and inter-process communication strategies to evaluate their effectiveness in resolving real-world classical problems.	3	1	2
CO3	Analyzing Memory Management Techniques and Page Replacement Algorithms leads to the formulation of Free Space Management with the concept of virtual memory.	2	1	2
CO4	Evaluate Memory Management Techniques and Page Replacement Algorithms to formulate Free Space Management, integrating virtual memory, and showcasing critical assessment.	3	2	2
CO5	Illustrate understanding of File Systems, Input / Output Systems, and diverse disk scheduling algorithms through case studies.	2	2	2

Subject/Code No: Computer Graphics & Multimedia/5CS4-03
LTP: 3L+0T+0P Semester: 5th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Understand and apply basics about computer graphics along with graphics standards.	3	2	
CO2	Explain and analyses various algorithms to scan, convert the basic geometrical primitives, Area filling.	3		2
CO3	Explain, illustrate and design various algorithms for 2D transformations and clipping.	3		2
CO4	Understand various color models in computer graphics system and develop animated motions through OpenGL.	3		2
CO5	To understand the fundamentals concepts of parallel and perspective projections and evaluate various algorithms for 3D transformations.	3		2

Subject/Code No: Analysis of Algorithm/5CS4-05
LTP: 3L+0T+0P Semester: 5th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Observe the accuracy and efficiency of the algorithm.	3	3	3
CO2	Associate Dynamic Programming to address real-time challenges.	3	2	3
CO3	Construct and practice different pattern matching algorithms and the assignment problem.	3	3	2
CO4	Estimate the effectiveness of randomized algorithms through Min-Cut, 2-SAT, and similar techniques.	3	3	1
CO5	Anticipate algorithmic tendencies and the notion of diverse algorithm categories.	3	3	3

Subject/Code No: Wireless Communication (Elective)/ 5CS5-11
LTP: 2L+0T+0P Semester: 5th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Recognizing Mobile Radio Propagation, Fading, Diversity Concepts and Channel Modeling.	1	2	3
CO2	Relate the concept of cellular system and their technical challenges.	2	2	3
CO3	Correlate the Digital Signaling concept with fading channels.	1	2	3
CO4	Estimate the equalization techniques in wireless communication and error probability in faded channels.	1	2	3
CO5	Summarize the impacts of Design Parameters, Beam Forming and MIMO Systems in wireless communication.	1	2	3

Subject/Code No: Computer Graphics & Multimedia Techniques Lab/5CS4-21
LTP: _ 0L+0T+2P Semester: 5th Course
Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Understand and apply the various predefined functions for drawing various geometric shapes	3	1	1
CO2	Explain and analyze various algorithms to scan, convert the basic geometrical primitives, transformations, Area filling, clipping	3	1	1
CO3	Explain, illustrate and design various kinds of viewing and Projections.	3	1	1
CO4	Explain, illustrate and design various kinds of clipping techniques	3	1	1
CO5	Define, explain and apply various concepts associated with computer graphics to develop the animated game	3	1	1

Subject/Code No: Compiler Design Lab/5CS4-22
LTP: 0L+0T+2P Semester: 5th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Recognize the various forms of tokens and lexemes	2	1	2
CO2	Calculate scanning by using the concept of finite state automation, parse	3	2	3
CO3	Arrange intermediate code for various statements in a programming language concept	3	2	2
CO4	Organize the storage for heap structure	2	2	3
CO5	Construct various language patterns using flex tools they are also able to parse.	2	3	3

Subject/Code No: Analysis of Algorithm Lab/5CS4-23
LTP: 0L+0T+2P Semester: 5th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Observe the complexity of fundamental algorithms.	3	3	1
CO2	Relate sorting algorithms in real-world scenarios.	3	3	
CO3	Construct a binary search tree using assorted algorithms.	3	2	
CO4	Test algorithms for finding minimum spanning trees.	3	3	1
CO5	Appraise algorithms for pattern matching.	3	3	

Subject/Code No: Advance Java Lab/5CS4-24
LTP: L+0T+2P Semester: 5th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Recognize the foundational principles of Java programming and identify tools used in program design environments.	3		1
CO2	Utilize the principles of overloading, inheritance, and access controls in the context of class structures.	3		
CO3	Implement the concept of interfaces and demonstrate the process of importing packages in Java.	3		1
CO4	Formulate application designs incorporating file handling, exception management, and multithreading.	3		
CO5	Construct applications through the utilization of applets, and create intricate polygon designs, demonstrating creative and evaluative skills.	3		

Subject/Code No: Digital Image Processing/6CS3-01
LTP: 2L+0T+0P Semester: 6th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Illustrate the fundamental concepts of Digital Image Processing System	1	3	2
CO2	Demonstrate various transformations and filtering techniques on Images in different domains.	1	3	2
CO3	Distinguish the causes for image degradation and compare the image restoration techniques.	1	3	2
CO4	Distinguish various image compression and segmentation techniques.	2	3	2
CO5	Categorize different image segmentation and representation algorithms and techniques	2	3	2

Subject/Code No: Machine Learning/6CS4-02
LTP: 3L+0T+0P Semester: 6th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Apply supervised machine learning algorithms to real-time data to generate predictive insights.	3		3
CO2	Analyze real-world data with unsupervised machine learning algorithms to identify patterns and make predictions.	3		3
CO3	Evaluate different feature extraction and selection methods.	3		3
CO4	Identify the different types of semi supervised learning and reinforcement learning algorithms.	3		3
CO5	Develop and implement recommender systems and deep learning models to make predictions and recommendations.	3		3

Subject/Code No: Information Security System/6CS4-03
LTP: 2L+0T+0P Semester: 6th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Identify services that enhance the security and its mechanism.	1	2	2
CO2	Classify security attacks on information over network. Describe and apply classical encryption techniques.	1	1	2
CO3	Compare conventional encryption algorithms & public key cryptography, and design Encryption algorithm to provide the Integration and confidentiality of a message.	2	2	3
CO4	Understand the concept of hash function with application and message authentication code in security system.	1	1	2
CO5	Classify key management schemes and discuss web security and transport level security protocols	1	1	2

Subject/Code No: Computer Architecture and Organization/6CS4-04
LTP: 3L+0T+0P Semester: 6th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Implement register transfer with the help of micro-operations.	1	3	2
CO2	Analyze basic of computer organization, instructions, RISC & CISC characteristics.	1	3	2
CO3	Apply integer and floating type computer arithmetic techniques.	1	3	2
CO4	Analyze basics of memory organization, allocation and management schemes.	1	3	2
CO5	Assess modes of transfer and input output interface, interrupts and DMA processing.	1	3	2

Subject/Code No: Artificial Intelligence/6CS4-05
LTP: 2L+0T+0P Semester: 6th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Recall and identify distinct approaches in AI, with a specific emphasis on significant techniques such as search algorithms, knowledge representation, planning, and constraint management.	3	3	1
CO2	Elaborate on the current outlook of AI as the examination of agents that receive percepts from the environment and carry out actions in response.	2	2	1
CO3	Experimenting with the recognition of significant challenges encountered by AI and the intricacy involved in solving typical issues within the domain.	2	2	1
CO4	Systematically analyze and evaluate the presented techniques, then strategically employ them to address real-world challenges.	2		2
CO5	Create and evaluate advanced AI approaches, exemplified by intelligent systems and expert systems.	3	3	2

Subject/Code No: Cloud Computing/6CS4-06
LTP: 3L+0T+0P Semester: 6th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Recognize the progression of cloud computing and its practical uses over time.	3	3	1
CO2	Evaluate the structure, framework, and various models of cloud computing's design and architecture.	3	3	1
CO3	Measure an appraisal of virtualization technology and data centers, including their applications within the context of cloud computing.	3	3	1
CO4	Write the understanding of security concerning data, data centers, and cloud services.	3	2	1
CO5	Explain cloud services such as AWS and Google App Engine in terms of their integration capabilities with cloud applications.	3	2	1

Subject/Code No: Distributed System/6CS5-11
LTP: 2L+0T+0P Semester: 6th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Illustration of various architectures used to design distributed systems along with different types of operating systems.	2	3	
CO2	Analysis of concurrent programming with inter process communication techniques, such as remote method invocation, remote events.	3	2	1
CO3	Evaluation of various distributed file system through case studies.	2	2	
CO4	Analysis of distributed shared memory models and their failures in distributed computation.	3	2	
CO5	Analyze various faults and their consequences and replicated data management through exploration different types of Distributed Systems.	3	2	

Subject/Code No: E Commerce & ERP/6CS5-13
LTP: 2L+0T+0P Semester: 6th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Describe the Ecommerce and ERP, delving into their respective requisites and the infrastructure needed to support them.	2	2	1
CO2	Examine the necessary infrastructure and software prerequisites to ensure the operational functionality of Ecommerce portals.	2	2	1
CO3	Elaborate on the operational mechanisms of the Internet, web portals, and Ecommerce portals, while highlighting the essential infrastructure requirements.	2	2	1
CO4	Apply the effectiveness of tools and techniques in the realm of digital marketing, considering their resultant impact.	2	2	1
CO5	Construct an XML-based database and formulate an XML application tailored for storing data.	2	2	1

Subject/Code No: Digital Image Processing Lab/6CS4-21
LTP: 0L+0T+3P Semester: 6th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Apply image enhancement operation and image Arithmetic Operations on a given image	1	3	2
CO2	Demonstrate image restoration and histogram processing on images	1	3	2
CO3	Distinguish and compare various Noise and filtering algorithms on images	1	3	2
CO4	Illustrate image restoration and segmentation techniques on an image	2	3	2
CO5	Apply pattern recognition techniques on images using features extraction	2	3	2

Subject/Code No: Machine Learning Lab/6CS4-22
LTP: 0L+0T+3P Semester: 6th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Understand the mathematical and statistical prospective of machine learning algorithms through python programming.	3		3
CO2	Evaluate the machine learning models pre-processed through various feature engineering algorithms by python programming.	2		2
CO3	Design and evaluate the supervised models through python in built functions.	3		3
CO4	Design and evaluate the unsupervised models through python in built functions.	3		3
CO5	Understand the basic concepts of deep neural network model and design the same.	3		3

Subject/Code No: Python Lab/6CS4-23
LTP: 0L+0T+3P Semester: 6th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	List various data types in python and use them to solve basic python programs.	3	2	3
CO2	Describe Conditional statements and Looping structures concepts in python and apply these to create searching and sorting programs.	3	2	3
CO3	Explain usage of List, Tuples, Set, Dictionary and Strings and use these to solve programming problems in different ways.	3	2	3
CO4	Discuss file handling concepts and apply them to create basic data handling programs.	3	2	3
CO5	Understand various built-in python functions and formulate user-defined functions.	3	2	3

Subject/Code No: Mobile Application Development Lab/6CS4-24
LTP: 0L+0T+3P Semester: 6th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Construct fundamental concepts of Android programming.	3	2	3
CO2	Construct diverse Android applications focusing on layouts and immersive interactive interfaces.	3	2	3
CO3	Build Android applications centered around server less mobile databases such as SQLite.	3	2	3
CO4	Demonstrate an application that records data onto the SD card	3	2	3
CO5	Design a compact Android Studio application.	3	2	3

Subject/Code No: CLOUD COMPUTING/ 7CS1 Semester: 7th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO1	PSO2	PSO3
CO1	Exhibit the evolution of Cloud computing and its applications.	3		
CO2	Analyze the Design and Architecture of cloud and its models	3		
CO3	Evaluation of Virtualization Technology, Data Centers and their applications in cloud computing	3		
CO4	Develop the awareness of security on Data, Data Centre and Cloud services.			3
CO5	Assess an cloud services on AWS, GoogleApp Engine etc. , Integrating with cloud applications.	3		

Subject/Code No: INFORMATION SYSTEM SECURITY/ 7CS2
Semester: 7th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Analyze different cryptography techniques transposition and substitution methods.	3		
CO2	Apply AES, RC6, and random number generation. S-box theory		3	
CO3	Analyze Public key Cryptosystem using RSA and also learn various techniques used for the distribution of key in public key cryptosystem		3	
CO4	Analyze Message authentication and hash function using MD5 and SHA and also learn the concept of digital signature.		3	
CO5	Apply the IP security and password message protocols.			3

Subject/Code No: DATA MINING AND WAREHOUSING/ 7CS3
Semester: 7th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Apply preprocessing techniques over raw data and provide suitable input for range of data mining algorithms.			3
CO2	Apply appropriate association rule mining algorithms & statistical measures on data.			3
CO3	Create solutions to real life problems using different data mining techniques like classification, prediction & clustering.	3		
CO4	Design data warehouse with dimensional modeling.			3
CO5	Apply OLAP operations & discover the knowledge imbibed in the high dimensional system.	3		

Subject/Code No: COMPUTER AIDED DESIGN FOR VLSI/ 7CS4 Semester: 7th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Analyze digital circuits, incorporating into a VLSI chip. also expected to understand various design methodologies such as custom, semi-custom, standard cell, arrayed logic, sea-of-gates.	3		
CO2	Explore various contemporary techniques for the design, Simulation.	3		
CO3	Apply simulation, synthesis and optimization on digital circuit.			3
CO4	Design the Layout, routing, placement of a VLSI Chip.	3		
CO5	Optimize performance of h/w through CAD tools with floor planning, placement and routing.	3		

Subject/Code No: COMPILER CONSTRUCTION/ 7CS5
Semester: 7th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Analyse the working of compiler by understanding its different phases.	3		
CO2	Apply and implement different types of Parsing algorithms.			3
CO3	Evaluate between different types of Intermediate code generations.	3		
CO4	Analyze different storage organization techniques.	3		
CO5	Analyze different issues in the design of the code generator and basic block control flow graph.	3		

Subject/Code No: ADVANCED DATABASE MANAGEMENT SYSTEM/ 7CS6.1
Semester: 7th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Analyze the processes involved in query optimization which impact on database operation and design	3		
CO2	Analyze the database functions and packages suitable for enterprise database application development and management	3		
CO3	Evaluate alternative designs and architectures for databases.			3
CO4	Apply the database solutions for data access and its Security measures.	3		
CO5	Create the design of database systems for the solution of an applications.	3		

Subject/Code No: WEB DEVELOPMENT LAB/ 7CS7
Semester: 7th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Apply the basic knowledge of web development using knowledge of HTML and CSS elements.	3		
CO2	Create student registration form entry using validation through JavaScript.			3
CO3	Identify basic configuration of Web Servers. Design a dynamic web page using JSP, PHP and ASP	3		
CO4	Analysis and Interpretation for Dynamic Web Page using JSP and JDBC.	3		
CO5	Apply the concept of Session in Web Page and demonstrate the knowledge of Ajax development.			3

Subject/Code No: VLSI PHYSICAL DESIGN LAB/ 7CS8
Semester: 7th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Design digital circuits, incorporating into a VLSI chip.	3		
CO2	Explore various contemporary techniques for the design, Simulation.		3	
CO3	Apply simulation, synthesis and optimization of digital circuit.	3		
CO4	Implementation and Design the Layout, routing, placement of a VLSI Chip.			3
CO5	Optimize performance of h/w through CAD tools with floor planning, placement and routing.	3		

Subject/Code No: COMPILER DESIGN LAB/ 7CS9
Semester: 7th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Identify different kinds of tokens and lexemes.	3		
CO2	Analyze scanning by using the concept of finite state automation, parse tree.		3	
CO3	Deploy intermediate code for various statements in a programming language concept	3		
CO4	Deploy heap structure for storage	3		
CO5	Deploy various language patterns using lex tools they are also able to parse.	3		

Subject/Code No: PROJECT – I/ 7CSPR
Semester: 7th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Demonstrate a sound technical knowledge of their selected project topic that can be applied to fulfill the needs of society	3		
CO2	Analyze the problem to formulate it	3		
CO3	Develop engineering solutions to complex problems by utilizing a systematic approach.			3
CO4	Create an engineering project that can demonstrate functioning			3
CO5	Communicate effectively for various activities with the help of reports, presentations and verbal communication that can help in life-long learning.			3

Subject/Code No: PRACTICAL TRAINING/ 7CSTR
Semester: 7th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Demonstrate work done training duration.			3
CO2	Apply work done in the form of presentations and paper publication.			3
CO3	Apply verbal communication that can help in life-long.			3
CO4	Explore multiskilled engineer along with good technical knowledge, management and leadership skills.			3
CO5	Analyze the importance of sustainability and cost effectiveness in design and development of engineering solution.			3

Subject/Code No: MOBILE COMPUTING/ 8CS1 Semester: 8th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Analyze the principles of mobile computing technologies and Evaluate Mobility management Techniques.	3		
CO2	Interpret Data dissemination and management and evaluate mobile middleware.	3		
CO3	Assess Service Discovery and Evaluate standardization Methods.	3		
CO4	Apply Mobile IP, Mobile TCP, Database systems in mobile environments, and assess World Wide Web.			3
CO5	Analyze Ad Hoc networks, evaluate and practice Routing protocols.	3		

Subject/Code No: DIGITAL IMAGE PROCESSING/ 8CS2
Semester: 8th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Analyze various steps of Digital Image processing.	3		
CO2	Apply Image Transformation & Filtering techniques	3		
CO3	Evaluate various methods of Image Restoration.	3		
CO4	Evaluate concepts of Image Compression and segmentation	3		
CO5	Analyze image segmentation and representation algorithms and techniques.	3		

Subject/Code No: Distributed System/ 8CS3
Semester: 8th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Exploration and understanding various architectures used to design distributed systems along with different types of operating systems.	3		
CO2	Analysis of concurrent programming with interprocess communication techniques, such as remote method invocation, remote events.	3		
CO3	Analysis of various distributed file systems through case studies.	3		
CO4	Analysis of distributed shared memory models and their failures in distributed computation.	3		
CO5	Analyze various faults and their consequences and replicated data management through exploration different types of Distributed Systems.	3		

Subject/Code No: REAL TIME SYSTEM/ 8CS4.2
Semester: 8th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Analyze the concepts of Real-Time systems and modeling	3		
CO2	Explore the functionality in real-time systems, their architecture and inner behavior.	3		
CO3	Evaluate the multi-task scheduling algorithms for periodic tasks performance of scheduling.	3		
CO4	Apply scheduling algorithms for aperiodic, and sporadic tasks as well as examine the impact of scheduling			3
CO5	Design of protocols related to real-time communication			3

Subject/Code No: UNIX NETWORK PROGRAMMING & SIMULATION LAB/ 8CS5
Semester: 8th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Analyze the functionality of various distributions of Unix via. BSD, POSIX.	3		
CO2	Develop the programs for client and server involving UDP/TCP sockets using socket programming.	3		
CO3	Evaluate interoperability between IPV4 & IPV6.	3		
CO4	Implement the functionality of FORK function for system call			3
CO5	Evaluate the communication between client and server using Network Simulator.	3		

Subject/Code No: FPGA LAB/ 8CS6
Semester: 8th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Design the various continuous, discrete analog and digital signals with the use of sampling and quantization			3
CO2	Evaluate the various parameters of the different signals			3
CO3	Design the various filters and calculate the parameter for their characteristics.			3
CO4	Apply digital design flows for system design and recognize the trade-offs involved Design state machines to control complex systems	3		
CO5	Simulate the transmission and reception of signal of different digital modulation techniques	3		

Subject/Code No: DIGITAL IMAGE PROCESSING LAB/ 8CS7
Semester: 8th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Apply image enhancement operation and image Arithmetic Operations on a given image	3		
CO2	Evaluate image restoration and Histogram Processing on various images	3		
CO3	Analyze various Noise and filtering algorithms on images	3		
CO4	Implement image restoration and segmentation techniques on an image	3		
CO5	Extract features of an image and apply pattern recognition techniques	3		

Subject/Code No: PROJECT – II/ 8CSPR
Semester: 8th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Present the impact of engineering solution to society by working in a team	3		
CO2	Undertake problem formulation and need for sustainable development	3		
CO3	Design engineering solutions to complex problems by following ethical principles.			3
CO4	Demonstrate functioning and management of engineering project			3
CO5	Communicate effectively for various activities with the help of reports, presentations and verbal communication that can help in life-long learning.			3

Subject/Code No: SEMINAR/ 8CSSM
Semester: 8th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Demonstrate effectively work done by student.			3
CO2	Apply work done in the form of presentations and paper publication.	3		
CO3	Apply verbal communication that can help in life-long.			3
CO4	Explore multi skilled engineer along with good technical knowledge, management and leadership skills.			3
CO5	Analyze the importance of sustainability and cost effectiveness in design and development of engineering solution.			3

Bachelor of Technology Civil Engineering

Program Name: Civil Engineering
Session: 2019-20

S. No.	Course Code	Course Name	CO No.	Course Outcomes	PSO1	PSO2	PSO3
1	3CE2-01	Advance Engineering Mathematics-I	CO 1	Conduct investigations on interpolation and numerical integration based real world problems.	1	2	-
			CO 2	Analyse the various numerical methods and evaluate solution of problems based on differential equations, polynomial equations and Transcendental equations.	-	-	3
			CO 3	Evaluate Laplace transform and inverse Laplace transforms to solve Initial Value Problem (IVP).	3	-	-
			CO 4	Apply Fourier transforms and inverse Fourier transforms to solve Initial Value Problem (IVP) and Boundary Value Problem (BVP).	-	-	3
			CO 5	Apply Z-transform in discrete system and evaluate solution of problems based on recurrence relations.	1	-	2
2	3CE1-02	Technical Communication	CO 1	Apply basics of grammar, common error in writing and speaking, study of advanced grammar, editing strategies to achieve appropriate technical style of official documents such as Project Reports, Manuals, and Minutes of Meetings.	1	-	2
			CO 2	Investigate, judge and assess their linguistic ability which will get enhanced by Identifying key principles and delivery techniques of effective public speaking (listening, speaking, writing, reading)	2	-	2
			CO 3	Outline Notes and create different kinds of technical documents, plan information collection along with analyzing factors and strategies for Information design and document design in an organization.	2	-	2
			CO 4	Create emails and memos intended for an audience within the same company or team as well as to design Resume, Job Application, and Technical Reports.	2	-	3
			CO 5	Apply and analyze the relation between load, shear force, bending moment and slope deflection.	1	-	3
3	3CE3-03	Engineering Mechanics	CO 1	Analyze and evaluate Fundamental laws of mechanics.	1	-	2
			CO 2	Evaluate structure by methods of joints and method of section.	2	-	1
			CO 3	Differentiate the concept of Moment of Inertia of any section.	2	-	1
			CO 4	Analyze the principal of virtual works, different types of friction, Spring and their arrangement	2	1	-
			CO 5	Relate stresses and strain for a structure.	1	-	2
3	3CE3-05	Surveying	CO 1	Analyze the importance of surveying and apply the methods for measuring angles and directions using various instruments.	2	-	1
			CO 2	Evaluate RL using levelling instruments of a given area.	2	3	3
			CO 3	Analyze the different type of curve in field.	2	2	3
			CO 4	Apply the concept of tachometry and photogrammetric in field.	2	-	2

			CO 5	Create the setting out of work using different instruments (Total station and EDM).	2	2	3
5	3CE3-06	Fluid Mechanics	**CO 1**	Understand various types of fluid and its properties.	2	-	1
			CO 2	Apply & analyze various pressures at a point in a static fluid, equilibrium condition and stability concept for floating bodies.	3	2	-
			CO 3	Explain types, behaviour and various phenomenon to estimate the fluid discharge.	-	2	2
			CO 4	Apply the concept of Euler, Bernoulli's and momentum equation.	2	3	-
			CO 5	Evaluate the concept of laminar flow through pipes, its characteristics and losses.	-	2	2
6	3CE3-07	Building Materials and Construction	**CO 1**	Understand various types of fluid and its properties.	2	-	2
			CO 2	Apply & analyze various pressures at a point in a static fluid, equilibrium condition and stability concept for floating bodies.	2	-	2
			CO 3	Explain types, behaviour and various phenomenon to estimate the fluid discharge.	3	-	2
			CO 4	Apply the concept of Euler, Bernoulli's and momentum equation.	3	-	3
			CO 5	Evaluate the concept of laminar flow through pipes, its characteristics and losses.	3	-	2
7	3CE3-08	Engineering Geology	**CO 1**	Understand and evaluate the geology: Branches and Scope of Geology and the concepts of various geological materials and weathering processes.	2	3	-
			CO 2	Analyze and evaluate the properties, behaviour and engineering significance of different type of rocks and minerals.	1	-	3
			CO 3	Interpret and analyze different type of geological features: Fold, Fault, Joints and Unconformities.	1	1	2
			CO 4	Relate and evaluate Geophysical methods for Subsurface Analysis and understand the site selection parameters for Dam& Tunnel.	-	2	2
			CO 5	Create and evaluate the basic concept of remote sensing & GIS in various fields of Civil Engineering.	-	2	2
8	3CE3-21	Surveying Lab	**CO1**	Use different conventional instruments of measurements in surveying in length, angle, levelling measurements.	2	1	1
			CO2	Apply the procedures involved in field work and to work as a surveying team.	2	-	1
			CO3	Determine the Height of an object by trigonometric levelling	2	2	2
			CO 4	Discuss and determine the modern tool of measurement in surveying like EDM, Total station etc.	1	2	2
			CO5	Conduct a survey, collect field data and plot them on a paper	2	2	-
9	3CE3-22	Fluid Mechanics Lab	**CO1**	Able to demonstrate the basic properties and characteristics of incompressible fluid in laboratory.	2	2	1
			CO2	Able to demonstrate fundamental theorems governing fluid flows i.e., continuity, energy and momentum in laboratory.	2	2	1

			CO 4	Able to measure different fluid properties using various type of equipments like measurement of flow, pressure velocity and head loss.	2	2	1
			CO3	Classify the various pressure measuring devices.	2	1	1
10	3CE3-23	Computer Aided Civil Engineering Drawing	**CO1**	Draw Orthographic projections of Lines, Planes, and Solids	1	1	1
			CO2	Construct Isometric Scale, Isometric Projections and Views	1	2	-
			CO3	Draw Sections of various Solids including Cylinders, cones, prisms and pyramids	1	2	-
			CO4	Draw projections of lines, planes, solids, isometric projections and sections of solids including Cylinders, cones, prisms and pyramids using AutoCAD	1	2	1
11	3CE3-23	Civil Engineering Materials Lab	**CO1**	To study about selection criteria and uses of common building stones and dressing of stones.	2	2	1
			CO2	To understand the types and properties of bricks and their determination as per IS code such as water absorption, compressive strength, effloresces, dimension and tolerance test.	3	2	2
			CO3	To know raw material of cements.	2	2	1
			CO4	To study the various properties of material i.e glass, kotastone etc.	2	2	1
12	3CE3-25	Geolgy Lab	**CO1**	Students should be able to learn the significance of earth and its minerals.	2	2	2
			CO2	Students should be able to learn the significance of rocks and its engineering properties.	2	2	1
			CO3	Students should be able to understand the application of geology knowledge to civil engineering construction.	2	2	2
			CO4	To know about various applications of remote sensing techniques.	1	2	2
13	4CE2-01	Advance Engineering Mathematics-II	**CO 1**	Apply concept of probability and evaluate solutions of real-world problems.	-	2	2
			CO 2	Analyze standard probability distributions and evaluate solutions of real-world problems.	-	-	3
			CO 3	Estimate the relationship between variables of databases of the problems in quantify and qualitative forms and solve problems by methods of correlation, regression and Rank correlation.	3	-	2
			CO4	Explore the relationship between variables of databases of the problems and evaluate standard form of the problem by the method of least squares (Method of curve fitting).	-	-	3
			CO 5	Conduct investigation on hypothesis testing in statistical problems and evaluate solution of problem in appropriate form.	-	2	2
13	4CE1-03	Managerial Economics & Financial	**CO 1**	Determine the objectives, nature, scope, role & responsibilities of a manager of a business undertaking.	2	2	-

			CO 2	Predict the demand for a product or product mix of a company & to analyze various factors influencing demand elasticity. Forecast & compute the future sales level of a product by using various quantitative & qualitative techniques and with the help of past sales data.	2	2	-
			CO 3	Differentiate the meaning, importance, sources, & uses of capital in an enterprise and to estimate the working capital requirements.	2	2	-
			CO4	Know the meaning, importance, steps, methods, uses & limitations of Capital Budgeting & Market Structure.	2	-	1
			CO 5	Interpret, analyze, discuss & comment on the financial performance of a business unit through liquidity leverage, coverage, turn over & profitability ratios.	-	2	1
15	4CE3-03	Basic Electronics for Civil Engineering Applications	**CO 1**	Understand the concepts of Digital Electronics.	-	-	3
			CO 2	Interpret the Basic Electronics in measurements in Civil Engineering applications.	-	1	2
			CO 3	Analyze and equip with Errors in measurements systems and to expose to Data Acquisition and Processing.	-	-	3
			CO4	Apply skills of Sensors and to explain Various Sensor Characteristics.	-	1	2
			CO 5	To share them Image processing Tools and Mat lab codes on Images.	-	1	2
16	4CE3-05	Strength of Materials	**CO 1**	Understand and apply the concept of stress and strains and to evaluate stress and strains in different members.	3	3	-
			CO 2	Apply and analyze the Bending moment, Shear force and Axial thrust diagrams for statically determinate beams and the distribution of bending and shear stresses for simple and composite sections.	3	3	-
			CO 3	Interpret and compare the elementary concepts of torsion, shear stress in solid and hollow circular shafts.	2	2	-
			CO4	Evaluate the short and long columns subjected to various loading conditions.	3	2	1
			CO 5	Apply and analyze the relation between load, shear force, bending moment and slope deflection.	3	3	1
17	4CE3-06	Hydraulics Engineering	**CO 1**	Understand dimensional analysis and analyze the various models, concepts and characteristics of boundary layer and turbulent flow.	2	-	2
			CO 2	Classify steady, unsteady, uniform and non-uniform flow, to apply and evaluate gradually and rapidly varied flow in open channel flow	2	-	2
			CO 3	Identify about the working of hydraulic machines like pumps, turbines: To apply and relate the performance of hydraulic machines	2	3	3
			CO 4	Describe about hydrological phenomenon, unit hydrograph, analyze the rainfall, and properties of aquifer: to analyze and estimate the runoff and peak runoff rate.	3	2	2

			CO 5	Apply and estimate water requirement, delta, duty and base and various aspects of Design of Canal: To understand various approaches of cross section of channels and silt control in canals and analyze Kennedy's theory and Lacey's theory.	3	2	1
18	4CE3-07	Building Planning	**CO 1**	Understand and analyze the different types of buildings, criteria for location and site selection and the different methods of drawing sun chart and sun shading devices.	2	3	-
			CO 2	Apply and analyze the Climatic and comfort Consideration using climate modulating devices and evaluate the orientation criteria for tropical climate with the consideration of Building Bye Laws and NBC Regulations.	3	2	-
			CO 3	Evaluate the principles of Planning and different factors affecting planning including Vastu Shastra in Modern Building planning.	3	1	-
			CO 4	Interpret and compare the functional design and Accommodation requirements of different Buildings.	3	2	-
			CO 5	Relate the Services in Buildings.	3	2	-
19	4CE3-08	Concrete Technology	**CO 1**	Apply the knowledge of properties and role of various ingredients like cement, aggregate, admixtures etc. to produce good quality concrete.	2	2	-
			CO 2	Analyze properties of fresh and harden concrete by examining in lab and perform destructive, semi-destructive and non-destructive tests for concrete.	3	3	-
			CO 3	Categorize the concrete manufacturing process and selecting right step by step process to achieve workable, durable of fresh and harden concrete.	3	2	-
			CO 4	Design the concrete mix with suitable chemical admixture; this fulfils the required properties for fresh and hardened concrete.	3	3	-
			CO 5	Create the advance concrete and develop such concrete by adding and manipulating composition.	2	2	-
20	4CE3-21	Material Testing Lab	**CO1**	Explain basic properties of materials.	2	1	2
			CO2	Identify the test to be conducted for different properties of building materials.	-	1	2
			CO3	Test for different properties of building materials.	2	2	1
			CO 4	Analyze the test results for different properties.	1	1	2
21	4CE3-22	Hydraulics Engineering Lab	**CO1**	Describe the equipments used for behaviour and measurement of fluid in hydraulic structure	1	1	3
			CO2	Apply characteristics of Pelton Wheel, hydraulic jump and Centrifugal Pump in civil engineering	2	2	1
			CO3	Analyze the discharge by using various instruments like venturimeter Broad crested weir.	2	1	2
			CO 4	Evaluate momentum equation, Manning'& Chezy's coefficient of roughness for the bed of a given flume.	1	1	2
22	4CE3-23	Building Drawing	**CO1**	Create drawing of basic components of buildings.	3	2	2
			CO2	Identify the components of different buildings required as per their functional need.	3	1	1

			CO3	Create drawing of building masonry.	3	2	1
			CO 4	Draw the plan, section and elevation of a building	3	2	2
23	4CE3-23	Advanced Surveying Lab	**CO1**	Identify the instruments required for a particular survey problem	1	2	-
			CO2	Device a method to fulfill the desired objective.	1	2	1
			CO3	Conduct the survey experiment using appropriate instruments and procedure.	2	2	1
			CO 4	Analyze the data obtained and get the results after necessary computations.	2	2	1
23	4CE3-25	Concrete Lab	**CO1**	Explain the Quality control test on ingredients of concrete.	1	1	2
			CO2	Conduct Quality Control test on ingredients of fresh and hardened concrete.	3	2	2
			CO3	Analyze the test on fresh and hardened concrete and Non-destructive test on concrete.	1	2	1
			CO 4	Design the concrete mix.	2	1	1
23	5CE3-01	Construction Technology and equipment	**CO 1**	Implement the basic concept of engineering economics and evaluate cost optimization.	3	2	-
			CO 2	Apply the safety provision in the construction industry.	3	2	-
			CO 3	Analyze the safety in construction and evaluate safety requirements.	2	3	-
			CO 4	Analyze the Construction Planning and Materials Management.	1	3	1
			CO 5	Distinguish the different types of Construction Equipment and their Management.	1	3	1
23	5CE3-02	Structure Analysis- I	**CO 1**	Calculate the degree of indeterminacy of any structures.	3	-	1
			CO 2	Analyze the indeterminate structures by different kinds of methods.	3	-	1
			CO 3	Analyze the indeterminate structures by different kinds of methods.	3	-	1
			CO 4	Students will get the knowledge of elementary concepts of structural vibration.	3	-	-
			CO 5	Analyze the vibrating structure.	3	-	1
25	5CE3-03	Design of Concrete Structures	**CO 1**	Analyze the Singly reinforced beam and Design the Singly reinforced beam by Working Stress Method.	3	2	1
			CO 2	Differentiate the Singly reinforced beam & doubly reinforced beam and Design the Doubly reinforced beam by using Limit State Method.	1	3	-
			CO 3	Analyze the beam for flexure, shear, torsion, bond and anchorage and development length.	1	2	3
			CO 4	Categorized and design the one way and two-way concrete slab according IS 356 -2000.	2	3	1
			CO 5	Design the axially loaded, eccentrically loaded short columns, Isolated & Combined foundation.	3	2	-
26	5CE3-03	Geotechnical Engineering	**CO 1**	Interpret the Objective, scope and outcome of the course.understand the soil constituents and classification of soil also apply the Engineering and Index properties of soil.	3	2	-

			CO 2	Implement and analyze the concept of shearing strength of soil, Compaction of soil and vertical and horizontal stresses of soil.	3	2	-
			CO 3	Apply and analyze the Compressibility of soil, Consolidation characteristics and settlement of soil.	1	3	-
			CO 4	Differentiate the stability of slopes and Earth pressures on soil.	3	1	-
			CO 5	Implement and analyze the Bearing capacity and Site investigation of soil.	1	3	-
27	5CE3-05	Water Resources Engineering	**CO 1**	Apply appropriate methods of irrigation technique and evaluate water requirements for crop production.	3	-	1
			CO 2	Evaluate channels for appropriate water application in respective areas.	3	-	1
			CO 3	Design of various dams in respective areas.	3	2	1
			CO 4	Apply various cross-drainage structures in respective areas.	3	-	1
			CO 5	Analyze appropriate hydrological phenomena and estimate watershed yield.	3	-	-
28	5CE5-12	Disaster Management	**CO 1**	Implement the basic concept of hazard and disaster.	2	-	2
			CO 2	Analyze the Disaster Management Terminology.	3	-	2
			CO 3	Distinguish and analyze the different types of disasters.	2	-	2
			CO 4	Analyze and demonstrate the disaster management cycle and identify safety tips.	3	-	3
			CO 5	Relate the Disaster management system in India and evaluate the role of society in disaster management.	2	-	2
29	5CE5-13	Town Planning	**CO 1**	Describe the concept of Town Planning and different terminologies, town planning National Protocols	2	-	2
			CO 2	Discuss town planning methodologies and significant impact on a project	3	-	2
			CO 3	Apply the concept of town planning on real scenarios	2	-	2
			CO 4	Analyze effect of town planning on growth of a city	3	-	3
			CO 5	Conduct case studies of various towns of India	2	-	2
30	5CE5-13	Repair and Rehabilitation of Structures	**CO 1**	Analyze the sequence of construction activities and methods of construction of various structural elements	3	2	-
			CO 2	Evaluate the conventional and modern materials that are commonly used in Civil Engineering construction	3	-	-
			CO 3	Apply and differentiate various NDT (Non-Destructive Test) techniques.	-	1	3
			CO 4	Differentiate among various Repairing techniques and materials	-	3	-
			CO 5	Conduct the investigation on the case studies of bridges, piers and different concrete structures.	-	-	3
31	5CE5-15	Ground Improvement Technique	**CO 1**	Understand the fundamental concepts of ground improvement techniques in civil engineering construction activities	3	1	-
			CO 2	Describe the different techniques of ground improvements	3	1	-

			CO 3	Apply knowledge of mathematics, Science and Geotechnical Engineering to solve problems in the field of modification of ground required for construction of Civil Engineering structures.	3	1	-
			CO 4	Illustrate reinforced wall design using steel strip or geo-reinforcement	3	1	-
			CO 5	Use effectively the various methods of ground improvement techniques and Outline the solution for problematic soils	3	1	-
32	5CE3-21	Concrete Structures Design	**CO1**	Assess the bending moment and shear force for beams, columns, slabs and footings.	1	2	-
			CO2	Analyze the design parameters of the flexural members to fulfill the requirements of WSM and Limit state of Collapse for Flexure, shear and torsion.	1	2	-
			CO3	Design of flexural members for flexure, shear, bond, development length & curtailment of bar to fulfill the criteria of Limit State of Collapse for Flexure, shear and Torsion.	1	2	2
			CO 4	Analyze and design of column and column footings economically and suitably recommend the appropriate type according to site conditions	1	2	2
33	5CE3-22	Geotechnical Engineering Lab	**CO1**	Implement and analyze the properties of soil such as Grain size distribution, specific Gravity, liquid limit, plastic limit and density etc.	2	1	1
			CO2	Classify C-Ø values by unconfined compression Test Apparatus, Direct Shear Test Apparatus and Triaxial Test.	2	2	1
			CO3	Evaluate the differential free swell index, swelling pressure, CBR of soil.	2	2	1
			CO 4	Interpret the compressibility parameters of soil by consolidation test,permeability of soil by constant and falling head methods.	2	2	1
33	5CE3-23	Water Resource Engineering Design Lab	**CO1**	LO1) Explain the basic concept of water resource engineering, canals, dams, well irrigation, cross drainage structure and hydrology.	2	2	-
			CO2	LO2) Apply the water resource concept in irrigation system, canals, diversion head works, dams, well irrigation, cross-drainage structure and hydrology.	2	2	-
			CO3	LO3) Analyze the water requirement of crop, seepage losses in dam, forces acting on dam, run off and rain fall.	2	2	1
			CO 4	LO3) Design of canal, surface and subsurface flows, dams like embankment and gravity dam, tube well.	2	2	2
35	6CE03-01	Wind & Seismic Analysis	**CO 1**	Understand the basic concept of building configuration & Differentiate the types of building, shear walls, framed structure and Tube Structure.	3	1	-
			CO 2	Analyze the different types of design load as per Indian Standard Codes 875 Part-I, II & load Flow Concept in a Structure.	3	1	-

			CO 3	Differentiate the Flat, Pitched and Mono slope roof and analyze the roofs with respect to wind load as per Indian standard code IS 875-III.	3	1	1
			CO 4	Analyze the frame structures for earthquake load as per Indian standard code IS1893-I.	3	1	1
			CO 5	Differentiate the provision for earthquake resistance building as per Indian standard code IS 3326, IS13827, IS13828, IS13920 and IS13935.	3	1	-
36	6CE3-02	Structural Analysis-II	**CO 1**	Understand among various types of structures and Examine & Produce the Structure by Strain Energy method and Unit Load Method.	3	2	2
			CO 2	Apply the basic principles of SFD & BMD for the rolling loads and mathematical problems with reference to rolling loads and ILD.	3	2	1
			CO 3	Evaluate between types of arches and evaluate the stability of arches.	1	2	-
			CO 4	Analyze the concept of unsymmetrical bending and shear centre.	1	1	2
			CO 5	Analyze and Evaluate the Frame by using three different methods and Build & differentiate among these methods.	1	1	2
37	6CE3-03	Environmental Engineering	**CO 1**	Analyze the various water quality standard, Distinguish the water distribution system and design the various reservoir	1	2	3
			CO 2	Analyze the various water treatment methods, design and apply the various parameters used in the sewer system.	3	-	2
			CO 3	Design the sewerage systems, analyze the various Sewage characteristics Quality parameters and Distinguish the Standards of disposal in land	3	-	1
			CO 4	Analyze the various treatment method of sewage, Evaluate the various Pollution due to improper disposal of sewage, Distinguish the Wastewater Disposal and Refuse method	2	3	2
			CO 5	Analyze the Quantification of air pollutants, evaluate various control methods measures for Air pollution and noise pollution	3	2	2
38	6CE3-03	Design of Steel Structures	**CO 1**	Analyze steel sections used in steel structures and the suitable sections for design.	2	1	1
			CO 2	Analyzing the different kinds of connection used in steel structures and being able to create the compression and tension member.	3	2	1
			CO 3	Create the laterally supported and unsupported steel beams and analyze the gantry girder, plate girder and laterally loaded steel members.	3	3	1
			CO 4	Analyze and apply the different type's column bases.	2	2	1
			CO 5	Analyze and create the truss girder and foot over bridge.	2	2	1
39	6CE3-05	Estimating and Costing	**CO 1**	To provide the student with the ability to estimate the quantities of item of works involved in buildings and bill of quantities	2	2	2

			CO 2	To provide the student with the ability to estimate the quantities of item of works involved in different projects	1	1	2
			CO 3	To provide the student with the ability to do rate analysis	1	1	1
			CO 4	Preparation of estimates for different works like roads, buildings, earth work, water supply etc.	1	-	2
			CO 5	To provide the student with the ability to valuation of properties	2	-	2
30	6CE5-12	Solid and Hazardous Waste Management	**CO 1**	Analyze and characterization of solid waste, hazardous waste constituents.	1	-	2
			CO 2	Understand health and environmental issues related to solid waste management.	2	1	2
			CO 3	Apply steps in solid waste management-waste reduction at source, collection techniques, materials and resource recovery/recycling, transport of solid waste	-	2	2
			CO 4	Analyze treatment and disposal techniques, economics of the onsite vs. offsite waste management	-	2	2
			CO 5	Evaluate the effectiveness of a waste-to-energy facility in terms of energy production, emissions, and waste reduction.	-	-	-
31	6CE5-13	Traffic Engineering & Management	**CO 1**	Understand characteristics of road, road users and vehicle performance with traffic law	1	3	1
			CO 2	Analyze various traffic surveys and their interpretation with applications & significance.	1	2	1
			CO 3	Evaluate various intersections, traffic signs and markings.	1	2	1
			CO 4	Analyze road accidents its causes, effects, prevention, traffic and	1	2	1
			CO 5	Analyze Traffic Management System by Direct and indirect methods.	1	1	1
32	6CE5-13	Bridge Engineering	**CO 1**	Explain different types of bridges, components and loadings as per Indian standards provisions	1	**3**	**-**
			CO 2	Apply the fundamental concept of bridge loadings on Steel and RCC bridges	1	2	**-**
			CO 3	Analyze the RCC and steel bridges using Courbons and Hendry-Jaegar method	2	2	**-**
			CO 4	Design of Bearings, Steel and RCC bridges according to IRC codal provisions	2	2	**-**
			CO 5	Evaluate the impact of environmental factors on the durability of different bridge materials.	3	-	**-**
33	6CE5-15	Rock Engineering	**CO 1**	Define the use of rock mass classification systems (RMR & Q).	1	1	1
			CO 2	Explain methods for in situ investigation and laboratory testing of rock matrix and discontinuities.	2	-	1
			CO 3	Apply the knowledge ofthe characteristics and the mechanical properties (strength and failure criteria) of rock mass, rock matrix and discontinuities.	1	2	2

			CO 4	Analyse the stress distribution (isotropic, anisotropic) in situ and around an opening in rock (competent rock, jointed rock mass, blocky rock)	3	2	-
			CO 5	Analyze the potential environmental impact of rock excavation and suggest appropriate mitigation measures.	1	2	2
33	6CE5-16	GIS & Remote Sensing	**CO 1**	Evaluate Photogrammetric and apply principles of Photogrammetric to create maps and their substitutes	2	3	1
			CO 2	Analyze the basic concept of remote sensing.	2	3	-
			CO 3	Evaluate and analyze different types of platforms, sensors and their characteristics in Remote Sensing.	2	3	-
			CO 4	Analyze and create the different types of information from different remote sensing data products using various image processing techniques.	1	3	2
			CO 5	Create the basic concept of GIS and analyze the use of GIS tools for civil engineering purpose.	2	3	-
35	6CE3-21	Environmental Engineering Design and Lab	**CO1**	Understand the water quality parameters their permissible limits and compute population forecasting water demand	2	2	-
			CO2	Analyze the physical and chemical tests to be conducted for the water before supply.	2	2	-
			CO3	Design of filters, tanks, densification units and transmission system	2	2	1
			CO 4	Design of sewer lines, storm water systems, aerobic & anaerobic treatment units	2	2	-
36	6CE3-22	STEEL STRUCTURES DESIGN LAB	**CO1**	Calculate the plastic moment of different cross section and design of bolted and welded connections	2	1	1
			CO2	Analyze and design the tension, compression & column bases member under axial and combined loading	3	2	1
			CO3	Discuss the pre-engineered buildings, bridges & trusses	3	3	1
			CO 4	Identify and demonstrate the various section of steel structures at field visit	2	1	-
37	6CE3-23	QUANTITY SURVEYING AND COSTING	**CO1**	Able to prepare preliminary and detailed estimates by various methods.	2	-	2
			CO2	Able to do rate analysis of various items of work	1	1	2
			CO3	Able to evaluate earth work for road, canals ad channels.	1	1	1
			CO 4	Able to do Valuation of Buildings and Properties.	1	-	2
38	6CE3-23	Water and Earth Retaining Structure design lab	**CO1**	Understand concept of coefficient method (IS code) and apply it for analysis and design of continuous beams.	1	2	-
			CO2	Analysis and design of circular domes with u.d.l. & concentrated load at crown	1	2	-
			CO3	Classification of water tanks according to shape and design of rectangular, circular and intze type tanks.	1	2	2
			CO 4	Analysis and design of Cantilever Retaining Walls and introduction to counterfort and buttress type retaining walls.	-	1	2

39	6CE3- 25	DESIGN OF FOUNDATIONS	**CO1**	Apply the theoretical knowledge of bearing capacity to design various types of shallow foundation.	2	1	1
			CO2	Understand the design of pile foundation (covering both geotechnical and structural aspects)	3	2	1
			CO3	Discuss the different components of well foundation, its construction and design methods.	3	3	1
			CO 4	Use the theoretical knowledge of earth pressure to analyze and design of various retaining structures.	1	2	1
50	7CE1A	Water Resources Engineering-I	**CO 1**	Apply and analyze the functions, advantages of present status of irrigation in India and water harvesting and conservation.	3	2	2
			CO 2	Discuss the role of command area development authority and Canal Irrigation. To Analyze and Evaluate the design of channels, regime and semi theoretical approaches.	3	2	2
			CO 3	Apply and Distribution of Canal Water. To apply and evaluate different stages of rivers, and river training & bank protection works.	3	2	-
			CO 4	Analyze and Apply Water Logging Causes and types of channels lining and design of lined channels.	3	2	2
			CO 5	Use the Hydrology and Hydrologic cycle and evaluate Application to Engineering problems, measurement of rainfall, rain gauge, peak flow, flood frequency method	3	2	-
51	7CE2A	Design of Steel Structures-I	**CO 1**	Apply and analyze the types of steel, their broad specifications and Plastic analysis of steel structures.	2	3	-
			CO 2	Design the bolted and welded connections under axial and eccentric loadings.	3	3	-
			CO 3	Implement and analyze the Compression Member.	2	3	2
			CO 4	Classify and design the beams and their connections.	2	3	2
			CO 5	Analyze the column bases, Slab base, gusseted base for axial and eccentric compressive load.	2	3	-
52	7CE3A	Design of Concrete Structures-II	**CO 1**	Compare the concept of Pre-Tension & Post- Tension concrete and students are able to Analyze and Apply the concept of Pre-Tension & Post- Tension on rectangular Prestressed concrete Section.	2	3	-
			CO 2	Classify Torsion and different types of beam and Analyse & Evaluate the three types of Beams by using Indian Standard Code:356-2000.	2	3	-
			CO 3	Differentiate and apply the types of Tank and Dome using Indian Standard code: 3370-Part2-2009.	2	3	-
			CO 4	Describe the basic concept of Yield Line Theory & its applications & students are able to differentiate, Evaluate and analyse the different types of Retaining walls.	2	3	3

			CO 5	Classify the bridge and Culvert and students are able to apply and analyse the slab culvert and T- Bridge for IRC Loading by using Indian Stand Code: IRC 6-1966 and IRC 21-2000.	2	3	2
53	7CE3A	Transportation engineering-II	**CO 1**	Classify the various permanent way components, features, maintenance, and signal systems.	2	3	-
			CO 2	Apply and design the points and crossings, at surface, elevated and underground railway system conditions.	-	3	-
			CO 3	Design the various geometric attributes and gauge widening in the railway system.	2	3	-
			CO 4	Analyze the several components of airport engineering.	-	3	-
			CO 5	Design airport pavement by using various methods.	3	3	-
53	7CE5A	Application of Numerical Methods in Civil Engineering	**CO 1**	Discuss the decimal and binary number system and understand the concept of Accuracy, Errors and approximations for solution of problems.	2	-	2
			CO 2	Explain basic concepts of iterative methods and apply appropriate iterative methods for numerical solutions of nonlinear equations.	2	-	2
			CO 3	Execute the basic concept of matrices and understand consistency of the system of equations for solving linear systems of equations by direct methods.	2	1	2
			CO 4	Apply the concept of iterative methods and create the approximate solution of the linear system of equations by use of appropriate iterative methods.	2	-	3
			CO 5	Discuss the concept of finite differences, analyze the various methods and apply knowledge of interpolation for solution of engineering problems.	2	1	2
55	7CE6.1A	Advanced Transportation Engineering	**CO 1**	Classify the different traffic studies and also to apply & analyze the traffic data by various methods.	2	3	1
			CO 2	Apply the various methods for traffic engineering and also to solve out the problems based on distribution.	2	3	-
			CO 3	Analyze the principles of roads & signals and also design the various roads and signals in traffic engineering.	2	3	-
			CO 4	Analyze the various traffic laws and regulations & also to evaluate the various types of markings and signs.	1	3	2
			CO 5	Evaluate the effect of traffic on the environment and to understand & remember the various road safety measures.	2	3	-
56	7CE7A	Design of Water Resource Structures-I	**LO1**	Explain the basic concept of water resource engineering, canals, dams, well irrigation, cross drainage structure and hydrology.	2	2	

			LO2	Apply the water resource concept in irrigation system, canals, diversion head works, dams, well irrigation, cross-drainage structure and hydrology.	2	2	
			LO3	Analyze the water requirement of crop, seepage losses in dam, forces acting on dam, run off and rain fall.	2	2	1
			LO4	Design of canal, surface and subsurface flows, dams like embankment and gravity dam, tube well.	2	2	2
57	7CE8A	Steel Structures Design-I	**LO1**	Analyze steel sections used in steel structures and the suitable sections for design.	2	1	1
			LO2	Analyzing the different kinds of connection used in steel structures and being able to create the compression and tension member.	3	2	1
			LO3	Create the laterally supported and unsupported steel beams and analyze the gantry girder, plate girder and laterally loaded steel members.	3	3	1
			LO4	Analyze and apply the different type's column bases.	2	2	1
			LO5	Analyze and create the truss girder and foot over bridge.	2	2	1
58	7CE9A	Concrete Structures Design-II	**LO1**	Recall the basics of shear force and bending moment diagram.	3		
			LO2	Analysis and design of beams for flexure, shear and torsion as per codal provisions.		3	
			LO3	Apply checks for collapse and serviceability criteria for design of RC members as per codal provisions.	3		2
			LO4	Analysis and design of slab, column and footing as per codal provisions.	2	2	
59	7CE10A	Application of Numerical Methods in Civil Engineerinng Lab	**LO1**	Know about how to make engineering easy and more interesting.	3		
			LO2	Understand application of numerical methods.		3	
			LO3	Application of numerical methods to make program in language C.		2	2
60	7CETR	Practical Training & Industrial Visit	**LO1**	Participate in the projects in industries during his or her industrial training.	1	2	
			LO2	Describe use of advanced tools and techniques encountered during industrial training and visit.	-	-	3
			LO3	Interact with industrial personnel and follow engineering practices and discipline prescribed in industry.	-	2	2
			LO4	Develop awareness about general workplace behavior and build interpersonal and team skills.	-	3	
			LO5	Prepare professional work reports and presentations.	-	1	2
61	7CEPR	Project-I	**CO 1**	Team work to select an engineering problem and its solution	1	1	2

			CO 2	Formulate the problem and design using modern technologies and new software learning	2	—	1
			CO 3	Develop the engineering solutions by considering society and environment	1	—	2
			CO 4	Applying solution considering societal, health, safety, legal and cultural issues	1	—	2
			CO 5	Analysis and explanation of data to provide the valid conclusions.	2	—	2
			CO 6	Use of management principles in project functioning and consider the multidisciplinary environments.	2	1	2
			CO 7	To work effectively in Project as an individual member and team by following the ethical principles	-	2	1
			CO 8	Communicate effectively for various activities with help of reports, presentations and verbal communication that can help in life-long learning.	1	-	2
62	8CE1A	Water Resources Engineering-II	**CO 1**	Classify and design the Regulation of works and Drainage Structure.	3	2	-
			CO 2	Apply and analyze the surface and subsurface flows, using Bligh's and Khosla's theory, also describe the weirs and barrages.	3	1	-
			CO 3	Implement and analyze the Embankment Dams and Gravity Dams with the stability and seepage analysis.	3	2	-
			CO 4	Select and evaluate spillways and gates, general features of hydroelectric schemes, elements of power house structure, selection of turbines and cavitations.	3	1	-
			CO 5	Evaluate the impact of water projects on river regimes and environment. To analyze the Reservoir sedimentation and water shed management using optimization techniques and system approach and G.I.S. and Computer aided irrigation design.	3	2	-
63	8CE2A	Design of Steel Structures-II	**CO 1**	Differentiate the Gantry girder and Roof Truss and also Apply & analyse the Gantry girder and Roof Truss with help of Indian Standard Code: 800-2007, IS: 875-Part-III and understand the application of Tubular Sections.	1	3	-
			CO 2	Classify and evaluate the welded section & bolted Section using Design Specification IS: 800-2007.	1	3	-
			CO 3	Design the bridge, Categorization & Produced the Deck Type Bridge with help of Indian Standard Bridge Rule Code.	2	3	-
			CO 4	Design of bridge and differentiate the Foot over Bridge & Truss Girder Bridge with help of Indian Bridge Rule Code.	2	3	-

			CO 5	Differentiate explanation of the types of tank and analyse among these tank with the help of Indian Standard Code: IS 803-1967, IS 805-1968.	2	3	-
63	8CE3A	PPCM	**CO 1**	Discuss the financial evaluation of the project and also to differentiate the various construction project techniques.	3	1	-
			CO 2	Evaluate the different project management techniques and also analyze the methods of network for various projects.	3	-	1
			CO 3	Solve the problems related to project cost and time control and also to understand the cost and time for various projects.	3	2	1
			CO 4	Discuss the skills of contract management and also to evaluate the various contracts and tenders	3	-	-
			CO 5	Discover about the safety measures at construction sites and also to remember and understand the various environment and social aspects of construction projects.	3	3	1
65	8CE3.2A	Advance Foundation Engineering	**CO 1**	Discuss the various methods of estimation of bearing capacity of shallow foundation at different loading and water level conditions.	1	2	-
			CO 2	Evaluate the settlement under shallow foundation by various methods available with reference to Indian Standards.	2	2	-
			CO 3	Classify different types of pile with their use, modes of failure and to estimate bearing capacity and settlement of pile foundation at various conditions.	2	2	-
			CO 4	Analyze the behavior of collapsible and expansive soils also design practices of foundation for these soils.	1	3	-
			CO 5	Classify common types of raft, modes of failure and to measure bearing capacity, settlement of raft and well foundation at various conditions.	2	2	-
66	8CE5A	Design of Water Resource Structures-II	**LO 1**	Classify and design the Regulation of works and Drainage Structure.	3	2	-
			LO 2	Apply and analyze the surface and subsurface flows, using Bligh's and Khosla's theory, also describe the weirs and barrages.	3	1	-
			LO 3	Implement and analyze the Embankment Dams and Gravity Dams with the stability and seepage analysis.	3	2	-
			LO 4	Select and evaluate spillways and gates, general features of hydroelectric schemes, elements of power house structure, selection of turbines and cavitations.	3	1	-

			LO 5	Evaluate the impact of water projects on river regimes and environment. To analyze the Reservoir sedimentation and water shed management using optimization techniques and system approach and G.I.S. and Computer aided irrigation design.	3	2	-
67	8CE6A	Professional Practice & Estimating	**LO1**	Determine the NPV, IPR and B/C ratio and Understand about the tender and contracts.	2	-	3
			LO2	Understand the drafting of tender and contracts.	1	1	2
			LO3	Understand the contract models – PPP, BOT and BOOT	1	1	1
			LO 4	Develop the understanding about dispute settlement and Prepare Bar- chart and analyze the network by PERT & CPM.			3
68	8CE7A	Steel Structures Design-II	**LO1**	Calculate the plastic moment of different cross section and design of bolted and welded connections	2	1	1
			LO2	Analyze and design the tension, compression & column bases member under axial and combined loading	3	2	1
			LO3	Discuss the pre-engineered buildings, bridges & trusses	3	3	1
			LO 4	Identify and Demonstrate the various section of steel structures at field visit	2	1	1
69	8CE8A	Design of Foundations	**LO1**	Understand the significance and determine the load bearing capacity for shallow foundation.	3		
			LO2	Analyse the settlement behaviour of different type of soil.		3	
			LO3	Calculate the load bearing capacity for deep foundation	3		2
			LO 4	Apply the behaviour of different type of soil under different conditions.		3	
			LO5	Design the various parameters of raft and well foundations		3	
70	8CE9A	Structural Analysis by Matrix Methods	**LO1**	Distinguish statically determinate and redundant structural systems.	3		
			LO2	Analyses a suitable method for the structural system.		3	
			LO3	Calculate the forces in axially loaded member.			3
			LO 4	Know the deflection in axially loaded member.	3	2	
			LO5	Know the behavior of the frame and truss structure by flexibility and stiffness method			3
71	8CESM	Seminar	**LO1**	LO1: Discover potential research areas and conduct a survey of several available literatures in the preferred field of study.	1	1	3
			LO2	LO2: Compare and contrast the several existing solutions for research challenge.	1	1	3
			LO3	LO3: Report and present the findings of the study conducted in the preferred domain.	2	1	3

72	8CEPR	Project	**CO 1**	Team work to select an engineering problem and its solution	1	1	2
			CO 2	Formulate the problem and design using modern technologies and new software learning	2	—	1
			CO 3	Develop the engineering solutions by considering society and environment	1	—	2
			CO 4	Applying solution considering societal, health, safety, legal and cultural issues	1	—	2
			CO 5	Analysis and explanation of data to provide the valid conclusions.	2	3	—
			CO 6	Use of management principles in project functioning and consider the multidisciplinary environments.	-	1	2
			CO 7	To work effectively in Project as an individual member and team by following the ethical principles	-	2	3
			CO 8	Communicate effectively for various activities with help of reports, presentations and verbal communication that can help in life-long learning.	-	-	3

Bachelor of Technology Electronics and Communication Engineering

Program Name: Electronics and Communication Engineering

Subject/Code No: Advanced Engineering Mathematics-I & 3EC2-01 LTP: 3+1+0 Semester: III
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Elucidate the concepts of Laplace transformation, Fourier transformation, and Z transformation. Describe numerical techniques for deducing unknown values using known data, methodologies for locating roots, and approaches for solving diverse types of differential equations such as ordinary, partial, and simultaneous differential equations.	3	1	2
CO2	Utilization of suitable technology and assessment of the feasibility of various methods for numerically solving problems.	3	1	2
CO3	Examine the underlying principles of Fourier, Laplace, and Z-Transforms. These methodologies can be conducted using formulations based on either the time domain or the transform domain.	3	1	1
CO4	Design electrical circuits, including filters and networks, finds its optimal application in examining transient response phenomena. Likewise, the z-transform plays an essential role in both designing and analyzing digital filters, particularly those with infinite impulse response (IIR). Moreover, spatial, adaptive, inverse, and Wiener filters serve specialized purposes within distinct applications.	3	1	1

Subject/Code No: Managerial Economics and Financial Accounting, 3EC1-03 LTP: 2+0+0 Semester: III
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Examine economic principles such as demand, supply, market arrangement, and financial administration encompassing concepts like balance sheets.	2	1	2
CO2	Utilization of pertinent methodologies: employment of demand and supply equations, production and cost equations, along with theories of pricing.	3	1	1
CO3	Investigate the interconnections among economic factors through the lens of elasticity, analysis of cash flows, scrutiny of fund flows, and evaluation using ratios.	3	1	1
CO4	Assess tangible challenges faced by businesses by employing capital budgeting methods.	3	1	2

Subject/Code No: Digital System Design, 3EC3-03 LTP: 3+0+0 Semester: III
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	To introduce the idea of the number system, Boolean Algebra, combinational and sequential circuits, semiconductor memories, and the flow of VLSI design.	3	1	1
CO2	Utilize suitable technology to enhance circuit performance, leading to smoother and faster operations, thereby conserving time and energy.	3	1	1
CO3	Examine the creation process and compromises within different digital electronic categories, aiming to achieve lower power usage and smaller sizes.	3	2	2
CO4	Evaluate both synchronous and asynchronous sequential circuits, and cultivate the skill to design such circuits using VHDL.	3	1	1

Subject/Code No: Signal & Systems, 3EC3-05 LTP: 3+0+0 Semester: III
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO1	PSO2	PSO3
CO1	Illustrate the mathematical portrayal and categorizations of signals, linear shift-invariant (LSI) systems, the sampling theorem, and multiple-input multiple-output (MIMO) systems, along with their characteristics.	3	1	1
CO2	Elaborate on the concept of convolution as a means to elucidate the evolution of a linear time-invariant (LTI) system's response over time. This facilitates the analysis of both analog and digital communication systems' behaviors.	3	1	2
CO3	Investigate signals and systems through diverse transform domain techniques such as continuous-time Fourier transform (CTFT), discrete-time Fourier transform (DTFT), Laplace transform, and Z transform.	3	1	1
CO4	Examine the stability, linearity, causality, and time invariance of the system to ascertain its fundamental properties.	3	1	2
CO5	Design and execute the construction of zero-order hold and first-order hold interpolators.	3	1	1

Subject/Code No: Network Theory, 3EC3-06 LTP: 3+1+0 Semester: III
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO1	PSO2	PSO3
CO1	Elaborate on and provide insights into different notions encompassing mesh and node analysis, network theorems, frequency domain, time domain, electrical networks, Fourier series, transformations, port networks, and the analysis of filters.	3	1	1
CO2	Grasping the concepts of mesh and node analysis, network theorems, frequency domain, time domain, and electrical networks, along with delving into port networks and studying transient behavior analysis, offers a comprehensive understanding of the dynamics within a network.	3	1	2
CO3	Examine the functioning of electrical networks in relation to parameters and scrutinize the disparities between frequency domain and time domain analyses.	3	1	2
CO4	Assess the distinct parameters characteristic of both A.C. and D.C. networks.	3	1	1

Subject/Code No: Electronics Devices, 3EC3-07 LTP: 3+1+0 Semester: III
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Comprehend and elucidate the fundamental attributes of semiconductor materials, compound semiconductors, thermistors, P-N diodes, Zener diodes, Schottky diodes, bipolar junction transistors, MOSFETs, LEDs, photodiodes, solar cells, and the process of CMOS fabrication.	3	1	2
CO2	Understand that distinct techniques are utilized for assessing distinct aspects of semiconductor devices, encompassing parameters such as current, voltage, and power. These measurements are harnessed by researchers to deduce the amount of energy encapsulated within the device.	3	1	1
CO3	Examine and discern modifications in parameters like current, voltage, power, energy, power dissipation, time, and temperature.	3	1	2
CO4	Construct the voltage-current (V-I) characteristics of semiconductor devices, both with and without temperature fluctuations, and formulate the design of a complementary metal-oxide-semiconductor (CMOS) structure through a variety of fabrication steps, including oxidation, deposition, etching, diffusion, and metallization.	3	1	2

Subject/Code No: Electronics Devices Lab, 3EC3-21 LTP: 0+0+2 Semester: III
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Understand the concepts of semiconductor devices and components such as diodes, BJTs, JFETs, and MOSFETs.	2	1	2
CO2	Elaborate on the operational principles underlying semiconductor devices.	3	1	1
CO3	Create, examine, and assess various components in practical scenarios on a breadboard.	3	1	2
CO4	Analyze outcomes and substantiate them by contrasting them with ideal expectations.	3	1	1

Subject/Code No: Digital System Design Lab, 3EC3-22 LTP: 0+0+2 Semester: III
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Create, experiment with, and assess different combinational circuits like adders, subtractors, comparators, multiplexers, and demultiplexers.	3	2	1
CO2	Showcase the truth table for different logical expressions utilizing logic gates.	3	2	2
CO3	Recognize diverse digital integrated circuits (ICs) and grasp their functionalities.	3	2	1
CO4	Examine, devise, and execute Flip-Flops through analysis and design.	3	2	1

Subject/Code No: Signal Processing Lab, 3EC3-23 LTP: 0+0+2 Semester: III
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Understand the fundamental aspects of MATLAB, gain insight into signal basics and their diverse operations.	3	2	1
CO2	Create stochastic signals alongside various continuous and discrete-time signals.	3	2	1
CO3	Construct simple signal processing algorithms and validate them through MATLAB.	3	2	1
CO4	Authenticate random sequences characterized by varied distributions, mean values, and variances.	3	2	1
CO5	Devise, execute, interpret, and analyze experiments, followed by comprehensive data reporting.	3	2	1

Subject/Code No: Computer Programming Lab-I, 3EC3-24 LTP: 0+0+2 Semester: III
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Understand the significance of structure and abstract data types, along with their fundamental applicability in diverse scenarios.	2	3	2
CO2	Evaluate and distinguish between various algorithms by considering their time complexity.	2	3	2
CO3	Construct linear and non-linear data structures through the utilization of linked lists.	2	3	2
CO4	Comprehend and employ a range of data structures like stacks, queues, trees, graphs, and more, to address diverse computational challenges.	2	3	2
CO5	Develop proficiency in deploying different searching and sorting methods, and make informed decisions regarding their selection based on specific requirements.	2	3	2

Subject/Code No: Industrial Training, 3EC7-30 LTP: 0+0+1 Semester: III
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Engage in industry projects as part of the industrial training experience.	3	1	1
CO2	Collaborate with professionals from the industry and adhere to established engineering protocols and standards.	3	1	1
CO3	Foster an understanding of typical workplace conduct and cultivate interpersonal and teamwork proficiencies.	3	1	3
CO4	Create well-structured professional reports and deliver effective presentations.	3	1	1

Subject/Code No: Advanced Engineering Mathematics-II, 4EC2-01 LTP: 3+0+0 Semester: IV
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Demonstrate an understanding of the characteristics of complex numbers, special functions, and linear algebra, and apply this knowledge to address intricate engineering challenges within domains such as signal processing, which finds relevance in telecommunications (cellular phones), radar systems (facilitating airplane navigation), and even biological contexts (studying neural firing events in the brain).	1	1	2
CO2	Categorize complex contour integrals both through direct assessment and with respect to the fundamental theorem. Apply the Cauchy integral theorem in its diverse formulations.	1	1	2
CO3	Distinguish between various methods for solving higher-order differential equations, including Bessel's and Legendre's equations, and explore their practical application in fields such as hydrodynamics, elasticity theory, and the analysis of electrical transmission line loads in the realm of Electronics and Communication Engineering.	3	1	2
CO4	Conduct an in-depth examination of assorted numerical predicaments, employing appropriate technological tools to resolve them. Undertake a comparative evaluation of the feasibility of distinct approaches to numerically solving problems.	1	1	2

Subject/Code No: Technical Communication, 4EC1-02 LTP: 2+0+0 Semester: IV
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Elaborate on the technical communication process using the LSRW framework.	2	1	1
CO2	Explore the notion of Technical Materials/Texts across diverse technical publications.	2	1	1
CO3	Understand the skill of producing accurate professional documents.	2	1	1
CO4	Analyze the fundamental principles underlying Technical Reports, articles, and their structural arrangements.	2	1	1

Subject/Code No: Analog Circuits, 4EC3-03 LTP: 3+0+0 Semester: IV
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Evaluate the distinct attributes of BJT, FET, and OP-AMP amplifiers, along with Phase Shift and Hartley oscillators, delving into their inherent traits.	3	1	1
CO2	Illustrate the utility of mathematical equations in these contexts and undertake a comprehensive analysis of BJT, FET, and OP-AMP amplifiers, coupled with Phase Shift and Hartley oscillators, discerning their unique characteristics.	3	1	1
CO3	Explore the domain of Analog Circuits, specifically focusing on transistor amplifiers like BJT, FET, and oscillators including Phase Shift and Hartley. Delve into the application of mathematical equations in the augmentation of transistor-based amplification and oscillation within diverse fields.	3	1	1
CO4	Analyze the unique features of BJT, FET, and OP-AMP amplifiers, alongside Phase Shift and Hartley oscillators, and explore how they manifest in practical scenarios through numerical problem-solving and application-driven designs.	3	1	1

Subject/Code No: Microcontrollers, 4EC3-05 LTP: 3+0+0 Semester: IV
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Provide an overview of Microprocessors and Microcontrollers.	2	2	2
CO2	Demonstrate the connection of peripheral devices with fundamental and advanced microprocessors and microcontrollers.	2	2	2
CO3	Devise embedded systems to address industrial challenges utilizing elementary and sophisticated microprocessors and microcontrollers.	2	2	2
CO4	Conduct evaluations to enhance the efficiency of hardware devised for industrial issues.	2	2	2

Subject/Code No: Electronics Measurement & Instrumentation, 4EC3-06 LTP: 3+0+0 Semester: IV
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Elaborate upon and provide insights into diverse notions of Errors, Electronic Apparatus, Measuring Devices, Oscilloscopes, Signal Generators, Analytical Tools, and Transducers. [Comprehension]	3	1	1
CO2	Employ and put into practice the comprehension of electronic measuring devices, Oscilloscopes, Q-Meters, assorted error classifications, Signal generators, Wave Analyzers, and the process of Transducer selection. [Application, Comprehension]	3	1	1
CO3	Compare among the operations of varied instruments in terms of usability and referencing specific parameters. [Analysis] and assess the distinct parameters associated with diverse Instruments and Transducers.	2	1	1
CO4	Make choices regarding the suitable Instruments and Transducers based on specific applications. [Analysis, Design]	2	1	1

Subject/Code No: Analog and Digital Communication, 4EC3-07 LTP: 3+0+0 Semester: IV
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Understand various analog and digital methods for modulation and demodulation.	3	3	1
CO2	Able to compute various parameters associated with modulation and demodulation strategies.	3	1	1
CO3	Evaluate the effectiveness of modulation and demodulation techniques across different transmission scenarios.	3	1	1
CO4	Design analog and digital communication transmitters and receivers, such as the Viterbi receiver, through design processes.	3	3	1

Subject/Code No: Analog and Digital Communication Lab, 4EC3-21 LTP: 0+0+3 Semester: IV
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Comprehend various analog modulation techniques to assess their effectiveness and bandwidth utilization.	3	1	1
CO2	Evaluate how a communication system functions when subjected to noise interference.	3	1	1
CO3	Explore pulse modulation systems, examining their operational efficiency.	3	1	1
CO4	Assess diverse digital modulation methods and calculate their bit error rates.	3	3	1
CO5	Design a communication system that integrates both analog and digital modulation methodologies.	3	3	1

Subject/Code No: Analog Circuits Lab, 4EC3-22 LTP: 0+0+3 Semester: IV
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Elucidate the functioning of transistor amplifiers and oscillators for the purpose of empirically assessing their attributes across various parameters.	3	1	1
CO2	Utilize circuit diagrams to facilitate the practical assessment of these transistor-based systems and oscillators.	3	1	1
CO3	Conduct experiments systematically to generate empirical data in a suitable manner.	3	1	1
CO4	Evaluate the gathered experimental data to discern the characteristic traits exhibited by these transistors and oscillators.	3	1	1

Subject/Code No: Microcontrollers Lab, 4EC3-23 LTP: 0+0+3 Semester: IV
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Retrieve fundamental concepts of digital fundamentals applicable to Microprocessors and microcontrollers.	1	3	2
CO2	Construct diverse systems associated with assembly-level programming of microprocessors and microcontrollers.	1	3	2
CO3	Discriminate and examine the characteristics of Microprocessors & Microcontrollers.	1	3	2
CO4	Elucidate the foundational understanding of microprocessor and microcontroller interfacing, delay establishment, waveform creation, and Interrupt handling.	1	3	2
CO5	Develop proficiency in deploying different searching and sorting methods, and make informed decisions regarding their selection based on specific requirements.	1	3	2

Subject/Code No: Electronics Measurement & Instrumentation Lab, 4EC3-24 LTP: 0+0+3 Semester: IV
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Comprehension of the core principles of Electronic Instrumentation. Elucidate and recognize devices for measurement.	3	1	2
CO2	Demonstrate the measurement of resistance, inductance, and capacitance through diverse approaches.	3	1	2
CO3	Assess the instrumentation system aligning with sought-after standards, necessities, and outcomes.	3	1	1
CO4	Appraise varying parameters utilizing a range of measuring tools and transducers.	3	1	2

Subject/Code No: Computer Architecture, 5EC3-01 LTP: 2+0+0 Semester: V
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Understand the principles of computer organization along with fundamental concepts pertaining to processor architecture, memory arrangement, and input-output mechanisms.	1	3	2
CO2	Examine the fundamental framework of a digital computer, including methods for adding and multiplying integers and floating-point figures using two's complement and IEEE floating-point notation. Delve into the organization of input-output systems.	1	3	2
CO3	Critically assess arithmetic operations on both fixed and floating-point numbers within a computer, employing diverse algorithms such as the restoring method, microprogrammed control units, and DMA controllers.	1	3	2
CO4	Formulate designs for elementary and intermediate RISC pipelines, encompassing considerations like the instruction set, functional units, and integral components of computers.	1	3	2

Subject/Code No: Electromagnetics Waves, 5EC3-02 LTP: 3+0+0 Semester: V
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Introduce the idea of the number system, Boolean Algebra, combinational and sequential circuits, semiconductor memories, and the flow of VLSI design.	2	3	2
CO2	Utilize suitable technology to enhance circuit performance, leading to smoother and faster operations, thereby conserving time and energy.	3	2	1
CO3	Examine the creation process and compromises within different digital electronic categories, aiming to achieve lower power usage and smaller sizes.	3	3	2
CO4	Evaluate both synchronous and asynchronous sequential circuits, and cultivate the skill to design such circuits using VHDL.	3	2	1

Subject/Code No: Control System, 5EC3-03 LTP: 3+0+0 Semester: V
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Explain the fundamental notion of control systems encompassing both feedback and open-loop configurations. Explore time and frequency-based evaluations of system responses. Delve into state-variable examination, optimal control strategies, and nonlinear control systems.	3	1	2
CO2	Resolve intricacies related to feedback control systems, time-based responses, frequency-based reactions, and state-variable analyses. Employ tools like Routh-stability criterion, root locus, polar plot, bode plot, Nyquist plots, and state models to ascertain stability.	3	1	2
CO3	Assess the performance of diverse control systems by assessing their behavior in time-domain, frequency-domain, and through state-space analysis techniques.	3	1	2
CO4	Formulate suitable compensatory mechanisms for typical control scenarios using both time and frequency response approaches.	3	1	2

Subject/Code No: Digital Signal Processing, 5EC3-04 LTP: 3+0+0 Semester: V
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Elucidate the notion of sampling and its subsequent reconstruction. [Recall]	2	3	2
CO2	Elaborate on the Z-Transform, DFT, and FFT algorithms. [Comprehension]	2	3	2
CO3	Utilize the Z-Transform, DFT, and FFT algorithms to scrutinize Linear Shift-Invariant (LSI) systems. [Application and Analysis]	2	3	2
CO4	Formulate Infinite Impulse Response (IIR) and Finite Impulse Response (FIR) filters employing distinct techniques tailored for diverse Digital Signal Processing (D.S.P.) applications. [Design]	2	3	2

Subject/Code No: Microwave Theory & Techniques, 5EC3-05 LTP: 3+0+0 Semester: V
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Introduction to the fundamental ideas and tenets of microwave engineering.	2	1	2
CO2	Acquire insights into the functioning of electromagnetic waves and the construction of both active and passive microwave networks. Additionally, identify the distinct microwave parameters employed within these networks.	2	1	2
CO3	Examine the effectiveness of an impedance tuning network aimed at optimizing the transmission for satellite and RADAR communication.	2	1	2
CO4	Incorporate active and passive microwave components to construct a representative communication system, enabling an assessment of its impact on the human body.	2	1	2

Subject/Code No: Satellite Communication, 5EC5-13 LTP: 2+0+0 Semester: V
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Introduction to the structure of satellite systems as a mechanism for achieving rapid, extended-range communication.	3	1	1
CO2	Elaborate on diverse facets linked to satellite systems, including orbital equations, satellite subsystems, link budgeting, modulation, and multiple access methods.	3	1	1
CO3	Examine the array of access strategies employed in satellite communication.	3	1	1
CO4	Solve numerical scenarios concerning orbital motion and the formulation of a link budget based on specified parameters and conditions.	3	1	1

Subject/Code No: RF Simulation Lab, 5EC3-21 LTP: 0+0+3 Semester: V
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Elaborate upon fundamental microwave network theory and the application of scattering matrices.	3	1	1
CO2	Utilizing microwave energy for targeted heating of specific regions or objects enhances the performance of electronic devices.	3	1	1
CO3	Exhibit a comprehensive understanding of essential radio frequency (RF) concepts, RF amplification, and RF filtering.	3	1	1
CO4	Devise RF amplifier configurations employing microwave bipolar junction transistors (BJTs) and microwave field-effect transistors (FETs).	3	1	1
CO5	Create and manufacture microwave components or devices utilizing micro strip technology.	3	1	1

Subject/Code No: Digital Signal Processing Lab, 5EC3-22 LTP: 0+0+3 Semester: V
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Categorize signals and employ diverse signal manipulations.	3	1	1
CO2	Investigate assorted attributes of digital systems.	3	1	1
CO3	Construct Simulink models and graphical user interfaces (GUIs) for both analog and digital modulation methods.	3	1	1
CO4	Formulate a variety of Digital Signal Processing (DSP) algorithms using the MATLAB software package for distinct transformations.	3	1	1
CO5	Formulate, examine, and execute Analog & Digital filters through MATLAB programming.	3	1	1

Subject/Code No: Microwave Lab, 5EC3-23 LTP: 0+0+3 Semester: V
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Elaborate upon the fundamental idea behind microwave component mechanisms utilized in wired communication systems.	3	1	1
CO2	Construct linear and non-linear data structures through the utilization of linked lists.	3	2	1
CO3	Investigate the characteristics of distinct microwave parameters, considering their intrinsic traits.	3	2	1
CO4	Formulate an assessment of and design real-time application-oriented microwave waveguides intended for communication purposes.	3	2	1

Subject/Code No: Industrial Training, 5EC7-30 LTP: 0+0+1 Semester: V
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Engage in industrial projects as part of the industrial training experience.	1	2	3
CO2	Collaborate with professionals in the industry and adhere to established engineering protocols and standards.	1	2	3
CO3	Cultivate understanding of typical workplace conduct and enhance interpersonal and teamwork proficiencies.	1	2	3
CO4	Generate proficient work reports and deliver well-structured presentations.	1	2	3

Subject/Code No: Power Electronics, 6EC3-01 LTP: 2+0+0 Semester: VI
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Elaborate on the fundamental functioning and contrast the efficiency of different Power Semiconductor Devices, passive components, and switching circuits.	3	1	1
CO2	Elucidate the operation of step-up and step-down choppers, power supplies, and Buck-Boost converters through an understanding of the fundamental operational traits of power semiconductor devices.	3	1	1
CO3	Formulate typical alternative approaches and choose appropriate power converters for the regulation of electric motors and other industrial-grade equipment.	3	1	1
CO4	Design and assess Controlled Converters for both single-phase and three-phase systems, as well as Voltage and Current Source Inverters.	3	1	1

Subject/Code No: Computer Network, 6EC3-02 LTP: 3+0+0 Semester: VI
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Capable of acquiring and dissecting the principles behind layered protocol architecture; skillful in recognizing and detailing the system functions within the accurate protocol strata, while also explaining the interplay between these layer	2	2	2
CO2	Resolve mathematical quandaries to grasp data-link and network protocols more comprehensively.	2	2	2
CO3	Utilize network layer protocols and compute the requisite count of subnets for a given network.	2	2	2
CO4	Analyze the dependability of data transmission over the transport layer in the context of bit errors within a lossy channel scenario.	2	2	2

Subject/Code No: Fiber Optics Communications, 6EC3-03 LTP: 3+0+0 Semester: VI
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Understanding the fundamental ideas and fundamental principles of Fiber Optics Communication.	3	1	1
CO2	Acquiring insight into the functioning of fiber optic communication and applying this understanding to construct an optical measurement setup. This arrangement will enable the measurement of various crucial factors, including numerical aperture, dispersion, and attenuation.	3	1	1
CO3	Evaluating the composition of diverse categories of optical transmitters and receivers for the purpose of setting up optical connections.	3	1	1
CO4	Devising systems for WDM and DWDM, and additionally assessing the efficacy of active and passive optical components.	3	1	1

Subject/Code No: Antennas and Propagation, 6EC3-04 LTP: 3+0+0 Semester: VI
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Elaborate on the fundamental notion of antennas and their practical uses.	3	1	1
CO2	Determine an antenna's radiation pattern to deduce both its physical configuration and the wavelength of the emitted electromagnetic waves.	3	1	1
CO3	Assess the radiation patterns exhibited by different types of antennas.	3	1	1
CO4	Devise a Smart Antenna system tailored for real-time applications.	3	1	1

Subject/Code No: Information Theory and Coding, 6EC3-05 LTP: 3+0+0 Semester: VI
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Elaborate on the basics of information theory, including concepts like uncertainty, information, entropy, channel capacity, and the necessity of coding.	3	3	2
CO2	Employ coding methods for both sources and channels, such as Huffman, Lempel-Ziv, and Block codes.	3	3	2
CO3	Assess diverse coding and decoding strategies for multiple applications like compression and data transmission.	3	3	2
CO4	Formulate streamlined codes for error detection and correction techniques.	3	3	2

Subject/Code No: Introduction to MEMS (Professional Elective-II), 6EC5-11 LTP: 3+0+
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Grasp the underlying concepts encompassing the basic principles, configuration, production, characteristics, and methodology behind MEMS/NEMS, encompassing Micro devices, Micro systems, and Micromachining methodologies.	3	2	1
CO2	Utilize MEMS technology to craft minute, accurate entities.	3	2	1
CO3	Investigate the impact of scaling on Micro/Nano Sensors within distinct applications.	3	3	2
CO4	Formulate and execute the blueprint and construction of Micro/Nano devices, along with Micro/Nano systems, to address tangible real-world predicaments.	3	2	1

Subject/Code No: Nano Electronics (Professional Elective-II), 6EC5-12 LTP: 3+0+0
Semester: VI Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Explain and understand the Schrodinger equation, CMOS Scaling, the nano scale MOSFET, Finfets, Vertical MOSFETs, Resonant Tunneling Diode, Coulomb dots, Quantum blockade, Single electron transistors, Carbon nanotube electronics.	3	1	2
CO2	Use different methods to get energy, wave function, propagation constant, and channel length in MOSFETs and CMOS.	3	1	2
CO3	Analyze and identify the changes in the parameters like inter-atomic distance, 2D and 3D structure, Scaling of CMOS.	3	1	2
CO4	Synthesis the structure of CMOS, Finfet, Vertical MOSFET and Carbon nano tubes.	3	1	1

Subject/Code No: Computer Network Lab, 6EC3-21 LTP: 0+0+3 Semester: VI
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Understand the principles of TCP/IP protocols, layered architecture, as well as LAN, MAN, and WAN setups.	3	3	2
CO2	Apply data structures in networking, incorporating weighted and unweighted graphs.	3	3	2
CO3	Elaborate on the simulation of Queuing Theory.	3	1	1
CO4	Create a LAN Training Kit employing CSMA/CD/CA principles.	3	3	2

Subject/Code No: Antenna and Wave Propagation Lab, 6EC3-22 LTP: 0+0+2 Semester: VI
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Grasp the fundamental idea behind antenna radiation mechanisms employed in wireless communication.	3	1	1
CO2	Employ various communication modes tailored to specific applications such as mobile and satellite contexts.	3	1	1
CO3	Examine and detect issues within MOS and CMOS devices (such as assessing gate delay, transistor dimensions, power usage, as well as performance under extreme pressure and temperature conditions).	3	1	1
CO4	Investigate the characteristics of diverse antenna types with regards to their inherent parameters.	3	1	1

Subject/Code No: Electronics Design Lab, 6EC3-23 LTP: 0+0+3 Semester: VI
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Grasp the fundamental principles and practical uses of Op-amp IC (731), 555 timer IC, Cathode Ray Oscilloscope (CRO), breadboard, and function generator.	3	1	1
CO2	Utilize distinct design approaches on a breadboard employing IC-731 and IC-555 for various functionalities.	3	1	1
CO3	Examine the performance of diverse circuit configurations involving IC-731 and IC-555 across a spectrum of applications and inputs.	3	1	1
CO4	Formulate circuit diagrams on a breadboard utilizing IC-731 and IC-555 to cater to distinct application requirements.	3	1	1

Subject/Code No: Power Electronics Lab, 6EC3-24 LTP: 0+0+2 Semester: VI
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Comprehend AC voltage regulation through TRIAC, antiparallel thyristors, TRIAC and DIAC, in addition to generating pulses using the DSP/FPGA platform.	3	1	1
CO2	Comprehend AC voltage regulation through TRIAC, antiparallel thyristors, TRIAC and DIAC, in addition to generating pulses using the DSP/FPGA platform.	3	1	1
CO3	Explore single-phase bridge converters, single-phase cycloconverters, and single-phase dual converters, alongside direct current (DC) motor speed management.	3	1	1
CO4	Execute experiments encompassing single-phase PWM inverters, buck, boost, and buck-boost regulators.	3	1	1

Digital Signal Processing
MAPPING OF LOs WITH PSOs
Semester 7

CO Number	PSO 1	PSO 2	PSO 3
CO1	2	1	3
CO2	3	3	1
CO3	2	3	3
CO4	1	-	-
CO5	3	2	1

Digital Image Processing
MAPPING OF LOs WITH PSOs
Semester 7

CO Number	PSO 1	PSO 2	PSO 3
CO1	3	2	3
CO2	3	2	3
CO3	2	1	3
CO4	1	-	-
CO5	1	2	1

Wireless Communication
MAPPING OF LOs WITH PSOs
Semester 7

CO Number	PSO 1	PSO 2	PSO 3
CO1	3	2	3
CO2	3	2	
CO3	2		
CO4	1	-	-
CO5	1	2	1

VLSI Design
MAPPING OF LOs WITH PSOs
Semester 7

CO Number	PSO 1	PSO 2	PSO 3
CO1	2	1	3
CO2	3	3	1
CO3	2	3	3
CO4	1	-	-
CO5	3	2	1

VHDL
MAPPING OF LOs WITH PSOs
Semester 7

CO Number	PSO 1	PSO 2	PSO 3
CO1	2	2	-
CO2	2	2	-
CO3	2	2	-
CO4	1	1	-
CO5	1	2	-

Signal and Image Processing Lab
MAPPING OF COs WITH PSOs
Semester 7

CO Number	PSO 1	PSO 2	PSO 3
CO1	3	3	3
CO2	2	2	2
CO3	2	2	1
CO4	1	1	2
CO5	2	2	1

Wireless Communication Lab
MAPPING OF COs WITH PSOs
Semester 7

CO Number	PSO 1	PSO 2	PSO 3
CO1	3	3	3
CO2	2	2	2
CO3	2	-	-
CO4	1	1	2
CO5	2	2	1

Practical Training Seminar
MAPPING OF COs WITH PSOs
Semester 7

CO Number	PSO 1	PSO 2	PSO 3
CO1	1	3	3
CO2	2	2	2
CO3	2	-	-
CO4	1	1	2
CO5	2	2	1

Project Stage-I
MAPPING OF COs WITH PSOs
Semester 7

CO Number	PSO 1	PSO 2	PSO 3
CO1	1	3	2
CO2	2	2	2
CO3	2	-	-
CO4	1	1	2
CO5	1	2	1

IC Technology
MAPPING OF COs WITH PSOs
Semester 8

CO Number	PSO 1	PSO 2	PSO 3
CO1	1	1	3
CO2	2	2	2
CO3	2	-	-
CO4	1	1	2
CO5	2	2	1

Radar & TV Engineering
MAPPING OF COs WITH PSOs
Semester 8

CO Number	PSO 1	PSO 2	PSO 3
CO1	1	1	3
CO2	2	2	2
CO3	2	-	1
CO4	1	1	2
CO5	2	1	1

MEMS & Nanotechnology
MAPPING OF COs WITH PSOs
Semester 8

CO Number	PSO 1	PSO 2	PSO 3
CO1	1	1	1
CO2	2	-	2
CO3	2	-	1
CO4	1	1	2
CO5	1	1	1

Microcontroller & Embedded System
MAPPING OF COs WITH PSOs
Semester 8

CO Number	PSO 1	PSO 2	PSO 3
CO1	1	1	1
CO2	2	-	1
CO3	2	1	1
CO4	1	1	2
CO5	1	1	1

RF Fabrication Lab
MAPPING OF COs WITH PSOs
Semester 8

CO Number	PSO 1	PSO 2	PSO 3
CO1	1	1	2
CO2	2	-	1
CO3	2	1	1
CO4	1	2	2
CO5	1	1	1

Industrial Electronics & Management
MAPPING OF COs WITH PSOs
Semester 8

CO Number	PO1	PO2	PO3
CO1	2	1	1
CO2	2	-	1
CO3	2	1	1
CO4	1	2	2
CO5	2	1	-

VLSI & Optical Fiber Lab
MAPPING OF COs WITH PSOs
Semester 8

CO Number	PSO 1	PSO 2	PSO 3
CO1	1	-	3
CO2	2	-	3
CO3	1	-	3
CO4	2	-	3
CO5	1	-	3

Project Stage-II
MAPPING OF COs WITH PSOs
Semester 8

CO Number	PSO 1	PSO 2	PSO 3
CO1	2	3	2
CO2	2	-	2
CO3	2	2	-
CO4	2	-	3
CO5	2	2	-

Seminar
MAPPING OF COs WITH PSOs
Semester 8

CO Number	PSO 1	PSO 2	PSO 3
CO1	2	1	3
CO2	3	2	1
CO3	3	2	1
CO4	3	1	2
CO5	-	3	1

Bachelor of Technology Electrical Engineering

Program Name: Electrical Engineering

Subject/Code No: Advance Mathematics / 3EE2-01 Semester: 3rd
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Explain the concept of operators, finite differences and interpolation	3	3	3
CO2	Apply Numerical methods to solve first order Ordinary Differential Equations and Algebraic and Transcendental equations	3	2	2
CO3	Use Laplace Transforms and Fourier transform in engineering applications.	2	2	3
CO4	Determine the solution of difference equations by use of Z transform.	2	1	3
CO5	Understand complex variables, analytic function, Conformal Transformations.	3	2	2

Subject/Code No: Technical Communication/3EE1-02 Semester: 3rd
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Grasp the attributes of technical writing and recognize the significance of intent, readership, and category in conveying information within technical domains.	3	2	2
CO2	Retrieve the steps of planning, composing, refining, polishing, and evaluating technical and business papers through both personal and cooperative writing processes	3	1	3
CO3	Develop precise, succinct technical manuscripts that adeptly employ writing style, grammatical correctness, and organizational structure to establish coherent understanding with the reader.	2	3	1
CO4	Investigate, assess, integrate, and employ information to generate technical analyses.	2	2	2

Subject/Code No: - Power generation Process/3EE3-03 Semester: 3rd
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Understand various aspects of electrical generation, different type of power plant and their advantage- disadvantages & their relative efficiencies.	3	2	1
CO2	Acquire knowledge of solar, wind and tidal power plant and their impact on environment, sustainable energy and Indian energy scene.	2	3	1
CO3	Analyze various type of load curves and terminology related to load and their significance and methods of power factor improvement.	3	2	1
CO4	Apply techniques to evaluate generation cost, depreciation reserve and Acquire knowledge of different method of energy cost reduction.	2	2	3

Subject/Code No: Electrical Circuit Analysis/3EE3-05 Semester: 3rd
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Practice the fundamental concepts in circuit theory followed by an analytical understanding of transient and steady state stability concepts along with the transformations from time domain to frequency domain.	3	1	2
CO2	Select the fundamental concepts, theorems, transforms for computing the values of system parameters, stability states, and current & voltage values in a particular branch or node.	2	1	2
CO3	Assess the circuit and phasor diagrams, network interconnections, steady state stabilities, and gain or phase margins.	3	3	
CO4	Design theoretically converter/electronic circuits based on rated value of current, voltage and loads.	2	3	3

Subject/Code No: Analog Electronics/3EE3-06 Semester: 3rd
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Recall and understand the working principle of PN junction diode and its applications.	2	3	3
CO2	Understand the working of BJT and its applications.	2		1
CO3	Understand the working of JFET and MOSFET	3	2	3
CO4	Analyze and design of Differential, multi-stage and operational amplifiers	2	3	1
CO5	perform tasks like switching, amplification, voltage regulation, filtering, and control, as well as include controllers and comparator circuits	3	2	1

Subject/Code No: Electrical Machine - I/3EE3-07 Semester: 3rd
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Demonstrate fundamental principles and regulations concerning the magnetic circuits in DC machines and Transformers.	3	2	3
CO2	Deduce the control methodologies and traits of DC Machines and Transformers.	2	3	3
CO3	Evaluate the comparable circuitry of both DC machines and transformers.	2	3	3
CO4	Generate a summary encompassing the performance, various connection types, and testing approaches for DC machines and Transformers across diverse load conditions.	3	2	1

Subject/Code No: Electromagnetic Field/3EE3-08 Semester: 3rd
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Showcase the principles and principles governing electric, magnetic, and time-varying fields.	2	3	1
CO2	Engage in a discussion concerning the arrangement of charges, conditions at boundaries, as well as the Laplace, Poisson, and Maxwell's equations, all aimed at finding solutions.	2	3	3
CO3	Explore the response of dielectric and conductive materials within electromagnetic fields by employing conditions related to electric and magnetic driving forces.	3	2	3
CO4	Calculate parameters like capacitance, inductance, mutual inductance, electronic wave characteristics, electric field strength, electric flux density, magnetic flux density, and conditions for plane waves to address real-time issues.	3	2	1

Subject/Code No: Analog Electronics Lab/3EE3-21 Semester: 3rd
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Access and analyze the gain-frequency characteristics of BJT amplifier with and without negative feedback in the emitter circuit and determine bandwidths, gain bandwidth products and gains at 1 kHz with and without negative feedback. Derive output for load regulation, ripple factor by learning basics of series and shunt voltage regulators.	3	3	2
CO2	Analyze the characteristics of small signal amplifier using FET; measure variation of output power & distortion with load, for a push pull amplifier.	3	2	3
CO3	Record, observe and analyze the effect of variation in R & C on oscillator frequency in case of Wein bridge oscillator and transistor phase shift oscillator.	2	3	1
CO4	Record, observe and analyze the effect of variation of C on oscillator frequency for Hartley and Colpitts oscillator.	2	2	1

Subject/Code No: Electrical Machine- I Lab/3EE3-22 Semester: 3rd
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Determine the parameters of equivalent circuit for transformer for different tests (open circuit & short circuit test,sumpner's back to back test) and its performance parameters i.e. voltage regulation and efficiency. Apply direct loading method on single phase transformer and determine its efficiency and voltage regulation.	3	2	1
CO2	Determine the parameters of equivalent circuit for delta-delta connected three phase transformers through heat run test. Verify the condition of parallel operation of transformer for load sharing analysis.	3	2	3
CO3	Convert three phases to two phase supply using scott connection. Control the speed of dc shunt motor for above the base speed and below the base speed using field current control and armature voltage control methods respectively and plot their performance characteristic (speed versus field current/ armature voltage)	2	3	1
CO4	Evaluate various tests, find efficiency & voltage regulation of electrical machines	2	3	1

Subject/Code No: Electrical circuit design Lab/3EE3-23 Semester: 3rd
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Record and analyze data sheet reading. Use tool requiring cognitive knowledge and apply this knowledge for soldering-de soldering processes.	2	3	1
CO2	Simulate different circuits (bipolar junction transistor, unijunction transistor, half and full bridge rectifier, regulated power supply, multivibrator) and validate their characteristic on breadboard.	3	2	1
CO3	Evaluate real time quantities using sensors in different processes (proximity, accelerometer, pressure etc.)	3	2	1
CO4	Implement hardware of different control circuits (temperature control and dc motor speed control).	3	2	3

Subject/Code No: Industrial Training 3EE7-30 Semester: 3rd
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Demonstrate competency in the field of electrical engineering through problem identification, formulation and solution.	3	2	3
CO2	Develop the ability to work as an individual and in group with the capacity to be a leader or manager as well as an effective team member.	3	2	1
CO3	Implement skills effectively in oral and written communication, including report writing and power point presentations using multimedia tools.	2	3	1
CO4	Analyze industrial problems as a part of industrial training curriculum.	1	3	2
CO5	Acquire practical understanding of theoretical aspects by participating in industrial projects.	3	3	1

Subject/Code No: Biology/4EE2-01 Semester: 3th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Improve the overall scenario by learning the correlation of Biology with engineering majors, as biological systems are considered to be very much efficient.	3	1	2
CO2	Use the disciplinary skills towards designing or improving the biological systems and engineering systems in future by getting a basic understanding of genetics and classifications.	3	2	3
CO3	Assist to the development of new systems like nanotechnology, bioelectronics, smart electronics and artificial intelligence by having an understanding of fundamentals of biology in relation to biomolecules, enzymes, Proteins etc.	3	2	1
CO4	Develop an understanding of analogies between biological and electronic substrates, information processes and transport mechanisms.	3	2	3

Subject/Code No: Managerial Economics and Financial Accounting/4EE1-03 Semester: 3th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Discuss the concepts of economics like demand, supply, market structure and financial management like balance sheet.	3	2	3
CO2	Apply the economic functions and theories like: demand & supply functions, production & cost functions & pricing theories.	3	2	3
CO3	Analyze the relationship between economic variables using the concept of elasticity, cash flow analysis, fund flow analysis and ratio analysis.	3	2	1
CO4	Evaluate the real-life problems of business organizations using capital budgeting techniques.	3		2

Subject/Code No: Electronic Measurement & Instrumentation/4EE3-03 Semester: 3th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Comprehend the operational mechanisms and categorization of measurement devices alongside their practical uses.	2	1	1
CO2	Apply the principles of operation in showcasing how wattmeter's and energy meter's function.	2	1	2
CO3	Analyze and assess the effectiveness of AC/DC Potentiometers in terms of their performance	2		1
CO4	Classify the diverse forms of resistors employed for measurement applications.	2	1	3
CO5	Evaluate the features and attributes of different AC bridges that have been designed.	2	2	1

Subject/Code No: Electrical Machine - II/4EE3-05 Semester: 3th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Explain the fundamental concepts, principles and analysis of AC rotating machines.	3	2	3
CO2	Analyze performance of Induction & Synchronous machine in addition to revolving magnetic field theory.	3	2	1
CO3	Design of winding type required for production of revolving magnetic field.	3	2	2
CO4	Interpret the behavior of AC machines using phasor, equivalent circuits and its characteristics	2	3	1

Subject/Code No: Power Electronics/4EE3-06 Semester: 3th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Illustrate the characteristics of power diodes, thyristors (SCRs), IGBTs, MOSFETs, and IGBTs, as well as gate triggering methods of SCRs	2	3	3
CO2	Evaluate the waveforms of single phase and three phase-controlled rectifiers for R and RL loads.	2	3	2
CO3	Evaluate an appropriate DC-DC converter based on the output application requirements.	3	2	1
CO4	Simulate an inverter circuit that uses PWM to smooth the output waveform.	3	2	3

Subject/Code No: Digital Electronics Lab/4EE3-23 Semester: 3th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Enhance comprehension of the numerical system and its implementation within digital electronics. Contrast various logic family variants.	3	3	
CO2	Conduct practical investigations on adders, subtractors, multiplexers, and demultiplexers to corroborate their truth tables.	3	3	
CO3	Devise diverse sequential circuits while considering factors like switching speed, throughput/latency, gate count, area, energy usage, and power consumption.	3	3	1
CO4	Incorporate memory components into assorted digital circuit configurations for practical real-world utilization.	3	3	

Subject/Code No: Measurement Lab/4EE3-24 Semester: 3th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Elaborate the basics of measurement of electrical quantities	3	3	
CO2	Find the voltage, current and resistance of electrical circuit using potentiometer.	3	3	
CO3	Evaluate the unknown resistance and inductance in electrical circuits using ac bridges	3	3	1
CO4	Calibrate a single-phase energy meter by phantom loading at different power factors.	3	3	

Subject/Code No: Electrical/5EE3-01 Semester: 3th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Learn about the concepts of Bonding and types of solids, Crystalline state and their defects, Classical theory of electrical and thermal conduction in solids, temperature dependence of resistivity, skin effect, Hall effect.	3		
CO2	Acquire knowledge of Dielectric Properties of Insulators in Static and Alternating field, Properties of Ferro-Electric materials, Polarization, Piezoelectricity, Frequency dependence of Electronic and Ionic Polarizability, Complex dielectric constant of non-dipolar solids, dielectric losses.	3		
CO3	Apply concepts of Magnetization of matter, Magnetic Material Classification, Ferromagnetic Origin, Curie-Weiss Law, Soft and Hard Magnetic Materials, Superconductivity and its origin, Zero resistance and Meissner Effect, critical current density.	3	2	
CO4	Acquire knowledge of Conductivity of metals Ohm's law and relaxation time of electrons, collision time and mean free path, electron scattering and resistivity of metals.	3		

Subject/Code No: POWER SYSTEM-I/5EE3-02 Semester: 5th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Understand the overall framework of the power system while taking various faults and their mitigation measures into account.	3	2	2
CO2	Illustrate various electrical characteristics of transmission lines in transient, sub-transient, and steady state stability modes.	3	2	1
CO3	Interpret the integration of distributed generation with grid while taking into account the protection system in real-time projects.	3	2	
CO4	Estimate the electrical machines parameters & insulation requirements under different stability modes.	3	1	2

Subject/Code No: Control System/5EE3-03 Semester: 5th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Utilize the core principles of both linear and nonlinear control systems to mathematically express their characteristics.	3	3	1
CO2	Compare and contrast the temporal and spectral reactions of systems that are Linear Time Invariant, examining their behaviors and properties.	3		
CO3	Evaluate the state space parameters within conventional control systems, considering their significance and impact.	3	3	1
CO4	Utilize the core principles of both linear and nonlinear control systems to mathematically express their characteristics.	3	3	1

Subject/Code No: Microprocessor/ 5EE3-04 Semester: 5th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Elaborate the fundamental concepts of 8051 architecture, programming instructions, and 8051 interfacing schemes.	3	3	3
CO2	Indicate the programming knowledge for external devices interfacing and serial communication	3	3	
CO3	Understand the memory expansion and interfacing of peripheral device such as ADC, DAC, timers, counters, etc.	3	3	1
CO4	Develop 8051 programs for controlling external/interfacing devices for solving a particular task/problem.	3	3	1
CO5	Elaborate the fundamental concepts of 8051 architecture, programming instructions, and 8051 interfacing schemes.	3	3	

Subject/Code No: Electrical Machine Design/5EE3-05 Semester: 5th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Interpret the characteristics of engineering materials used for electrical machine designing.	3	3	
CO2	Infer the performance characteristics of electrical Machines with the specified constraints.	3	3	1
CO3	Relate electrical machine models in computer aided design software.	3	3	
CO4	Interpret the design of windings & core of electrical machines.	3	3	

Subject/Code No: Restructured Power System/5EE5-11 Semester: 5th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Categorize electricity market models, congestion management methods, ancillary services, and transmission pricing.	3	2	
CO2	Compare methods of congestion management, market models & pricing schemes to identify the best options.	3	3	
CO3	Prepare theoretically a restructured model of existing power system by taking into account network congestion, best pricing model, and ancillary services.	3	3	
CO4	Acquire knowledge about different supplementary services and the markets associated with these services on both the national and international levels.	3	3	

Subject/Code No: Power Semester: 5th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Illustrate the basic layouts of hydro, thermal, nuclear and gas power plants.	3	3	1
CO2	Distinguish the parameters of the feeders, distributors, and EHV transmission lines.	3	3	
CO3	Evaluate the dielectric strength of transformer oil, insulating materials & insulators.	3	3	
CO4	Create a probability tool to forecast load for short-, medium-, and long-term planning.	3	3	2

Subject/Code No: Control System Lab/5EE3-22 Semester: 5th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Analyze the output response of a given system for different test signals.	3	2	
CO2	Design the 1st order and 2nd order circuits for transient response analysis.	3	2	
CO3	Identify the frequency response of various compensating networks.	3	2	
CO4	Investigate the various approaches for controller parameter tuning.	3		
CO5	Device the stability of control system using Bode plots	3	2	

Subject/Code No: Microprocessor Lab/5EE3-23 Semester: 5th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Demonstrate the functions, operations, memory structure and hardware units of 8085 microprocessor kit.	3	3	3
CO2	Evaluate different waveforms using 8253 / 8253 programmable timer.	3	3	
CO3	Build and demonstrate assembly level programs for transferring data to specified output ports in serial and parallel fashion.	3	3	1
CO4	Fabricate 8-bit LED/LCD interface to 8085 microprocessor kit using 8155 and 8255.	3	3	1
CO5	Develop programs to perform addition, subtraction, division, block transfer, searching, sorting, etc using assembly language.	3	3	

Subject/Code No: System Programming Lab/5EE3-24 Semester: 5th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Simulate the basic of MATLAB features and syntaxes in mathematical Programming.	3	3	
CO2	Solve various basic electrical and electronic problems in MATLAB environment	3	3	1
CO3	Execute the single-phase induction machine Torque- speed characteristics and transformer test in MATLAB Simulink.	3	3	
CO4	Design Single Phase Full Wave Diode Bridge Rectifier with LC Filter in MATLAB Simulink.	3	3	1
CO5	Evaluate the importance of MATLAB in research by simulation work	3	3	

Subject/Code No: Industrial Training/5EE7-30 Semester: 5th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Recognize industrial methodologies and fields in collaboration with industry experts	3	3	
CO2	Investigate sophisticated tools and methods employed in industrial processing.	3	3	
CO3	Enhance understanding of overall workplace etiquette and foster interpersonal and teamwork proficiencies.	3	3	3
CO4	Construct adept presentations and professional work documents	3	3	1
CO5	Build the professional presentations and work reports.	2	2	3

Subject/Code No: Computer Architecture/6EE3-01 Semester: 6th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Explain the structure, memory hierarchy, and input-output arrangement of computers, incorporating details about a 16-bit and 32-bit microprocessor.	3	3	
CO2	Explore the various addressing modes, programming models, instruction-level pipelining, and the role of memory management units.	3	3	
CO3	Evaluate the effectiveness of a multi-bus organization, the significance of interrupts and interrupt controllers, the utilization of real mode addressing, and the implementation of dynamic scheduling.	3	3	1
CO4	Discuss the interplay between data types, microinstructions, memory classifications, interface circuits, and instruction sets in the context of computer system design.	3	3	2

Subject/Code No: Power System - II/6EE3-02 Semester: 6th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Manipulate the power flow equations to analyze the voltage and frequency issues of system.	3	2	
CO2	Examine the system stability and contingency by observing the system voltage and frequency.	3	2	2
CO3	Interpret the power and demand side management in the prospect of optimum utilization of electrical energy by dynamic pricing strategy.	3	2	1
CO4	Summarize different case studies on power system to assess system security.	3	2	1

Subject/Code No: Power System Protection/6EE3-03 Semester: 6th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Understand the fundamentals of fault analysis, power system protection and the components involved in power system protection.	3	3	
CO2	Describe the concepts of under-frequency, under-voltage and df/dt relays, wide area measurement system and over current protection.	3	3	1
CO3	Summarize the protection schemes for power system components.	3	3	
CO4	Understand the implementation of the digital protection scheme with the help of signal processing techniques.	3	3	1

Subject/Code No: Electrical Energy Conversion and Auditing/6EE3-04 Semester: 6th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Illustrate the energy landscape, energy approach, regulations pertaining to energy, ensuring energy stability, and the enhancement of energy utilization.	3	3	
CO2	Examine methods for conserving energy and technologies that promote efficiency in the creation of electrical and industrial machinery.	3	3	1
CO3	Assess the pricing structure, conduct energy audits, manage energy consumption, and appraise the energy equilibrium within a company or entity.	3	3	1
CO4	Illustrate the energy landscape, energy approach, regulations pertaining to energy, ensuring energy stability, and the enhancement of energy utilization.	3	3	

Subject/Code No: Electric Drives/6EE3-05 Semester: 6th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Elaborate on the intricate principles behind DC and AC drives, delve into the nuances of scalar and vector control methods for alternating current motors, and explore the operation of drives across multiple quadrants	3	3	
CO2	Investigate the interconnection between power electronics and robust control systems knowledge, examining how these domains synergize to achieve meticulous speed regulation for both AC and DC motors.	3	3	
CO3	Formulate the closed-loop control architecture of DC drives and expound upon the design intricacies inherent in achieving vector control for AC drives.	3	3	1
CO4	Assess and scrutinize the array of application-oriented precision speed control techniques tailored for both AC and DC motor, considering their effectiveness and suitability in different scenarios.	3	3	3

Subject/Code No: Power System Planning. /6EE5-11 Semester: 6th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Brief about the basic structure of Indian power sector with organizing & monitoring bodies.	3	3	
CO2	Select the Reliability Planning Criteria for Generation, Transmission and Distribution.	3	3	
CO3	Evaluate the factors affecting load dispatch and modeling of Generation Sources.	3	3	1
CO4	Estimate the Objectives of Transmission Planning with Network Reconfiguration.	3	3	

Subject/Code No: Electrical and Hybrid Vehicles. /6EE5-13 Semester: 6th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Illustrate diverse electric vehicle configurations and their constituent elements, outline hybrid vehicle setups, dimension components appropriately, and implement effective energy management strategies.	3	3	1
CO2	Assess the operational characteristics of electric and hybrid electric vehicles.	3	3	3
CO3	Devise hybrid vehicle and battery electric vehicle designs incorporating refined strategies for managing energy efficiently.	3	3	1
CO4	Assess the drive train configurations in both electric and hybrid electric vehicles.	3	3	1
CO5	Illustrate diverse electric vehicle configurations and their constituent elements, outline hybrid vehicle setups, dimension components appropriately, and implement effective energy management strategies.			

Subject/Code No: Power System - II Lab/6EE3-21 Semester: 6th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Evaluate the various parameters of a power system network (min 3 bus) using different load flow techniques.	3	3	1
CO2	Investigate the transient stability of power system network (min 3 buses).	3	3	2
CO3	Find optimal power flow with the help of analytical and iterative methods.	3	3	1
CO4	Design a power system network (min 3 bus) and analyze the severity of various types of fault.	3	2	2
CO5	Comprehend the necessity of limits of voltage and overload in power system and perform the voltage and overload security analysis of power system network.	3	2	1

Subject/Code No: Electric Drives Lab/6EE3-22 Semester: 6th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Differentiate the testing of firing circuits in three phase-controlled bridge converters.	3	3	1
CO2	Examine the operation of three phase fully and half controlled converters for different types of loads experimentally.	3	3	1
CO3	Demonstrate the speed control methods of AC & DC motors	3	3	2
CO4	Illustrate operation and analysis of different converters with reference to control strategy.	3	3	
CO5	Analyze power quality aspects of three-phase controlled converters by calculating different parameters for different loads.	3	3	

Subject/Code No: Power System Protection Lab/6EE3-23 Semester: 6th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Determine fault type, fault impedance and fault location during single line to ground fault, line-to line fault and double line to ground fault.	3	3	3
CO2	Explain the operation of micro-controller based over current relay in DMT type and IDMT type.	3	3	
CO3	Analyze and discuss the operation of micro-controller based under voltage relay, and micro-controller based over voltage relay.	3	3	

Subject/Code No: Modeling and simulation lab/6EE3-24 Semester: 6th
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Acquire proficiency in the software tools essential for the simulation of machinery and power systems. Apply this knowledge practically.	3	3	1
CO2	Examine and contrast the operational effectiveness of electrical machinery when working alongside reactive power compensation equipment.	3	2	3
CO3	Assess the functionality of Flexible AC Transmission System (FACTS) controllers based on their suitability for power system applications.	2	2	1
CO4	Devise a proficient Single Machine Infinite Bus (SMIB) model that incorporates a FACTS controller, employing MATLAB software as the platform for design.	3	3	2
CO5	Devise a proficient Single Machine Infinite Bus (SMIB) model that incorporates a FACTS controller, employing MATLAB software as the platform for design.	3	3	2

POWER SYSTEM PLANNING
MAPPING OF COs WITH PSOs
Semester 7

CO Number	PSO 1	PSO 2	PSO 3
CO1	-	-	3
CO2	-	1	3
CO3	-	-	3
CO4	1	-	3
CO5	1	-	3

POWER SYSTEM ANALYSIS
MAPPING OF COs WITH PSOs
Semester 7

CO Number	PSO 1	PSO 2	PSO 3
CO1	3	3	3
CO2	2	2	2
CO3	2	2	1
CO4	1	2	2
CO5	2	2	1

ARTIFICIAL INTELLIGENCE TECHNIQUES
MAPPING OF COs WITH PSOs
Semester 7

CO Number	PSO 1	PSO 2	PSO 3
CO1	3	3	3
CO2	2	2	2
CO3	2	-	-
CO4	-	3	3
CO5	-	2	-

NON-CONVENTIONAL ENERGY SOURCES
MAPPING OF COs WITH PSOs
Semester 7

CO Number	PSO 1	PSO 2	PSO 3
CO1	2	1	3
CO2	-	-	1
CO3	-	-	1
CO4	-	1	2
CO5	-	3	1

POWER SYSTEM ENGINEERING
MAPPING OF COs WITH PSOs
Semester 7

CO Number	PSO 1	PSO 2	PSO 3
CO1	3	2	3
CO2	3	2	3
CO3	2	1	3
CO4	1	-	-
CO5	1	2	1

COMPUTER AIDED DESIGN OF ELECTRICAL MACHINES
MAPPING OF COs WITH PSOs
Semester 7

CO Number	PSO 1	PSO 2	PSO 3
CO1	3	2	3-
CO2	3	2	3
CO3	2	1	3
CO4	1	-	-
CO5	1	2	1

EHV AC/DC TRANSMISSION
MAPPING OF COs WITH PSOs
Semester 8

CO Number	PSO 1	PSO 2	PSO 3
CO1	1	2	3
CO2	1	3	2
CO3	1	2	3
CO4	1	2	3
CO5	1	2	3

ELECTRICAL DRIVES AND THEIR CONTROL
MAPPING OF COs WITH PSOs
Semester 8

CO Number	PSO 1	PSO 2	PSO 3
CO1	3	1	2
CO2	3	2	-
CO3	3	2	-
CO4	3	1	-
CO5	3	1	2

PROTECTION OF POWER SYSTEM
MAPPING OF COs WITH PSOs
Semester 8

CO Number	PSO 1	PSO 2	PSO 3
CO1	3	3	3
CO2	2	2	2
CO3	2	2	1
CO4	1	1	2
CO5	2	1	2

FACTS DEVICES AND THEIR CONTROL
MAPPING OF COs WITH PSOs
Semester 8

CO Number	PSO 1	PSO 2	PSO 3
CO1	2	-	1
CO2	2	-	2
CO3	1	2	
CO4	2		2
CO5	1		2