



POORNIMA

INSTITUTE OF ENGINEERING & TECHNOLOGY

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

COS POS ASSESSMENT & ATTAINMENT PROCESS MANUAL

2024-25



- APPLIED SCIENCES
- COMPUTER ENGINEERING
- ARTIFICIAL INTELLIGENCE & DATA SCIENCE
- COMPUTER SCIENCE & ENGINEERING (ARTIFICIAL INTELLIGENCE)
- COMPUTER SCIENCE & ENGINEERING (DATA SCIENCE)
- COMPUTER SCIENCE & ENGINEERING (INDIAN LANGUAGE)
- INTERNET OF THINGS



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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 Artificial Intelligence & Data Science Department

VISION:

To develop technocrats in the domain of emerging technologies by making them ethical professionals with innovative knowledge and scientific temper to enrich the society ready to face global challenges.

MISSION:

- To develop the students as technocrats proficient with technologies in the field of Artificial Intelligence & Data Science.
- To provide quality education as per need of industry and professions, while ensuring students' contribution to society through research development aptitude.
- To nurture the students with professional ethics & concern towards mankind in a global perspective.



CHAPTER II.D

Vision and Mission of the Computer Science & Engineering (Artificial Intelligence) Department

VISION:

To develop technocrats in the domain of emerging technologies by making them ethical professionals with innovative knowledge and scientific temper to enrich the society ready to face global challenges.

MISSION:

- To develop the students as technocrats proficient with technologies in the field of Computer Science & Engineering (Artificial Intelligence).
- To provide quality education as per need of industry and professions, while ensuring students' contribution to society through research development aptitude.
- To nurture the students with professional ethics & concern towards mankind in a global perspective.



CHAPTER II.E

Vision and Mission of the Computer Science & Engineering (Data Science) Department

VISION:

To develop technocrats in the domain of emerging technologies by making them ethical professionals with innovative knowledge and scientific temper to enrich the society ready to face global challenges.

MISSION:

- To develop the students as technocrats proficient with technologies in the field of Computer Science & Engineering (Data Science)
- To provide quality education as per need of industry and professions, while ensuring students' contribution to society through research development aptitude.
- To nurture the students with professional ethics & concern towards mankind in a global perspective.



CHAPTER II.F

Vision and Mission of the Internet of Things Department

VISION:

To become pioneer in cutting-edge technologies of electronics, robotics, automation, and intelligent systems and fostering innovation for a smarter and sustainable society.

MISSION:

- Develop and deploy advanced IoT solutions leveraging electronics, robotics, and automation to streamline processes, enhance efficiency, and drive digital transformation across industries.
- Empower businesses and communities through intelligent systems embedded within IoT frameworks, enabling real-time decision-making and adaptive responses to dynamic environments.
- Pioneer research and development in IoT technologies, emphasizing secure and scalable automation solutions that optimize resource utilization and minimize environmental impact.
- Educate and advocate for the adoption of IoT-driven intelligent systems, promoting a connected ecosystem that enhances quality of life, productivity, and global competitiveness.



CHAPTER II.G

The Process for Defining Vision and Mission of the Department

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

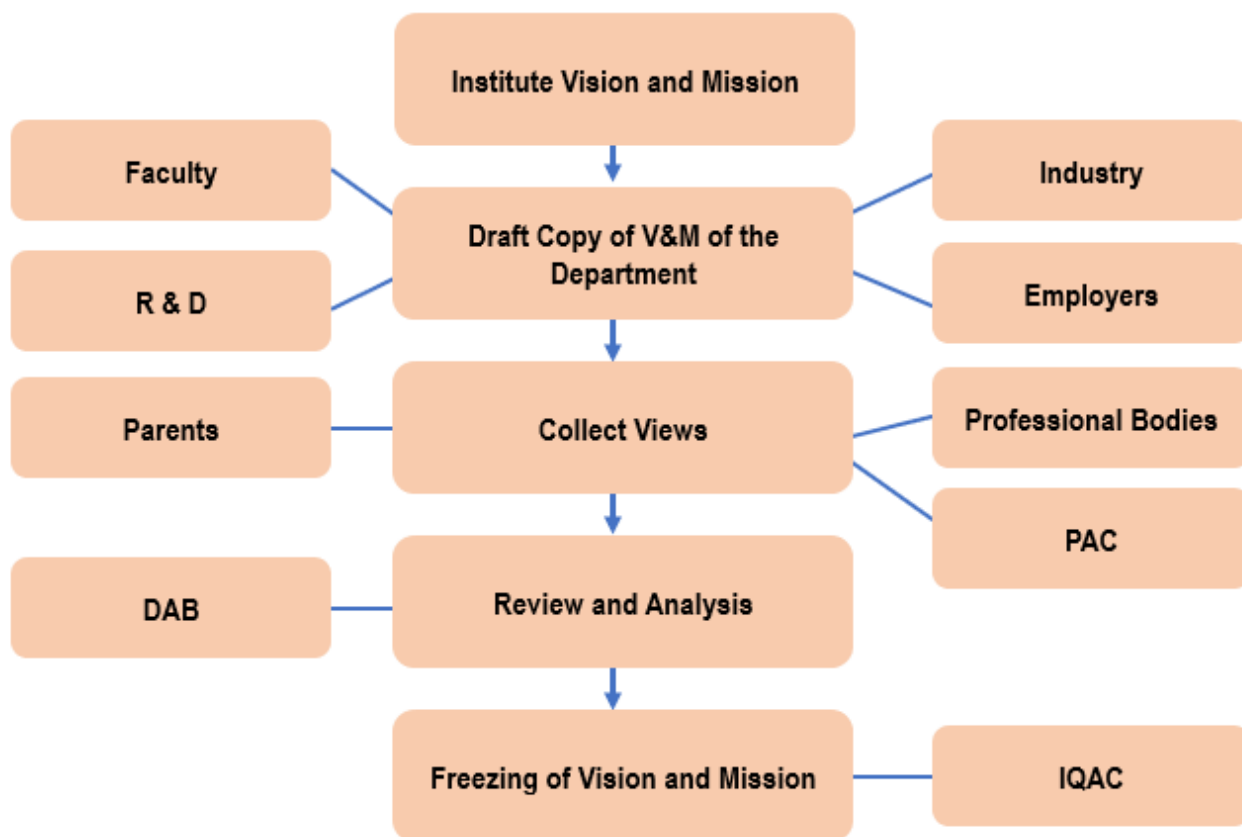
Step 1: The Vision & Mission of the Institute is taken as the basis.

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



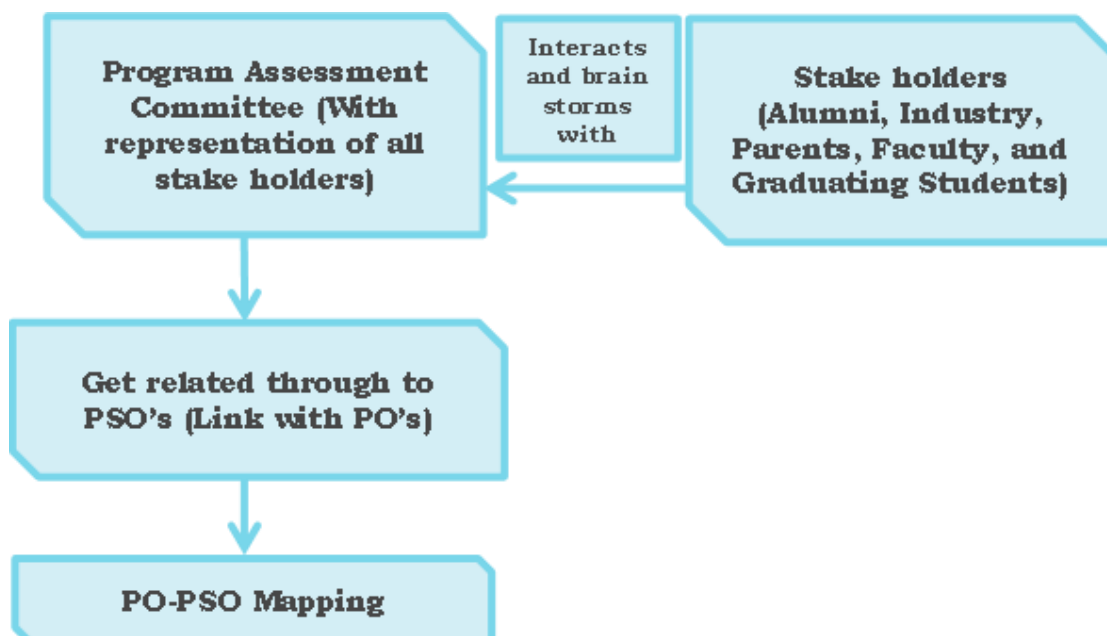
9	Individual and team work: Graduate should be able to Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings	i) Graduate will demonstrate an ability to work effectively as an individual and as a team member/ leader in multi- Disciplinary 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.

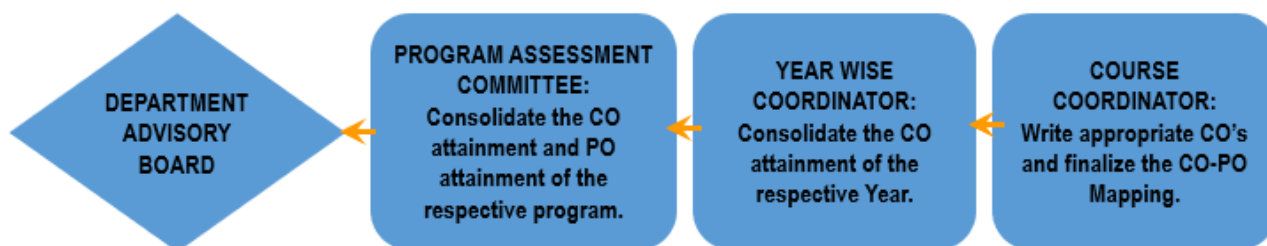


Figure: Hierarchy of faculty involvement



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.

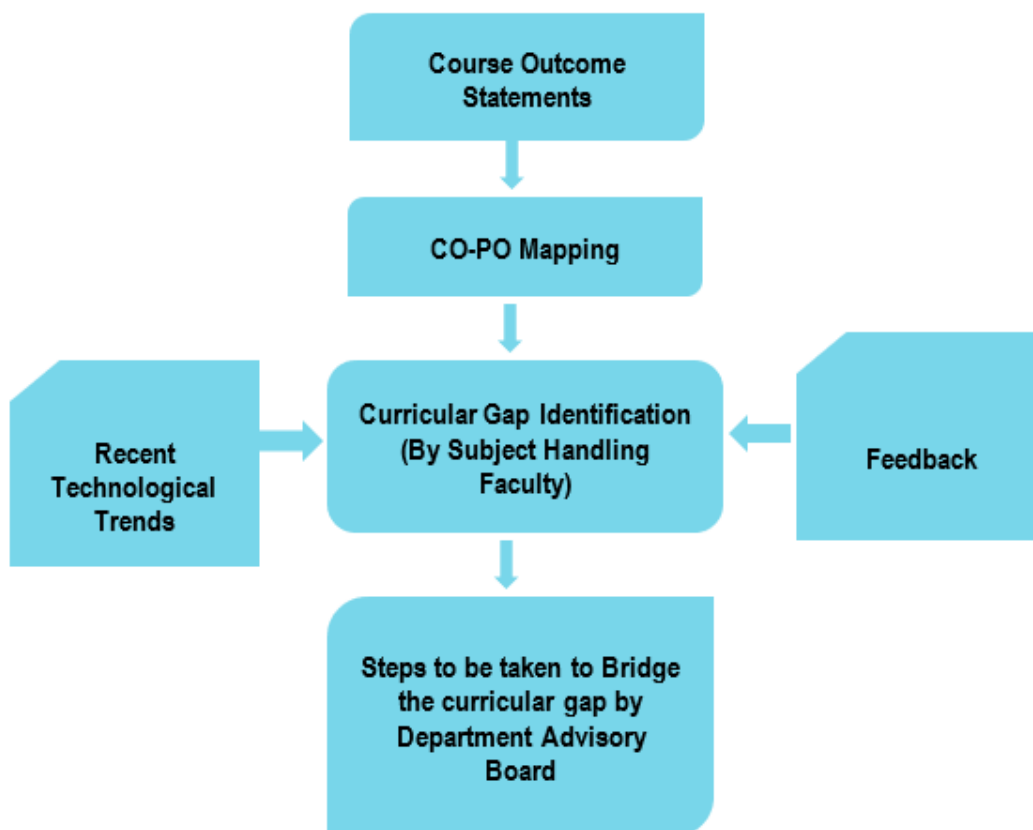


Figure: Identification of curricular gap



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.

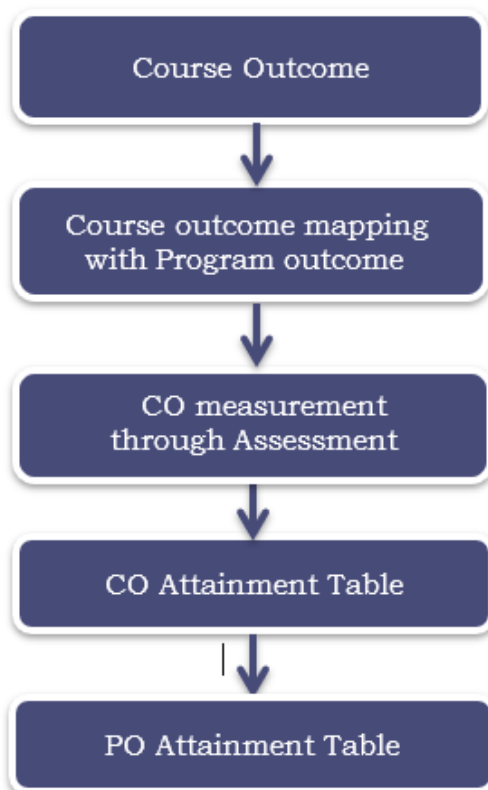


Figure: The process of CO-PO mapping validation

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:

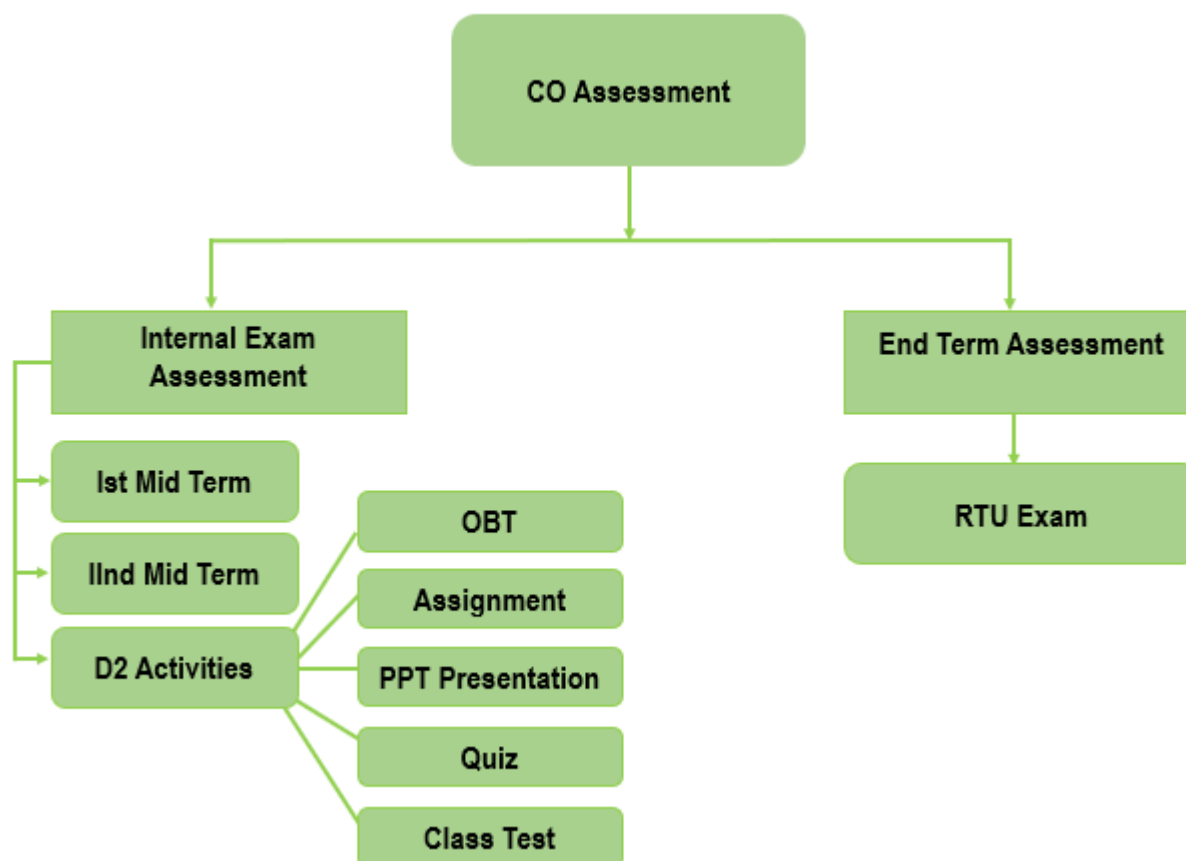
- Direct Assessment (DA), and
- Indirect Assessment (IA)

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 liaison 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/ Assignments	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	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	Summer Internship	To test students' concepts in independent analysis.	Two internal project reviews are conducted and average of these two review assessments are considered	PO1 to PO12	Summer Internship



Direct	Project	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 and final CO attainment calculated.	PO1 to PO12	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 program 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 program 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.

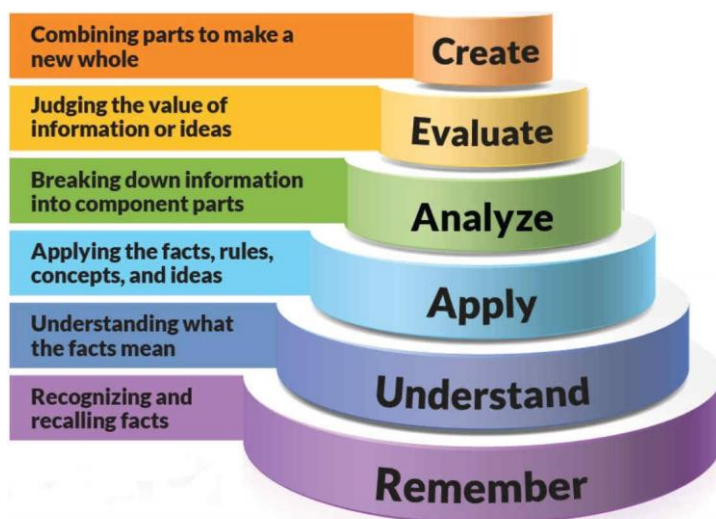
Bloom's Taxonomy:

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.

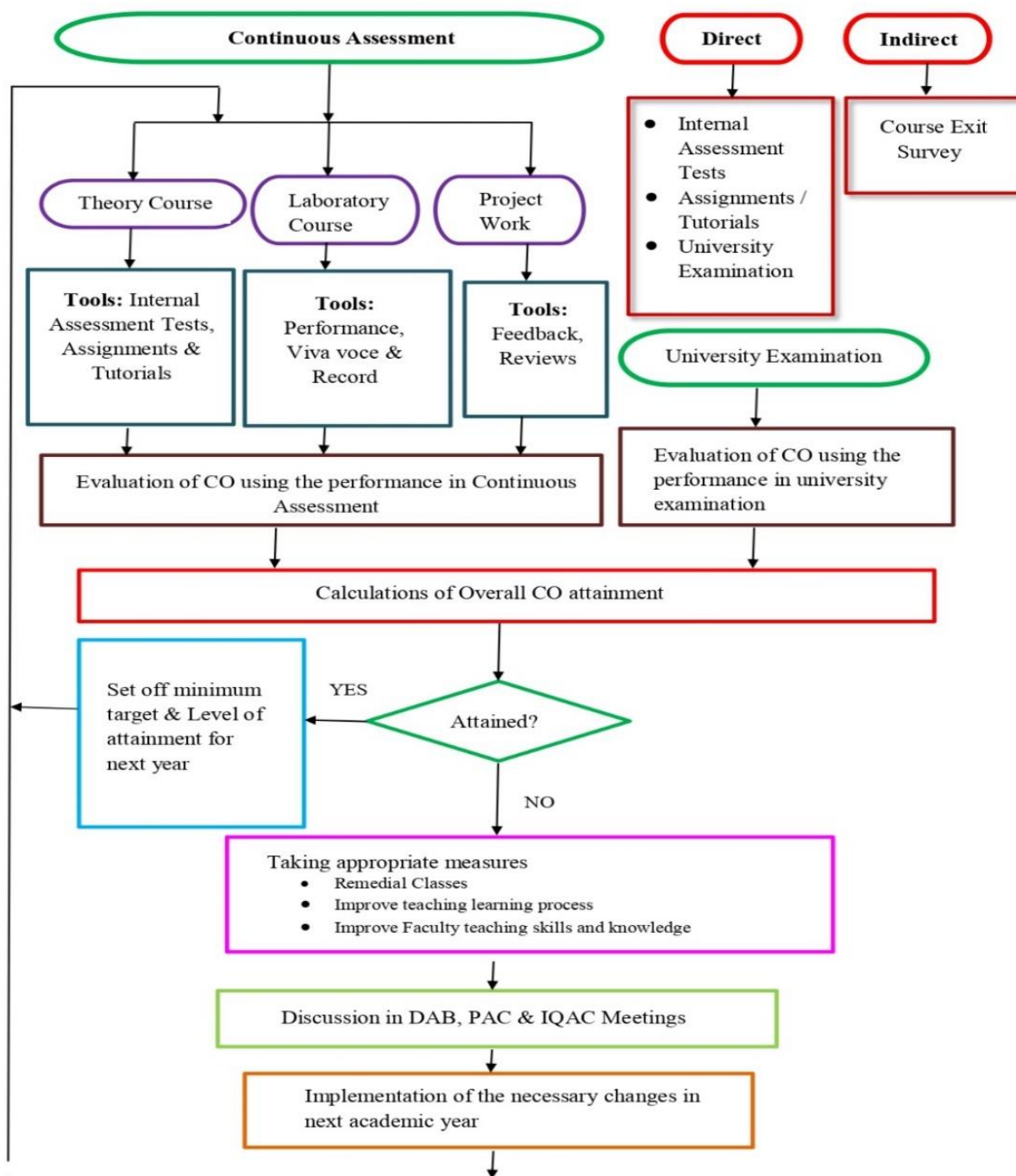


Figure 1 Process for CO Attainment



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	30	Twice in a Semester
Attainment	University Examination	70	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.

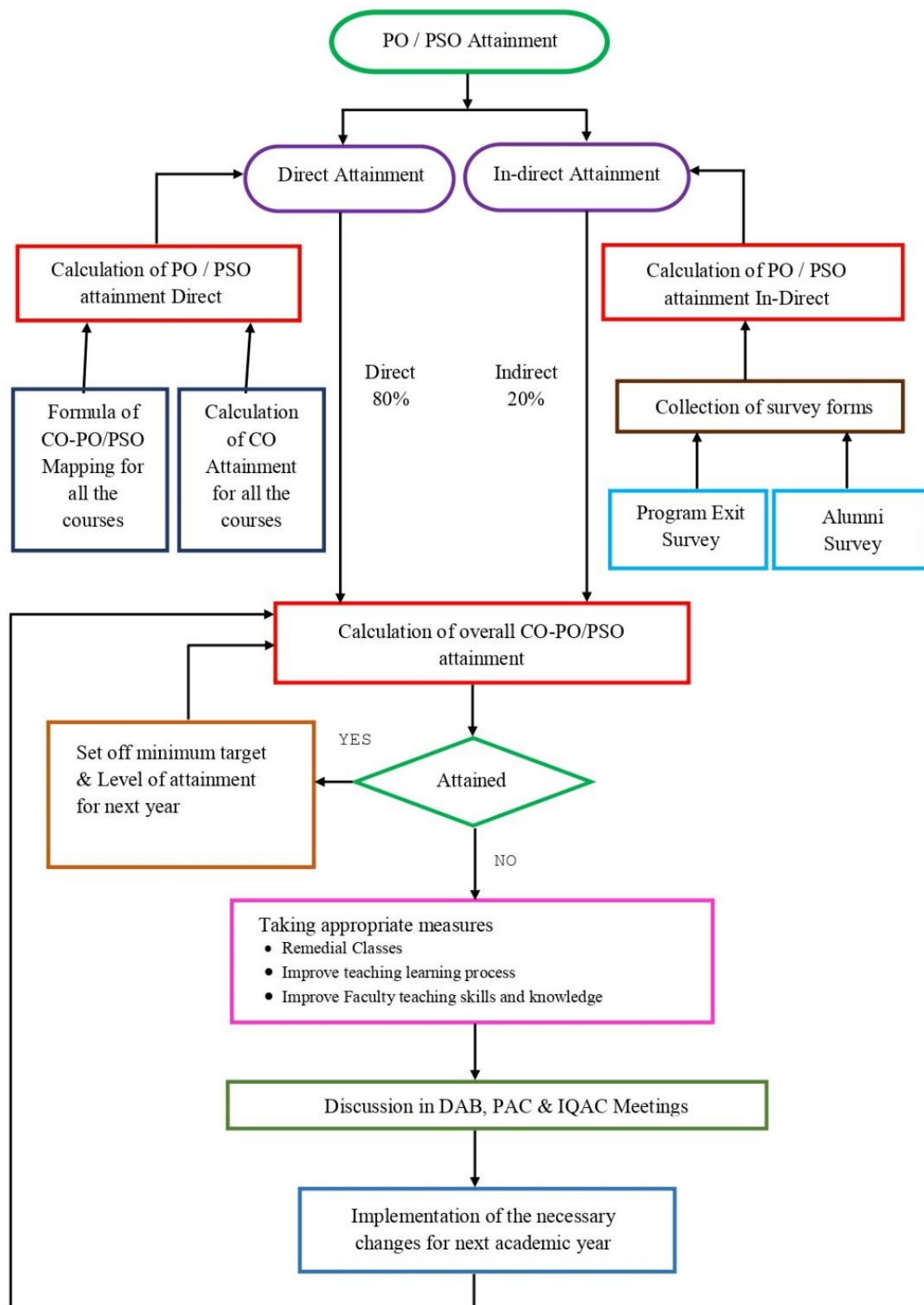


Figure 2 Process for PO/PSO Attainment



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: 2024-25

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 Artificial Intelligence & Data Science

PSO1: Artificial and Machine Intelligence Skills

Empower graduates with a comprehensive skill set in software development, fostering their employability across varied industries to meet the dynamic demands in professional landscape.

PSO2: Analytics & Basic sciences

Integrate principles from basic sciences, such as mathematics and statistics, to analyse and solve complex problems and give innovative solutions in AI and Data Science.

PSO3: Carrier and Life Skills

Master AI and Data Analytics to Innovate for Societal Impact, resolving complex issues with theoretical knowledge and practical tools.



Bachelor of Technology Computer Science & Engineering (Artificial Intelligence)

PSO 1: Computing skills with AI-Integrated Software Solutions

Proficiency in developing IT solutions integrated with AI technologies for applications such as machine learning, computer vision, and natural language processing.

PSO 2: Analytical and Scientific Foundations

Apply mathematics and statistics to solve complex problems and create innovative AI and Data Science solutions.

PSO 3: Career and Societal Impact Skills

Expertise to implement AI with computer science to tackle real-world problems using both theoretical understanding and hands-on skills.



Bachelor of Technology Computer Science & Engineering (Data Science)

PSO 1: Computing Skills for Data Science & Machine Intelligence

In depth knowledge of Data Science and Machine Intelligence with essential computing skills, by learning computational techniques to tackle real-world challenges.

PSO 2: Data Analytic and Basic Sciences

Utilize core principles of sciences especially from mathematics and statistics to analyze and solve complex problems, fostering innovative solutions in Data Science & Engineering.

PSO 3: Professional and Life Skills

Develops essential competencies for career and personal success, including communication, teamwork, leadership, adaptability, and ethical decision-making.



Bachelor of Technology Internet of Things

PSO 1: Develop Proficiency in Software Development for IoT Applications

Equip graduates with a comprehensive skill set in software development, enhancing their readiness for diverse IoT applications across industries and optimizing their employability in a rapidly evolving professional landscape.

PSO 2: Apply Foundational Sciences in IoT based Automation

Utilize principles from foundational sciences like mathematics and statistics to apply automation based on IoT. Extract valuable insights and create innovative solutions for challenges in AI, Data Science, and IoT.

PSO 3: Harness Data Analytics for Societal Impact in IoT

Leverage data analytics capabilities within IoT environments to tackle intricate societal challenges. Integrate theoretical knowledge with practical IoT tools to foster innovation and devise sustainable solutions.



Bachelor of Technology Computer Engineering (Indian Language)

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.



CHAPTER VII

COURSE OUTCOMES (COs)

Session: 2024-25

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

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

Semester: I / II semester

Course Outcome

CO Number	CO Definition
CO1	Evaluate the strength of $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ solution with the help of Hypo solution, Ferrous Ammonium Sulphate solution with the help of $\text{K}_2\text{Cr}_2\text{O}_7$ solution and NaOH and Na_2CO_3 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 hardness, 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
C01	Understand and describe the structure of a C program to explain, write, compile and execute programs using input and output statements.
C02	Classify and write programs by applying the decision control statements and loop control statements using different operators.
C03	Formulate, analyze and solve the problem by writing programs using pointers, arrays and strings.
C04	Design object-based programs by creating new data type using structure and union.
C05	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
C01	Describe various sanitary fittings and water supply fittings.
C02	Examine pH, Turbidity, Hardness and Total solids of given water sample.
C03	Use of EDM and Total Station in the field.
C04	Investigate the linear and angular measurements of the points on the ground and levelling.
C05	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
C01	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.
C02	Measure the no-load current waveform using an oscilloscope and calculate transformer voltages, currents, power, and efficiency
C03	Conduct various three-phase transformer connections to Analyse voltage and current relationships, while recording phase shifts between the primary and secondary sides.
C04	Recognize the operational characteristics, cut-out sections, and speed behavior of DC machines, synchronous machines, single-phase, and three-phase induction machines
C05	Create a torque-speed curve for a separately excited DC motor, examine the operation of DC-DC converters, DC-AC converters, and AC-DC 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
C01	Discuss the concept of engineering terminology, engineering scales and conic sections.
C02	Apply the necessary skills in drawing and explaining orthographic projection of points, lines, and planes.
C03	Understand and Draw projections of solids
C04	Draw and classify the sections of solids.
C05	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
C01	Recall and understand the conventional representation of machine components and material, types of lines & dimensioning.
C02	Explain concept of first and third angle projections and prepare drawing of simple machine elements, sectional views for various parts and assembly.
C03	Draw and explain various types of temporary and permanent fasteners.
C04	Draw free hand sketches of lines, materials and various components i.e. bearings, couplings, welded joints, pipe joints, valves etc.
C05	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
C01	Tabulate Database System with the help of Entity Relationship Diagram that visualizes a database system implemented in a real-world scenario.
C02	Apply data deduction and manipulation techniques using query languages on a variety of databases.
C03	Use normal forms in the process of enhancing the database schema through refinement techniques.
C04	Create transaction plans incorporating diverse scheduling types.
C05	Generalize and assess the effectiveness of concurrency control mechanisms and recovery systems.

Subject/Code No: Theory of Computation/4CS4-06:

LTP: 3L+0T+0P Semester: 4th

Course Outcome

CO Number	CO Definition
C01	Apply the knowledge of different types of grammar; he/she can analyze the all types of grammar and evaluate the relationship among them.
C02	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
C03	Apply the knowledge of Context Free grammar; he/she can generate the Context free grammar and Pushdown Automaton for evaluating the CFG.
C04	Apply the knowledge of Turing Machine he/she can analyze the Type-0 grammar and can design and evaluate the Turing Machine
C05	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
C01	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.
C02	State and cite mathematical problems for data-link and network protocols.
C03	Use network layer protocols and calculate number of subnets required for a network.
C04	Compute the reliability of data transfer over transport layer by glossy channel bit errors problem.
C05	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+2P Semester: 4th

Course Outcome

CO Number	CO Definition
C01	Analyze the fundamentals of assembly level programming
C02	Apply interfacing concept between input and output devices.
C03	Elaborate the interfacing of various other devices with microprocessor.
C04	Compose the various programs on different problems using Assembly Language Programming.
C05	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
C01	Create and execute a database schema for a specified problem domain.
C02	Manage integrity constraints within a database using a relational database management system (RDBMS).
C03	Construct and devise a graphical user interface (GUI) application using a fourth-generation programming language (4GL).
C04	Composing PL/SQL code encompassing stored procedures, stored functions, cursors, and packages.
C05	Produce SQL and Procedural interfaces to SQL comprehensively.

Subject/Code No: Network Programming Lab/4CS4-23

LTP: 0L+0T+3P Semester: 4th

Course Outcome

CO Number	CO Definition
C01	Identify the functioning of various networking equipment's
C02	Illustrate the LAN Installation techniques and Configurations techniques
C03	Solving various Error correcting techniques and framing methods
C04	Practice the programs for client and server involving UDP/TCP sockets using socket programming.
C05	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
C01	Summarize the concepts and commands in UNIX.
C02	Construct the directory layout of a typical UNIX system, maintain, and secure UNIX directories
C03	Illustrate the knowledge to use the several shell quoting mechanisms correctly.
C04	Construct regular expression using filters and various commands to express the patterns.
C05	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
C01	Express and restate fundamentals of java, and tools for program designing environments.
C02	Construct classes and implement the principles of method overloading, inheritance, and access controls within those classes.
C03	Develop Java packages and incorporate the concept of interfaces, along with importing these packages in Java.
C04	Formulate the application by managing file operations, handling exceptions, and implementing threads.
C05	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
C01	Solve the theory algebra and linear algebra in source coding
C02	Create channel performance using information theory
C03	Manipulate linear block codes for error detection and error correction.
C04	Modify Cyclic codes for error detection and error correction.
C05	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: HCI (Elective)/5CS5-12

LTP: 2L+0T+0P Semester: 5th

Course Outcome

CO Number	CO Definition
CO1	Explain the key principles and concepts of Human-Computer Interaction (HCI).
CO2	Evaluate and compare different models and their applications in HCI
CO3	To assess and apply HCI guidelines and evaluation methods to make informed judgments about the usability and user experience of interactive systems.
CO4	To understand, analyze, and apply various research methods in HCI
CO5	To use various task modeling and formalism techniques and understanding the foundational concepts of CA.



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
C01	Identify services that enhance the security and its mechanism.
C02	Classify security attacks on information over network. Describe and apply classical encryption techniques.
C03	Compare conventional encryption algorithms & public key cryptography, and design Encryption algorithm to provide the Integration and confidentiality of a message.
C04	Understand the concept of hash function with application and message authentication code in security system
C05	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
C01	Implement register transfer with the help of micro-operations.
C02	Analyze basic of computer organization, instructions, RISC & CISC characteristics.
C03	Apply integer and floating type computer arithmetic techniques.
C04	Analyze basics of memory organization, allocation and management schemes.
C05	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
C01	Recall and identify distinct approaches in AI, with a specific emphasis on significant techniques such as search algorithms, knowledge representation, planning, and constraint management.
C02	Elaborate on the current outlook of AI as the examination of agents that receive percepts from the environment and carry out actions in response.
C03	Experimenting with the recognition of significant challenges encountered by AI and the intricacy involved in solving typical issues within the domain.
C04	Systematically analyze and evaluate the presented techniques, then strategically employ them to address real-world challenges.
C05	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
C01	Recognize the progression of cloud computing and its practical uses over time
C02	Evaluate the structure, framework, and various models of cloud computing's design and architecture.
C03	Measure an appraisal of virtualization technology and data centers, including their applications within the context of cloud computing.
C04	Write the understanding of security concerning data, data centers, and cloud services.
C05	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
C01	Illustration of various architectures used to design distributed systems along with different types of operating systems.
C02	Analysis of concurrent programming with inter process communication techniques, such as remote method invocation, remote events.
C03	Evaluation of various distributed file system through case studies.
C04	Analysis of distributed shared memory models and their failures in distributed computation.
C05	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
C01	Describe the Ecommerce and ERP, delving into their respective requisites and the infrastructure needed to support them.
C02	Examine the necessary infrastructure and software prerequisites to ensure the operational functionality of Ecommerce portals.
C03	Elaborate on the operational mechanisms of the Internet, web portals, and Ecommerce portals, while highlighting the essential infrastructure requirements.
C04	Apply the effectiveness of tools and techniques in the realm of digital marketing, considering their resultant impact.
C05	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: 7CS4-01/Internet of Things

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

Course Outcome

CO Number	CO Definition
CO1	Recognize the fundamental idea behind the Internet of Things (IoT).
CO2	Apply the connection of diverse sensors to Arduino/Raspberry Pi.
CO3	Execute wireless data transmission among distinct devices.
CO4	Display proficiency in transferring sensor data to and from cloud-based servers.
CO5	Evaluate the transformative impact of the Internet on Mobile Devices, Cloud Computing, and Sensor Networks.

Subject/Code No: 7AG6-60.2/Environmental Engineering and Disaster Management

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

Course Outcome

CO Number	CO Definition
CO1	State the natural environment and its relationships with human activities and realize the importance of ecosystem and biodiversity for maintaining ecological balance and know the objective and scope of the course.
CO2	Examine different types of pollutants, their distinguishing traits, and comprehend the significance of ensuring a secure water supply system and water quality.
CO3	Evaluate strategies for managing solid waste, examining its attributes and the repercussions of solid waste on the environment. Assess both the quantity and attributes of solid waste, as well as its proper disposal methods. Recognize the significance of sanitation within this context.
CO4	Assess the factors influencing the volume and attributes of wastewater, and analyze the processes involved in its treatment.
CO5	Generalize various types of Disasters and their social and environmental impact and the associated risk and vulnerability and plan the disaster management.



Subject/Code No: 7CS4-21/Internet of Things Lab

Semester: 7th Semester LTP: 0L+0T+4P

Course Outcome

CO Number	CO Definition
CO1	Recognize the constituent Components within IoT Architecture.
CO2	Construct connections between Devices and Sensors, applying theoretical understanding.
CO3	Implement wireless data transmission techniques among various devices.
CO4	Evaluate and select appropriate IoT Devices and Sensors based on provided Case Studies.
CO5	Execute the upload and download of sensor data on cloud and server, culminating in a comprehensive and proficient utilization demonstration.

Subject/Code No: 7CS4-22/Cyber Security Lab

Semester: 7th Semester LTP: 0L+0T+4P

Course Outcome

CO Number	CO Definition
CO1	Utilizing substitution and transposition techniques to achieve encryption and decryption of plain text, demonstrating comprehension and practical application.
CO2	Design a solution for Key Exchange problem and understand the general attacks on system
CO3	Analyse the data transferred in client server communication and working of various network protocol
CO4	Understand security-based tools like Wire shark, tcp dump, rootkits, snort etc.
CO5	Apply encryption, decryption techniques for secure data transmission, and digital signature generation, demonstrating understanding and application.

Subject/Code No: 8CS4-01/Big Data Analytics

Semester: 8th Semester LTP: 3L+0T+0P

Course Outcome

CO Number	CO Definition
CO1	Classify the building blocks of Big Data and review the growing field of Big Data Analytics.
CO	Compose the algorithm of data intensive problem using map reduce example
CO3	Study and implement Writable Classes in Hadoop I/O
CO4	Design and Implementation of Big Data Analytics using pig to solve data intensive problems and to generate analytics
CO5	Implement Big Data Activities using Hive.



Subject/Code No: 8TT6-60.2/Disaster Management

Semester: 8th Semester LTP: 3L+0T+0P

Course Outcome

CO Number	CO Definition
CO1	Discuss the practicalities of hazards, disasters with associated natural/social phenomena Understand this with disaster management theory (cycle, phases)
CO2	List the existing global frameworks and existing agreements (e.g. Sendai)
CO3	Choose a methods of community involvement as an essential part of successful DRR. Humanitarian Assistance/Support before and after disaster
CO4	Technological innovations in Disaster Risk Reduction: Advantages and problems.
CO5	Experience on conducting independent DM study including data search, analysis and presentation of disaster case study.

Subject/Code No: 8CS4-21/Big Data Analytics Lab

Semester: 8th Semester LTP: 0L+0T+2P

Course Outcome

CO Number	CO Definition
CO1	Summarize and implement the basic data structure algorithms like Linked list, stack, queue, set and map in Java.
CO2	Illustrate the knowledge and implement different file management in Hadoop.
CO3	Discuss the example of map reduces and develop the data application using variety of system
CO4	Evaluate and perform different operation on Data using Pig Latin
CO5	Illustrate different operations on relations and databases using Hive.

Subject/Code No: 8CS4-22/Software Testing & Validation Lab

Semester: 8th Semester LTP: 0L+0T+2P

Course Outcome

CO Number	CO Definition
CO1	Understand the Automation Testing Approach using various tool
CO2	Analyse & discuss the performance of different websites using JMeter
CO3	Calculate the coverage analysis of programs using Eclemma tool.
CO4	Describe & calculate the mutation score for various programs using jumble testing tool.
CO5	Generate Test sequences and compare using Selenium tool for different websites.



Bachelor of Technology Artificial Intelligence & Data Science

Program Name: Artificial Intelligence & Data Science
Session 2024-25

Subject/Code No: Technical Communication/3AID1-02

LTP: 2+0+0 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: Advanced Engineering Mathematics/3AID2-01

LTP: 3+0+0 Semester: 3rd

Course Outcome

CO Number	CO Definition
CO1	Develop the concept of Probabilistic models and Random Variable.
CO2	Analysis through statistical methods like Normal distribution, Binomial Distribution etc.
CO3	Mathematical modeling for Industrial Problem using linear programming and solution by Graphical methods.
CO4	Finding Solution of real time problems with Mathematical modelling.
CO5	Evaluate and create model for problems related to transportation and assignment.

Subject/Code No: Digital Electronics/3AID3-04

LTP: 3+0+0 Semester: 3rd

Course Outcome

CO Number	CO Definition
CO1	Understand and apply number system in digital design.
CO2	Apply the laws of Boolean algebra to represent and simplify digital circuits.
CO3	Calculate the parameters of logic families and define their characteristics.
CO4	Develop competence in Combinational Logic Problem formulation and Logic Optimization.
CO5	Classify the different types of flip-flops and design various sequential circuits



Subject/Code No: Data Structure & Algorithms/3AID4-05

LTP: 3+0+0 Semester: 3rd

Course Outcome

CO Number	CO Definition
CO1	Know the concept of stack operations and its implementation to solve real time problems.
CO2	Recognize the knowledge of Linked List and Queues to design algorithms for complex engineering tasks.
CO3	Analyze and design efficient searching and sorting techniques.
CO4	Evaluate problems by storing data in tree structure and performing basic operations.
CO5	Apply graph concept for complex problem and understand hasing.

Subject/Code No: Object Oriented Programming/3AID4-06

LTP: 3+0+0 Semester: 3rd

Course Outcome

CO Number	CO Definition
CO1	Knowing the basic knowledge of object-oriented programming language constructs.
CO2	Discussing and identifying the concept of reference, dynamic memory allocation and concept of various types of functions in classes.
CO3	Apply inheritance and its types in real time problems.
CO4	Implement concept of polymorphism to perform different types of bindings.
CO5	Create application using I/O and file handling with exception handling.

Subject/Code No: Software Engineering/3AID4-07

LTP: 3+0+0 Semester: 3rd

Course Outcome

CO Number	CO Definition
CO1	Decompose the given project in various phases of a lifecycle.
CO2	Choose appropriate process model depending on the user requirements.
CO3	Perform various life cycle activities like Analysis, Design, Implementation, Testing and Maintenance.
CO4	Know various processes used in all the phases of the product.
CO5	Analyse the knowledge, techniques, and skills in the development of a software product.



Subject/Code No: Data Structures and Algorithms Lab/3AID4-21

LTP: 0+0+3 Semester: 3rd

Course Outcome

CO Number	CO Definition
CO1	Understand and examine the concept of array & its storage.
CO2	Illustrate the implementation of basic data structure using an array.
CO3	Analyse and compare different searching and sorting techniques.
CO4	Develop programs to perform operations on Non-linear Data Structures such as Tree and Graphs.
CO5	Design and use different sorting algorithms.

Subject/Code No: Object Oriented Programming Lab/3AID4-22

LTP: 0+0+3 Semester: 3rd

Course Outcome

CO Number	CO Definition
CO1	Understand the concept of C++ programming language while evaluating different access specifiers to define member function.
CO2	Implement memory allocation techniques and various inbuilt functions.
CO3	Know inheritance and analyse the types of inheritance.
CO4	Apply the concept of polymorphism to perform different types of bindings.
CO5	Develop and use of application related to I/O and file handling with exception handling.

Subject/Code No: Software Engineering Lab/3AID4-23

LTP: 0+0+3 Semester: 3rd

Course Outcome

CO Number	CO Definition
CO1	Understand the software engineering methodologies involved in the phases for project development.
CO2	Know about open-source tools used for implementing software engineering methods.
CO3	Develop product-startups implementing software process models in software engineering methods.
CO4	Understand Open-source Tools: StarUML / UMLGraph / Topcased.
CO5	Discuss and analyse how to develop software requirements specifications for a given problem.



Subject/Code No: Digital Electronics Lab/3AID4-24

LTP: 0+0+3 Semester: 3rd

Course Outcome

CO Number	CO Definition
CO1	List different types of logic gates, identify their ICs and also verify their truth tables.
CO2	Demonstrate the functioning of basic logic gates, adder, and subtractor using universal gates.
CO3	Design a combinational circuit using MSI devices and verify its functionalities.
CO4	Develop various sequential circuit using Flip Flops and verify its functionalities.
CO5	Formulate Various types of counters, Shift registers SISO, SIPO, PISO, PIPO using Flip-Flops and verify its functionalities using simulation tool.

Subject/Code No: Industrial Training/3AID7-30

LTP: 0+0+3 Semester: 3rd

Course Outcome

CO Number	CO Definition
CO1	Compose an interest in research-oriented fields and develop the ability to research for literature and prepare brief report.
CO2	Identify the skills, competencies and points of view needed by professionals in the field most closely related to the course.
CO3	Discuss and identify about topics of current intellectual importance.
CO4	Develop the communication skills and awareness about the industrial environment.
CO5	Revise Skill development for presentation.

Subject/Code No: Discrete Mathematical Structures/4AID2-01

LTP: 3+0+0 Semester: IV

Course Outcome

CO Number	CO Definition
CO1	Explain the various fundamental concepts of the Set theory and Logics.
CO2	Illustrate the concept of relations and Diagraph to analyse the area of greatest impact for improvement.
CO3	Create the application part of lattices in distributed computing and Data mining.
CO4	Implementation of Graphs and their application in real time problem.
CO5	Analyse the concept of Algebraic Structures.



Subject/Code No: Managerial Economics and Financial Accounting/4AID1-03

LTP: 2+0+0 Semester: IV

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.

Subject/Code No: Microprocessors & Interfaces/4AID3-04

LTP: 3+0+0 Semester: IV

Course Outcome

CO Number	CO Definition
CO1	Discuss working of functional components of computer system.
CO2	Demonstrate an overall functional structure of the Microprocessor.
CO3	Explain how interrupts are used to implement I/O control and data transfers.
CO4	To learn the design aspects of I/O and Memory Interfacing circuits.
CO5	Implement their practical approach through laboratory experiments.

Subject/Code No: Database Management System/4AID4-05

LTP: 3+0+0 Semester: IV

Course Outcome

CO Number	CO Definition
CO1	Develop database using E-R diagram to represent simple database application scenarios.
CO2	Identify data from database using query language.
CO3	Apply normalization process to refine database schema.
CO4	Describe transaction processing and Serializability.
CO5	Interpret the concept of Concurrency Control and concept of Failure and Recovery.



Subject/Code No: Theory of Computation/4AID4-06

LTP: 3+0+0 Semester: IV

Course Outcome

CO Number	CO Definition
C01	Analyse the concept of Finite Automata and distinguish between Non- Deterministic Finite Automata and Deterministic Finite Automata. Analyse regular sets and its properties. Composition of Regular Expression from Finite Automata and vice-versa.
C02	Understand the Context Free Grammar and its simplification.
C03	Asses the Context Free Language and generation of Push Down Automata for Context Free Grammar.
C04	Know the Turing Machine and its various types. Discuss the Hierarichy of formal languages.
C05	Evaluating the P, NP, NP complete, NP hard problems with the help of examples.

Subject/Code No: Data Communication and Computer Networks/4AID4-07

LTP: 3+0+0 Semester: IV

Course Outcome

CO Number	CO Definition
C01	Describe the concept of signals and illustrate the functionality of OSI & TCP/IP reference model.
C02	Explain channel allocation, framing, flow control, and error control mechanisms and apply them using data link layer protocols.
C03	Determine the function of network layer, design subnets and calculate IP addresses for a network.
C04	Illustrate and Analyse different transport layer protocols and functions.
C05	Analyze the different protocols at Application layer.

Subject/Code No: Microprocessor and Interface Lab/4AID4-21

LTP: 0+0+3 Semester: IV

Course Outcome

CO Number	CO Definition
C01	Knowing and apply the fundamentals of assembly level programming of microprocessors and microcontroller.
C02	Implement standard microprocessor real time interfaces including GPIO, serial ports, digital-to-analog converters and analog-to-digital converters.
C03	Interpret Troubleshoot interactions between software and hardware.
C04	Analyze abstract problems and apply a combination of hardware and software to address the problem.
C05	Use standard test and measurement equipment to evaluate digital interfaces.



Subject/Code No: Data Base Management System Lab/4AID4-22

LTP: 0+0+3 Semester: IV

Course Outcome

CO Number	CO Definition
C01	Know how to make database schema for given scenarios.
C02	Apply Keys and Constraints on database using RDBMS.
C03	Formulate aggregate functions.
C04	Compose PL/SQL including stored procedures, stored functions, cursors concept.
C05	Develop Triggers, SQL and Procedural interfaces.

Subject/Code No: Network Programming Lab/4AID4-23

LTP: 0+0+3 Semester: IV

Course Outcome

CO Number	CO Definition
C01	Describe the functioning of various networking equipment's and Standard Network Topologies.
C02	Explain and Define the LAN Installation and Configurations techniques.
C03	Design code for various Error correcting techniques and framing methods through C Language.
C04	Analyze and verify client and server involving UDP/TCP sockets using Socket Programming.
C05	Demonstrate and determine the Communication Models between client and server using Network Simulator.

Subject/Code No: Linux Shell Programming Lab/4AID4-24/4CDS4-24

LTP: 0+0+3 Semester: IV

Course Outcome

CO Number	CO Definition
C01	Know and apply Key Concepts and Commands for Shell Programming.
C02	Analyze the different security measures that can be implemented to protect the directory structure.
C03	Define Approaches to Mastering Shell Quoting Mechanisms.
C04	Evaluate Patterns with simple Regular Expressions using Filters using various Command.
C05	Explain how to use scripting to enhance command output.



Subject/Code No: Java Lab/4AID4-25

LTP: 0+0+3 Semester: IV

Course Outcome

CO Number	CO Definition
C01	Use the syntax and semantics of java programming language and basic concepts of OOP.
C02	Develop reusable programs using the concepts of inheritance, polymorphism, interfaces and packages.
C03	Apply the concepts of Multithreading and Exception handling to develop efficient and error free codes.
C04	Design event driven GUI and web related applications which mimic the real word scenarios.
C05	Design the applications using applets and use of graphics in java.

Subject/Code No: Data Mining-Concepts and Techniques/5AID3-01

LTP: 3+0+0 Semester: V

Course Outcome

CO Number	CO Definition
C01	Know the Mathematical Foundations to Data Mining Tools
C02	Apply Classical Models and Algorithms in Data Mining
C03	Categorize Patterns through Association Rule Mining, Classification, and Clustering
C04	Employ Appropriate Data Mining Algorithms for Practical Problem Solving
C05	Analyze Data Mining Trends and Impacts

Subject/Code No: Compiler Design/5AID4-02

LTP: 3+0+0 Semester: V

Course Outcome

CO Number	CO Definition
C01	Illustrate all phases of the Compiler and analyse it's the functioning
C02	Determine the Parsing algorithms and various error handling in parser
C03	Analyse the syntax directed definition and all types of Intermediate code generations.
C04	Classify various type of storage organisation techniques and symbol list.
C05	Explain all code generation, block control graphs and Source-code optimization techniques



Subject/Code No: Operating System/5AID4-03

LTP: 3+0+0 Semester: V

Course Outcome

CO Number	CO Definition
C01	Memorise the fundamental concepts of operating systems, processes, and process synchronization.
C02	Explain different approaches to memory management.
C03	Analyze and design deadlock detection and prevention techniques as well as device management.
C04	Recognize and describe the structure of file systems and directories.
C05	Discuss different case studies of operating systems.

Subject/Code No: Computer Graphics and Multimedia Techniques/5AID4-04

LTP: 3+0+0 Semester: V

Course Outcome

CO Number	CO Definition
C01	Analyse the fundamental concepts of computer graphics, the mathematical and geometrical issues related to computers, and assess alternative algorithmic solutions.
C02	Recognize and describe the different graphics primitives.
C03	Describe, demonstrate, and create several 2D transformation methods and clipping algorithms.
C04	Build the essential ideas of parallel and perspective projection and assess several 3D transformation algorithms
C05	Develop dynamic motions and an understanding of the many colour models used in computer graphics systems.

Subject/Code No: Analysis of Algorithm/5AID4-05

LTP: 3+0+0 Semester: V

Course Outcome

CO Number	CO Definition
C01	Argue the correctness of algorithms using inductive proofs and analyze worst-case running times of algorithms using asymptotic analysis.
C02	Explain important algorithmic design paradigms and apply when an algorithmic design situation calls for it.
C03	Explain the major graph algorithms and Employ graphs to model engineering problems, when appropriate.
C04	Compare between different data structures and pick an appropriate data structure for a design situation.
C05	Describe the classes P, NP, and NP Complete and be able to prove that a certain problem is NP-Complete.



Subject/Code No: Fundamentals of Block Chain/5AID5-11

LTP: 3+0+0 Semester: V

Course Outcome

CO Number	CO Definition
CO1	Describe the basics of Blockchain, notation of Distributed Systems in Blockchain and analyse various problems.
CO2	Discuss about Technology Stack of Blockchain with Protocols and analyse the feature of crypto Currency.
CO3	Explain and illustrate the essential components of a blockchain platform.
CO4	Determine and analyse the various Blockchain Technology.
CO5	Illustrate various Types of Consensus Algorithms

Subject/Code No: Probability and Statistics for Data Science (5AID5-12)

LTP: 3+0+0 Semester: V

Course Outcome

CO Number	CO Definition
CO1	Gain Familiarity: with diverse data collection methods and develop proficiency in basic data visualization techniques. Understand measures of central tendency, dispersion, skewness, and kurtosis, and learn to interpret them
CO2	Develop Understanding: of fundamental probability concepts and the ability to calculate probabilities for different events.
CO3	Acquire Understanding: of various types of random variables, grasp the concepts of conditional probability, and distinguish between univariate and bivariate probability distributions. Learn about transforming continuous random variables and their practical applications
CO4	Acquire Knowledge: about the characteristics of random variables, including expectation and variance. Learn to compute various generating functions
CO5	Learn Hypothesis Testing: principles and techniques, and develop proficiency in analyzing hypotheses and their outcomes.



Subject/Code No: Programming for Data Science (5AID5-13)

LTP: 3+0+0 Semester: V

Course Outcome

CO Number	CO Definition
CO1	To know the mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
CO2	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
CO3	Use designed solutions for complex engineering problems and designed 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.
CO4	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.
CO5	Apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

Subject/Code No: Computer Graphics and Multimedia Techniques Lab/5AID4-21

LTP: 0+0+3 Semester: V

Course Outcome

CO Number	CO Definition
CO1	Implement basic transformations on objects using OpenGL.
CO2	Apply clipping and filling techniques for modifying an object.
CO3	Understand the practical implementation of modeling, rendering, viewing of objects in 2D.
CO4	Design multimedia applications
CO5	Identify multimedia compression techniques and applications.

Subject/Code No: Compiler Design Lab/5AID4-22

LTP: 0+0+3 Semester: V

Course Outcome

CO Number	CO Definition
CO1	Understand Lexical analyzer and use this knowledge to implement its various sub-functions for any regular language.
CO2	Design and code of Symbol Table in C language.
CO3	Verify the code for Lexical analyzer for given language using C and LEX tools.
CO4	Apply the Code of YACC Program for identification of strings and Operators.
CO5	Analyze context free grammar and Code for First and Follows using programming language C.



Subject/Code No: Analysis of Algorithm Lab/5AID4-23

LTP: 0+0+3 Semester: V

Course Outcome

CO Number	CO Definition
CO1	Analyze algorithms in terms of space and time complexity
CO2	Implement problems using brute force, divide and conquer and decrease and conquer techniques.
CO3	Simulate problems using greedy, dynamic programming and backtracking approaches.
CO4	Use different string-matching algorithms.
CO5	Explore the implementation of Problem classes Np, Np-Hard and Np-complete

Subject/Code No: Advanced Java Lab/5AID4-24

LTP: 0+0+3 Semester: V

Course Outcome

CO Number	CO Definition
CO1	Know the fundamentals of MVC with Applets and Swing.
CO2	Know and implement the concept of Java Database Connectivity (JDBC) and Client server programming.
CO3	Implement the concept of RMI and implement distributed application.
CO4	Design the web application by using the concept of JAVA Servlet.
CO5	Design the web application by using the concept of JSP.

Subject/Code No: Industrial Training/5AID7-30

LTP: 0+0+1 Semester: V

Course Outcome

CO Number	CO Definition
CO1	Participate in the projects in industries during his or her industrial training.
CO2	Describe use of advanced tools and techniques encountered during industrial training and visit.
CO3	Interact with industrial personnel and follow engineering practices and discipline prescribed in industry.
CO4	Develop awareness about general workplace behavior and build interpersonal and team skills.
CO5	Prepare professional work reports and presentations.



Subject/Code No: Digital Image Processing/6AID3-01

LTP: 3+0+0 Semester: VI

Course Outcome

CO Number	CO Definition
C01	Describe digital image, digital image representation and need of digital image processing.
C02	Applying different type of transformation and filtering techniques on an image.
C03	Identify various noise models and evaluate the values for restoration and degradation models.
C04	Analyze various image compression techniques.
C05	Analyze and evaluate various Image Transformation and Segmentation Techniques

Subject/Code No: Machine Learning/6AID4-02

LTP: 3+0+0 Semester: VI

Course Outcome

CO Number	CO Definition
C01	Apply the supervised machine learning algorithms to perform real-time data analysis and generate predictions.
C02	Know and apply real-time data analysis through the use of unsupervised machine learning algorithms like clustering and association mining.
C03	Evaluate feature extraction & selection methods and select appropriate machine learning model.
C04	Analyze various semi supervised learning & reinforcement learning algorithms.
C05	Use advance concepts like recommender system and deep learning.

Subject/Code No: Information System Security/6AID4-03

LTP: 3+0+0 Semester: VI

Course Outcome

CO Number	CO Definition
C01	Analyse and determine for any organization the security requirements and appropriate solutions.
C02	Protect system from different types of threats, malicious software's vulnerabilities and attacks.
C03	Describe symmetric and public key encryption algorithms like DES, AES, RSA etc
C04	Identify ethical, professional responsibilities, risks and liabilities in computer and network environment, and best practices to write security policy.
C05	Distinguish and analyse available network and protocols such as SSL, IPSes, TLS, etc.



Subject/Code No: Computer Architecture & Organization/6AID4-04

LTP: 3+0+0 Semester: VI

Course Outcome

CO Number	CO Definition
CO1	illustration of basics of Data representations, different operations, Analyse basics of computer architecture and design of basic computer
CO2	describe & implement different processing techniques to optimize assembly language programs
CO3	Analyse & differentiate basics of data transfer in different memory, RISC & CISC characteristics
CO4	Use arithmetic operations and input/output organization and interface
CO5	know various memories, storage and communication techniques within them and with processor

Subject/Code No: Artificial Intelligence/6AID4-05

LTP: 3+0+0 Semester: VI

Course Outcome

CO Number	CO Definition
CO1	Understand and use various types of logic and knowledge representation schemes.
CO2	Implantation of AI concepts in game playing
CO3	Use of logics, calculus, theorems & probability to enhance knowledge and reasoning
CO4	Evaluate the various Supervised and Unsupervised Learning algorithms using appropriate Dataset
CO5	Design and evaluate Deep learning Algorithms

Subject/Code No: Cloud Computing/6AID4-06

LTP: 3+0+0 Semester: VI

Course Outcome

CO Number	CO Definition
CO1	Know the nutshell of Cloud Computing from scratch.
CO2	Discuss the model, types of clouds, various service models, programming concepts and design architecture of cloud computing.
CO3	Know the Virtualization Technology, virtualization of various components of cloud and its implementation level.
CO4	Evaluate security issues, threats, challenges and security architecture for Data, Data Centre and Cloud Services as well as disaster recovery of Data.
CO5	Describe various cloud platforms in IT industry like AWS, Microsoft Azure.



Subject/Code No: Artificial Neural Network/6AID5-11

LTP: 3+0+0 Semester: VI

Course Outcome

CO Number	CO Definition
C01	Discussion on neural network and different learning techniques
C02	Use different kind of loss functions and optimizations
C03	Interpret and apply Back Propagation algorithm In Neural Network
C04	Knowing of Self-Organization Maps
C05	Identifying and analyze Dynamical Models and Hopfield Models

Subject/Code No: Natural Language Processing/6AID5-12

LTP: 3+0+0 Semester: VI

Course Outcome

CO Number	CO Definition
C01	Understand key challenges in NLP and their corresponding solutions.
C02	Formulate proficiency in NLP programming techniques.
C03	Develop the capability to evaluate NLP problems effectively.
C04	Know and use the skill to extract essential insights from pertinent research papers.
C05	Apply the concepts of natural language understanding, processing, and generation.

Subject/Code No: Digital Image Processing Lab/6AID4-21

LTP: 0+0+3 Semester: VI

Course Outcome

CO Number	CO Definition
C01	Apply a proper image enhancement technique for given a set of noisy images.
C02	Able to design and implement the various Linear filtering methods for image enhancement.
C03	Implement the different Geometric transformations on images and understand two-dimensional Fourier transform.
C04	Develop any application using different image processing techniques.
C05	To learn the spatial and frequency domain techniques of image compression.



Subject/Code No: Machine Learning Lab/6AID4-22

LTP: 0+0+3 Semester: VI

Course Outcome

CO Number	CO Definition
C01	Know the filtration of data to get the desired results in data analysis
C02	Apply machine learning models as per the real-life problem statements
C03	Use of supervised and unsupervised learning algorithms
C04	Develop neural networks for learning non-linear functions in Python
C05	Apply Machine Learning algorithms and Neural Networks to solve real world problems.

Subject/Code No: Python Lab/6AID4-23

LTP: 0+0+3 Semester: VI

Course Outcome

CO Number	CO Definition
C01	Know the fundamental data types of pythons.
C02	Apply knowledge of if-else, while and for loop for decision control.
C03	Understand various methods to manipulate String.
C04	Know functions and file handling in python.
C05	Implement sorting algorithms for various scenarios.

Subject/Code No: Mobile Application Development Lab/6AID4-24

LTP: 0+0+3 Semester: VI

Course Outcome

CO Number	CO Definition
C01	Know the components and structure of mobile application development frameworks for Android and windows OS-based mobiles.
C02	Understand how to work with various mobile application development frameworks
C03	Apply the basic and important design concepts and issues of development of mobile applications.
C04	Implement activities with dialogs, spinner, fragments and navigation drawer by applying themes
C05	Develop mobile applications using SQLite.



Subject/Code No: Big Data Analytics/7AID4-01

LTP: 3+0+0 Semester: VII

Course Outcome

CO Number	CO Definition
CO1	Illustrate the building block of Big Data and overview of big data analytics
CO2	Analyze the Big Data framework like Hadoop and describe map reduce in Big Data to generate analytics
CO3	Design of Algorithms to solve Data Intensive Problems using Hadoop I/O structure.
CO4	Implementation of Big Data Analytics using pig to solve data intensive problems and to generate analytics
CO5	Determination of Big Data Analytics using hive and resolve data intensive problems

Subject/Code No: Environmental Engineering and Disaster Management/7AG6-60.2

LTP: 3+0+0 Semester: VII

Course Outcome

CO Number	CO Definition
CO1	List and review research literature and analyze complex Environmental Engineering problems using fundamentals of mathematics, sciences and engineering.
CO2	Develop solutions for Environmental Engineering problems and compose system components and processes to meet the specified needs with appropriate consideration for the public health and safety.
CO3	Explain effectively environmental issues and solutions through written and oral presentations to engineering communities and society.
CO4	Know ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental and societal contexts.
CO5	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety and welfare, as well as global, cultural, social, environmental and economic factors.

Subject/Code No: Big Data Analysis Lab/7AID4-21

LTP: 0+0+3 Semester: VII

Course Outcome

CO Number	CO Definition
CO1	Implement various data structure in JAVA
CO2	Demonstrate and describe to do installation of Hadoop.
CO3	Using map reduce paradigm develop the program in JAVA.
CO4	Analyze and perform different operations on data using Pig Latin scripts.
CO5	Illustrate and apply different operations on relations and databases using Hive.



Subject/Code No: R. Programming Lab/7AID4-22

LTP: 0+0+3 Semester: VII

Course Outcome

CO Number	CO Definition
CO1	Developing R Programming Skills and Data Structure Manipulation
CO2	Knowing Data Importation, Cleansing, and Visualization
CO3	Applying Hypothesis Testing and Conducting Exploratory Data Analysis
CO4	Employing Clustering, Diminishing Dimensionality, and Unveiling Linear Regression Insights
CO5	Discussing Machine Learning Techniques and Practicing Web Scraping

Subject/Code No: Industrial Training Seminar/7AID7-30

LTP: 0+0+3 Semester: VII

Course Outcome

CO Number	CO Definition
CO1	Apply the knowledge to work on any project in computing.
CO2	Know how to write reports in industrial technical seminar.
CO3	Develop the communication skills to work with a group of workers and learn the proper behavior in a working environment.
CO4	Know how to work with multi-tasking professionals and multidisciplinary team.
CO5	Develop skills to improve presentation and other soft skills.

Subject/Code No: Technical Seminar/7AID7-40

LTP: 0+0+3 Semester: VII

Course Outcome

CO Number	CO Definition
CO1	Define the motivation for any topic of interest and describe the thought process development for a technical presentation.
CO2	List relevant sources for a literature survey and construct a document based on technical publications.
CO3	Analyse the proof-of-concept and recognize patterns in related data.
CO4	Discuss effective presentation techniques and enhance soft skills.
CO5	Apply new and recent technology (e.g. Latex) to translate technical reports accurately.



Subject/Code No: Deep Learning & Its Application (8AID4-01)

LTP: 3+0+0 Semester: VIII

Course Outcome

CO Number	CO Definition
CO1	To know the basic knowledge of Learning Algorithms.
CO2	To Analysis and design of the Neural Network Concepts so that Test and validate a trained network to generalizes.
CO3	To Apply and development of a CNN-based application.
CO4	Explain the architecture and applications of RNNs, Bidirectional RNNs, Encoder-Decoder sequence-to-sequence architectures, Back propagation Through Time for training RNNs, LSTM networks
CO5	To Develop and recognize the Theoretical foundations and practical implementations of auto encoders in real-world scenarios will be explored.

Subject/Code No: Disaster Management (8TT6-60.2)

LTP: 3+0+0 Semester: VIII

Course Outcome

CO Number	CO Definition
CO1	To know types of disaster and hazards and related issues.
CO2	Describe various Hydro-meteorological and Geological Based Disasters.
CO3	Apply methods of community involvement as an essential part of successful DRR. Humanitarian Assistance/Support before and after disaster.
CO4	Formulate technological innovations in Disaster Risk Reduction: Advantages and problems
CO5	Use experience on conducting independent DM study including data search, analysis and presentation of disaster case study

Subject/Code No: Deep Learning & Its Application Lab (8AID4-21)

LTP: 0+0+3 Semester: VIII

Course Outcome

CO Number	CO Definition
CO1	Demonstrate recall of fundamental concepts in deep learning, including neural network architectures, activation functions, and optimization algorithms, through quizzes, exams, and class discussions.
CO2	Explain the principles underlying various deep learning techniques, such as convolutional neural networks (CNNs) for image processing and recurrent neural networks (RNNs) for sequential data, by summarizing key concepts and providing examples.
CO3	Apply deep learning algorithms to solve practical problems in computer vision, natural language processing, and other domains, by designing and implementing neural network models in programming assignments and projects.
CO4	Analyze the performance of deep learning models and interpret their results using relevant metrics and visualization tools, evaluating the effectiveness of different architectures and optimization strategies through experiments and case studies.
CO5	Design novel deep learning solutions for complex problems, integrating multiple techniques and adapting them to new domains, by proposing innovative project ideas and implementing them with creativity and originality.



Subject/Code No: Robot Programming Lab (8AID4-22)

LTP: 0+0+3 Semester: VIII

Course Outcome

CO Number	CO Definition
C01	Apply programming concepts to effectively program robots for various tasks.
C02	Analyze and select effective algorithms for solving robotics problems.
C03	Synthesize knowledge to design and implement functional robotic systems.
C04	Evaluate robot performance and optimize algorithms for better efficiency.
C05	Critically evaluate ethical implications and propose responsible strategies.

Subject/Code No: Project (8AID7-50)

LTP: 0+0+3 Semester: VIII

Course Outcome

CO Number	CO Definition
C01	Carry out a substantial research-based project which will provide the solution to the society.
C02	Find out the need for practical implementation of the solution.
C03	Provide design solutions by considering ethical issues.
C04	Exhibit the solutions to the stakeholders.
C05	Illustration of ideas using respective tools.



Bachelor of Technology Computer Science & Engineering (Artificial Intelligence)

Program Name: Computer Science & Engineering (Artificial Intelligence)
Session: 2024-25

Subject/Code No: Technical Communication/3CAI1-02

LTP: 2+0+0 Semester: III

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: Advanced Engineering Mathematics/3CAI2-01

LTP: 3+0+0 Semester: III

Course Outcome

CO Number	CO Definition
CO1	Develop the concept of Probabilistic models and Random Variable
CO2	Analysis through statistical methods like Normal distribution, Binomial Distribution etc.
CO3	Mathematical modeling for Industrial Problem using linear programming and solution by Graphical methods
CO4	Finding Solution of real time problems with Mathematical modelling
CO5	Evaluate and create model for problems related to transportation and assignment

Subject/Code No: Digital Electronics/3CAI3-04

LTP: 3+0+0 Semester: III

Course Outcome

CO Number	CO Definition
CO1	Understand and apply number system in digital design
CO2	Apply the laws of Boolean algebra to represent and simplify digital circuits
CO3	Calculate the parameters of logic families and define their characteristics.
CO4	Develop competence in Combinational Logic Problem formulation and Logic Optimization
CO5	Classify the different types of flip-flops and design various sequential circuits



Subject/Code No: Data Structure and Algorithms/3CAI4-05

LTP: 3+0+0 Semester: III

Course Outcome

CO Number	CO Definition
C01	Know the concept of stack operations and its implementation to solve real time problems
C02	Recognize the knowledge of Linked List and Queues to design algorithms for complex engineering tasks
C03	Analyze and design efficient searching and sorting techniques
C04	Evaluate problems by storing data in tree structure and performing basic operations
C05	Apply graph concept for complex problem and understand hashing

Subject/Code No: Object oriented Programming/3CAI4-06

LTP: 3+0+0 Semester: III

Course Outcome

CO Number	CO Definition
C01	Knowing the basic knowledge of object-oriented programming language constructs.
C02	Discussing and identifying the concept of reference, dynamic memory allocation and concept of various types of functions in classes.
C03	Apply inheritance and its types in real time problems.
C04	Implement concept of polymorphism to perform different types of bindings.
C05	Create application using I/O and file handling with exception handling.

Subject/Code No: Software Engineering / 3CAI4-07

LTP: 3+0+0 Semester: III

Course Outcome

CO Number	CO Definition
C01	Decompose the given project in various phases of a lifecycle.
C02	Choose appropriate process model depending on the user requirements.
C03	Perform various life cycle activities like Analysis, Design, Implementation, Testing and Maintenance.
C04	Know various processes used in all the phases of the product.
C05	Analyse the knowledge, techniques, and skills in the development of a software product.



Subject/Code No: Data Structures and Algorithms Lab /3CAI4-21

LTP: 0+0+3 Semester: III

Course Outcome

CO Number	CO Definition
C01	Understand and examine the concept of array & its storage
C02	Illustrate the implementation of basic data structure using an array.
C03	Analyze and compare different searching and sorting techniques
C04	Develop programs to perform operations on Non-linear Data Structures such as Tree and Graphs
C05	Design and use different sorting algorithms

Subject/Code No: Object Oriented Programming Lab/3CAI4-22

LTP: 0+0+3 Semester: III

Course Outcome

CO Number	CO Definition
C01	Understand the concept of C++ programming language while evaluating different access specifiers to define member function.
C02	Implement memory allocation techniques and various inbuilt functions.
C03	Know inheritance and analyze the types of inheritance.
C04	Apply the concept of polymorphism to perform different types of bindings.
C05	Develop and use of application related to I/O and file handling with exception handling.

Subject/Code No: Software Engineering Lab/3CAI4-23

LTP: 0+0+3 Semester: III

Course Outcome

CO Number	CO Definition
C01	Understand the software engineering methodologies involved in the phases for project development.
C02	Know about open-source tools used for implementing software engineering methods.
C03	Develop product-startups implementing software process models in software engineering methods.
C04	Understand Open-source Tools: StarUML / UMLGraph / Topcased.
C05	Discuss and analyze how to develop software requirements specifications for a given problem.



Subject/Code No: Digital Electronics Lab/3CAI4-24

LTP: 0+0+3 Semester: III

Course Outcome

CO Number	CO Definition
C01	List different types of logic gates, identify their ICs and also verify their truth tables.
C02	Demonstrate the functioning of basic logic gates, adder, and subtractor using universal gates.
C03	Design a combinational circuit using MSI devices and verify its functionalities.
C04	Develop various sequential circuit using Flip Flops and verify its functionalities.
C05	Formulate Various types of counters, Shift registers SISO, SIPO, PISO, PIPO using Flip-Flops and verify its functionalities using simulation tool

Subject/Code No: Industrial Training/3CAI7-30

LTP: 0+0+1 Semester: III

Course Outcome

CO Number	CO Definition
C01	Compose an interest in research-oriented fields and develop the ability to research for literature and prepare brief report.
C02	Identify the skills, competencies and points of view needed by professionals in the field most closely related to the course
C03	Discuss and identify about topics of current intellectual importance
C04	Develop the communication skills and awareness about the industrial environment.
C05	Revise Skill development for presentation.

Subject/Code No: Discrete Mathematical Structures/4CAI2-01

LTP: 3+0+0 Semester: IV

Course Outcome

CO Number	CO Definition
C01	Explain the various fundamental concepts of the Set theory and Logics.
C02	Illustrate the concept of relations and Diagraph to analyse the area of greatest impact for improvement.
C03	Create the application part of lattices in distributed computing and Data mining.
C04	Implementation of Graphs and their application in real time problem
C05	Analyse the concept of Algebraic Structures.



Subject/Code No: Managerial Economics and Financial Accounting/4CAI1-03

LTP: 2+0+0 Semester: IV

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.

Subject/Code No: Microprocessors & Interfaces/4CAI3-04

LTP: 3+0+0 Semester: IV

Course Outcome

CO Number	CO Definition
CO1	Discuss working of functional components of computer system.
CO2	Demonstrate an overall functional structure of the Microprocessor.
CO3	Explain how interrupts are used to implement I/O control and data transfers.
CO4	To learn the design aspects of I/O and Memory Interfacing circuits.
CO5	Implement their practical approach through laboratory experiments.

Subject/Code No: Database Management System/4CAI4-05

LTP: 3+0+0 Semester: IV

Course Outcome

CO Number	CO Definition
CO1	Develop database using E-R diagram to represent simple database application scenarios.
CO2	Identify data from database using query language.
CO3	Apply normalization process to refine database schema.
CO4	Describe transaction processing and Serializability.
CO5	Interpret the concept of Concurrency Control and concept of Failure and Recovery.



Subject/Code No: Theory of Computation/ 4CAI4-06

LTP: 3+0+0 Semester: IV

Course Outcome

CO Number	CO Definition
CO1	Analyse the concept of Finite Automata and distinguish between Non- Deterministic Finite Automata and Deterministic Finite Automata. Analyse regular sets and its properties. Composition of Regular Expression from Finite Automata and vice-versa.
CO2	Understand the Context Free Grammar and its simplification.
CO3	Asses the Context Free Language and generation of Push Down Automata for Context Free Grammar.
CO4	Know the Turing Machine and its various types. Discuss the Hierarichy of formal languages.
CO5	Evaluating the P, NP, NP complete, NP hard problems with the help of examples.

Subject/Code No: Data Communication and Computer Networks/4CAI4-07

LTP: 3+0+0 Semester: IV

Course Outcome

CO Number	CO Definition
CO1	Describe the concept of signals and illustrate the functionality of OSI & TCP/IP reference model.
CO2	Explain channel allocation, framing, flow control, and error control mechanisms and apply them using data link layer protocols.
CO3	Determine the function of network layer, design subnets and calculate IP addresses for a network.
CO4	Illustrate and Analyse different transport layer protocols and functions.
CO5	Analyze the different protocols at Application layer.

Subject/Code No: Microprocessor and Interface Lab /4CAI4-21

LTP: 0+0+2 Semester: IV

Course Outcome

CO Number	CO Definition
CO1	Knowing and apply the fundamentals of assembly level programming of microprocessors and microcontroller.
CO2	Implement standard microprocessor real time interfaces including GPIO, serial ports, digital-to-analog converters and analog-to-digital converters.
CO3	Interpret Troubleshoot interactions between software and hardware.
CO4	Analyze abstract problems and apply a combination of hardware and software to address the problem.
CO5	Use standard test and measurement equipment to evaluate digital interfaces.



Subject/Code No: Data Base Management System Lab/4CAI4-22

LTP: 0+0+3 Semester: IV

Course Outcome

CO Number	CO Definition
C01	Know how to make database schema for given scenarios
C02	Apply Keys and Constraints on database using RDBMS.
C03	Formulate aggregate functions
C04	Compose PL/SQL including stored procedures, stored functions, cursors concept
C05	Develop Triggers, SQL and Procedural interfaces

Subject/Code No: Network Programming Lab/4CAI4-23

LTP: 0+0+3 Semester: IV

Course Outcome

CO Number	CO Definition
C01	Describe the functioning of various networking equipment's and Standard Network Topologies
C02	Explain and Define the LAN Installation and Configurations techniques
C03	Design code for various Error correcting techniques and framing methods through C Language
C04	Analyze and verify client and server involving UDP/TCP sockets using Socket Programming.
C05	Demonstrate and determine the Communication Models between client and server using Network Simulator.

Subject/Code No: Linux Shell Programming Lab/4CAI4-24

LTP: 0+0+3 Semester: IV

Course Outcome

CO Number	CO Definition
C01	Know and apply Key Concepts and Commands for Shell Programming
C02	Analyze the different security measures that can be implemented to protect the directory structure
C03	Define Approaches to Mastering Shell Quoting Mechanisms
C04	Evaluate Patterns with simple Regular Expressions using Filters using various Command
C05	Explain how to use scripting to enhance command output.



Subject/Code No: Java Lab/4CAI4-25

LTP: 0+0+2 Semester: IV

Course Outcome

CO Number	CO Definition
CO1	Use the syntax and semantics of java programming language and basic concepts of OOP.
CO2	Develop reusable programs using the concepts of inheritance, polymorphism, interfaces and packages.
CO3	Apply the concepts of Multithreading and Exception handling to develop efficient and error free codes.
CO4	Design event driven GUI and web related applications which mimic the real word scenarios.
CO5	Design the applications using applets and use of graphics in java.

Subject/Code No: Data Mining (5CAI3-01)

LTP: 3+0+0 Semester: V

Course Outcome

CO Number	CO Definition
CO1	Know the Mathematical Foundations to Data Mining Tools.
CO2	Apply Classical Models and Algorithms in Data Mining.
CO3	Categorize Patterns through Association Rule Mining, Classification, and Clustering
CO4	Employ Appropriate Data Mining Algorithms for Practical Problem Solving
CO5	Analyze Data Mining Trends and Impacts

Subject/Code No: Compiler Design (5CAI4-02)

LTP: 3+0+0 Semester: V

Course Outcome

CO Number	CO Definition
CO1	Illustrate all phases of the Compiler and analyse it's the functioning
CO2	Determine the Parsing algorithms and various error handling in parser
CO3	Analyse the syntax directed definition and all types of Intermediate code generations.
CO4	Classify various type of storage organization techniques and symbol list.
CO5	Explain all code generation, block control graphs and Source-code optimization techniques



Subject/Code No: Operating System (5CAI4-03)

LTP: 3+0+0 Semester: V

Course Outcome

CO Number	CO Definition
CO1	Memorise the fundamental concepts of operating systems, processes, and process synchronization.
CO2	Explain different approaches to memory management.
CO3	Analyze and design deadlock detection and prevention techniques as well as device management.
CO4	Recognize and describe the structure of file systems and directories.
CO5	Discuss different case studies of operating systems.

Subject/Code No: Computer Graphics and Multimedia Techniques (5CAI4-04)

LTP: 3+0+0 Semester: V

Course Outcome

CO Number	CO Definition
CO1	Analyse the fundamental concepts of computer graphics, the mathematical and geometrical issues related to computers, and assess alternative algorithmic solutions.
CO2	Recognize and describe the different graphics primitives.
CO3	Describe, demonstrate, and create several 2D transformation methods and clipping algorithms.
CO4	Build the essential ideas of parallel and perspective projection and assess several 3D transformation algorithms.
CO5	Develop dynamic motions and an understanding of the many colour models used in computer graphics systems.

Subject/Code No: Analysis of Algorithm (5CAI4-05)

LTP: 3+0+0 Semester: V

Course Outcome

CO Number	CO Definition
CO1	Argue the correctness of algorithms using inductive proofs and analyze worst-case running times of algorithms using asymptotic analysis.
CO2	Explain important algorithmic design paradigms and apply when an algorithmic design situation calls for it.
CO3	Explain the major graph algorithms and Employ graphs to model engineering problems, when appropriate.
CO4	Compare between different data structures and pick an appropriate data structure for a design situation.
CO5	Describe the classes P, NP, and NP Complete and be able to prove that a certain problem is NP-Complete.



Subject/Code No: Fundamentals of Blockchain (5CAI5-11)

LTP: 3+0+0 Semester: V

Course Outcome

CO Number	CO Definition
CO1	Describe the basics of Blockchain, notation of Distributed Systems in Blockchain and analyse various problems.
CO2	Discuss about Technology Stack of Blockchain with Protocols and analyse the feature of crypto Currency.
CO3	Explain and illustrate the essential components of a blockchain platform.
CO4	Determine and analyse the various Blockchain Technology.
CO5	Illustrate various Types of Consensus Algorithms

Subject/Code No: Programming for Data Science (5CAI5-13)

LTP: 3+0+0 Semester: V

Course Outcome

CO Number	CO Definition
CO1	To know the mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
CO2	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
CO3	Use designed solutions for complex engineering problems and designed 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.
CO4	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.
CO5	Apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

Subject/Code No: Computer Graphics and Multimedia Techniques Lab (5CAI4-21)

LTP: 0+0+3 Semester: V

Course Outcome

CO Number	CO Definition
CO1	Implement basic transformations on objects using OpenGL.
CO2	Apply clipping and filling techniques for modifying an object.
CO3	Understand the practical implementation of modeling, rendering, viewing of objects in 2D.
CO4	Design multimedia applications
CO5	Identify multimedia compression techniques and applications.



Subject/Code No: Compiler Design Lab (5CAI4-22)

LTP: 0+0+3 Semester: V

Course Outcome

CO Number	CO Definition
CO1	Understand Lexical analyzer and use this knowledge to implement its various sub-functions for any regular language.
CO2	Design and code of Symbol Table in C language.
CO3	Verify the code for Lexical analyzer for given language using C and LEX tools.
CO4	Apply the Code of YACC Program for identification of strings and Operators.
CO5	Analyze context free grammar and Code for First and Follows using programming language C.

Subject/Code No: Analysis of Algorithm Lab (5CAI4-23)

LTP: 0+0+3 Semester: V

Course Outcome

CO Number	CO Definition
CO1	Analyze algorithms in terms of space and time complexity
CO2	Implement problems using brute force, divide and conquer and decrease and conquer techniques.
CO3	Simulate problems using greedy, dynamic programming and backtracking approaches.
CO4	Use different string-matching algorithms.
CO5	Explore the implementation of Problem classes Np, Np-Hard and Np-complete

Subject/Code No: Advanced Java Lab (5CAI4-24)

LTP: 0+0+3 Semester: V

Course Outcome

CO Number	CO Definition
CO1	Know the fundamentals of MVC with Applets and Swing.
CO2	Know and implement the concept of Java Database Connectivity (JDBC) and Client server programming.
CO3	Implement the concept of RMI and implement distributed application
CO4	Design the web application by using the concept of JAVA Servlet.
CO5	Design the web application by using the concept of JSP.



Subject/Code No: Industrial Training (5CAI7-30)

LTP: 0+0+3 Semester: V

Course Outcome

CO Number	CO Definition
CO1	Participate in the projects in industries during his or her industrial training.
CO2	Describe use of advanced tools and techniques encountered during industrial training and visit.
CO3	Interact with industrial personnel and follow engineering practices and discipline prescribed in industry.
CO4	Develop awareness about general workplace behavior and build interpersonal and team skills.
CO5	Prepare professional work reports and presentations.

Subject/Code No: Digital Image Processing (6CAI3-01)

LTP: 3+0+0 Semester: VI

Course Outcome

CO Number	CO Definition
CO1	Describe digital image, digital image representation and need of digital image processing.
CO2	Applying different type of transformation and filtering techniques on an image.
CO3	Identify various noise models and evaluate the values for restoration and degradation models.
CO4	Analyze various image compression techniques.
CO5	Analyze and evaluate various Image Transformation and Segmentation Techniques

Subject/Code No: Machine Learning (6CAI4-02)

LTP: 3+0+0 Semester: VI

Course Outcome

CO Number	CO Definition
CO1	Apply the supervised machine learning algorithms to perform real-time data analysis and generate predictions
CO2	Know and apply real-time data analysis through the use of unsupervised machine learning algorithms like clustering and association mining
CO3	Evaluate feature extraction & selection methods and select appropriate machine learning model
CO4	Analyze various semi supervised learning & reinforcement learning algorithms
CO5	Use advance concepts like recommender system and deep learning



Subject/Code No: Information System Security (6CAI4-03)

LTP: 3+0+0 Semester: VI

Course Outcome

CO Number	CO Definition
CO1	Analyse and determine for any organization the security requirements and appropriate solutions.
CO2	Protect system from different types of threats, malicious software's vulnerabilities and attacks.
CO3	Describe symmetric and public key encryption algorithms like DES, AES, RSA etc
CO4	Identify ethical, professional responsibilities, risks and liabilities in computer and network environment, and best practices to write security policy.
CO5	Distinguish and analyse available network and protocols such as SSL, IPSes, TLS, etc.

Subject/Code No: Computer Architecture and Organization (6CAI4-04)

LTP: 3+0+0 Semester: VI

Course Outcome

CO Number	CO Definition
CO1	illustration of basics of Data representations, different operations, Analyse basics of computer architectures and design of basic computer
CO2	Describe & implement different processing techniques to optimize assembly language programs
CO3	Analyse & differentiate basics of data transfer in different memory, RISC & CISC characteristics
CO4	Use arithmetic operations and input/output organization and interface
CO5	Know various memories, storage and communication techniques within them and with processor

Subject/Code No: Principles of Artificial Intelligence (6CAI4-05)

LTP: 3+0+0 Semester: VI

Course Outcome

CO Number	CO Definition
CO1	Understand and use various types of logic and knowledge representation schemes.
CO2	Implementation of AI concepts in game playing
CO3	Use of logics, calculus, theorems & probability to enhance knowledge and reasoning
CO4	Evaluate the various Supervised and Unsupervised Learning algorithms using appropriate Dataset
CO5	Design and evaluate Deep learning Algorithms



Subject/Code No: Cloud Computing (6CAI4-06)

LTP: 3+0+0 Semester: VI

Course Outcome

CO Number	CO Definition
CO1	Know the nutshell of Cloud Computing from scratch.
CO2	Discuss the model, types of clouds, various service models, programming concepts and design architecture of cloud computing.
CO3	Know the Virtualization Technology, virtualization of various components of cloud and its implementation level.
CO4	Evaluate security issues, threats, challenges and security architecture for Data, Data Centre and Cloud Services as well as disaster recovery of Data.
CO5	Describe various cloud platforms in IT industry like AWS, Microsoft Azure.

Subject/Code No: Artificial Neural Network (6CAI5-11)

LTP: 3+0+0 Semester: VI

Course Outcome

CO Number	CO Definition
CO1	Discussion on neural network and different learning techniques
CO2	Use different kind of loss functions and optimizations
CO3	Interpret and apply Back Propagation algorithm In Neural Network
CO4	Knowing of Self-Organization Maps
CO5	Identifying and analyze Dynamical Models and Hopfield Models

Subject/Code No: Natural Language Processing (6CAI5-12)

LTP: 3+0+0 Semester: VI

Course Outcome

CO Number	CO Definition
CO1	Understand key challenges in NLP and their corresponding solutions.
CO2	Formulate proficiency in NLP programming techniques.
CO3	Develop the capability to evaluate NLP problems effectively.
CO4	Know and use the skill to extract essential insights from pertinent research papers.
CO5	Apply the concepts of natural language understanding, processing, and generation.

Subject/Code No: Digital Image Processing Lab (6CAI4-21)

LTP: 0+0+3 Semester: VI

Course Outcome

CO Number	CO Definition
CO1	Apply a proper image enhancement technique for given a set of noisy images.
CO2	Able to design and implement the various Linear filtering methods for image enhancement.
CO3	Implement the different Geometric transformations on images and understand two-dimensional Fourier transform.
CO4	Develop any application using different image processing techniques.
CO5	To learn the spatial and frequency domain techniques of image compression.



Subject/Code No: Machine Learning Lab (6CAI4-22)

LTP: 0+0+3 Semester: VI

Course Outcome

CO Number	CO Definition
CO1	Know the filtration of data to get the desired results in data analysis
CO2	Apply machine learning models as per the real-life problem statements
CO3	Use of supervised and unsupervised learning algorithms
CO4	Develop neural networks for learning non-linear functions in Python
CO5	Apply Machine Learning algorithms and Neural Networks to solve real world problems

Subject/Code No: Python Lab (6CAI4-23)

LTP: 0+0+3 Semester: VI

Course Outcome

CO Number	CO Definition
CO1	Know the fundamental data types of python.
CO2	Apply knowledge of if-else, while and for loop for decision control.
CO3	Understand various methods to manipulate String.
CO4	Know funtions and file handling in python.
CO5	Implement sorting algorithms for various scenarios.

Subject/Code No: Mobile Application Development Lab (6CAI4-24)

LTP: 0+0+3 Semester: VI

Course Outcome

CO Number	CO Definition
CO1	Know the components and structure of mobile application development frameworks for Android and windows OS-based mobiles.
CO2	Understand how to work with various mobile application development frameworks
CO3	Apply the basic and important design concepts and issues of development of mobile applications.
CO4	Implement activities with dialogs, spinner, fragments and navigation drawer by applying themes
CO5	Develop mobile applications using SQLite.

Subject/Code No: Deep Learning & Its Application (7CAI4-01)

LTP: 3+0+0 Semester: VII

Course Outcome

CO Number	CO Definition
CO1	To know the basic knowledge of Learning Algorithms.
CO2	To Analysis and design of the Neural Network Concepts so that Test and validate a trained network to generalizes.
CO3	To Apply and development of a CNN-based application.
CO4	Explain the architecture and applications of RNNs, Bidirectional RNNs, Encoder-Decoder sequence-to-sequence architectures, Back propagation Through Time for training RNNs, LSTM networks
CO5	To Develop and recognize the Theoretical foundations and practical implementations of auto encoders in real-world scenarios will be explored.



Subject/Code No: Environmental Engineering and Disaster Management/7AG6-60.2

LTP: 3+0+0 Semester: VII

Course Outcome

CO Number	CO Definition
CO1	List and review research literature and analyze complex Environmental Engineering problems using fundamentals of mathematics, sciences and engineering.
CO2	Develop solutions for Environmental Engineering problems and compose system components and processes to meet the specified needs with appropriate consideration for the public health and safety.
CO3	Explain effectively environmental issues and solutions through written and oral presentations to engineering communities and society.
CO4	Know ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental and societal contexts.
CO5	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety and welfare, as well as global, cultural, social, environmental and economic factors.

Subject/Code No: Deep Learning & Its Application Lab (7CAI4-21)

LTP: 0+0+3 Semester: VII

Course Outcome

CO Number	CO Definition
CO1	Demonstrate recall of fundamental concepts in deep learning, including neural network architectures, activation functions, and optimization algorithms, through quizzes, exams, and class discussions.
CO2	Explain the principles underlying various deep learning techniques, such as convolutional neural networks (CNNs) for image processing and recurrent neural networks (RNNs) for sequential data, by summarizing key concepts and providing examples.
CO3	Apply deep learning algorithms to solve practical problems in computer vision, natural language processing, and other domains, by designing and implementing neural network models in programming assignments and projects.
CO4	Analyze the performance of deep learning models and interpret their results using relevant metrics and visualization tools, evaluating the effectiveness of different architectures and optimization strategies through experiments and case studies.
CO5	Design novel deep learning solutions for complex problems, integrating multiple techniques and adapting them to new domains, by proposing innovative project ideas and implementing them with creativity and originality.

Subject/Code No: Computer Vision Lab (7CAI4-22)

LTP: 0+0+3 Semester: VII

Course Outcome

CO Number	CO Definition
CO1	Understand the basic concepts of Data Science, its lifecycle, and the role of data visualization in analysis and decision-making.
CO2	Apply data cleaning, transformation, and exploratory data analysis (EDA) using Python.
CO3	Analyze advanced statistical analysis and create interactive web applications.
CO4	Evaluate and build interactive dashboards in Power BI for effective data storytelling and decision-making.
CO5	Create advanced visualization techniques to develop comprehensive data analysis projects, adhering to ethical practices.



Subject/Code No: Industrial Training Seminar/7CAI7-30

LTP: 0+0+3 Semester: VII

Course Outcome

CO Number	CO Definition
CO1	Apply the knowledge to work on any project in computing.
CO2	Know how to write reports in industrial technical seminar.
CO3	Develop the communication skills to work with a group of workers and learn the proper behavior in a working environment.
CO4	Know how to work with multi-tasking professionals and multidisciplinary team.
CO5	Develop skills to improve presentation and other soft skills.

Subject/Code No: Technical Seminar/7CAI7-40

LTP: 0+0+3 Semester: VII

Course Outcome

CO Number	CO Definition
CO1	Define the motivation for any topic of interest and describe the thought process development for a technical presentation.
CO2	List relevant sources for a literature survey and construct a document based on technical publications.
CO3	Analyse the proof-of-concept and recognize patterns in related data.
CO4	Discuss effective presentation techniques and enhance soft skills.
CO5	Apply new and recent technology (e.g. Latex) to translate technical reports accurately.

Subject/Code No: Big Data Analytics (8CAI4-01)

LTP: 3+0+0 Semester: VIII

Course Outcome

CO Number	CO Definition
CO1	Illustrate the building block of Big Data and overview of big data analytics
CO2	Analyze the Big Data framework like Hadoop and describe map reduce in Big Data to generate analytics
CO3	Design of Algorithms to solve Data Intensive Problems using Hadoop I/O structure.
CO4	Implementation of Big Data Analytics using pig to solve data intensive problems and to generate analytics
CO5	Determination of Big Data Analytics using hive and resolve data intensive problems



Subject/Code No: Disaster Management (8TT6-60.2)

LTP: 3+0+0

Semester: VIII

Course Outcome

CO Number	CO Definition
CO1	To know types of disaster and hazards and related issues.
CO2	Describe various Hydro-meteorological and Geological Based Disasters.
CO3	Apply methods of community involvement as an essential part of successful DRR. Humanitarian Assistance/Support before and after disaster.
CO4	Formulate technological innovations in Disaster Risk Reduction: Advantages and problems
CO5	Use experience on conducting independent DM study including data search, analysis and presentation of disaster case study

Subject/Code No: Big Data Analysis Lab (8CAI4-21)

LTP: 0+0+3

Semester: VIII

Course Outcome

CO Number	CO Definition
CO1	Implement various data structure in JAVA
CO2	Demonstrate and describe to do installation of Hadoop.
CO3	Using map reduce paradigm develop the programmes in JAVA.
CO4	Analyze and perform different operations on data using Pig Latin scripts.
CO5	Illustrate and apply different operations on relations and databases using Hive.

Subject/Code No: Robot Programming Lab (8CAI4-22)

LTP: 0+0+3

Semester: VIII

Course Outcome

CO Number	CO Definition
CO1	Apply programming concepts to effectively program robots for various tasks.
CO2	Analyze and select effective algorithms for solving robotics problems.
CO3	Synthesize knowledge to design and implement functional robotic systems.
CO4	Evaluate robot performance and optimize algorithms for better efficiency.
CO5	Critically evaluate ethical implications and propose responsible strategies.



Subject/Code No: Project (8CAI7-50)

LTP: 0+0+3 Semester: VIII

Course Outcome

CO Number	CO Definition
C01	Carry out a substantial research-based project which will provide the solution to the society.
C02	find out the need for practical implementation of the solution.
C03	provide design solutions by considering ethical issues.
C04	Exhibit the solutions to the stakeholders.
C05	Illustration of ideas using respective tools.



Bachelor of Technology Computer Engineering & Engineering (Data Science)

Program Name: Computer Engineering & Engineering (Data Science)

Session: 2024-25

Subject/Code No: Technical Communication (3CDS1-02)

Semester: 3rd LTP: 3L+0T+0P

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: Advanced Engineering Mathematics (3CDS2-01)

LTP: 3+0+0 Semester: III

Course Outcome

CO Number	CO Definition
CO1	Develop the concept of Probabilistic models and Random Variable
CO2	Analysis through statistical methods like Normal distribution, Binomial Distribution etc
CO3	Mathematical modeling for Industrial Problem using linear programming and solution by Graphical methods
CO4	Finding Solution of real time problems with Mathematical modelling
CO5	Evaluate and create model for problems related to transportation and assignment

Subject/Code No: Digital Electronics (3CDS3-04)

LTP: 3+0+0 Semester: III

Course Outcome

CO Number	CO Definition
CO1	Understand and apply number system in digital design
CO2	Apply the laws of Boolean algebra to represent and simplify digital circuits
CO3	Calculate the parameters of logic families and define their characteristics.
CO4	Develop competence in Combinational Logic Problem formulation and Logic Optimization
CO5	Classify the different types of flip-flops and design various sequential circuits



Subject/Code No: Data Structure and Algorithms (3CDS4-05)

LTP: 3+0+0 Semester: III

Course Outcome

CO Number	CO Definition
CO1	Know the concept of stack operations and its implementation to solve real time problems
CO2	Recognize the knowledge of Linked List and Queues to design algorithms for complex engineering tasks
CO3	Analyze and design efficient searching and sorting techniques
CO4	Evaluate problems by storing data in tree structure and performing basic operations
CO5	Apply graph concept for complex problem and understand hashing

Subject/Code No: Object Oriented Programming (3CDS4-06)

LTP: 3+0+0 Semester: III

Course Outcome

CO Number	CO Definition
CO1	Knowing the basic knowledge of object-oriented programming language constructs.
CO2	Discussing and identifying the concept of reference, dynamic memory allocation and concept of various types of functions in classes.
CO3	Apply inheritance and its types in real time problems.
CO4	Implement concept of polymorphism to perform different types of bindings.
CO5	Create application using I/O and file handling with exception handling.

Subject/Code No: Software Engineering (3CDS4-07)

LTP: 3+0+0 Semester: III

Course Outcome

CO Number	CO Definition
CO1	Decompose the given project in various phases of a lifecycle.
CO2	Choose appropriate process model depending on the user requirements.
CO3	Perform various life cycle activities like Analysis, Design, Implementation, Testing and Maintenance.
CO4	Know various processes used in all the phases of the product.
CO5	Analyse the knowledge, techniques, and skills in the development of a software product.



Subject/Code No: Data Structures & Algorithms Lab (3CDS4-21)

LTP: 0+0+3 Semester: III

Course Outcome

CO Number	CO Definition
CO1	Understand and examine the concept of array & its storage
CO2	Illustrate the implementation of basic data structure using an array.
CO3	Analyse and compare different searching and sorting techniques
CO4	Develop programs to perform operations on Non-linear Data Structures such as Tree and Graphs
CO5	Design and use different sorting algorithms

Subject/Code No: Object Oriented Programming Lab (3CDS4-22)

LTP: 0+0+3 Semester: III

Course Outcome

CO Number	CO Definition
CO1	Understand the concept of C++ programming language while evaluating different access specifiers to define member function.
CO2	Implement memory allocation techniques and various inbuilt functions.
CO3	Know inheritance and analyse the types of inheritance.
CO4	Apply the concept of polymorphism to perform different types of bindings.
CO5	Develop and use of application related to I/O and file handling with exception handling.

Subject/Code No: Software Engineering Lab (3CDS4-23)

LTP: 0+0+3 Semester: III

Course Outcome

CO Number	CO Definition
CO1	Understand the software engineering methodologies involved in the phases for project development.
CO2	Know about open-source tools used for implementing software engineering methods.
CO3	Develop product-startups implementing software process models in software engineering methods.
CO4	Understand Open-source Tools: StarUML / UMLGraph / Topcased.
CO5	Discuss and Analyse how to develop software requirements specifications for a given problem.



Subject/Code No: Digital Electronics Lab (3CDS4-24)

LTP: 0+0+3 Semester: III

Course Outcome

CO Number	CO Definition
CO1	List different types of logic gates, identify their ICs and also verify their truth tables.
CO2	Demonstrate the functioning of basic logic gates, adder, and subtractor using universal gates.
CO3	Design a combinational circuit using MSI devices and verify its functionalities.
CO4	Develop various sequential circuit using Flip Flops and verify its functionalities.
CO5	Formulate Various types of counters, Shift registers SISO, SIPO, PISO, PIPO using Flip-Flops and verify its functionalities using simulation tool

Subject/Code No: Industrial Training (3CDS7-30)

LTP: 0+0+3 Semester: III

Course Outcome

CO Number	CO Definition
CO1	Compose an interest in research-oriented fields and develop the ability to research for literature and prepare brief report
CO2	Identify the skills, competencies and points of view needed by professionals in the field most closely related to the course
CO3	Discuss and identify about topics of current intellectual importance
CO4	Develop the communication skills and awareness about the industrial environment.
CO5	Revise Skill development for presentation.

Subject/Code No: Discrete Mathematical Structures (4CDS2-01)

LTP: 3+0+0 Semester: IV

Course Outcome

CO Number	CO Definition
CO1	Explain the various fundamental concepts of the Set theory and Logics.
CO2	Illustrate the concept of relations and Diagraph to analyse the area of greatest impact for improvement.
CO3	Create the application part of lattices in distributed computing and Data mining.
CO4	Implementation of Graphs and their application in real time problem
CO5	Analyse the concept of Algebraic Structures.



Subject/Code No: Managerial Economics & Financial Accounting (4CDS1-03)

LTP: 2+0+0 Semester: IV

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.

Subject/Code No: Microprocessors & Interfaces (4CDS3-04)

LTP: 3+0+0 Semester: IV

Course Outcome

CO Number	CO Definition
CO1	Discuss working of functional components of computer system.
CO2	Demonstrate an overall functional structure of the Microprocessor.
CO3	Explain how interrupts are used to implement I/O control and data transfers.
CO4	To learn the design aspects of I/O and Memory Interfacing circuits.
CO5	Implement their practical approach through laboratory experiments.

Subject/Code No: Database Management System (4CDS4-05)

LTP: 3+0+0 Semester: IV

Course Outcome

CO Number	CO Definition
CO1	Develop database using E-R diagram to represent simple database application scenarios.
CO2	Identify data from database using query language.
CO3	Apply normalization process to refine database schema.
CO4	Describe transaction processing and Serializability.
CO5	Interpret the concept of Concurrency Control and concept of Failure and Recovery.



Subject/Code No: Theory of Computation (4CDS4-06)

LTP: 3+0+0 Semester: IV

Course Outcome

CO Number	CO Definition
CO1	Analyse the concept of Finite Automata and distinguish between Non- Deterministic Finite Automata and Deterministic Finite Automata. Analyse regular sets and its properties. Composition of Regular Expression from Finite Automata and vice-versa.
CO2	Understand the Context Free Grammar and its simplification.
CO3	Asses the Context Free Language and generation of Push Down Automata for Context Free Grammar.
CO4	Know the Turing Machine and its various types. Discuss the Hierarchy of formal languages.
CO5	Evaluating the P, NP, NP complete, NP hard problems with the help of examples.

Subject/Code No: Data Communication and Computer Networks (4CDS4-07)

LTP: 3+0+0 Semester: IV

Course Outcome

CO Number	CO Definition
CO1	Describe the concept of signals and illustrate the functionality of OSI & TCP/IP reference model.
CO2	Explain channel allocation, framing, flow control, and error control mechanisms and apply them using data link layer protocols.
CO3	Determine the function of network layer, design subnets and calculate IP addresses for a network.
CO4	Illustrate and Analyse different transport layer protocols and functions.
CO5	Analyze the different protocols at Application layer.

Subject/Code No: Microprocessor and Interface Lab (4CDS4-21)

LTP: 0+0+2 Semester: IV

Course Outcome

CO Number	CO Definition
CO1	Knowing and apply the fundamentals of assembly level programming of microprocessors and microcontroller.
CO2	Implement standard microprocessor real time interfaces including GPIO, serial ports, digital-to-analog converters and analog-to-digital converters.
CO3	Interpret Troubleshoot interactions between software and hardware.
CO4	Analyze abstract problems and apply a combination of hardware and software to address the problem.
CO5	Use standard test and measurement equipment to evaluate digital interfaces.



Subject/Code No: Data Base Management System Lab (4CDS4-22)

LTP: 0+0+3 Semester: IV

Course Outcome

CO Number	CO Definition
CO1	Know how to make database schema for given scenarios
CO2	Apply Keys and Constraints on database using RDBMS.
CO3	Formulate aggregate functions
CO4	Compose pl/sql including stored procedures, stored functions, cursors concept
CO5	Develop Triggers, SQL and Procedural interfaces

Subject/Code No: Network Programming Lab (4CDS4-23)

LTP: 0+0+3 Semester: IV

Course Outcome

CO Number	CO Definition
CO1	Describe the functioning of various networking equipment's and Standard Network Topologies
CO2	Explain and Define the LAN Installation and Configurations techniques
CO3	Design code for various Error correcting techniques and framing methods through C Language
CO4	Analyze and verify client and server involving UDP/TCP sockets using Socket Programming.
CO5	Demonstrate and determine the Communication Models between client and server using Network Simulator.

Subject/Code No: Linux Shell Programming Lab (4CDS4-24)

LTP: 0+0+3 Semester: IV

Course Outcome

CO Number	CO Definition
CO1	Know and apply Key Concepts and Commands for Shell Programming
CO2	Analyze the different security measures that can be implemented to protect the directory structure
CO3	Define Approaches to Mastering Shell Quoting Mechanisms
CO4	Evaluate Patterns with simple Regular Expressions using Filters using various Command
CO5	Explain how to use scripting to enhance command output.

Subject/Code No: Java Lab (4CDS4-25)

LTP: 0+0+2 Semester: IV

Course Outcome

CO Number	CO Definition
CO1	Use the syntax and semantics of java programming language and basic concepts of OOP.
CO2	Develop reusable programs using the concepts of inheritance, polymorphism, interfaces and packages.
CO3	Apply the concepts of Multithreading and Exception handling to develop efficient and error free codes.
CO4	Design event driven GUI and web related applications which mimic the real word scenarios.
CO5	Design the applications using applets and use of graphics in java.



Subject/Code No: Data Mining (5CDS3-01)

LTP: 3+0+0 Semester: V

Course Outcome

CO Number	CO Definition
CO1	Know the Mathematical Foundations to Data Mining Tools
CO2	Apply Classical Models and Algorithms in Data Mining
CO3	Categorize Patterns through Association Rule Mining, Classification, and Clustering
CO4	Employ Appropriate Data Mining Algorithms for Practical Problem Solving
CO5	Analyze Data Mining Trends and Impacts

Subject/Code No: Compiler Design (5CDS4-02)

LTP: 3+0+0 Semester: V

Course Outcome

CO Number	CO Definition
CO1	Illustrate all phases of the Compiler and analyse it's the functioning
CO2	Determine the Parsing algorithms and various error handling in parser
CO3	Analyse the syntax directed definition and all types of Intermediate code generations.
CO4	Classify various type of storage organization techniques and symbol list.
CO5	Explain all code generation, block control graphs and Source-code optimization techniques

Subject/Code No: Operating System (5CDS4-03)

LTP: 3+0+0 Semester: V

Course Outcome

CO Number	CO Definition
CO1	Memorise the fundamental concepts of operating systems, processes, and process synchronization.
CO2	Explain different approaches to memory management.
CO3	Analyze and design deadlock detection and prevention techniques as well as device management.
CO4	Recognize and describe the structure of file systems and directories.
CO5	Discuss different case studies of operating systems.

Subject/Code No: Data Visualization - R Programming / Power BI (5CDS-04)

LTP: 3+0+0 Semester: V

Course Outcome

CO Number	CO Definition
CO1	Understand the basic concepts of Data Science, its lifecycle, and the role of data visualization in analysis and decision-making.
CO2	Apply data cleaning, transformation, and exploratory data analysis (EDA) using R.
CO3	Evaluate advanced statistical analysis methods and create interactive web applications using R and Shiny.
CO4	Create interactive dashboards in Power BI for effective data storytelling and decision-making.
CO5	Analyze advanced visualization techniques and integrate R with Power BI to develop comprehensive data analysis projects, adhering to ethical practices.



Subject/Code No: Analysis of Algorithm (5CDS4-05)

LTP: 3+0+0 Semester: V

Course Outcome

CO Number	CO Definition
CO1	Argue the correctness of algorithms using inductive proofs and Analyze worst-case running times of algorithms using asymptotic analysis.
CO2	Explain important algorithmic design paradigms and apply when an algorithmic design situation calls for it.
CO3	Explain the major graph algorithms and Employ graphs to model engineering problems, when appropriate.
CO4	Compare between different data structures and pick an appropriate data structure for a design situation.
CO5	Describe the classes P, NP, and NP Complete and be able to prove that a certain problem is NP-Complete.

Subject/Code No: Fundamentals of Blockchain (5CDS5-11)

LTP: 3+0+0 Semester: V

Course Outcome

CO Number	CO Definition
CO1	Describe the basics of Blockchain, notation of Distributed Systems in Blockchain and analyse various problems.
CO2	Discuss about Technology Stack of Blockchain with Protocols and analyse the feature of crypto Currency.
CO3	Explain and illustrate the essential components of a blockchain platform.
CO4	Determine and analyse the various Blockchain Technology.
CO5	Illustrate various Types of Consensus Algorithms

Subject/Code No: Probability and Statistics for Data Science (5CDS5-12)

LTP: 3+0+0 Semester: V

Course Outcome

CO Number	CO Definition
CO1	Gain Familiarity: with diverse data collection methods and develop proficiency in basic data visualization techniques. Understand measures of central tendency, dispersion, skewness, and kurtosis, and learn to interpret them
CO2	Develop Understanding: of fundamental probability concepts and the ability to calculate probabilities for different events.
CO3	Acquire Understanding: of various types of random variables, grasp the concepts of conditional probability, and distinguish between univariate and bivariate probability distributions. Learn about transforming continuous random variables and their practical applications
CO4	Acquire Knowledge: about the characteristics of random variables, including expectation and variance. Learn to compute various generating functions
CO5	Learn Hypothesis Testing: principles and techniques, and develop proficiency in analyzing hypotheses and their outcomes.



Subject/Code No: Programming for Data Science (5CDS5-13)

LTP: 3+0+0 Semester: V

Course Outcome

CO Number	CO Definition
CO1	To know the mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
CO2	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
CO3	Use designed solutions for complex engineering problems and designed 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.
CO4	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.
CO5	Apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

Subject/Code No: R Programming Lab (5CDS-21)

LTP: 0+0+3 Semester: V

Course Outcome

CO Number	CO Definition
CO1	To know the mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
CO2	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
CO3	Use designed solutions for complex engineering problems and designed 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.
CO4	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.
CO5	Apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

Subject/Code No: Compiler Design Lab (5CDS4-22)

LTP: 0+0+3 Semester: V

Course Outcome

CO Number	CO Definition
CO1	Understand Lexical analyzer and use this knowledge to implement its various sub-functions for any regular language.
CO2	Design and code of Symbol Table in C language.
CO3	Verify the code for Lexical analyzer for given language using C and LEX tools.
CO4	Apply the Code of YACC Program for identification of strings and Operators.
CO5	Analyze context free grammar and Code for First and Follows using programming language C.



Subject/Code No: Industrial Training (5CDS7-30)

LTP: 0+0+3 Semester: V

Course Outcome

CO Number	CO Definition
CO1	Participate in the projects in industries during his or her industrial training.
CO2	Describe use of advanced tools and techniques encountered during industrial training and visit.
CO3	Interact with industrial personnel and follow engineering practices and discipline prescribed in industry.
CO4	Develop awareness about general workplace behavior and build interpersonal and team skills.
CO5	Prepare professional work reports and presentations.

Subject/Code No: Digital Image Processing (6CDS3-01)

LTP: 3+0+0 Semester: VI

Course Outcome

CO Number	CO Definition
CO1	Describe digital image, digital image representation and need of digital image processing.
CO2	Applying different type of transformation and filtering techniques on an image.
CO3	Identify various noise models and evaluate the values for restoration and degradation models.
CO4	Analyze various image compression techniques.
CO5	Analyze and evaluate various Image Transformation and Segmentation Techniques

Subject/Code No: Machine Learning (6CDS4-02)

LTP: 3+0+0 Semester: VI

Course Outcome

CO Number	CO Definition
CO1	Apply the supervised machine learning algorithms to perform real-time data analysis and generate predictions
CO2	Know and apply real-time data analysis through the use of unsupervised machine learning algorithms like clustering and association mining
CO3	Evaluate feature extraction & selection methods and select appropriate machine learning model
CO4	Analyze various semi supervised learning & reinforcement learning algorithms
CO5	Use advance concepts like recommender system and deep learning



Subject/Code No: Information System Security (6CDS4-03)

LTP: 3+0+0 Semester: VI

Course Outcome

CO Number	CO Definition
CO1	Analyse and determine for any organization the security requirements and appropriate solutions.
CO2	Protect system from different types of threats, malicious software's vulnerabilities and attacks.
CO3	Describe symmetric and public key encryption algorithms like DES, AES, RSA etc
CO4	Identify ethical, professional responsibilities, risks and liabilities in computer and network environment, and best practices to write security policy.
CO5	Distinguish and analyse available network and protocols such as SSL, IPSes, TLS, etc.

Subject/Code No: Computer Architecture and Organization (6CDS4-04)

LTP: 3+0+0 Semester: VI

Course Outcome

CO Number	CO Definition
CO1	Illustration of basics of Data representations, different operations, Analyse basics of computer architecture and design of basic computer
CO2	describe & implement different processing techniques to optimize assembly language programs
CO3	Analyse & differentiate basics of data transfer in different memory, RISC & CISC characteristics
CO4	Use arithmetic operations and input/output organisation and interface
CO5	know various memories, storage and communication techniques within them and with processor

Subject/Code No: Artificial Intelligence (6CDS4-05)

LTP: 3+0+0 Semester: VI

Course Outcome

CO Number	CO Definition
CO1	Understand and use various types of logic and knowledge representation schemes.
CO2	Implementation of AI concepts in game playing
CO3	Use of logics, calculus, theorems & probability to enhance knowledge and reasoning
CO4	Evaluate the various Supervised and Unsupervised Learning algorithms using appropriate Dataset
CO5	Design and evaluate Deep learning Algorithms



Subject/Code No: Cloud Computing (6CDS4-06)

LTP: 3+0+0 Semester: VI

Course Outcome

CO Number	CO Definition
CO1	Know the nutshell of Cloud Computing from scratch.
CO2	Discuss the model, types of clouds, various service models, programming concepts and design architecture of cloud computing.
CO3	Know the Virtualization Technology, virtualization of various components of cloud and its implementation level.
CO4	Evaluate security issues, threats, challenges and security architecture for Data, Data Centre and Cloud Services as well as disaster recovery of Data.
CO5	Describe various cloud platforms in IT industry like AWS, Microsoft Azure.

Subject/Code No: Artificial Neural Network (6CDS5-11)

LTP: 3+0+0 Semester: VI

Course Outcome

CO Number	CO Definition
CO1	Discussion on neural network and different learning techniques
CO2	Use different kind of loss functions and optimizations
CO3	Interpret and apply Back Propagation algorithm In Neural Network
CO4	Knowing of Self-Organization Maps
CO5	Identifying and analyze Dynamical Models and Hopfield Models

Subject/Code No: Nature Inspired Computing (6CDS-12)

LTP: 3+0+0 Semester: VI

Course Outcome

CO Number	CO Definition
CO1	Understand fundamental concepts of NP (nondeterministic polynomial time) -hardness and computational complexity
CO2	Understand the strengths, weaknesses and appropriateness of nature-inspired algorithms.
CO3	Apply nature-inspired algorithms to optimization, design and learning problems.
CO4	Analyze the behavior systems of nature inspired algorithm applied in real world problems.
CO5	Understand the theory behind the design of immune networks and DNA computing and their potential applications.



Subject/Code No: Big Data Analytics & Hadoop (6CDS-13)

LTP: 3+0+0 Semester: VI

Course Outcome

CO Number	CO Definition
CO1	Understand the fundamental characteristics of big data (volume, velocity, variety, veracity) and explain their impact on various industries.
CO2	Evaluate different data storage and processing techniques within Hadoop for efficient management and analysis of big data.
CO3	Analyze the broader Hadoop ecosystem, including components such as HBase, Hive, Pig, and Spark, and understand their respective roles in data processing.
CO4	Apply data preprocessing techniques such as cleaning, transformation, and feature extraction to prepare data for analysis.
CO5	Apply advanced big data analytics techniques using Apache Spark's MLlib (Machine Learning Library) and GraphX to solve complex real-world problems in a capstone project.

Subject/Code No: Digital Image Processing Lab (6CDS4-21)

LTP: 0+0+3 Semester: VI

Course Outcome

CO Number	CO Definition
CO1	Apply a proper image enhancement technique for given a set of noisy images.
CO2	Able to design and implement the various Linear filtering methods for image enhancement.
CO3	Implement the different Geometric transformations on images and understand two-dimensional Fourier transform.
CO4	Develop any application using different image processing techniques.
CO5	To learn the spatial and frequency domain techniques of image compression.

Subject/Code No: Machine Learning Lab (6CDS4-22)

LTP: 0+0+3 Semester: VI

Course Outcome

CO Number	CO Definition
CO1	Know the filtration of data to get the desired results in data analysis
CO2	Apply machine learning models as per the real-life problem statements
CO3	Use of supervised and unsupervised learning algorithms
CO4	Develop neural networks for learning non-linear functions in Python
CO5	Apply Machine Learning algorithms and Neural Networks to solve real world problems



Subject/Code No: Python Lab (6CDS4-23)

LTP: 0+0+3 Semester: VI

Course Outcome

CO Number	CO Definition
CO1	Know the fundamental data types of python.
CO2	Apply knowledge of if-else, while and for loop for decision control.
CO3	Understand various methods to manipulate String.
CO4	know functions and file handling in python.
CO5	Implement sorting algorithms for various scenarios.

Subject/Code No: Mobile Application Development Lab (6CDS4-24)

LTP: 0+0+3 Semester: VI

Course Outcome

CO Number	CO Definition
CO1	Know the components and structure of mobile application development frameworks for Android and windows OS-based mobiles.
CO2	Understand how to work with various mobile application development frameworks
CO3	Apply the basic and important design concepts and issues of development of mobile applications.
CO4	Implement activities with dialogs, spinner, fragments, and navigation drawer by applying themes
CO5	Develop mobile applications using SQLite.



Bachelor of Technology Computer Engineering (Indian Language)

Program Name: Computer Engineering (Indian Language)

Session: 2024-25

Subject/Code No: 3CSR2-01/Advanced Engineering Mathematics

Semester: 3rd LTP: 3L+0T+0P

Course Outcome

CO Number	CO Definition
C01	Recall and understand the fundamental concepts of probability and standard distributions which can describe real life phenomenon.
C02	Analyze the various method of numerical solutions of Normal, Poisson and Binomial probability distribution.
C03	Formulate the optimization problems in mathematical form with classification.
C04	Interpret non-linear optimization problems and solve by appropriate methods.
C05	Demonstrate linear optimization problems and solve by standard methods.

Subject/Code No: 3CSR1-02: Technical Communication

Semester: 3rd Semester LTP: 2L+0T+0P

Course Outcome

CO Number	CO Definition
C01	Understand the process of technical communication in terms of LSRW.
C02	Apply the concept of Technical Materials/Texts in various technical documents.
C03	Enhance the skills in the process of technical communication in terms of LSRW.
C04	Implement the basic concepts of technical communication in Technical Reports, articles and their formats.

Subject/Code No: 3CSR3-04/Digital Electronics

Semester: 3rd Semester LTP: 3L+0T+0P

Course Outcome

CO Number	CO Definition
C01	Demonstrate basic principles of digital circuits and different number systems
C02	Distinguish logic expressions and circuits using Boolean laws and K-map
C03	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.
C04	Design various types of memory less element digital electronic circuits for particular operation within the realm of economic, performance, efficiency, user friendly and environmental constraints.
C05	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: 3CSR4-05/Data Structures and Algorithms

Semester: 3rd LTP: 3L+0T+0P

Course Outcome

CO Number	CO Definition
C01	Recognize fundamental Stack operations to address a range of engineering problems.
C02	Relate the principles of Queues and Linked Lists to offer solutions for computer-based issues.
C03	Discover different Search and Sorting methods to rationalize their application in diverse scenarios.
C04	Practice the concept of Trees and their operations to furnish valid solutions.
C05	Compare a variety of techniques that can be employed with Graphs and Hashing.

Subject/Code No: 3CSR4-06/Object Oriented Programming

Semester: 3rd Semester LTP: 3L+0T+0P

Course Outcome

CO Number	CO Definition
C01	Describe the Object-Oriented Programming paradigm with the concept of objects and classes.
C02	Explain the memory management techniques using constructors, destructors and pointers
C03	Classify and demonstrate the various Inheritance techniques.
C04	Understand how to apply polymorphism techniques on the object-oriented problem.
C05	Summarize the exception handling mechanism, file handling techniques and Use of generic programming in Object oriented programming

Subject/Code No: 3CSR4-07/Software Engineering

Semester: 3rd LTP: 3L+0T+0P

Course Outcome

CO Number	CO Definition
C01	Recognize different software life cycle models and testing techniques to develop real time projects.
C02	Identify cost estimation and risk analysis in project management.
C03	Interpret and deduce the engineering process of software requirement analysis.
C04	Apply procedural design methods to architect software systems.
C05	Collaborate the concept of object-oriented analysis and design in software development process.



Subject/Code No: 3CSR4-21/Data Structures and Algorithms Lab

Semester: 3rd Semester LTP: 0L+0T+3P

Course Outcome

CO Number	CO Definition
CO1	Recognize fundamental Stack and Queue operations to address a range of engineering problems.
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 scenarios.
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: 3CSR4-22/Object Oriented Programming Lab

Semester: 3rd Semester LTP: 0L+0T+3P

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	Apply object-oriented programming concepts using class and objects
CO4	Analyse and apply the generic classes concepts in programming problem
CO5	Illustrate and evaluate the file Input Output mechanisms

Subject/Code No: 3CSR4-23/Software Engineering Lab

Semester: 3rd Semester LTP: 0L+0T+3P

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: 3CSR4-24/Digital Electronics Lab

Semester: 3rd Semester LTP: 0L+0T+3P

Course Outcome

CO Number	CO Definition
C01	Demonstrate the basics of logic gates
C02	Demonstrate basic combinational circuits and verify their functionalities
C03	Apply the working mechanism and design guidelines of different sequential circuits in the digital system design
C04	Construct different types of counter for real time digital systems
C05	Distinguish the different types of shift registers

Subject/Code No: 4CSR2-01/Discrete Mathematics Structure

Semester: 4th Semester LTP: 3L+0T+0P

Course Outcome

CO Number	CO Definition
C01	Demonstrate the basics of logic gates
C02	Demonstrate basic combinational circuits and verify their functionalities
C03	Apply the working mechanism and design guidelines of different sequential circuits in the digital system design
C04	Construct different types of counter for real time digital systems
C05	Distinguish the different types of shift registers

Subject/Code No: 4CSR1-03/Managerial Economics and Financial Accounting

Semester: 4th Semester LTP: 2L+0T+0P

Course Outcome

CO Number	CO Definition
C01	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.
C02	Calculate and classify the domestic product, national product and elasticity of price on demand and supply.
C03	Draw the cost graphs, revenue graphs and forecast the impact of change in price in various perfect as well as imperfect market structures.
C04	Compare the financial statements to interpret the financial position of the firm and evaluate the project investment decisions.



Subject/Code No: 4CSR3-04/Microprocessor & Interfaces

Semester: 4th Semester LTP: 3L+0T+0P

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: 4CSR4-05/Database Management System

Semester: 4th Semester LTP: 3L+0T+0P

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: 4CSR4-06/Theory of Computation

Semester: 4th Semester LTP: 3L+0T+0P

Course Outcome

CO Number	CO Definition
CO1	Understand the process of technical communication in terms of LSRW.
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: 4CSR4-07/Data Communication and Computer Networks

Semester: 4th Semester LTP: 3L+0T+0P

Course Outcome

CO Number	CO Definition
C01	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.
C02	State and cite mathematical problems for data-link and network protocols.
C03	Use network layer protocols and calculate number of subnets required for a network.
C04	Compute the reliability of data transfer over transport layer by lossy channel bit errors problem.
C05	Select and plan for common services, system services, such as name and address lookups, and communications applications.

Subject/Code No: 4CSR4-21/Microprocessor & Interfaces Lab

Semester: 4th Semester LTP: 0L+0T+2P

Course Outcome

CO Number	CO Definition
C01	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.
C02	State and cite mathematical problems for data-link and network protocols.
C03	Use network layer protocols and calculate number of subnets required for a network.
C04	Compute the reliability of data transfer over transport layer by lossy channel bit errors problem.
C05	Select and plan for common services, system services, such as name and address lookups, and communications applications.

Subject/Code No: 4CSR4-22/ Database Management System Lab

Semester: 4th Semester LTP: 0L+0T+3P

Course Outcome

CO Number	CO Definition
C01	Create and execute a database schema for a specified problem domain
C02	Manage integrity constraints within a database using a relational database management system (RDBMS).
C03	Construct and devise a graphical user interface (GUI) application using a fourth-generation programming language (4GL).
C04	Composing PL/SQL code encompassing stored procedures, stored functions, cursors, and packages.
C05	Produce SQL and Procedural interfaces to SQL comprehensively.



Subject/Code No: 4CSR4-23/ Network Programming Lab

Semester: 4th Semester LTP: 0L+0T+3P

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	Practise 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: 4CSR4-24/ Linux Shell Programming Lab

Semester: 4th Semester LTP: 0L+0T+2P

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 and files.
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: 4CSR4-25/Java Lab

Semester: 4th Semester LTP: 0L+0T+2P

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/5CSR3-01

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/5CSR4-02

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/5CSR4-03

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/5CSR4-04

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/5CSR4-05

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)/5CSR5-11

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: HCI (Elective)/5CSR5-12

LTP: 2L+0T+0P Semester: 5th

Course Outcome

CO Number	CO Definition
CO1	Explain the key principles and concepts of Human-Computer Interaction (HCI).
CO2	Evaluate and compare different models and their applications in HCI
CO3	To assess and apply HCI guidelines and evaluation methods to make informed judgments about the usability and user experience of interactive systems.
CO4	To understand, analyze, and apply various research methods in HCI
CO5	To use various task modeling and formalism techniques and understanding the foundational concepts of CA.

Subject/Code No: Computer Graphics & Multimedia Techniques Lab/5CSR4-21

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/5CSR4-22

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/5CSR4-23

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/5CSR4-24

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/6CSR3-01

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/6CSR4-02

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/6CSR4-03

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/6CSR4-04

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/6CSR4-05

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/6CSR4-06

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/6CSR5-11

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/6CSR5-13

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/6CSR4-21

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/6CSR4-22

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/6CSR4-23

LTP: 0L+0T+3P Semester: 6th

Course Outcome

CO Number	CO Definition
C01	List various data types in python and use them to solve basic python programs.
C02	Describe Conditional statements and Looping structures concepts in python and apply these to create searching and sorting programs.
C03	Explain usage of List, Tuples, Set, Dictionary and Strings and use these to solve programming problems in different ways.
C04	Discuss file handling concepts and apply them to create basic data handling programs.
C05	Understand various built-in python functions and formulate user-defined functions.

Subject/Code No: Mobile Application Development Lab/6CRS4-24

LTP: 0L+0T+3P Semester: 6th

Course Outcome

CO Number	CO Definition
C01	Construct fundamental concepts of Android programming.
C02	Construct diverse Android applications focusing on layouts and immersive interactive interfaces.
C03	Build Android applications centered around server less mobile databases such as SQLite.
C04	Demonstrate an application that records data onto the SD card.
C05	Design a compact Android Studio application.

Subject/Code No: 7CSR4-01/Internet of Things

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

Course Outcome

CO Number	CO Definition
C01	Recognize the fundamental idea behind the Internet of Things (IoT).
C02	Apply the connection of diverse sensors to Arduino/Raspberry Pi.
C03	Execute wireless data transmission among distinct devices.
C04	Display proficiency in transferring sensor data to and from cloud-based servers.
C05	Evaluate the transformative impact of the Internet on Mobile Devices, Cloud Computing, and Sensor Networks.



Subject/Code No: 7AG6-60.2/Environmental Engineering and Disaster Management

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

Course Outcome

CO Number	CO Definition
CO1	State the natural environment and its relationships with human activities and realize the importance of ecosystem and biodiversity for maintaining ecological balance and know the objective and scope of the course.
CO2	Examine different types of pollutants, their distinguishing traits, and comprehend the significance of ensuring a secure water supply system and water quality.
CO3	Evaluate strategies for managing solid waste, examining its attributes and the repercussions of solid waste on the environment. Assess both the quantity and attributes of solid waste, as well as its proper disposal methods. Recognize the significance of sanitation within this context.
CO4	Assess the factors influencing the volume and attributes of wastewater, and analyze the processes involved in its treatment.
CO5	Generalize various types of Disasters and their social and environmental impact and the associated risk and vulnerability and plan the disaster management.

Subject/Code No: 7CSR4-21/Internet of Things Lab

Semester: 7th Semester LTP: 0L+0T+4P

Course Outcome

CO Number	CO Definition
CO1	Recognize the constituent Components within IoT Architecture.
CO2	Construct connections between Devices and Sensors, applying theoretical understanding.
CO3	Implement wireless data transmission techniques among various devices.
CO4	Evaluate and select appropriate IoT Devices and Sensors based on provided Case Studies.
CO5	Execute the upload and download of sensor data on cloud and server, culminating in a comprehensive and proficient utilization demonstration.

Subject/Code No: 7CSR4-22/Cyber Security Lab

Semester: 7th Semester LTP: 0L+0T+4P

Course Outcome

CO Number	CO Definition
CO1	Utilizing substitution and transposition techniques to achieve encryption and decryption of plain text, demonstrating comprehension and practical application.
CO2	Design a solution for Key Exchange problem and understand the general attacks on system
CO3	Analyse the data transferred in client server communication and working of various network protocol
CO4	Understand security-based tools like Wire shark, tcp dump, rootkits, snort etc.
CO5	Apply encryption, decryption techniques for secure data transmission, and digital signature generation, demonstrating understanding and application.



Subject/Code No: 8CSR4-01/Big Data Analytics

Semester: 8th Semester LTP: 3L+0T+0P

Course Outcome

CO Number	CO Definition
CO1	Classify the building blocks of Big Data and review the growing field of Big Data Analytics.
CO	Compose the algorithm of data intensive problem using map reduce example
CO3	Study and implement Writable Classes in Hadoop I/O
CO4	Design and Implementation of Big Data Analytics using pig to solve data intensive problems and to generate analytics
CO5	Implement Big Data Activities using Hive.

Subject/Code No: 8TT6-60.2/Disaster Management

Semester: 8th Semester LTP: 3L+0T+0P

Course Outcome

CO Number	CO Definition
CO1	Discuss the practicalities of hazards, disasters with associated natural/social phenomena Understand this with disaster management theory (cycle, phases)
CO2	List the existing global frameworks and existing agreements (e.g. Sendai)
CO3	Choose a methods of community involvement as an essential part of successful DRR. Humanitarian Assistance/Support before and after disaster
CO4	Technological innovations in Disaster Risk Reduction: Advantages and problems.
CO5	Experience on conducting independent DM study including data search, analysis and presentation of disaster case study.

Subject/Code No: 8CSR4-21/Big Data Analytics Lab

Semester: 8th Semester LTP: 0L+0T+2P

Course Outcome

CO Number	CO Definition
CO1	Summarize and implement the basic data structure algorithms like Linked list, stack, queue, set and map in Java.
CO2	Illustrate the knowledge and implement different file management in Hadoop.
CO3	Discuss the example of map reduces and develop the data application using variety of system
CO4	Evaluate and perform different operation on Data using Pig Latin
CO5	Illustrate different operations on relations and databases using Hive.



Subject/Code No: 8CSR4-22/Software Testing & Validation Lab

Semester: 8th Semester LTP: 0L+0T+2P

Course Outcome

CO Number	CO Definition
C01	Understand the Automation Testing Approach using various tool
C02	Analyse & discuss the performance of different websites using JMeter
C03	Calculate the coverage analysis of programs using Eclemma tool.
C04	Describe & calculate the mutation score for various programs using jumble testing tool.
C05	Generate Test sequences and compare using Selenium tool for different websites.



Bachelor of Internet of Things

Program Name: Internet of Things

Session: 2024-25

Subject/Code No: Advanced Engineering Mathematics/3CIT2-01

Semester: 3rd LTP: 3+0+0

Course Outcome

CO Number	CO Definition
CO1	Understand and remember the basic principles of probability and standard distributions that can explain real-life phenomena.
CO2	Analyze the various method of numerical solutions of Normal, Poisson and Binomial probability distribution
CO3	Express the optimization problems mathematically, including their classification.
CO4	Analyze non-linear optimization problems and solve them using suitable methods.
CO5	Show how to solve linear optimization problems using standard methods.

Subject/Code No: Technical Communication 3CIT1-02/4CS1-02

Semester: 3rd LTP: 3+0+0

Course Outcome

CO Number	CO Definition
CO1	Understand the process of technical communication in terms of LSRW.
CO2	Apply the principles of technical materials and texts to various technical documents.
CO3	Improve skills in the process of technical communication, focusing on Listening, Speaking, Reading, and Writing (LSRW).
CO4	Apply the basic concepts of technical communication to technical reports, articles, and their formats.
CO5	Evaluate the effectiveness of technical reports, proposals, and articles in conveying technical information and achieving their intended purposes

Subject/Code No: Digital Electronics 3CIT3-04

Semester: 3rd LTP: 3+0+0

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 3CIT4-05

Semester: 3rd LTP: 3+0+0

Course Outcome

CO Number	CO Definition
CO1	Recognize fundamental Stack operations to address a range of engineering problems.
CO2	Explain the concepts and applications of different types of queues such as circular queues, dequeues, and priority queues.
CO3	Discover different Search and Sorting methods to rationalize their application in diverse scenarios.
CO4	Practice the concept of Trees and their operations to furnish valid solutions.
CO5	Explain representations of Graphs and Assess collision resolution strategies like linear and quadratic probing, and double hashing in various hashing scenarios.

Subject/Code No: Object Oriented Programming 3CIT4-06

Semester: 3rd LTP: 3+0+0

Course Outcome

CO Number	CO Definition
CO1	Describe the Object Oriented Programming paradigm with the concept of objects and classes.
CO2	Explain inline functions, function overloading, and functions with default arguments in C++.
CO3	Define and Implement Inheritance, function overriding in derived classes and virtual function
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 3CIT4-07

Semester: 3rd LTP: 3+0+0

Course Outcome

CO Number	CO Definition
CO1	Define the different software life-cycle models, software requirements specification, formal requirements specification, verification, and validation
CO2	Explain the objectives of software project management, resource estimation methods, LOC and FP estimation, effort estimation, the COCOMO model.
CO3	Interpret and deduce the engineering process of software requirement analysis.
CO4	Analyze the fundamentals of software design, principles of effective modular design, and the creation of data, architectural, and procedural designs, including the preparation of design documentation.
CO5	Collaborate the concept of object-oriented analysis and design in software development process.



Subject/Code No: Data Structures and Algorithms Lab 3CIT4-21

Semester: 3rd LTP: 0+0+3

Course Outcome

CO Number	CO Definition
CO1	Remember the concepts of array storage and size of a word in C programming and Recall the differences between row major and column major storage in multi-dimensional arrays.
CO2	Understand the implementation of stack, queue, circular queue, and de-queue using a one-dimensional array.
CO3	Discover different Search and Sorting methods to rationalize their application in diverse scenarios.
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 3CIT4-22

Semester: 3rd LTP: 0+0+3

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	Apply knowledge of constant data members and member functions, as well as static data members and member functions within a class.
CO4	Analyse and apply the generic classes concepts in programming problem
CO5	Illustrate and evaluate the file Input Output mechanisms

Subject/Code No: Software Engineering Lab 3CIT4-23

Semester: 3rd LTP: 0+0+3

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	Discuss 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 3CIT4-24

Semester: 3rd LTP: 0+0+3

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 counter for real time digital systems
CO5	Distinguish the different types of shift registers

Subject/Code No: Discrete Mathematics Structure 4CIT2-01

Semester: 4th LTP: 3+0+0

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 3CIT1-03/ 4CIT1-03

Semester: 4th LTP: 3+0+0

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	Use capital budgeting techniques to assess the viability of investment opportunities and make informed financial decisions.



Subject/Code No: Database Management System 4CIT4-05

Semester: 4th LTP: 3+0+0

Course Outcome

CO Number	CO Definition
CO1	Create a tabular representation of a Database System using an Entity Relationship Diagram (ERD) to visualize the Create a tabular representation of a Database System using an Entity Relationship Diagram (ERD) to visualize the implementation of a real-world database scenario.e implementation of a real-world database 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 4CIT4-06

Semester: 4th LTP: 3+0+0

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 4CIT4-07

Semester: 4th LTP: 3+0+0

Course Outcome

CO Number	CO Definition
CO1	Capable of identifying the principles of layered protocol architecture, recognizing and categorizing system functions within the appropriate protocol layers, and demonstrating the interactions between these layers.
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 lossy 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 4CIT4-21

Semester: 4th LTP: 0+0+3

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 programmes 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 4CIT4-22

Semester: 4th LTP: 0+0+3

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 4CIT4-23

Semester: 4th LTP: 0+0+3

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	Practise 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 4CIT4-24

Semester: 4th LTP: 0+0+3

Course Outcome

CO Number	CO Definition
C01	Summarize the concepts and commands in UNIX.
C02	Construct the directory layout of a typical UNIX system, maintain, and secure UNIX directories and files.
C03	Illustrate the knowledge to use the several shell quoting mechanisms correctly.
C04	Construct regular expression using filters and various commands to express the patterns.
C05	Write simple scripts to develop basic command output

Subject/Code No: Java Lab 4CIT4-25

Semester: 4th LTP: 0+0+3

Course Outcome

CO Number	CO Definition
C01	Express and restate fundamentals of java, and tools for program designing environments.
C02	Construct classes and implement the principles of method overloading, inheritance, and access controls within those classes.
C03	Develop Java packages and incorporate the concept of interfaces, along with importing these packages in Java.
C04	Formulate the application by managing file operations, handling exceptions, and implementing threads.
C05	Create applications utilizing Java applets and design various polygons. This task involves the application of knowledge and the synthesis of design skills



CHAPTER VIII

Program wise CO-PO Mapping

Session: 2024-25

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 MATHEMATICS I & 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	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
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	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
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 $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ solution with the help of Hypo solution, Ferrous Ammonium Sulphate solution with the help of $\text{K}_2\text{Cr}_2\text{O}_7$ solution and NaOH and Na_2CO_3 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 hardness, 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	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
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	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
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 &1/2FY3-23 LTP:0+0+3

Semester: I / II semester

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
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	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
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	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
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	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
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	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
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	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
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	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
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	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
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: Wireless Communication (Elective)/5CS5-12

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	Explain the key principles and concepts of Human-Computer Interaction (HCI)	2	3	3		2							2
CO2	Evaluate and compare different models and their applications in HCI	2	2	2	2								2
CO3	To assess and apply HCI guidelines and evaluation methods to make informed judgments about the usability and user experience of interactive systems.	2	2	3		3							
CO4	To understand, analyze, and apply various research methods in HCI	2	3	3									
CO5	To use various task modeling and formalism techniques and understanding the foundational concepts of CA	2	2	2		2							

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	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
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	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
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	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
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	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
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	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
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:7CS4-01/Internet of Things

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

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Recognize the fundamental idea behind the Internet of Things (IoT).	2	1	2	2	1		1					
CO2	Apply the connection of diverse sensors to Arduino/Raspberry Pi.	2	2		2	2							
CO3	Execute wireless data transmission among distinct devices.	2	1	2		2			1				
CO4	Display proficiency in transferring sensor data to and from cloud-based servers.	1	1	1	1	2		1	1				
CO5	Evaluate the transformative impact of the Internet on Mobile Devices, Cloud Computing, and Sensor Networks.	1	2	1	1	1	1	1	1				



Subject/Code No: 7AG6-60.2/Environmental Engineering and Disaster Management

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

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	State the natural environment and its relationships with human activities and realize the importance of ecosystem and biodiversity for maintaining ecological balance and know the objective and scope of the course.	2					2	2	3				3
CO2	Examine different types of pollutants, their distinguishing traits, and comprehend the significance of ensuring a secure water supply system and water quality.	2					3	3	1				2
CO3	Evaluate strategies for managing solid waste, examining its attributes and the repercussions of solid waste on the environment. Assess both the quantity and attributes of solid waste, as well as its proper disposal methods. Recognize the significance of sanitation within this context.	3					3	3					
CO4	Assess the factors influencing the volume and attributes of wastewater, and analyze the processes involved in its treatment.	3					2	2					2
CO5	Generalize various types of Disasters and their social and environmental impact and the associated risk and vulnerability and plan the disaster management.	2					3	3					2

Subject/Code No: 7CS4-21/Internet of Things Lab

Semester: 7th Semester LTP: 0L+0T+4P

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 constituent Components within IoT Architecture.	2	1	2	1	1		1	1	1	1	1	
CO2	Construct connections between Devices and Sensors, applying theoretical understanding.	3	2	2	2	2						3	
CO3	Implement wireless data transmission techniques among various devices.	2	2	2	3	2		2		2			
CO4	Evaluate and select appropriate IoT Devices and Sensors based on provided Case Studies.	1	3	1	1					1	1		1
CO5	Execute the upload and download of sensor data on cloud and server, culminating in a comprehensive and proficient utilization demonstration.	3	1	1	1	1		1		1		1	1



Subject/Code No: 7CS4-22/Cyber Security Lab

Semester: 7th Semester LTP: 0L+0T+4P

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Utilizing substitution and transposition techniques to achieve encryption and decryption of plain text, demonstrating comprehension and practical application.	3	3	1		3							
CO2	Design a solution for Key Exchange problem and understand the general attacks on system	3	3	1		3							
CO3	Analyse the data transferred in client server communication and working of various network protocol	3	3	3		1							1
CO4	Understand security-based tools like Wire shark, tcp dump, rootkits, snort etc.	3	3	1	3	1	3						
CO5	Apply encryption, decryption techniques for secure data transmission, and digital signature generation, demonstrating understanding and application.	3	3	2	2	2							2

Subject/Code No: 8CS4-01/Big Data Analytics

Semester: 8th Semester LTP: 3L+0T+0P

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 building blocks of Big Data and review the growing field of Big Data Analytics	2	1	1	2	2							
CO2	Compose the algorithm of data intensive problem using map reduce example	1	1	3	1	1							
CO3	Study and implement Writable Classes in Hadoop I/O	2	3	2	2	3							
CO4	Design and Implementation of Big Data Analytics using pig to solve data intensive problems and to generate analytics	2	1	3	2	1							
CO5	Implement Big Data Activities using Hive	2	2	1	2	1							

Subject/Code No: 8TT6-60.2/Disaster Management

Semester: 8th Semester LTP: 3L+0T+0P

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 practicalities of hazards, disasters with associated natural/social phenomena Understand this with disaster management theory (cycle, phases)	2	2			3		3	1		2		
CO2	List the existing global frameworks and existing agreements(e.g. Sendai)	2	2		2		1	2	1				1
CO3	Choose a methods of community involvement as an essential part of successful DRR. Humanitarian Assistance/Support before and after disaster	1	1		1		2	2	1				2
CO4	Technological innovations in Disaster Risk Reduction: Advantages and problems.	1	2					3	1		1		2
CO5	Experience on conducting independent DM study including data search, analysis and presentation of disaster case study.	2	1				2	3	1				1



Subject/Code No: 8CS4-21/Big Data Analytics Lab

Semester: 8th Semester LTP: 0L+0T+2P

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Summarize and implement the basic data structure algorithms like Linked list, stack, queue, set and map in Java.	3	3	3	3								
CO2	Illustrate the knowledge and implement different file management in hadoop	3	2	2	2	2							
CO3	Discuss the example of map reduce and develop the data application using variety of system	3	2	3	2								
CO4	Evaluate and perform different operation on Data using Pig Latin	3	3		3								
CO5	Illustrate different operations on relations and databases using Hive.	3				3							

Subject/Code No: 8CS4-22/Software Testing & Validation Lab

Semester: 8th Semester LTP: 0L+0T+2P

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 Automation Testing Approach using various tool		3			3							
CO2	Analyse & discuss the performance of different websites using JMeter		3	2		2							
CO3	Calculate the coverage analysis of programs using EclEmma tool.					3							
CO4	Describe & calculate the mutation score for various programs using jumble testing tool.	3											
CO5	Generate Test sequences and compare using Selenium tool for different websites.		3	2	2	3							



Bachelor of Technology Artificial Intelligence & Data Science

Program Name: Artificial Intelligence & Data Science
(Session: 2024-25)

Subject/Code No: Technical Communication 3AID1-02 LTP: 3+0+0

Semester: III

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
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: Advanced Engineering Mathematics 3AID2-01 LTP: 3+0+0

Semester: III

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Develop the concept of Probabilistic models and Random Variable.	3	2	3	-	2	1	-	-	-	-	-	-
CO2	Analysis through statistical methods like Normal distribution, Binomial Distribution etc.	3	3	3	3	1	1	-	-	-	-	-	-
CO3	Mathematical modeling for Industrial Problem using linear programming and solution by Graphical methods.	2	2	3	2	1	2	-	-	-	-	-	-
CO4	Finding Solution of real time problems with Mathematical modelling.	2	3	3	2	1	2	-	-	-	-	-	-
CO5	Evaluate and create model for problems related to transportation and assignment	3	1	3	1	1	1	-	-	-	-	-	-



Subject/Code No: Digital Electronics & 3AID3-04 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	Understand and apply number system in digital design	2	3	2	-	-	-	-	-	-	-	-	2
CO2	Apply the laws of Boolean algebra to represent re-present and simplify digital circuits	1	3	2	1	2	-	-	-	-	-	-	3
CO3	Calculate the parameters of logic families and define their characteristics.	2	-	3	2	3	-	-	-	-	-	-	2
CO4	Develop competence in Combinational Logic Problem formulation and Logic Optimization	1	3	3	2	2	-	-	-	-	-	-	2
CO5	Classify the different types of flip-flops and design various sequential circuits	1	3	2	1	2	-	-	-	-	-	-	2

Subject/Code No: Data Structure and Algorithms 3AID4-05 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	Know the concept of stack operations and its implementation to solve real time problems	1	2	3	-	-	1	-	-	-	-	-	-
CO2	Recognize the knowledge of Linked List and Queues to design algorithms for complex engineering tasks	3	2	2	1	-	-	-	-	-	-	-	-
CO3	Analyze and design efficient searching and sorting techniques	2	1	3	1	-	2	-	-	-	-	-	-
CO4	Evaluate problems by storing data in tree structure and performing basic operations	2	2	2	2	-	2	-	-	-	-	-	-
CO5	Apply graph concept for complex problem and understand hasing	1	3	2	1	-	1	-	-	-	-	-	-

Subject/Code No: Object Oriented Programming 3AID4-06 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	Knowing the basic knowledge of object-oriented programming language constructs.	2	3	3	2	-	-	-	-	-	-	-	-
CO2	Discussing and identifying the concept of reference, dynamic memory allocation and concept of various types of functions in classes.	2	3	3	2	-	-	-	-	-	-	-	-
CO3	Apply inheritance and it's types in real time problems.	2	3	3	2	-	-	-	-	-	-	-	-
CO4	Implement concept of polymorphism to perform different types of bindings.	1	3	3	2	-	-	-	-	-	-	-	-
CO5	Create application using I/O and file handling with exception handling.	1	3	3	2	-	-	-	-	-	-	-	-



Subject/Code No: Software Engineering 3AID4-07 LTP: 3+0+0
Semester: III

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Decompose the given project in various phases of a lifecycle.	1	1	2	2	2	-	-	-	-	2	-	2
CO2	Choose appropriate process model depending on the user requirements.	1	-	2	2	2	-	-	-	-	-	-	1
CO3	Perform various life cycle activities like Analysis, Design, Implementation, Testing and Maintenance.	1	1	2	2	1	-	-	-	-	-	2	1
CO4	Know various processes used in all the phases of the product.	2	-	3	3	-	-	-	-	-	-	2	2
CO5	Analyse the knowledge, techniques, and skills in the development of a software product.	1	2	2	1	1	-	-	-	-	-	-	1

Subject/Code No: Data Structures Lab 3AID4-21 LTP: 0+0+3
Semester: III

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Understand and examine the concept of array & its storage	2	2	3	3	2	2	-	-	-	-	-	-
CO2	Illustrate the implementation of basic data structure using an array.	2	2	3	2	-	2	-	-	-	-	-	-
CO3	Analyse and compare different searching and sorting techniques	2	3	2	2	-	2	-	-	-	-	-	-
CO4	Develop programs to perform operations on Non-linear Data Structures such as Tree and Graphs	3	3	3	1	1	1	-	-	-	-	-	-
CO5	Design and use different sorting algorithms	3	2	2	2	-	2	-	-	-	-	-	-

Subject/Code No: Object Oriented Programming Lab 3AID4-22 LTP: 0+0+3
Semester: III

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Understand the concept of C++ programming language while evaluating different access specifiers to define member function.	2	2	2	3	3	-	2	-	-	-	-	-
CO2	Implement memory allocation techniques and various inbuilt functions.	2	2	2	3	3	-	2	-	-	-	-	-
CO3	Know inheritance and analyse the types of inheritance.	2	2	2	3	3	-	2	-	-	-	-	-
CO4	Apply the concept of polymorphism to perform different types of bindings.	2	2	2	2	2	-	2	-	-	-	-	-
CO5	Develop and use of application related to I/O and file handling with exception handling.	2	2	2	2	2	-	2	-	-	-	-	-



Subject/Code No: Software Engineering Lab 3AID4-23 LTP: 0+0+3

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 software engineering methodologies involved in the phases for project development.	2	2	2	2	-	-	-	-	-	-	-	2
CO2	Know about open-source tools used for implementing software engineering methods.	1	2	2	2	2	-	-	-	-	-	-	1
CO3	Develop product-startups implementing software process models in software engineering methods.	2	2	2	2	2	-	-	-	-	-	2	-
CO4	Understand Open-source Tools: StarUML / UMLGraph / Topcased.	2	3	-	3	3	-	-	-	-	-	2	-
CO5	Discuss and analyse how to develop software requirements specifications for a given problem.	1	2	2	1	1	-	-	-	-	-	-	1

Subject/Code No: Digital Electronics Lab 3AID4-24 LTP: 0+0+3

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	List different types of logic gates, identify their ICs and also verify their truth tables.	2	2	3	-	-	-	-	-	-	-	-	2
CO2	Demonstrate the functioning of basic logic gates, adder, and subtractor using universal gates.	2	2	3	3	-	-	-	-	-	-	-	2
CO3	Design a combinational circuit using MSI devices and verify its functionalities.	3	2	3	2	-	-	-	-	-	-	-	2
CO4	Develop various sequential circuit using Flip Flops and verify its functionalities.	2	3	2	-	2	-	-	-	-	-	-	2
CO5	Formulate Various types of counters, Shift registers SISO, SIPO, PISO, PIPO using Flip-Flops and verify its functionalities using simulation tool	2	2	2	-	3	-	-	-	-	-	-	2

Subject/Code No: Industrial Training 3AID7-30 LTP: 0+0+3

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	Compose an interest in research-oriented fields and develop the ability to research for literature and prepare brief report	2	3	-	-	-	2	2	2	-	-	-	-
CO2	Identify the skills, competencies and points of view needed by professionals in the field most closely related to the course.	2	3	-	-	3	-	-	-	2	-	-	-
CO3	Discuss and identify about topics of current intellectual importance	-	-	-	1	1	2	1	-	-	-	2	-
CO4	Develop the communication skills and awareness about the industrial environment.	-	-	-	-	-	-	2	1	1	2	1	-
CO5	Revise Skill development for presentation.	-	-	3	-	3	-	-	-	-	-	3	-



Subject/Code No: Discrete Mathematical Structures 4AID2-01 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	Explain the various fundamental concepts of the Set theory and Logics.	3	2	3	1	-	1	-	-	-	-	-	-
CO2	Illustrate the concept of relations and Diagraph to analyse the area of greatest impact for improvement.	3	3	3	3	1	-	-	-	-	-	-	-
CO3	Create the application part of lattices in distributed computing and Data mining.	2	2	3	2	1	2	-	-	-	-	-	-
CO4	Implimentaion of Graphs and their application in real time problem	3	2	2	2	2	2	-	-	-	-	-	-
CO5	Analyse the concept of Algebraic Structures.	3	3	3	1	1	1	-	-	-	-	-	-

Subject/Code No: Managerial Economics and Financial Accounting 4AID1-03 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	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: Microprocessors & Interfaces 4AID3-04 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	Discuss working of functional components of computer system.	3	2	3	2	2	-	-	-	-	-	-	2
CO2	Demonstrate an overall functional structure of the Microprocessor.	2	2	1	2	2	-	-	-	-	-	-	1
CO3	Explain how interrupts are used to implement I/O control and data transfers.	2	2	2	1	2	-	-	-	-	-	-	1
CO4	To learn the design aspects of I/O and Memory Interfacing circuits.	1	2	2	2	2	-	-	-	-	-	-	1
CO5	Implement their practical approach through laboratory experiments.	2	2	1	2	2	-	-	-	-	-	-	1



Subject/Code No: Database Management System 4AID4-05 LTP: 3+0+0

Semester: IV

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Develop database using E-R diagram to represent simple database application scenarios	2	2	3	-	1	1	-	-	-	-	-	-
CO2	Identify data from database using query language	2	2	-	2	-	1	-	-	-	-	-	-
CO3	Apply normalization process to refine database schema	3	2	3	2	-	-	-	-	-	-	-	-
CO4	Describe transaction processing and Serializability	3	3	-	-	-	2	-	-	-	-	-	-
CO5	Interpret the concept of Concurrency Control and concept of Failure and Recovery	3	3	-	2	-	-	-	-	-	-	-	-

Subject/Code No: Theory of Computation 4AID4-06 LTP: 3+0+0

Semester: IV

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Analyse the concept of Finite Automata and distinguish between Non- Deterministic Finite Automata and Deterministic Finite Automata. Analyse regular sets and its properties. Composition of Regular Expression from Finite Automata and vice-versa.	1	2	2	2	-	-	-	-	-	-	-	-
CO2	Understand the Context Free Grammar and its simplification.	2	2	2	2	-	-	-	-	-	-	-	-
CO3	Asses the Context Free Language and generation of Push Down Automata for Context Free Grammar.	2	2	3	3	-	-	-	-	-	-	-	-
CO4	Know the Turing Machine and its various types. Discuss the Hierarchy of formal languages.	2	2	3	3	-	-	-	-	-	-	-	-
CO5	Evaluating the P, NP, NP complete, NP hard problems with the help of examples.	2	3	3	3	-	-	-	-	-	-	-	-

Subject/Code No: Data Communication and Computer Networks 4AID4-07 LTP: 3+0+0

Semester: IV

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Describe the concept of signals and illustrate the functionality of OSI & TCP/IP reference model.	3	2	2	1	-	-	-	1	-	-	-	-
CO2	Explain channel allocation, framing, flow control, and error control mechanisms and apply them using data link layer protocols.	3	2	3	2	-	-	-	-	-	-	-	-
CO3	Determine the function of network layer, design subnets and calculate IP addresses for a network.	3	3	3	2	-	-	-	-	-	-	-	-
CO4	Illustrate and Analyse different transport layer protocols and functions.	3	2	2	2	-	-	-	-	-	-	-	-
CO5	Analyze the different protocols at Application layer.	3	1	2	1	-	-	-	-	-	-	-	-



Subject/Code No: Microprocessor and Interface Lab 4AID4-21 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	Knowing and apply the fundamentals of assembly level programming of microprocessors and microcontroller.	-	2	2	2	2	2	-	-	-	-	-	2
CO2	Implement standard microprocessor real time interfaces including GPIO, serial ports, digital-to-analog converters and analog-to-digital converters.	-	-	2	3	2	-	-	-	-	-	-	3
CO3	Interpret Troubleshoot interactions between software and hardware.	-	-	3	-	3	3	-	-	-	-	-	3
CO4	Analyze abstract problems and apply a combination of hardware and software to address the problem.	-	-	3	3	3	-	-	-	-	-	-	3
CO5	Use standard test and measurement equipment to evaluate digital interfaces.	-	-	3	-	3	3	-	-	-	-	-	3

Subject/Code No: Data Base Management System Lab 4AID4-22 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	Know how to make database schema for given scenario's	3	3	2	-	2	-	-	-	-	-	-	-
CO2	Apply Keys and Constraints on database using RDBMS.	3	3	3	2	2	-	-	-	-	-	-	-
CO3	Formulate aggregate functions	3	3	2	-	-	-	-	-	-	-	-	-
CO4	Compose PL/SQL including stored procedures, stored functions, cursors concept	3	2	2	-	3	-	-	-	-	-	-	-
CO5	Develop Triggers, SQL and Procedural interfaces	3	3	2	3	2	-	-	-	-	-	-	-

Subject/Code No: Network Programming Lab 4AID4-23 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	Describe the functioning of various networking equipment's and Standard Network Topologies	3	-	-	-	-	2	-	-	-	-	-	2
CO2	Explain and Define the LAN Installation and Configurations techniques	3	-	-	-	2	-	-	-	-	-	-	-
CO3	Design code for various Error correcting techniques and framing methods through C Language	3	2	3	-	-	-	-	-	-	-	-	-
CO4	Analyze and verify client and server involving UDP/TCP sockets using Socket Programming.	3	2	2	-	-	-	-	-	-	-	-	-
CO5	Demonstrate and determine the Communication Models between client and server using Network Simulator.	3	2	-	-	2	-	-	-	-	-	-	-



Subject/Code No: Linux Shell Programming Lab 4AID4-24 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	Know and apply Key Concepts and Commands for Shell Programming	3	2	2	-	3	-	-	-	2	-	-	2
CO2	Analyze the different security measures that can be implemented to protect the directory structure	-	3	-	-	-	-	-	-	3	-	-	3
CO3	Define Approaches to Mastering Shell Quoting Mechanisms	-	-	-	3	-	-	-	-	3	-	-	3
CO4	Evaluate Patterns with simple Regular Expressions using Filters using various Command	-	-	3	-	-	-	-	-	3	-	-	3
CO5	Explain how to use scripting to enhance command output.	-	-	3	-	-	-	-	-	3	-	-	3

Subject/Code No: Java Lab 4AID4-25 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	Use the syntax and semantics of java programming language and basic concepts of OOP.	2	2	2	2	-	-	-	-	-	-	-	2
CO2	Develop reusable programs using the concepts of inheritance, polymorphism, interfaces and packages.	2	2	2	2	2	-	-	-	-	-	-	2
CO3	Apply the concepts of Multithreading and Exception handling to develop efficient and error free codes.	-	-	3	-	-	-	-	-	-	-	3	3
CO4	Design event driven GUI and web related applications which mimic the real word scenarios.	-	-	3	-	-	-	-	-	-	-	3	3
CO5	Design the applications using applets and use of graphics in java.	-	-	3	-	-	-	-	-	-	-	-	3

Subject/Code No: Data Mining-Concepts and Techniques 5AID3-01 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	Know the Mathematical Foundations to Data Mining Tools	3	3	3	-	-	3	-	-	-	-	-	1
CO2	Apply Classical Models and Algorithms in Data Mining	3	3	3	1	1	-	-	-	-	-	-	1
CO3	Categorize Patterns through Association Rule Mining, Classification, and Clustering	3	3	1	3	1	-	-	-	-	-	-	1
CO4	Employ Appropriate Data Mining Algorithms for Practical Problem Solving	1	3	3	1	-	-	-	-	-	-	-	1
CO5	Analyze Data Mining Trends and Impacts	2	3	-	-	-	2	-	-	2	-	2	2



Subject/Code No: Compiler Design 5AID4-02 LTP: 3+0+0

Semester: V

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Illustrate all phases of the Compiler and analyse it's the functioning	3	2	-	1	-	-	-	-	-	-	-	-
CO2	Determine the Parsing algorithms and various error handling in parser	2	2	2	1	-	-	-	-	-	-	-	-
CO3	Analyse the syntax directed definition and all types of Intermediate code generations.	2	2	2	2	-	-	-	-	-	-	-	-
CO4	Classify various type of storage organization techniques and symbol list.	3	2	2	2	-	-	-	-	-	-	-	-
CO5	Explain all code generation, block control graphs and Source-code optimization techniques	3	3	2	1	-	-	-	-	-	-	-	-

Subject/Code No: Operating System 5AID4-03 LTP: 3+0+0

Semester: V

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Memorise the fundamental concepts of operating systems, processes, and process synchronization.	2	2	3	2	2	1	-	-	-	-	-	1
CO2	Explain different approaches to memory management.	2	2	3	2	2	2	-	-	-	-	-	1
CO3	Analyze and design deadlock detection and prevention techniques as well as device management.	2	3	3	1	2	1	-	-	-	-	-	1
CO4	Recognize and describe the structure of file systems and directories.	3	2	1	2	2	-	-	-	-	-	-	1
CO5	Discuss different case studies of operating systems.	-	3	3	-	3	-	-	-	-	-	-	1

Subject/Code No: Computer Graphics and Multimedia Techniques 5AID4-04 LTP: 3+0+0

Semester: V

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Analyse the fundamental concepts of computer graphics, the mathematical and geometrical issues related to computers, and assess alternative algorithmic solutions.	2	-	-	-	-	2	2	2	-	2	-	2
CO2	Recognise and describe the different graphics primitives.	2	2	2	2	-	1	1	1	1	2	-	-
CO3	Describe, demonstrate, and create several 2D transformation methods and clipping algorithms.	2	2	2	1	2	-	-	-	2	1	-	2
CO4	Build the essential ideas of parallel and perspective projection and assess several 3D transformation algorithms	3	2	1	2	2	-	-	-	-	-	-	-
CO5	Develop dynamic motions and an understanding of the many colour models used in computer graphics systems.	3	-	2	1	1	2	-	-	-	-	-	-



Subject/Code No: Analysis of Algorithm 5AID4-05 LTP: 3+0+0

Semester: V

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Argue the correctness of algorithms using inductive proofs and analyze worst-case running times of algorithms using asymptotic analysis.	2	2	1	3	-	-	-	-	-	-	-	1
CO2	Explain important algorithmic design paradigms and apply when an algorithmic design situation calls for it.	2	-	1	3	-	-	-	-	-	-	-	1
CO3	Explain the major graph algorithms and Employ graphs to model engineering problems, when appropriate.	2	2	1	3	-	-	-	-	-	3	-	1
CO4	Compare between different data structures and pick an appropriate data structure for a design situation.	2	2	1	3	-	-	-	-	-	-	-	1
CO5	Describe the classes P, NP, and NP Complete and be able to prove that a certain problem is NP-Complete.	2	2	1	2	-	-	-	-	1	2	-	1

Subject/Code No: Fundamentals of Block Chain 5AID5-11 LTP:3+0+0

Semester: V

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Describe the basics of Blockchain, notation of Distributed Systems in Blockchain and analyse various problems.	3	2	-	2	-	-	-	-	-	-	-	-
CO2	Discuss about Technology Stack of Blockchain with Protocols and analyse the feature of crypto Currency.	3	-	-	1	-	-	-	3	-	-	-	-
CO3	Explain and illustrate the essential components of a blockchain platform.	3	-	-	-	-	1	-	3	-	-	-	-
CO4	Determine and analyse the various Blockchain Technology.	3	-	1	1	-	1	-	1	-	-	-	-
CO5	Illustrate various Types of Consensus Algorithms	3	1	1	1	-	-	-	-	-	-	-	-



Subject/Code No: Probability & Statistics for Data Science/ 5AID5-12 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	Gain Familiarity: with diverse data collection methods and develop proficiency in basic data visualization techniques. Understand measures of central tendency, dispersion, skewness, and kurtosis, and learn to interpret them	3	3	1	3	1	-	-	-	-	-	-	-
CO2	Develop Understanding: of fundamental probability concepts and the ability to calculate probabilities for different events.	3	3	3	3	1	-	-	-	-	-	-	-
CO3	Acquire Understanding: of various types of random variables, grasp the concepts of conditional probability, and distinguish between univariate and bivariate probability distributions. Learn about transforming continuous random variables and their practical applications	3	3	3	3	1	-	-	-	-	-	-	-
CO4	Acquire Knowledge: about the characteristics of random variables, including expectation and variance. Learn to compute various generating functions	3	3	3	3	3	-	-	-	-	-	-	-
CO5	Learn Hypothesis Testing: principles and techniques, and develop proficiency in analyzing hypotheses and their outcomes.	3	2	2	3	3	-	-	-	-	-	-	-

Subject/Code No: Programming for Data Science/ 5AID5-13 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	To know the mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	3	2	-	-	1	2	-	-	-	-	-	2
CO2	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	2	2	-	1	2	-	-	-	-	-	-	-
CO3	Use designed solutions for complex engineering problems and designed 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.	-	3	2	3	3	-	-	-	-	-	-	-
CO4	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.	2	3	3	-	3	-	-	-	-	-	-	-
CO5	Apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.	2	3	-	3	3	-	-	-	-	-	-	-



Subject/Code No: Computer Graphics and Multimedia Lab/5AID4-21 LTP: 0+0+3

Semester: V

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Implement basic transformations on objects using OpenGL.	2	2	3	-	2	-	-	-	-	-	-	-
CO2	Apply clipping and filling techniques for modifying an object.	2	2	3	2	2	-	-	-	-	-	-	-
CO3	Understand the practical implementation of modeling, rendering, viewing of objects in 2D.	2	2	3	2	3	-	-	-	-	-	-	-
CO4	Design multimedia applications	2	2	2	2	3	-	-	-	-	-	-	-
CO5	Identify multimedia compression techniques and applications.	2	2	2	2	2	-	-	-	-	-	-	-

Subject/Code No: Compiler Design Lab 5AID4-22 LTP: 0+0+2

Semester: V

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Understand Lexical analyzer and use this knowledge to implement its various sub-functions for any regular language.	3	3	-	-	-	-	-	-	-	-	-	-
CO2	Design and code of Symbol Table in C language.	3	3	-	-	-	-	-	-	-	-	-	-
CO3	Verify the code for Lexical analyzer for given language using C and LEX tools.	3	3	-	-	-	-	-	-	-	-	-	-
CO4	Apply the Code of YACC Program for identification of strings and Operators.	2	2	2	-	-	-	-	-	-	-	-	-
CO5	Analyze context free grammar and Code for First and Follows using programming language C.	3	3	2	-	-	-	-	-	-	-	-	-

Subject/Code No: Analysis of Algorithm Lab 5AID4-23 LTP: 0+0+2

Semester: V

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Analyze algorithms in terms of space and time complexity	3	3	2	2	-	-	-	-	-	-	-	-
CO2	Implement problems using brute force, divide and conquer and decrease and conquer techniques.	3	3	3	3	-	-	-	-	-	-	-	-
CO3	Simulate problems using greedy, dynamic programming and backtracking approaches.	3	3	2	2	-	-	-	-	-	-	-	-
CO4	Use different string-matching algorithms.	3	3	3	3	-	-	-	-	-	-	-	-
CO5	Explore the implementation of Problem classes Np, Np-Hard and Np-complete	3	3	3	3	-	-	-	-	-	-	-	-



Subject/Code No: Advanced Java Lab 5AID4-24 LTP: 0+0+2

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	Know the fundamentals of MVC with Applets and Swing.	2	2	3	-	2	-	-	-	-	-	-	-
CO2	Know and implement the concept of Java Database Connectivity (JDBC) and Client server programming.	2	2	3	2	2	-	-	-	-	-	-	-
CO3	Implement the concept of RMI and implement distributed application.	2	2	3	2	2	-	-	-	-	-	-	-
CO4	Design the web application by using the concept of JAVA Servlet.	2	2	2	2	3	-	-	-	-	-	-	-
CO5	Design the web application by using the concept of JSP.	1	1	1	-	1	-	-	-	-	-	3	-

Subject/Code No: Industrial Training 5AID7-30 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	Participate in the projects in industries during his or her industrial training.	1	1	-	-	1	1	-	1	-	-	-	1
CO2	Describe use of advanced tools and techniques encountered during industrial training and visit.	1	-	-	-	-	1	-	1	1	-	-	1
CO3	Interact with industrial personnel and follow engineering practices and discipline prescribed in industry.	2	-	-	-	-	-	-	-	-	3	-	2
CO4	Develop awareness about general workplace behavior and build interpersonal and team skills.	1	-	-	-	-	1	3	1	-	3	1	1
CO5	Prepare professional work reports and presentations.	-	-	-	-	-	-	-	-	1	3	-	1

Subject/Code No: Digital Image Processing 6AID3-01 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	Describe digital image, digital image representation and need of digital image processing.	-	-	-	-	3	3	-	-	-	-	-	3
CO2	Applying different type of transformation and filtering techniques on an image.	3	1	-	-	3	3	-	-	1	-	-	3
CO3	Identify various noise models and evaluate the values for restoration and degradation models.	3	1	3	1	3	-	-	-	-	-	-	3
CO4	Analyze various image compression techniques.	1	3	1	1	-	1	-	-	-	-	-	3
CO5	Analyze and evaluate various Image Transformation and Segmentation Techniques	-	3	3	-	3	1	-	-	-	-	-	3



Subject/Code No: Machine Learning 6AID4-02 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	Apply the supervised machine learning algorithms to perform real-time data analysis and generate predictions	3	2	1	2	2	-	-	2	-	-	1	-
CO2	Know and apply real-time data analysis through the use of unsupervised machine learning algorithms like clustering and association mining	3	3	3	3	1	-	-	-	1	-	-	-
CO3	Evaluate feature extraction & selection methods and select appropriate machine learning model	3	2	2	3	1	-	-	-	1	-	1	1
CO4	Analyze various semi supervised learning & reinforcement learning algorithms	3	2	3	2	3	-	-	-	-	-	-	1
CO5	Use advance concepts like recommender system and deep learning	3	2	2	2	2	1	-	-	-	-	-	2

Subject/Code No: Information System Security 6AID4-03 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	Analyse and determine for any organization the security requirements and appropriate solutions.	2	3	-	-	-	2	-	-	-	-	-	2
CO2	Protect system from different types of threats, malicious software's vulnerabilities and attacks.	1	3	-	-	-	1	-	-	-	-	-	1
CO3	Describe symmetric and public key encryption algorithms like DES, AES, RSA etc	3	3	-	-	-	-	-	-	-	-	-	1
CO4	Identify ethical, professional responsibilities, risks and liabilities in computer and network environment, and best practices to write security policy.	1	-	-	-	-	3	-	3	-	-	1	1
CO5	Distinguish and analyse available network and protocols such as SSL, IPSes, TLS, etc.	3	3	-	-	-	-	-	-	-	-	-	1

Subject/Code No: Computer architecture & Organization 6AID4-04 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	illustration of basics of Data representations, different operations, Analyse basics of computer architecture and design of basic computer	3	3	3	1	-	-	-	-	-	-	-	-
CO2	describe & implement different processing techniques to optimize assembly language programs	3	3	3	3	-	-	-	-	-	-	-	-
CO3	Analyse & differentiate basics of data transfer in different memory, RISC & CISC characteristics	3	2	2	2	-	-	-	-	-	-	-	-
CO4	Use arithmetic operations and input/output organization and interface	3	3	3	1	-	-	-	-	-	-	-	-
CO5	know various memories, storage and communication techniques within them and with processor	3	3	3	3	-	-	-	-	-	-	-	-



Subject/Code No: Artificial Intelligence 6AID4-05 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	Understand and use various types of logic and knowledge representation schemes.	3	1	3	3	1	1	-	-	-	-	-	1
CO2	Implantation of AI concepts in game playing	2	3	2	3	2	2	-	-	-	-	-	-
CO3	Use of logics, calculus, theorems & probability to enhance knowledge and reasoning	2	3	2	2	2	2	-	-	-	-	-	2
CO4	Evaluate the various Supervised and Unsupervised Learning algorithms using appropriate Dataset	2	2	3	2	1	1	-	-	-	-	-	1
CO5	Design and evaluate Deep learning Algorithms	3	3	3	1	1	1	-	-	-	-	-	1

Subject/Code No: Cloud Computing 6AID4-06 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	Know the nutshell of Cloud Computing from scratch.	2	-	-	-	-	2	2	-	-	2	-	3
CO2	Discuss the model, types of clouds, various service models, programming concepts and design architecture of cloud computing.	2	2	2	2	-	1	1	1	1	2	-	2
CO3	Know the Virtualization Technology, virtualization of various components of cloud and its implementation level.	2	1	1	1	1	-	-	-	1	1	-	1
CO4	Evaluate security issues, threats, challenges and security architecture for Data, Data Centre and Cloud Services as well as disaster recovery of Data.	3	2	1	2	2	-	-	-	-	-	-	2
CO5	Describe various cloud platforms in IT industry like AWS, Microsoft Azure.	3	-	2	1	1	2	-	-	-	-	-	2

Subject/Code No: Artificial Neural Network 6AID5-11 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	Discussion on neural network and different learning techniques	3	3	3	3	-	-	-	-	-	-	-	-
CO2	Use different kind of loss functions and optimizations	3	3	3	3	3	-	-	-	-	-	-	-
CO3	Interpret and apply Back Propagation algorithm In Neural Network	3	1	1	1	1	-	-	-	-	-	-	-
CO4	Knowing of Self-Organization Maps	3	1	3	1	1	-	-	-	-	-	-	-
CO5	Identifying and analyze Dynamical Models and Hopfield Models	3	1	1	1	1	-	-	-	-	-	-	-



Subject/Code No: Natural Language Processing 6AID5-12 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	Understand key challenges in NLP and their corresponding solutions.	3	3	1	3	3	-	-	-	-	-	-	-
CO2	Formulate proficiency in NLP programming techniques.	3	3	3	3	1	-	-	-	-	-	-	-
CO3	Develop the capability to evaluate NLP problems effectively.	3	1	3	3	1	-	-	-	-	-	-	-
CO4	Know and use the skill to extract essential insights from pertinent research papers.	3	3	3	3	-	-	-	-	-	-	-	1
CO5	Apply the concepts of natural language understanding, processing, and generation.	3	2	2	3	-	2	-	-	-	-	-	2

Subject/Code No: Digital Image Processing Lab 6AID4-21 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	Apply a proper image enhancement technique for given a set of noisy images.	3	-	-	3	3	-	-	-	-	-	-	3
CO2	Able to design and implement the various Linear filtering methods for image enhancement.	2	2	2	3	3	-	-	-	-	-	-	2
CO3	Implement the different Geometric transformations on images and understand two-dimensional Fourier transform.	2	2	3	2	3	-	-	-	-	-	-	2
CO4	Develop any application using different image processing techniques.	2	2	2	3	3	-	-	-	-	-	-	2
CO5	To learn the spatial and frequency domain techniques of image compression.	2	3	2	2	3	-	-	-	-	-	-	2

Subject/Code No: Machine Learning Lab 6AID4-22 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	Know the filtration of data to get the desired results in data analysis	3	3	3	1	-	-	-	-	-	-	-	-
CO2	Apply machine learning models as per the real-life problem statements	2	3	3	2	-	-	-	-	-	-	-	-
CO3	Use of supervised and unsupervised learning algorithms	3	3	2	2	-	-	-	-	-	-	-	-
CO4	Develop neural networks for learning non-linear functions in Python	2	2	2	2	-	-	-	-	-	-	-	-
CO5	Apply Machine Learning algorithms and Neural Networks to solve real world problems	2	2	2	2	-	-	-	-	-	-	-	-



Subject/Code No: Python Lab & 6AID4-23 LTP: 0+0+3

Semester: VI

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Know the fundamental data types of pythons.	2	2	3	-	2	-	-	-	-	-	-	-
CO2	Apply knowledge of if-else, while and for loop for decision control.	2	2	3	2	2	-	-	-	-	-	-	-
CO3	Understand various methods to manipulate String.	2	2	3	2	2	-	-	-	-	-	-	-
CO4	know functions and file handling in python.	2	2	2	2	3	-	-	-	-	-	-	-
CO5	Implement sorting algorithms for various scenarios.	2	2	2	-	2	-	-	-	-	-	-	-

Subject/Code No: Mobile Application Development Lab & 6AID4-24 LTP: 0+0+3

Semester: VI

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Know the components and structure of mobile application development frameworks for Android and windows OS-based mobiles.	2	2	3	-	2	-	-	-	-	-	-	-
CO2	Understand how to work with various mobile application development frameworks	2	2	3	2	2	-	-	-	-	-	-	-
CO3	Apply the basic and important design concepts and issues of development of mobile applications.	2	2	3	2	3	-	-	-	-	-	-	-
CO4	Implement activities with dialogs, spinner, fragments and navigation drawer by applying themes	2	2	2	2	3	-	-	-	-	-	-	-
CO5	Develop mobile applications using SQLite.	2	2	2	2	2	-	-	-	-	-	-	-



Subject/Code No: Big Data Analytics /7AID4-01 LTP: 3+0+0

Semester: VII

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 building block of Big Data and overview of big data analytics	3	2	2	-	-	-	-	-	-	-	-	-
CO2	Analyze the Big Data framework like Hadoop and describe map reduce in Big Data to generate analytics	2	2	2	1	-	-	-	-	-	-	-	-
CO3	Design of Algorithms to solve Data Intensive Problems using Hadoop I/O structure.	2	2	2	1	-	-	-	-	-	-	-	-
CO4	Implementation of Big Data Analytics using pig to solve data intensive problems and to generate analytics	3	3	2	1	-	-	-	-	-	-	-	-
CO5	Determination of Big Data Analytics using hive and resolve data intensive problems	3	3	2	1	-	-	-	-	-	-	-	-

Subject/Code No: Environmental Engineering and Disaster Management / 7AG6-60.2 LTP: 3+0+0

Semester: VII

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	List and review research literature and analyze complex Environmental Engineering problems using fundamentals of mathematics, sciences and engineering.	3	2	-	2	-	-	-	-	-	-	-	-
CO2	Develop solutions for Environmental Engineering problems and compose system components and processes to meet the specified needs with appropriate consideration for the public health and safety.	2	-	2	-	3	2	-	-	-	-	-	-
CO3	Explain effectively environmental issues and solutions through written and oral presentations to engineering communities and society.	2	-	2	-	2	2	-	-	-	2	-	-
CO4	Know ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental and societal contexts.	-	-	-	-	-	2	1	3	-	2	-	-
CO5	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety and welfare, as well as global, cultural, social, environmental and economic factors.	-	-	3	-	2	2	-	-	-	-	2	-



Subject/Code No: Big Data Analysis Lab/ 7AID4-21

LTP: 0+0+3

Semester: VII

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Implement various data structure in JAVA	3	3	-	-	-	-	-	3	-	-	-	-
CO2	Demonstrate and describe to do installation of Hadoop.	2	2	2	-	2	-	-	-	-	-	-	-
CO3	Using map reduce paradigm develop the program in JAVA.	2	2	2	2	-	-	-	-	-	-	-	-
CO4	Analyze and perform different operations on data using Pig Latin scripts.	3	3	-	-	-	-	-	-	-	-	-	-
CO5	Illustrate and apply different operations on relations and databases using Hive.	3	3	-	-	-	-	-	-	-	-	-	-

Subject/Code No: R. Programming Lab /7AID4-22

LTP: 0+0+3

Semester: VII

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Developing R Programming Skills and Data Structure Manipulation	3	3	1	3	1	-	-	-	-	-	-	1
CO2	Knowing Data Importation, Cleansing, and Visualization	3	3	2	2	2	-	-	-	-	-	-	2
CO3	Applying Hypothesis Testing and Conducting Exploratory Data Analysis	3	3	3	3	1	-	-	-	-	-	-	1
CO4	Employing Clustering, Diminishing Dimensionality, and Unveiling Linear Regression Insights	3	3	3	3	-	-	-	-	-	-	-	1
CO5	Discussing Machine Learning Techniques and Practicing Web Scrapping	3	3	3	3	1	-	-	-	-	-	-	1

Subject/Code No: Industrial Training & Seminar / 7AID7-30

LTP: 0+0+1

Semester: VII

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 to work on any project in computing.	1	1	-	-	1	1	-	1	-	-	-	1
CO2	Know how to write reports in industrial technical seminar.	1	-	-	-	-	1	-	1	1	-	-	1
CO3	Develop the communication skills to work with a group of workers and learn the proper behavior in a working environment.	2	-	-	-	-	-	-	-	-	3	-	2
CO4	Know how to work with multi-tasking professionals and multidisciplinary team.	1	-	-	-	-	1	3	1	-	3	1	1
CO5	Develop skills to improve presentation and other soft skills.	-	-	-	-	-	-	-	-	1	3	-	1



Subject/Code No: Seminar / 7AID7-40 LTP: 0+0+1

Semester: VII

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Define the motivation for any topic of interest and describe the thought process development for a technical presentation.	3	3	1	3	1	-	-	-	-	-	-	1
CO2	List relevant sources for a literature survey and construct a document based on technical publications.	3	3	3	3	1	-	-	-	-	-	-	1
CO3	Analyse the proof-of-concept and recognize patterns in related data.	3	1	3	3	1	-	-	-	-	-	-	1
CO4	Discuss effective presentation techniques and enhance soft skills.	3	2	3	3	-	-	-	-	-	-	-	2
CO5	Apply new and recent technology (e.g. Latex) to translate technical reports accurately.	3	1	3	3	1	1	-	-	-	-	-	1

Subject/Code No: Deep Learning and Its Applications / 8AID4-01 LTP: 3+0+0

Semester: VIII

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	To know the basic knowledge of Learning Algorithms	-	-	-	-	3		2	2	-	3	-	-
CO2	To Analysis and design of the Neural Network Concepts so that Test and validate a trained network to generalizes	3	3	3	-	3		2	-	-	-	-	-
CO3	To Apply and development of a CNN-based application.	2	3	2	2	3		-	-	-	-	-	-
CO4	Explain the architecture and applications of RNNs, Bidirectional RNNs, Encoder-Decoder sequence-to-sequence architectures, Back propagation Through Time for training RNNs, LSTM networks	2	2	2	2	2		-	1	-	-	-	-
CO5	To Develop and recognize the Theoretical foundations and practical implementations of auto encoders in real-world scenarios will be explored.	1	2	2	2	2		-	2	1	-	-	-



Subject/Code No: Disaster Management & 8TT6-60.2

LTP: 3+0+0

Semester: VIII

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	To know types of disaster and hazards and related issues.	1	2	2	-	-	2	2	-	2	-	-	2
CO2	Describe various Hydro-meteorological and Geological Based Disasters.	2	-	-	-	-	2	2	-	-	-	-	2
CO3	Apply methods of community involvement as an essential part of successful DRR. Humanitarian Assistance/Support before and after disaster.	-	-	3	2	-	2	2	-	2	1	-	-
CO4	Formulate technological innovations in Disaster Risk Reduction: Advantages and problems	-	-	2	2	2	-	-	-	-	1	-	-
CO5	Use experience on conducting independent DM study including data search, analysis and presentation of disaster case study	1	2	-	-	-	-	3	-	-	-	-	2

Subject/Code No: Deep Learning & its application Lab /8AID4-21

LTP: 0+0+3

Semester: VIII

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Demonstrate recall of fundamental concepts in deep learning, including neural network architectures, activation functions, and optimization algorithms, through quizzes, exams, and class discussions.	-	3	3	-	3	-	-	-	-	-	-	-
CO2	Explain the principles underlying various deep learning techniques, such as convolutional neural networks (CNNs) for image processing and recurrent neural networks (RNNs) for sequential data, by summarizing key concepts and providing examples.	-	3	2	-	3	2	-	-	-	-	-	-
CO3	Apply deep learning algorithms to solve practical problems in computer vision, natural language processing, and other domains, by designing and implementing neural network models in programming assignments and projects.	-	-	3	-	3	-	-	-	-	-	-	-
CO4	Analyze the performance of deep learning models and interpret their results using relevant metrics and visualization tools, evaluating the effectiveness of different architectures and optimization strategies through experiments and case studies.	-	3	-	-	3	-	-	-	-	-	-	-
CO5	Design novel deep learning solutions for complex problems, integrating multiple techniques and adapting them to new domains, by proposing innovative project ideas and implementing them with creativity and originality.	-	-	3	-	-	-	3	-	-	-	-	-



Subject/Code No: Robot Programming Lab /8AID4-22 LTP: 0+0+3

Semester: VIII

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Apply programming concepts to effectively program robots for various tasks.	-	2	2	2	2	2	-	-	-	-	-	-
CO2	Analyze and select effective algorithms for solving robotics problems.	-	-	2	3	2	-	-	-	-	-	-	-
CO3	Synthesize knowledge to design and implement functional robotic systems.	-	-	3	-	3	3	-	-	-	-	-	-
CO4	Evaluate robot performance and optimize algorithms for better efficiency.	-	-	3	3	3	-	-	-	-	-	-	-
CO5	Critically evaluate ethical implications and propose responsible strategies.	-	-	3	-	3	3	-	-	-	-	-	-

Subject/Code No: Project Lab /8AID7-50

LTP: 0+0+1

Semester: VIII

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Carry out a substantial research-based project which will provide the solution to the society	3	3	1	3	1	-	-	-	-	-	-	-
CO2	find out the need for practical implementation of the solution	3	3	3	3	1	-	-	-	-	-	-	-
CO3	provide design solutions by considering ethical issues	3	3	1	3	1	-	-	-	-	-	-	-
CO4	Exhibit the solutions to the stakeholders	2	3	2	2	3	-	-	-	-	-	-	-
CO5	Illustration of ideas using respective tools	3	1	3	3	1	1	-	-	-	-	-	-



Bachelor of Technology Computer Science & Engineering (Artificial Intelligence)

Program Name: Computer Science & Engineering (Artificial Intelligence)
(Session: 2024-25)

Subject/Code No: Technical Communication 3CAI1-02 LTP: 2+0+0

Semester: III 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 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: Advanced Engineering Mathematics 3CAI2-01 LTP: 3+0+0

Semester: III Semester

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Develop the concept of Probabilistic models and Random Variable	3	2	3		2	1	-	-	-	-	-	-
CO2	Analysis through statistical methods like Normal distribution, Binomial Distribution etc.	3	3	2	3	1	1	-	-	-	-	-	-
CO3	Mathematical modeling for Industrial Problem using linear programming and solution by Graphical methods	3	3	3	2	1	2	-	-	-	-	-	-
CO4	Finding Solution of real time problems with Mathematical modelling	2	3	3	2	1	2	-	-	-	-	-	-
CO5	Evaluate and create model for problems related to transportation and assignment	3	2	3	1	1	1	-	-	-	-	-	-



Subject/Code No: Digital Electronics 3CAI3-04 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	Understand and apply number system in digital design	2	3	2	-	-	-	-	-	-	-	-	2
CO2	Apply the laws of Boolean algebra to represent and simplify digital circuits	1	3	2	1	2	-	-	-	-	-	-	3
CO3	Calculate the parameters of logic families and define their characteristics.	2	-	3	2	3	-	-	-	-	-	-	2
CO4	Develop competence in Combinational Logic Problem formulation and Logic Optimization	1	3	3	2	2	-	-	-	-	-	-	2
CO5	Classify the different types of flip-flops and design various sequential circuits	1	3	2	1	2	-	-	-	-	-	-	2

Subject/Code No: Data Structure and Algorithms/3CAI4-05 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	Know the concept of stack operations and its implementation to solve real time problems	1	2	3	-	-	1	-	-	-	-	-	-
CO2	Recognize the knowledge of Linked List and Queues to design algorithms for complex engineering tasks	3	2	2	1	-	-	-	-	-	-	-	-
CO3	Analyze and design efficient searching and sorting techniques	2	1	3	1	-	2	-	-	-	-	-	-
CO4	Evaluate problems by storing data in tree structure and performing basic operations	2	2	2	2	-	2	-	-	-	-	-	-
CO5	Apply graph concept for complex problem and understand hashing	1	3	2	1	-	1	-	-	-	-	-	-

Subject/Code No: Object oriented Programming 3CAI4-06 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	Knowing the basic knowledge of object-oriented programming language constructs.	2	3	3	2	-	-	-	-	-	-	-	-
CO2	Discussing and identifying the concept of reference, dynamic memory allocation and concept of various types of functions in classes.	2	3	3	2	-	-	-	-	-	-	-	-
CO3	Apply inheritance and its types in real time problems.	2	3	3	2	-	-	-	-	-	-	-	-
CO4	Implement concept of polymorphism to perform different types of bindings.	1	3	3	2	-	-	-	-	-	-	-	-
CO5	Create application using I/O and file handling with exception handling.	1	3	3	2	-	-	-	-	-	-	-	-



Subject/Code No: Software Engineering 3CAI4-07 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	Decompose the given project in various phases of a lifecycle.	1	1	2	2	2	-	-	-	-	2	-	2
CO2	Choose appropriate process model depending on the user requirements.	1	-	2	2	2	-	-	-	-	-	-	1
CO3	Perform various life cycle activities like Analysis, Design, Implementation, Testing and Maintenance.	1	1	2	2	1	-	-	-	-	-	2	1
CO4	Know various processes used in all the phases of the product.	2	-	3	3	-	-	-	-	-	-	2	2
CO5	Analyse the knowledge, techniques, and skills in the development of a software product.	1	2	2	1	1	-	-	-	-	-	-	1

Subject/Code No: Data Structures Lab 3CAI4-21

LTP: 0+0+3

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 and examine the concept of array & its storage	2	2	3	3	2	2	-	-	-	-	-	-
CO2	Illustrate the implementation of basic data structure using an array.	2	2	3	2	-	2	-	-	-	-	-	-
CO3	Analyze and compare different searching and sorting techniques	2	3	2	2	-	2	-	-	-	-	-	-
CO4	Develop programs to perform operations on Non-linear Data Structures such as Tree and Graphs	3	3	3	1	1	1	-	-	-	-	-	-
CO5	Design and use different sorting algorithms	3	2	2	2	-	2	-	-	-	-	-	-

Subject/Code No: Object Oriented Programming Lab 3CAI4-22 LTP: 0+0+3

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 concept of C++ programming language while evaluating different access specifiers to define member function.	2	2	2	3	3	-	2	-	-	-	-	-
CO2	Implement memory allocation techniques and various inbuilt functions.	2	2	2	3	3	-	2	-	-	-	-	-
CO3	Know inheritance and analyze the types of inheritance.	2	2	2	3	3	-	2	-	-	-	-	-
CO4	Apply the concept of polymorphism to perform different types of bindings.	2	2	2	2	2	-	2	-	-	-	-	-
CO5	Develop and use of application related to I/O and file handling with exception handling.	2	2	2	2	2	-	2	-	-	-	-	-



Subject/Code No: Software Engineering Lab 3CAI4-23 LTP: 0+0+3

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 software engineering methodologies involved in the phases for project development.	2	2	2	2	-	-	-	-	-	-	-	2
CO2	Know about open-source tools used for implementing software engineering methods.	1	2	2	2	2	-	-	-	-	-	-	1
CO3	Develop product-startups implementing software process models in software engineering methods.	2	2	2	2	2	-	-	-	-	-	2	
CO4	Understand Open-source Tools: StarUML / UMLGraph / Topcased.	2	3		3	3	-	-	-	-	-	2	
CO5	Discuss and analyze how to develop software requirements specifications for a given problem.	1	2	2	1	1	-	-	-	-	-	-	1

Subject/Code No: Digital Electronics Lab 3CAI4-24 LTP: 0+0+3

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	List different types of logic gates, identify their ICs and also verify their truth tables.	2	2	3	-	-	-	-	-	-	-	-	2
CO2	Demonstrate the functioning of basic logic gates, adder, and subtractor using universal gates.	2	2	3	3	-	-	-	-	-	-	-	2
CO3	Design a combinational circuit using MSI devices and verify its functionalities.	3	2	3	2	-	-	-	-	-	-	-	2
CO4	Develop various sequential circuit using Flip Flops and verify its functionalities.	2	3	2	-	2	-	-	-	-	-	-	2
CO5	Formulate Various types of counters, Shift registers SISO, SIPO, PISO, PIPO using Flip-Flops and verify its functionalities using simulation tool	2	2	2	-	3	-	-	-	-	-	-	2

Subject/Code No: Industrial Training 3CAI7-30 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	Compose an interest in research-oriented fields and develop the ability to research for literature and prepare brief report	2	3	-	-	-	2	2	2	-	-	-	-
CO2	Identify the skills, competencies and points of view needed by professionals in the field most closely related to the course	2	3	-	-	3	-	-	-	2	-	-	-
CO3	Discuss and identify about topics of current intellectual importance	-	-	-	1	1	2	1	-	-	-	2	-
CO4	Develop the communication skills and awareness about the industrial environment.	-	-	-	-	-	-	2	1	1	2	1	-
CO5	Revise Skill development for presentation.	-	-	3	-	3	-	-	-	-	-	3	-



Subject/Code No: Discrete Mathematical Structures 4CAI2-01 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	Explain the various fundamental concepts of the Set theory and Logics.	3	2	3	1	-	1	-	-	-	-	-	-
CO2	Illustrate the concept of relations and Diagraph to analyse the area of greatest impact for improvement.	3	3	3	3	1	-	-	-	-	-	-	-
CO3	Create the application part of lattices in distributed computing and Data mining.	2	2	3	2	1	2	-	-	-	-	-	-
CO4	Implementation of Graphs and their application in real time problem	3	2	2	2	2	2	-	-	-	-	-	-
CO5	Analyse the concept of Algebraic Structures.	3	3	3	1	1	1	-	-	-	-	-	-

Subject/Code No: Managerial Economics and Financial Accounting 4CAI1-03 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	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: Microprocessors & Interfaces 4CAI3-04 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	Discuss working of functional components of computer system.	3	2	3	2	2	-	-	-	-	-	-	2
CO2	Demonstrate an overall functional structure of the Microprocessor.	2	2	1	2	2	-	-	-	-	-	-	1
CO3	Explain how interrupts are used to implement I/O control and data transfers.	2	2	2	1	2	-	-	-	-	-	-	1
CO4	To learn the design aspects of I/O and Memory Interfacing circuits.	1	2	2	2	2	-	-	-	-	-	-	1
CO5	Implement their practical approach through laboratory experiments.	2	2	1	2	2	-	-	-	-	-	-	1



Subject/Code No: Database Management System 4CAI4-05 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	Develop database using E-R diagram to represent simple database application scenarios	2	2	3	-	1	1	-	-	-	-	-	-
CO2	Identify data from database using query language	2	2	-	2	-	1	-	-	-	-	-	-
CO3	Apply normalization process to refine database schema	3	2	3	2	-	-	-	-	-	-	-	-
CO4	Describe transaction processing and Serializability	3	3	-	-	-	2	-	-	-	-	-	-
CO5	Interpret the concept of Concurrency Control and concept of Failure and Recovery	3	3	-	2	-	-	-	-	-	-	-	-

Subject/Code No: Theory of Computation 4CAI4-06

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	Analyse the concept of Finite Automata and distinguish between Non- Deterministic Finite Automata and Deterministic Finite Automata. Analyse regular sets and its properties. Composition of Regular Expression from Finite Automata and vice-versa.	1	2	2	2	-	-	-	-	-	-	-	-
CO2	Understand the Context Free Grammar and its simplification.	2	2	2	2	-	-	-	-	-	-	-	-
CO3	Asses the Context Free Language and generation of Push Down Automata for Context Free Grammar.	2	2	3	3	-	-	-	-	-	-	-	-
CO4	Know the Turing Machine and its various types. Discuss the Hierarchy of formal languages.	2	2	3	3	-	-	-	-	-	-	-	-
CO5	Evaluating the P, NP, NP complete, NP hard problems with the help of examples.	2	3	3	3	-	-	-	-	-	-	-	-

Subject/Code No: Data Communication and Computer Networks 4CAI4-07

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	Describe the concept of signals and illustrate the functionality of OSI & TCP/IP reference model.	3	2	2	1	-	-	-	1	-	-	-	-
CO2	Explain channel allocation, framing, flow control, and error control mechanisms and apply them using data link layer protocols.	3	2	3	2	-	-	-	-	-	-	-	-
CO3	Determine the function of network layer, design subnets and calculate IP addresses for a network.	3	3	3	2	-	-	-	-	-	-	-	-
CO4	Illustrate and Analyse different transport layer protocols and functions.	3	2	2	2	-	-	-	-	-	-	-	-
CO5	Analyze the different protocols at Application layer.	3	1	2	1	-	-	-	-	-	-	-	-



Subject/Code No: Microprocessor and Interface Lab 4CAI4-21 LTP: 0+0+3

Semester: IV

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Knowing and apply the fundamentals of assembly level programming of microprocessors and microcontroller.	-	2	2	2	2	2	-	-	-	-	-	2
CO2	Implement standard microprocessor real time interfaces including GPIO, serial ports, digital-to-analog converters and analog-to-digital converters.	-	-	2	3	2	-	-	-	-	-	-	3
CO3	Interpret Troubleshoot interactions between software and hardware.	-	-	3	-	3	3	-	-	-	-	-	3
CO4	Analyze abstract problems and apply a combination of hardware and software to address the problem.	-	-	3	3	3	-	-	-	-	-	-	3
CO5	Use standard test and measurement equipment to evaluate digital interfaces.	-	-	3	-	3	3	-	-	-	-	-	3

Subject/Code No: Data Base Management System Lab 4CAI4-22 LTP: 0+0+3

Semester: IV

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Know how to make database schema for given scenarios	3	3	2	-	2	-	-	-	-	-	-	-
CO2	Apply Keys and Constraints on database using RDBMS.	3	3	3	2	2	-	-	-	-	-	-	-
CO3	Formulate aggregate functions	3	3	2	-	-	-	-	-	-	-	-	-
CO4	Compose PL/SQL including stored procedures, stored functions, cursors concept	3	2	2	-	3	-	-	-	-	-	-	-
CO5	Develop Triggers, SQL and Procedural interfaces	3	3	2	3	2	-	-	-	-	-	-	-

Subject/Code No: Network Programming Lab 4CAI4-23 LTP: 0+0+3

Semester: IV

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Describe the functioning of various networking equipment's and Standard Network Topologies	3	-	-	-	-	2	-	-	-	-	-	2
CO2	Explain and Define the LAN Installation and Configurations techniques	3	-	-	-	2	-	-	-	-	-	-	-
CO3	Design code for various Error correcting techniques and framing methods through C Language	3	2	3	-	-	-	-	-	-	-	-	-
CO4	Analyze and verify client and server involving UDP/TCP sockets using Socket Programming.	3	2	2	-	-	-	-	-	-	-	-	-
CO5	Demonstrate and determine the Communication Models between client and server using Network Simulator.	3	2	-	-	2	-	-	-	-	-	-	-



Subject/Code No: Linux Shell Programming Lab 4CAI4-24 LTP: 0+0+3

Semester: IV

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Know and apply Key Concepts and Commands for Shell Programming	3	2	2	-	3	-	-	-	2	-	-	2
CO2	Analyze the different security measures that can be implemented to protect the directory structure	-	3	-	-	-	-	-	-	3	-	-	3
CO3	Define Approaches to Mastering Shell Quoting Mechanisms	-	-	-	3	-	-	-	-	3	-	-	3
CO4	Evaluate Patterns with simple Regular Expressions using Filters using various Command	-	-	3	-	-	-	-	-	3	-	-	3
CO5	Explain how to use scripting to enhance command output.	-	-	3	-	-	-	-	-	3	-	-	3

Subject/Code No: Java Lab 4CAI4-25 LTP: 0+0+3

Semester: IV

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Use the syntax and semantics of java programming language and basic concepts of OOP.	2	2	2	2	-	-	-	-	-	-	-	2
CO2	Develop reusable programs using the concepts of inheritance, polymorphism, interfaces and packages.	2	2	2	2	2	-	-	-	-	-	-	2
CO3	Apply the concepts of Multithreading and Exception handling to develop efficient and error free codes.	-	-	3	-	-	-	-	-	-	-	3	3
CO4	Design event driven GUI and web related applications which mimic the real word scenarios.	-	-	3	-	-	-	-	-	-	-	3	3
CO5	Design the applications using applets and use of graphics in java.	-	-	3	-	-	-	-	-	-	-	-	3

Subject/Code No: Data Mining-Concepts and Techniques 5CAI3-01 LTP: 3+0+0

Semester: V

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Know the Mathematical Foundations to Data Mining Tools	3	3	3	-	-	3	-	-	-	-	-	1
CO2	Apply Classical Models and Algorithms in Data Mining	3	3	3	1	1	-	-	-	-	-	-	1
CO3	Categorize Patterns through Association Rule Mining, Classification, and Clustering	3	3	1	3	1	-	-	-	-	-	-	1
CO4	Employ Appropriate Data Mining Algorithms for Practical Problem Solving	1	3	3	1	-	-	-	-	-	-	-	1
CO5	Analyze Data Mining Trends and Impacts	2	3	-	-	-	2	-	-	2	-	2	2



Subject/Code No: Compiler Design 5CAI4-02 LTP: 3+0+0

Semester: V

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Illustrate all phases of the Compiler and analyse it's the functioning	3	2	-	1	-	-	-	-	-	-	-	-
CO2	Determine the Parsing algorithms and various error handling in parser	2	2	2	1	-	-	-	-	-	-	-	-
CO3	Analyse the syntax directed definition and all types of Intermediate code generations.	2	2	2	2	-	-	-	-	-	-	-	-
CO4	Classify various type of storage organization techniques and symbol list.	3	2	2	2	-	-	-	-	-	-	-	-
CO5	Explain all code generation, block control graphs and Source-code optimization techniques	3	3	2	1	-	-	-	-	-	-	-	-

Subject/Code No: Operating System 5CAI4-03 LTP:3+0+0

Semester: V

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Memorise the fundamental concepts of operating systems, processes, and process synchronization.	2	2	3	2	2	1	-	-	-	-	-	1
CO2	Explain different approaches to memory management.	2	2	3	2	2	2	-	-	-	-	-	1
CO3	Analyze and design deadlock detection and prevention techniques as well as device management.	2	3	3	1	2	1	-	-	-	-	-	1
CO4	Recognize and describe the structure of file systems and directories.	3	2	1	2	2	-	-	-	-	-	-	1
CO5	Discuss different case studies of operating systems.	-	3	3	-	3	-	-	-	-	-	-	1

Subject/Code No: Computer Graphics and Multimedia Techniques 5CAI4-04 LTP:3+0+0

Semester: V

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Analyse the fundamental concepts of computer graphics, the mathematical and geometrical issues related to computers, and assess alternative algorithmic solutions.	2	-	-	-	-	2	2	2	-	2	-	2
CO2	Recognize and describe the different graphics primitives.	2	2	2	2	-	1	1	1	1	2	-	-
CO3	Describe, demonstrate, and create several 2D transformation methods and clipping algorithms.	2	2	2	1	2	-	-	-	2	1	-	2
CO4	Build the essential ideas of parallel and perspective projection and assess several 3D transformation algorithms	3	2	1	2	2	-	-	-	-	-	-	-
CO5	Develop dynamic motions and an understanding of the many colour models used in computer graphics systems.	3	-	2	1	1	2	-	-	-	-	-	-



Subject/Code No: Analysis of Algorithm 5CAI4-05 LTP: 3+0+0

Semester: V

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Argue the correctness of algorithms using inductive proofs and analyze worst-case running times of algorithms using asymptotic analysis.	2	2	1	3	-	-	-	-	-	-	-	1
CO2	Explain important algorithmic design paradigms and apply when an algorithmic design situation calls for it.	2	-	1	3	-	-	-	-	-	-	-	1
CO3	Explain the major graph algorithms and Employ graphs to model engineering problems, when appropriate.	2	2	1	3	-	-	-	-	-	3	-	1
CO4	Compare between different data structures and pick an appropriate data structure for a design situation.	2	2	1	3	-	-	-	-	-	-	-	1
CO5	Describe the classes P, NP, and NP Complete and be able to prove that a certain problem is NP-Complete.	2	2	1	2	-	-	-	-	1	2	-	1

Subject/Code No: Fundamentals of Block Chain 5CAI5-11 LTP:3+0+0

Semester: V

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Describe the basics of Blockchain, notation of Distributed Systems in Blockchain and analyse various problems.	3	2	-	2	-	-	-	-	-	-	-	-
CO2	Discuss about Technology Stack of Blockchain with Protocols and analyse the feature of crypto Currency.	3	-	-	1	-	-	-	3	-	-	-	-
CO3	Explain and illustrate the essential components of a blockchain platform.	3	-	-	-	-	1	-	3	-	-	-	-
CO4	Determine and analyse the various Blockchain Technology.	3	-	1	1	-	1	-	1	-	-	-	-
CO5	Illustrate various Types of Consensus Algorithms	3	1	1	1	-	-	-	-	-	-	-	-



Subject/Code No: Programming for Data Science 5CAI5-13 LTP:3+0+0

Semester: V

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	To know the mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	3	2	-	-	1	2	-	-	-	-	-	2
CO2	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	2	2	-	1	2	-	-	-	-	-	-	-
CO3	Use designed solutions for complex engineering problems and designed 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.	-	3	2	3	3	-	-	-	-	-	-	-
CO4	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.	2	3	3	-	3	-	-	-	-	-	-	-
CO5	Apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.	2	3	-	3	3	-	-	-	-	-	-	-

Subject/Code No: Computer Graphics and Multimedia Lab/5CAI4-21 LTP: 0+0+3

Semester: V

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Implement basic transformations on objects using OpenGL.	2	2	3	-	2	-	-	-	-	-	-	-
CO2	Apply clipping and filling techniques for modifying an object.	2	2	3	2	2	-	-	-	-	-	-	-
CO3	Understand the practical implementation of modeling, rendering, viewing of objects in 2D.	2	2	3	2	3	-	-	-	-	-	-	-
CO4	Design multimedia applications	2	2	2	2	3	-	-	-	-	-	-	-
CO5	Identify multimedia compression techniques and applications.	2	2	2	2	2	-	-	-	-	-	-	-



Subject/Code No: Compiler Design Lab 5CAI4-22 LTP: 0+0+3

Semester: V

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Understand Lexical analyzer and use this knowledge to implement its various sub-functions for any regular language.	3	3	-	-	-	-	-	-	-	-	-	-
CO2	Design and code of Symbol Table in C language.	3	3	-	-	-	-	-	-	-	-	-	-
CO3	Verify the code for Lexical analyzer for given language using C and LEX tools.	3	3	-	-	-	-	-	-	-	-	-	-
CO4	Apply the Code of YACC Program for identification of strings and Operators.	2	2	2	-	-	-	-	-	-	-	-	-
CO5	Analyze context free grammar and Code for First and Follows using programming language C.	3	3	2	-	-	-	-	-	-	-	-	-

Subject/Code No: Analysis of Algorithm Lab 5CAI4-23 LTP: 0+0+3

Semester: V

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Analyze algorithms in terms of space and time complexity	3	3	2	2	-	-	-	-	-	-	-	-
CO2	Implement problems using brute force, divide and conquer and decrease and conquer techniques.	3	3	3	3	-	-	-	-	-	-	-	-
CO3	Simulate problems using greedy, dynamic programming and backtracking approaches.	3	3	2	2	-	-	-	-	-	-	-	-
CO4	Use different string-matching algorithms.	3	3	3	3	-	-	-	-	-	-	-	-
CO5	Explore the implementation of Problem classes NP, NP-Hard and NP-complete	3	3	3	3	-	-	-	-	-	-	-	-

Subject/Code No: Advanced Java Lab 5CAI4-24 LTP: 0+0+3

Semester: V

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Know the fundamentals of MVC with Applets and Swing.	2	2	3	-	2	-	-	-	-	-	-	-
CO2	Know and implement the concept of Java Database Connectivity (JDBC) and Client server programming.	2	2	3	2	2	-	-	-	-	-	-	-
CO3	Implement the concept of RMI and implement distributed application.	2	2	3	2	2	-	-	-	-	-	-	-
CO4	Design the web application by using the concept of JAVA Servlet.	2	2	2	2	3	-	-	-	-	-	-	-
CO5	Design the web application by using the concept of JSP.	1	1	1	-	1	-	-	-	-	-	3	-



Subject/Code No: Industrial Training 5CAI7-30 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	Participate in the projects in industries during his or her industrial training.	1	1	-	-	1	1	-	1	-	-	-	1
CO2	Describe use of advanced tools and techniques encountered during industrial training and visit.	1	-	-	-	-	1	-	1	1	-	-	1
CO3	Interact with industrial personnel and follow engineering practices and discipline prescribed in industry.	2	-	-	-	-	-	-	-	-	3	-	2
CO4	Develop awareness about general workplace behavior and build interpersonal and team skills.	1	-	-	-	-	1	3	1	-	3	1	1
CO5	Prepare professional work reports and presentations.	-	-	-	-	-	-	-	-	1	3	-	1

Subject/Code No: Digital Image Processing 6CAI3-01 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	Describe digital image, digital image representation and need of digital image processing.	-	-	-	-	3	3	-	-	-	-	-	3
CO2	Applying different type of transformation and filtering techniques on an image.	3	1	-	-	3	3	-	-	1	-	-	3
CO3	Identify various noise models and evaluate the values for restoration and degradation models.	3	1	3	1	3	-	-	-	-	-	-	3
CO4	Analyze various image compression techniques.	1	3	1	1	-	1	-	-	-	-	-	3
CO5	Analyze and evaluate various Image Transformation and Segmentation Techniques	-	3	3	-	3	1	-	-	-	-	-	3

Subject/Code No: Machine Learning 6CAI4-02 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	Apply the supervised machine learning algorithms to perform real-time data analysis and generate predictions	3	2	1	2	2	-	-	2	-	-	1	-
CO2	Know and apply real-time data analysis through the use of unsupervised machine learning algorithms like clustering and association mining	3	3	3	3	1	-	-	-	1	-	-	-
CO3	Evaluate feature extraction & selection methods and select appropriate machine learning model	3	2	2	3	1	-	-	-	1	-	1	1
CO4	Analyze various semi supervised learning & reinforcement learning algorithms	3	2	3	2	3	-	-	-	-	-	-	1
CO5	Use advance concepts like recommender system and deep learning	3	2	2	2	2	1	-	-	-	-	-	2



Subject/Code No: Information System Security 6CAI4-03 LTP: 3+0+0

Semester: VI

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Analyse and determine for any organization the security requirements and appropriate solutions.	2	3	-	-	-	2	-	-	-	-	-	2
CO2	Protect system from different types of threats, malicious software's vulnerabilities and attacks.	1	3	-	-	-	1	-	-	-	-	-	1
CO3	Describe symmetric and public key encryption algorithms like DES, AES, RSA etc	3	3	-	-	-	-	-	-	-	-	-	1
CO4	Identify ethical, professional responsibilities, risks and liabilities in computer and network environment, and best practices to write security policy.	1	-	-	-	-	3	-	3	-	-	1	1
CO5	Distinguish and analyses available network and protocols such as SSL, IPSes, TLS, etc.	3	3	-	-	-	-	-	-	-	-	-	1

Subject/Code No: Computer architecture & Organization 6CAI4-04 LTP: 3+0+0

Semester: VI

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	illustration of basics of Data representations, different operations, Analyse basics of computer architecture and design of basic computer	3	3	3	1	-	-	-	-	-	-	-	-
CO2	describe & implement different processing techniques to optimize assembly language programs	3	3	3	3	-	-	-	-	-	-	-	-
CO3	Analyse & differentiate basics of data transfer in different memory, RISC & CISC characteristics	3	2	2	2	-	-	-	-	-	-	-	-
CO4	Use arithmetic operations and input/output organization and interface	3	3	3	1	-	-	-	-	-	-	-	-
CO5	know various memories, storage and communication techniques within them and with processor	3	3	3	3	-	-	-	-	-	-	-	-

Subject/Code No: Principles of Artificial Intelligence 6CAI4-05 LTP: 3+0+0

Semester: VI

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Understand and use various types of logic and knowledge representation schemes.	3	1	3	3	1	1	-	-	-	-	-	1
CO2	Implantation of AI concepts in game playing	2	3	2	3	2	2	-	-	-	-	-	-
CO3	Use of logics, calculus, theorems & probability to enhance knowledge and reasoning	2	3	2	2	2	2	-	-	-	-	-	2
CO4	Evaluate the various Supervised and Unsupervised Learning algorithms using appropriate Dataset	2	2	3	2	1	1	-	-	-	-	-	1
CO5	Design and evaluate Deep learning Algorithms	3	3	3	1	1	1	-	-	-	-	-	1



Subject/Code No: Cloud Computing 6CAI4-06 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	Know the nutshell of Cloud Computing from scratch.	2	-	-	-	-	2	2	-	-	2	-	3
CO2	Discuss the model, types of clouds, various service models, programming concepts and design architecture of cloud computing.	2	2	2	2	-	1	1	1	1	2	-	2
CO3	Know the Virtualization Technology, virtualization of various components of cloud and its implementation level.	2	1	1	1	1	-	-	-	1	1	-	1
CO4	Evaluate security issues, threats, challenges and security architecture for Data, Data Centre and Cloud Services as well as disaster recovery of Data.	3	2	1	2	2	-	-	-	-	-	-	2
CO5	Describe various cloud platforms in IT industry like AWS, Microsoft Azure.	3	-	2	1	1	2	-	-	-	-	-	2

Subject/Code No: Artificial Neural Network 6CAI5-11 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	Discussion on neural network and different learning techniques	3	3	3	3	-	-	-	-	-	-	-	-
CO2	Use different kind of loss functions and optimizations	3	3	3	3	3	-	-	-	-	-	-	-
CO3	Interpret and apply Back Propagation algorithm In Neural Network	3	1	1	1	1	-	-	-	-	-	-	-
CO4	Knowing of Self-Organization Maps	3	1	3	1	1	-	-	-	-	-	-	-
CO5	Identifying and analyze Dynamical Models and Hopfield Models	3	1	1	1	1	-	-	-	-	-	-	-

Subject/Code No: Natural Language Processing 6CAI5-12 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	Understand key challenges in NLP and their corresponding solutions.	3	3	1	3	3	-	-	-	-	-	-	-
CO2	Formulate proficiency in NLP programming techniques.	3	3	3	3	1	-	-	-	-	-	-	-
CO3	Develop the capability to evaluate NLP problems effectively.	3	1	3	3	1	-	-	-	-	-	-	-
CO4	Know and use the skill to extract essential insights from pertinent research papers.	3	3	3	3	-	-	-	-	-	-	-	1
CO5	Apply the concepts of natural language understanding, processing, and generation.	3	2	2	3	-	2	-	-	-	-	-	2



Subject/Code No: Digital Image Processing Lab 6CAI4-21 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	Apply a proper image enhancement technique for given a set of noisy images.	3	-	-	3	3	-	-	-	-	-	-	3
CO2	Able to design and implement the various Linear filtering methods for image enhancement.	2	2	2	3	3	-	-	-	-	-	-	2
CO3	Implement the different Geometric transformations on images and understand two-dimensional Fourier transform.	2	2	3	2	3	-	-	-	-	-	-	2
CO4	Develop any application using different image processing techniques.	2	2	2	3	3	-	-	-	-	-	-	2
CO5	To learn the spatial and frequency domain techniques of image compression.	2	3	2	2	3	-	-	-	-	-	-	2

Subject/Code No: Machine Learning Lab 6CAI4-22 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	Know the filtration of data to get the desired results in data analysis	3	3	3	1	-	-	-	-	-	-	-	-
CO2	Apply machine learning models as per the real-life problem statements	2	3	3	2	-	-	-	-	-	-	-	-
CO3	Use of supervised and unsupervised learning algorithms	3	3	2	2	-	-	-	-	-	-	-	-
CO4	Develop neural networks for learning non-linear functions in Python	2	2	2	2	-	-	-	-	-	-	-	-
CO5	Apply Machine Learning algorithms and Neural Networks to solve real world problems	2	2	2	2	-	-	-	-	-	-	-	-

Subject/Code No: Python Lab & 6CAI4-23 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	Know the fundamental data types of python.	2	2	3	-	2	-	-	-	-	-	-	-
CO2	Apply knowledge of if-else, while and for loop for decision control.	2	2	3	2	2	-	-	-	-	-	-	-
CO3	Understand various methods to manipulate String.	2	2	3	2	2	-	-	-	-	-	-	-
CO4	know functions and file handling in python.	2	2	2	2	3	-	-	-	-	-	-	-
CO5	Implement sorting algorithms for various scenarios.	2	2	2	-	2	-	-	-	-	-	-	-



Subject/Code No: Mobile Application Development Lab & 6CAI4-24 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	Know the components and structure of mobile application development frameworks for Android and windows OS-based mobiles.	2	2	3	-	2	-	-	-	-	-	-	-
CO2	Understand how to work with various mobile application development frameworks	2	2	3	2	2	-	-	-	-	-	-	-
CO3	Apply the basic and important design concepts and issues of development of mobile applications.	2	2	3	2	3	-	-	-	-	-	-	-
CO4	Implement activities with dialogs, spinner, fragments and navigation drawer by applying themes	2	2	2	2	3	-	-	-	-	-	-	-
CO5	Develop mobile applications using SQLite.	2	2	2	2	2	-	-	-	-	-	-	-

Subject/Code No: Deep Learning & its application /7CAI4-01 LTP: 3+0+0

Semester: VII

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	To know the basic knowledge of Learning Algorithms	-	-	-	-	3		2	2	-	3	-	-
CO2	To Analysis and design of the Neural Network Concepts so that Test and validate a trained network to generalizes	3	3	3	-	3		2	-	-	-	-	-
CO3	To Apply and development of a CNN-based application.	2	3	2	2	3		-	-	-	-	-	-
CO4	Explain the architecture and applications of RNNs, Bidirectional RNNs, Encoder-Decoder sequence-to-sequence architectures, Back propagation Through Time for training RNNs, LSTM networks	2	2	2	2	2		-	1	-	-	-	-
CO5	To Develop and recognize the Theoretical foundations and practical implementations of auto encoders in real-world scenarios will be explored.	1	2	2	2	2		-	2	1	-	-	-



Subject/Code No: Environmental Engineering and Disaster Management / 7AG6-60.2 LTP: 3+0+0 Semester: VII
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	List and review research literature and analyze complex Environmental Engineering problems using fundamentals of mathematics, sciences and engineering.	3	2	-	2	-	-	-	-	-	-	-	-
CO2	Develop solutions for Environmental Engineering problems and compose system components and processes to meet the specified needs with appropriate consideration for the public health and safety.	2	-	2	-	3	2	-	-	-	-	-	-
CO3	Explain effectively environmental issues and solutions through written and oral presentations to engineering communities and society.	2	-	2	-	2	2	-	-	-	2	-	-
CO4	Know ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental and societal contexts.	-	-	-	-	-	2	1	3	-	2	-	-
CO5	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety and welfare, as well as global, cultural, social, environmental and economic factors.	-	-	3	-	2	2	-	-	-	-	2	-

Subject/Code No: Deep Learning & its application Lab/ 7CA14-21 LTP: 0+0+3 Semester: VII
Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	demonstrate recall of fundamental concepts in deep learning, including neural network architectures, activation functions, and optimization algorithms, through quizzes, exams, and class discussions.	-	3	3	-	3	-	-	-	-	-	-	-
CO2	explain the principles underlying various deep learning techniques, such as convolutional neural networks (CNNs) for image processing and recurrent neural networks (RNNs) for sequential data, by summarizing key concepts and providing examples.	-	3	2	-	3	2	-	-	-	-	-	-
CO3	apply deep learning algorithms to solve practical problems in computer vision, natural language processing, and other domains, by designing and implementing neural network models in programming assignments and projects.	-	-	3	-	3	-	-	-	-	-	-	-
CO4	analyze the performance of deep learning models and interpret their results using relevant metrics and visualization tools, evaluating the effectiveness of different architectures and optimization strategies through experiments and case studies.	-	3	-	-	3	-	-	-	-	-	-	-
CO5	design novel deep learning solutions for complex problems, integrating multiple techniques and adapting them to new domains, by proposing innovative project ideas and implementing them with creativity and originality.	-	-	3	-	-	-	3	-	-	-	-	-



Subject/Code No: Computer Vision Lab /7CAI4-22 LTP: 0+0+3 Semester: VII

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Understand the basic concepts of Data Science, its lifecycle, and the role of data visualization in analysis and decision-making.	2	-	-	3	2	-	-	-	-	-	-	2
CO2	Apply data cleaning, transformation, and exploratory data analysis (EDA) using Python.	1	1	1	3	-	3	-	-	1	-	-	1
CO3	Analyze advanced statistical analysis and create interactive web applications.	-	-	2	3	-	-	-	-	-	-	-	3
CO4	Evaluate and build interactive dashboards in Power BI for effective data storytelling and decision-making.	3	3	-	-	-	2	-	-	-	-	-	-
CO5	Create advanced visualization techniques to develop comprehensive data analysis projects, adhering to ethical practices.	3	2	2	3	-	-	-	-	-	-	-	3

Subject/Code No: Industrial Training & Seminar / 7CAI7-30 LTP: 0+0+3 Semester: VII

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Apply the knowledge to work on any project in computing.	1	1	-	-	1	1	-	1	-	-	-	1
CO2	Know how to write reports in industrial technical seminar.	1	-	-	-	-	1	-	1	1	-	-	1
CO3	Develop the communication skills to work with a group of workers and learn the proper behavior in a working environment.	2	-	-	-	-	-	-	-	-	3	-	2
CO4	Know how to work with multi-tasking professionals and multidisciplinary team.	1	-	-	-	-	1	3	1	-	3	1	1
CO5	Develop skills to improve presentation and other soft skills.	-	-	-	-	-	-	-	-	1	3	-	1

Subject/Code No: Technical Seminar / 7CAI7-40 LTP: 0+0+3 Semester: VII

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Define the motivation for any topic of interest and describe the thought process development for a technical presentation.	3	3	1	3	1	-	-	-	-	-	-	1
CO2	List relevant sources for a literature survey and construct a document based on technical publications.	3	3	3	3	1	-	-	-	-	-	-	1
CO3	Analyse the proof-of-concept and recognize patterns in related data.	3	1	3	3	1	-	-	-	-	-	-	1
CO4	Discuss effective presentation techniques and enhance soft skills.	3	2	3	3	-	-	-	-	-	-	-	2
CO5	Apply new and recent technology (e.g. Latex) to translate technical reports accurately.	3	1	3	3	1	1	-	-	-	-	-	1



Subject/Code No: Big Data Analytics / 8CAI4-01 LTP: 3+0+0

Semester: VIII

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Illustrate the building block of Big Data and overview of big data analytics	3	2	2	-	-	-	-	-	-	-	-	-
CO2	Analyze the Big Data framework like Hadoop and describe map reduce in Big Data to generate analytics	2	2	2	1	-	-	-	-	-	-	-	-
CO3	Design of Algorithms to solve Data Intensive Problems using Hadoop I/O structure.	2	2	2	1	-	-	-	-	-	-	-	-
CO4	Implementation of Big Data Analytics using pig to solve data intensive problems and to generate analytics	3	3	2	1	-	-	-	-	-	-	-	-
CO5	Determination of Big Data Analytics using hive and resolve data intensive problems	3	3	2	1	-	-	-	-	-	-	-	-

Subject/Code No: Disaster Management & 8TT6-60.2 LTP: 3+0+0

Semester: VIII

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	To know types of disaster and hazards and related issues.	1	2	2	-	-	2	2	-	2	-	-	2
CO2	Describe various Hydro-meteorological and Geological Based Disasters.	2	-	-	-	-	2	2	-	-	-	-	2
CO3	Apply methods of community involvement as an essential part of successful DRR. Humanitarian Assistance/Support before and after disaster.	-	-	3	2	-	2	2	-	2	1	-	-
CO4	Formulate technological innovations in Disaster Risk Reduction: Advantages and problems	-	-	2	2	2	-	-	-	-	1	-	-
CO5	Use experience on conducting independent DM study including data search, analysis and presentation of disaster case study	1	2	-	-	-	-	3	-	-	-	-	2

Subject/Code No: Big Data Analytics Lab /8CAI4-21 LTP: 0+0+3 Semester: VIII

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Implement various data structure in JAVA	3	3	-	-	-	-	-	3	-	-	-	-
CO2	Demonstrate and describe to do installation of Hadoop.	2	2	2	-	2	-	-	-	-	-	-	-
CO3	Using map reduce paradigm develop the programmes in JAVA.	2	2	2	2	-	-	-	-	-	-	-	-
CO4	Analyze and perform different operations on data using Pig Latin scripts.	3	3	-	-	-	-	-	-	-	-	-	-
CO5	Illustrate and apply different operations on relations and databases using Hive.	3	3	-	-	-	-	-	-	-	-	-	-



Subject/Code No: Robot Programming Lab /8CAI4-22 LTP: 0+0+3

Semester: VIII

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Apply programming concepts to effectively program robots for various tasks.	-	2	2	2	2	2	-	-	-	-	-	-
CO2	Analyze and select effective algorithms for solving robotics problems.	-	-	2	3	2	-	-	-	-	-	-	-
CO3	Synthesize knowledge to design and implement functional robotic systems.	-	-	3	-	3	3	-	-	-	-	-	-
CO4	Evaluate robot performance and optimize algorithms for better efficiency.	-	-	3	3	3	-	-	-	-	-	-	-
CO5	Critically evaluate ethical implications and propose responsible strategies.	-	-	3	-	3	3	-	-	-	-	-	-

Subject/Code No: Project Lab /8CAI7-50 LTP: 0+0+3

Semester: VIII

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Carry out a substantial research-based project which will provide the solution to the society	3	3	1	3	1	-	-	-	-	-	-	-
CO2	find out the need for practical implementation of the solution	3	3	3	3	1	-	-	-	-	-	-	-
CO3	provide design solutions by considering ethical issues	3	3	1	3	1	-	-	-	-	-	-	-
CO4	Exhibit the solutions to the stakeholders	2	3	2	2	3	-	-	-	-	-	-	-
CO5	Illustration of ideas using respective tools	3	1	3	3	1	1	-	-	-	-	-	-



Bachelor of Technology Computer Science & Engineering (Data Science)

Program Name: Computer Science & Engineering (Data Science)

(Session: 2024-25)

Subject/Code No: Technical Communication 3CDS1-02 LTP: 3+0+0

Semester: III 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 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: Advanced Engineering Mathematics 3CDS2-01 LTP: 3+0+0

Semester: III Semester

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Develop the concept of Probabilistic models and Random Variable	3	2	3	-	2	1	-	-	-	-	-	-
CO2	Analysis through statistical methods like Normal distribution, Binomial Distribution etc	3	3	3	3	1	1	-	-	-	-	-	-
CO3	Mathematical modeling for Industrial Problem using linear programming and solution by Graphical methods	2	2	3	2	1	2	-	-	-	-	-	-
CO4	Finding Solution of real time problems with Mathematical modelling	2	3	3	2	1	2	-	-	-	-	-	-
CO5	Evaluate and create model for problems related to transportation and assignment	3	1	3	1	1	1	-	-	-	-	-	-

Subject/Code No: Digital Electronics 3CDS3-04 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	Understand and apply number system in digital design	2	3	2	-	-	-	-	-	-	-	-	2
CO2	Apply the laws of Boolean algebra to represent and simplify digital circuits	1	3	2	1	2	-	-	-	-	-	-	3
CO3	Calculate the parameters of logic families and define their characteristics.	2	-	3	2	3	-	-	-	-	-	-	2
CO4	Develop competence in Combinational Logic Problem formulation and Logic Optimization	1	3	3	2	2	-	-	-	-	-	-	2
CO5	Classify the different types of flip-flops and design various sequential circuits	1	3	2	1	2	-	-	-	-	-	-	2



Subject/Code No: Data Structure and Algorithms 3CDS4-05

LTP: 3+0+0

Semester: III

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Know the concept of stack operations and its implementation to solve real time problems	1	2	3	-	-	1	-	-	-	-	-	-
CO2	Recognize the knowledge of Linked List and Queues to design algorithms for complex engineering tasks	3	2	2	1	-	-	-	-	-	-	-	-
CO3	Analyze and design efficient searching and sorting techniques	2	1	3	1	-	2	-	-	-	-	-	-
CO4	Evaluate problems by storing data in tree structure and performing basic operations	2	2	2	2	-	2	-	-	-	-	-	-
CO5	Apply graph concept for complex problem and understand hashing	1	3	2	1	-	1	-	-	-	-	-	-

Subject/Code No: Object oriented Programming 3CDS4-06 LTP: 3+0+0

Semester: III

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Knowing the basic knowledge of object-oriented programming language constructs.	2	3	3	2	-	-	-	-	-	-	-	-
CO2	Discussing and identifying the concept of reference, dynamic memory allocation and concept of various types of functions in classes.	2	3	3	2	-	-	-	-	-	-	-	-
CO3	Apply inheritance and it's types in real time problems.	2	3	3	2	-	-	-	-	-	-	-	-
CO4	Implement concept of polymorphism to perform different types of bindings.	1	3	3	2	-	-	-	-	-	-	-	-
CO5	Create application using I/O and file handling with exception handling.	1	3	3	2	-	-	-	-	-	-	-	-

Subject/Code No: Software Engineering 3CDS4-07 LTP: 3+0+0

Semester: III

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Decompose the given project in various phases of a lifecycle.	1	1	2	2	2	-	-	-	-	2	-	2
CO2	Choose appropriate process model depending on the user requirements.	1	-	2	2	2	-	-	-	-	-	-	1
CO3	Perform various life cycle activities like Analysis, Design, Implementation, Testing and Maintenance.	1	1	2	2	1	-	-	-	-	-	2	1
CO4	Know various processes used in all the phases of the product.	2	-	3	3	-	-	-	-	-	-	2	2
CO5	Analyse the knowledge, techniques, and skills in the development of a software product.	1	2	2	1	1	-	-	-	-	-	-	1



Subject/Code No: Data Structure and Algorithms Lab 3CDS4-21

LTP: 0+0+3

Semester: III

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Understand and examine the concept of array & its storage	2	2	3	3	2	2	-	-	-	-	-	-
CO2	Illustrate the implementation of basic data structure using an array.	2	2	3	2	-	2	-	-	-	-	-	-
CO3	Analyze and compare different searching and sorting techniques	2	3	2	2	-	2	-	-	-	-	-	-
CO4	Develop programs to perform operations on Non-linear Data Structures such as Tree and Graphs	3	3	3	1	1	1	-	-	-	-	-	-
CO5	Design and use different sorting algorithms	3	2	2	2	-	2	-	-	-	-	-	-

Subject/Code No: Object Oriented Programming Lab 3CDS4-22

LTP: 0+0+3

Semester: III

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Understand the concept of C++ programming language while evaluating different access specifiers to define member function.	2	2	2	3	3	-	2	-	-	-	-	-
CO2	Implement memory allocation techniques and various inbuilt functions.	2	2	2	3	3	-	2	-	-	-	-	-
CO3	Know inheritance and analyze the types of inheritance.	2	2	2	3	3	-	2	-	-	-	-	-
CO4	Apply the concept of polymorphism to perform different types of bindings.	2	2	2	2	2	-	2	-	-	-	-	-
CO5	Develop and use of application related to I/O and file handling with exception handling.	2	2	2	2	2	-	2	-	-	-	-	-

Subject/Code No: Software Engineering Lab 3CDS4-23

LTP: 0+0+3

Semester: III

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Understand the software engineering methodologies involved in the phases for project development.	2	2	2	2	-	-	-	-	-	-	-	2
CO2	Know about open-source tools used for implementing software engineering methods.	1	2	2	2	2	-	-	-	-	-	-	1
CO3	Develop product-startups implementing software process models in software engineering methods.	2	2	2	2	2	-	-	-	-	-	2	
CO4	Understand Open-source Tools: StarUML / UMLGraph / Top cased.	2	3		3	3	-	-	-	-	-	2	
CO5	Discuss and analyze how to develop software requirements specifications for a given problem.	1	2	2	1	1	-	-	-	-	-	-	1



Subject/Code No: Digital Electronics Lab 3CDS4-24 LTP: 0+0+3

Semester: III

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	List different types of logic gates, identify their ICs and also verify their truth tables.	2	2	3	-	-	-	-	-	-	-	-	2
CO2	Demonstrate the functioning of basic logic gates, adder, and subtractor using universal gates.	2	2	3	3	-	-	-	-	-	-	-	2
CO3	Design a combinational circuit using MSI devices and verify its functionalities.	3	2	3	2	-	-	-	-	-	-	-	2
CO4	Develop various sequential circuit using Flip Flops and verify its functionalities.	2	3	2	-	2	-	-	-	-	-	-	2
CO5	Formulate Various types of counters, Shift registers SISO, SIPO, PISO, PIPO using Flip-Flops and verify its functionalities using simulation tool	2	2	2	-	3	-	-	-	-	-	-	2

Subject/Code No: Industrial Training 3CDS7-30 LTP: 0+0+1

Semester: III

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Compose an interest in research-oriented fields and develop the ability to research for literature and prepare brief report	2	3	-	-	-	2	2	2	-	-	-	-
CO2	Identify the skills, competencies and points of view needed by professionals in the field most closely related to the course	2	3	-	-	3	-	-	-	2	-	-	-
CO3	Discuss and identify about topics of current intellectual importance	-	-	-	1	1	2	1	-	-	-	2	-
CO4	Develop the communication skills and awareness about the industrial environment.	-	-	-	-	-	-	2	1	1	2	1	-
CO5	Revise Skill development for presentation.	-	-	3	-	3	-	-	-	-	-	3	-

Subject/Code No: Discrete Mathematical Structures 4CDS2-01

LTP: 3+0+0

Semester: IV

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Explain the various fundamental concepts of the Set theory and Logics.	3	2	3	1	-	1	-	-	-	-	-	-
CO2	Illustrate the concept of relations and Diagram to analyse the area of greatest impact for improvement.	3	3	3	3	1	-	-	-	-	-	-	-
CO3	Create the application part of lattices in distributed computing and Data mining.	2	2	3	2	1	2	-	-	-	-	-	-
CO4	Implementation of Graphs and their application in real time problem	3	2	2	2	2	2	-	-	-	-	-	-
CO5	Analyse the concept of Algebraic Structures.	3	3	3	1	1	1	-	-	-	-	-	-



Subject/Code No: Managerial Economics and Financial Accounting 4CDS1-03 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	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: Microprocessors & Interfaces 4CDS3-04 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	Discuss working of functional components of computer system.	3	2	3	2	2	-	-	-	-	-	-	2
CO2	Demonstrate an overall functional structure of the Microprocessor.	2	2	1	2	2	-	-	-	-	-	-	1
CO3	Explain how interrupts are used to implement I/O control and data transfers.	2	2	2	1	2	-	-	-	-	-	-	1
CO4	To learn the design aspects of I/O and Memory Interfacing circuits.	1	2	2	2	2	-	-	-	-	-	-	1
CO5	Implement their practical approach through laboratory experiments.	2	2	1	2	2	-	-	-	-	-	-	1

Subject/Code No: Database Management System 4CDS4-05 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	Develop database using E-R diagram to represent simple database application scenarios	2	2	3	-	1	1	-	-	-	-	-	-
CO2	Identify data from database using query language	2	2	-	2	-	1	-	-	-	-	-	-
CO3	Apply normalization process to refine database schema	3	2	3	2	-	-	-	-	-	-	-	-
CO4	Describe transaction processing and Serializability	3	3	-	-	-	2	-	-	-	-	-	-
CO5	Interpret the concept of Concurrency Control and concept of Failure and Recovery	3	3	-	2	-	-	-	-	-	-	-	-



Subject/Code No: Theory of Computation 4CDS4-06 LTP: 3+0+0

Semester: IV

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Analyse the concept of Finite Automata and distinguish between Non- Deterministic Finite Automata and Deterministic Finite Automata. Analyse regular sets and its properties. Composition of Regular Expression from Finite Automata and vice-versa.	1	2	2	2	-	-	-	-	-	-	-	-
CO2	Understand the Context Free Grammar and its simplification.	2	2	2	2	-	-	-	-	-	-	-	-
CO3	Asses the Context Free Language and generation of Push Down Automata for Context Free Grammar.	2	2	3	3	-	-	-	-	-	-	-	-
CO4	Know the Turing Machine and its various types. Discuss the hierarchy of formal languages.	2	2	3	3	-	-	-	-	-	-	-	-
CO5	Evaluating the P, NP, NP complete, NP hard problems with the help of examples.	2	3	3	3	-	-	-	-	-	-	-	-

Subject/Code No: Data Communication and Computer Networks 4CDS4-07 LTP: 3+0+0 Semester: IV

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Describe the concept of signals and illustrate the functionality of OSI & TCP/IP reference model.	3	2	2	1	-	-	-	1	-	-	-	-
CO2	Explain channel allocation, framing, flow control, and error control mechanisms and apply them using data link layer protocols.	3	2	3	2	-	-	-	-	-	-	-	-
CO3	Determine the function of network layer, design subnets and calculate IP addresses for a network.	3	3	3	2	-	-	-	-	-	-	-	-
CO4	Illustrate and Analyse different transport layer protocols and functions.	3	2	2	2	-	-	-	-	-	-	-	-
CO5	Analyze the different protocols at Application layer.	3	1	2	1	-	-	-	-	-	-	-	-

Subject/Code No: Microprocessor and Interface Lab 4CDS4-21 LTP: 0+0+3

Semester: IV

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Knowing and apply the fundamentals of assembly level programming of microprocessors and microcontroller.	-	2	2	2	2	2	-	-	-	-	-	2
CO2	Implement standard microprocessor real time interfaces including GPIO, serial ports, digital-to-analog converters and analog-to-digital converters.	-	-	2	3	2	-	-	-	-	-	-	3
CO3	Interpret Troubleshoot interactions between software and hardware.	-	-	3	-	3	3	-	-	-	-	-	3
CO4	Analyze abstract problems and apply a combination of hardware and software to address the problem.	-	-	3	3	3	-	-	-	-	-	-	3
CO5	Use standard test and measurement equipment to evaluate digital interfaces.	-	-	3	-	3	3	-	-	-	-	-	3



Subject/Code No: Data Base Management System Lab 4CDS4-22

LTP: 0+0+3

Semester: IV

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Know how to make database schema for given scenarios	3	3	2	-	2	-	-	-	-	-	-	-
CO2	Apply Keys and Constraints on database using RDBMS.	3	3	3	2	2	-	-	-	-	-	-	-
CO3	Formulate aggregate functions	3	3	2	-	-	-	-	-	-	-	-	-
CO4	Compose pl/sql including stored procedures, stored functions, cursors concept	3	2	2	-	3	-	-	-	-	-	-	-
CO5	Develop Triggers, SQL and Procedural interfaces	3	3	2	3	2	-	-	-	-	-	-	-

Subject/Code No: Network Programming Lab 4CDS4-23

LTP: 0+0+3

Semester: IV

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Describe the functioning of various networking equipment's and Standard Network Topologies	3	-	-	-	-	2	-	-	-	-	-	2
CO2	Explain and Define the LAN Installation and Configurations techniques	3	-	-	-	2	-	-	-	-	-	-	-
CO3	Design code for various Error correcting techniques and framing methods through C Language	3	2	3	-	-	-	-	-	-	-	-	-
CO4	Analyze and verify client and server involving UDP/TCP sockets using Socket Programming.	3	2	2	-	-	-	-	-	-	-	-	-
CO5	Demonstrate and determine the Communication Models between client and server using Network Simulator.	3	2	-	-	2	-	-	-	-	-	-	-

Subject/Code No: Linux Shell Programming Lab 4CDS4-24 LTP: 0+0+3

Semester: IV

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Know and apply Key Concepts and Commands for Shell Programming	3	2	2	-	3	-	-	-	2	-	-	2
CO2	Analyze the different security measures that can be implemented to protect the directory structure	-	3	-	-	-	-	-	-	3	-	-	3
CO3	Define Approaches to Mastering Shell Quoting Mechanisms	-	-	-	3	-	-	-	-	3	-	-	3
CO4	Evaluate Patterns with simple Regular Expressions using Filters using various Command	-	-	3	-	-	-	-	-	3	-	-	3
CO5	Explain how to use scripting to enhance command output.	-	-	3	-	-	-	-	-	3	-	-	3



Subject/Code No: Java Lab 4CDS4-25 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	Use the syntax and semantics of java programming language and basic concepts of OOP.	2	2	2	2	-	-	-	-	-	-	-	2
CO2	Develop reusable programs using the concepts of inheritance, polymorphism, interfaces and packages.	2	2	2	2	2	-	-	-	-	-	-	2
CO3	Apply the concepts of Multithreading and Exception handling to develop efficient and error free codes.	-	-	3	-	-	-	-	-	-	-	3	3
CO4	Design event driven GUI and web related applications which mimic the real word scenarios.	-	-	3	-	-	-	-	-	-	-	3	3
CO5	Design the applications using applets and use of graphics in java.	-	-	3	-	-	-	-	-	-	-	-	3

Subject/Code No: Data Mining-Concepts and Techniques /5CDS3-01 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	Know the Mathematical Foundations to Data Mining Tools	3	3	3	-	-	3	-	-	-	-	-	1
CO2	Apply Classical Models and Algorithms in Data Mining	3	3	3	1	1	-	-	-	-	-	-	1
CO3	Categorize Patterns through Association Rule Mining, Classification, and Clustering	3	3	1	3	1	-	-	-	-	-	-	1
CO4	Employ Appropriate Data Mining Algorithms for Practical Problem Solving	1	3	3	1	-	-	-	-	-	-	-	1
CO5	Analyze Data Mining Trends and Impacts	2	3	-	-	-	2	-	-	2	-	2	2

Subject/Code No: Compiler Design/ 5CDS4-02 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	Illustrate all phases of the Compiler and analyse its functioning	3	2	-	1	-	-	-	-	-	-	-	-
CO2	Determine the Parsing algorithms and various error handling in parser	2	2	2	1	-	-	-	-	-	-	-	-
CO3	Analyse the syntax directed definition and all types of Intermediate code generations.	2	2	2	2	-	-	-	-	-	-	-	-
CO4	Classify various type of storage organisation techniques and symbol list.	3	2	2	2	-	-	-	-	-	-	-	-
CO5	Explain all code generation, block control graphs and Source-code optimization techniques	3	3	2	1	-	-	-	-	-	-	-	-



Subject/Code No: Operating System /5CDS4-03 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	Memorise the fundamental concepts of operating systems, processes, and process synchronization.	2	2	3	2	2	1	-	-	-	-	-	1
CO2	Explain different approaches to memory management.	2	2	3	2	2	2	-	-	-	-	-	1
CO3	Analyze and design deadlock detection and prevention techniques as well as device management.	2	3	3	1	2	1	-	-	-	-	-	1
CO4	Recognize and describe the structure of file systems and directories.	3	2	1	2	2	-	-	-	-	-	-	1
CO5	Discuss different case studies of operating systems.	-	3	3	-	3	-	-	-	-	-	-	1

Subject/Code No: Data Visualization - R Programming / Power BI/ 5CDS-04 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	Understand the basic concepts of Data Science, its lifecycle, and the role of data visualization in analysis and decision-making.	2	-	-	2	3	-	-	-	-	-	-	2
CO2	Apply data cleaning, transformation, and exploratory data analysis (EDA) using R.	1	1	3	3	-	1	-	-	1	-	-	1
CO3	Evaluate advanced statistical analysis methods and create interactive web applications using R and Shiny.	-	-	3	3	-	-	-	-	-	-	-	2
CO4	Create interactive dashboards in Power BI for effective data storytelling and decision-making.	3	2	-	-	-	3	-	-	-	-	-	-
CO5	Analyze advanced visualization techniques and integrate R with Power BI to develop comprehensive data analysis projects, adhering to ethical practices.	2	3	2	3	-	-	-	-	-	-	-	3

Subject/Code No: Analysis of Algorithm/ 5CDS4-05 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	Argue the correctness of algorithms using inductive proofs and Analyze worst-case running times of algorithms using asymptotic analysis.	2	2	1	3	-	-	-	-	-	-	-	1
CO2	Explain important algorithmic design paradigms and apply when an algorithmic design situation calls for it.	2	-	1	3	-	-	-	-	-	-	-	1
CO3	Explain the major graph algorithms and Employ graphs to model engineering problems, when appropriate.	2	2	1	3	-	-	-	-	-	3	-	1
CO4	Compare between different data structures and pick an appropriate data structure for a design situation.	2	2	1	3	-	-	-	-	-	-	-	1
CO5	Describe the classes P, NP, and NP Complete and be able to prove that a certain problem is NP-Complete.	2	2	1	2	-	-	-	-	1	2	-	1



Subject/Code No: Fundamentals of Blockchain/ 5CDS5-11 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	Describe the basics of Blockchain, notation of Distributed Systems in Blockchain and analyse various problems.	3	2	-	2	-	-	-	-	-	-	-	-
CO2	Discuss about Technology Stack of Blockchain with Protocols and analyse the feature of crypto Currency.	3	-	-	1	-	-	-	3	-	-	-	-
CO3	Explain and illustrate the essential components of a blockchain platform.	3	-	-	-	-	1	-	3	-	-	-	-
CO4	Determine and analyse the various Blockchain Technology.	3	-	1	1	-	1	-	1	-	-	-	-
CO5	Illustrate various Types of Consensus Algorithms	3	1	1	1	-	-	-	-	-	-	-	-

Subject/Code No: Probability & Statistics for Data Science/ 5CDS5-12 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	Gain Familiarity: with diverse data collection methods and develop proficiency in basic data visualization techniques. Understand measures of central tendency, dispersion, skewness, and kurtosis, and learn to interpret them	3	3	1	3	1	-	-	-	-	-	-	-
CO2	Develop Understanding: of fundamental probability concepts and the ability to calculate probabilities for different events.	3	3	3	3	1	-	-	-	-	-	-	-
CO3	Acquire Understanding: of various types of random variables, grasp the concepts of conditional probability, and distinguish between univariate and bivariate probability distributions. Learn about transforming continuous random variables and their practical applications	3	3	3	3	1	-	-	-	-	-	-	-
CO4	Acquire Knowledge: about the characteristics of random variables, including expectation and variance. Learn to compute various generating functions	3	3	3	3	3	-	-	-	-	-	-	-
CO5	Learn Hypothesis Testing: principles and techniques, and develop proficiency in analyzing hypotheses and their outcomes.	3	2	2	3	3	-	-	-	-	-	-	-



Subject/Code No: Programming for Data Science/ 5CDS5-13 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	To know the mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	3	2	-	-	1	2	-	-	-	-	-	2
CO2	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	2	2	-	1	2	-	-	-	-	-	-	-
CO3	Use designed solutions for complex engineering problems and designed 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.	-	3	2	3	3	-	-	-	-	-	-	-
CO4	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.	2	3	3	-	3	-	-	-	-	-	-	-
CO5	Apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.	2	3	-	3	3	-	-	-	-	-	-	-

Subject/Code No: R Programming Lab /5CDS4-21 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	Understand proficiency in basic R programming, including creating variables, performing mathematical operations, using control flow statements, and writing functions.	2	-	-	-	3	-	-	-	-	-	-	2
CO2	Apply data import/export, cleaning, and wrangling operations in R to prepare data for analysis.	2	2	-	-	-	2	-	-	2	-	-	2
CO3	Analyze and visualize data using R, applying both basic and advanced visualization techniques.	3	-	3	3	-	-	-	-	-	-	-	3
CO4	Create and deploy machine learning models and web applications using R, and handle big data for scalable solutions.	2	2	-	-	-	3	-	-	-	-	-	-
CO5	Evaluate tasks using R for improved efficiency and collaborate effectively on data analysis projects using R and Power BI.	-	3	-	3	-	-	-	-	-	-	-	2



Subject/Code No: Compiler Design Lab/5CDS4-22 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	Understand Lexical analyzer and use this knowledge to implement its various sub-functions for any regular language.	3	3	-	-	-	-	-	-	-	-	-	-
CO2	Design and code of Symbol Table in C language.	3	3	-	-	-	-	-	-	-	-	-	-
CO3	Verify the code for Lexical analyzer for given language using C and LEX tools.	3	3	-	-	-	-	-	-	-	-	-	-
CO4	Apply the Code of YACC Program for identification of strings and Operators.	2	2	2	-	-	-	-	-	-	-	-	-
CO5	Analyze context free grammar and Code for First and Follows using programming language C.	3	3	2	-	-	-	-	-	-	-	-	-

Subject/Code No: Analysis of Algorithm Lab/ 5CDS4-23 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	Analyze algorithms in terms of space and time complexity	3	3	2	2	-	-	-	-	-	-	-	-
CO2	Implement problems using brute force, divide and conquer and decrease and conquer techniques.	3	3	3	3	-	-	-	-	-	-	-	-
CO3	Simulate problems using greedy, dynamic programming and backtracking approaches.	3	3	2	2	-	-	-	-	-	-	-	-
CO4	Use different string-matching algorithms.	3	3	3	3	-	-	-	-	-	-	-	-
CO5	Explore the implementation of Problem classes Np, Np-Hard and Np-complete	3	3	3	3	-	-	-	-	-	-	-	-

Subject/Code No: Advanced Java Lab/ 5CDS4-24 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	Know the fundamentals of MVC with Applets and Swing.	2	2	3	-	2	-	-	-	-	-	-	-
CO2	Know and implement the concept of Java Database Connectivity (JDBC) and Client server programming.	2	2	3	2	2	-	-	-	-	-	-	-
CO3	Implement the concept of RMI and implement distributed application.	2	2	3	2	2	-	-	-	-	-	-	-
CO4	Design the web application by using the concept of JAVA Servlet.	2	2	2	2	3	-	-	-	-	-	-	-
CO5	Design the web application by using the concept of JSP.	1	1	1	-	1	-	-	-	-	-	3	-



Subject/Code No: Industrial Training/5CDS7-30 LTP: 0+0+1

Semester: V

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Participate in the projects in industries during his or her industrial training.	1	1	-	-	1	1	-	1	-	-	-	1
CO2	Describe use of advanced tools and techniques encountered during industrial training and visit.	1	-	-	-	-	1	-	1	1	-	-	1
CO3	Interact with industrial personnel and follow engineering practices and discipline prescribed in industry.	2	-	-	-	-	-	-	-	-	3	-	2
CO4	Develop awareness about general workplace behavior and build interpersonal and team skills.	1	-	-	-	-	1	3	1	-	3	1	1
CO5	Prepare professional work reports and presentations.	-	-	-	-	-	-	-	-	1	3	-	1

Subject/Code No: Digital Image Processing /6CDS3-01 LTP: 3+0+0

Semester: VI

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Describe digital image, digital image representation and need of digital image processing.	-	-	-	-	3	3	-	-	-	-	-	3
CO2	Applying different type of transformation and filtering techniques on an image.	3	1	-	-	3	3	-	-	1	-	-	3
CO3	Identify various noise models and evaluate the values for restoration and degradation models.	3	1	3	1	3	-	-	-	-	-	-	3
CO4	Analyze various image compression techniques.	1	3	1	1	-	1	-	-	-	-	-	3
CO5	Analyze and evaluate various Image Transformation and Segmentation Techniques	-	3	3	-	3	1	-	-	-	-	-	3

Subject/Code No: Machine Learning/ 6CDS4-02 LTP: 3+0+0

Semester: VI

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Apply the supervised machine learning algorithms to perform real-time data analysis and generate predictions	3	2	1	2	2	-	-	2	-	-	1	-
CO2	Know and apply real-time data analysis through the use of unsupervised machine learning algorithms like clustering and association mining	3	3	3	3	1	-	-	-	1	-	-	-
CO3	Evaluate feature extraction & selection methods and select appropriate machine learning model	3	2	2	3	1	-	-	-	1	-	1	1
CO4	Analyze various semi supervised learning & reinforcement learning algorithms	3	2	3	2	3	-	-	-	-	-	-	1
CO5	Use advance concepts like recommender system and deep learning	3	2	2	2	2	1	-	-	-	-	-	2



Subject/Code No: Information Security System/ 6CDS4-03 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	Analyse and determine for any organization the security requirements and appropriate solutions.	2	3	-	-	-	2	-	-	-	-	-	2
CO2	Protect system from different types of threats, malicious software's vulnerabilities and attacks.	1	3	-	-	-	1	-	-	-	-	-	1
CO3	Describe symmetric and public key encryption algorithms like DES, AES, RSA etc	3	3	-	-	-	-	-	-	-	-	-	1
CO4	Identify ethical, professional responsibilities, risks and liabilities in computer and network environment, and best practices to write security policy.	1	-	-	-	-	3	-	3	-	-	1	1
CO5	Distinguish and analyse available network and protocols such as SSL, IPSes, TLS, etc.	3	3	-	-	-	-	-	-	-	-	-	1

Subject/Code No: Computer Architecture & Organization/ 6CDS4-04 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	illustration of basics of Data representations, different operations, Analyse basics of computer architecture and design of basic computer	3	3	3	1	-	-	-	-	-	-	-	-
CO2	Describe & implement different processing techniques to optimize assembly language programs	3	3	3	3	-	-	-	-	-	-	-	-
CO3	Analyse& differentiate basics of data transfer in different memory, RISC & CISC characteristics	3	2	2	2	-	-	-	-	-	-	-	-
CO4	Use arithmetic operations and input/output organisation and interface	3	3	3	1	-	-	-	-	-	-	-	-
CO5	Know various memories, storage and communication techniques within them and with processor	3	3	3	3	-	-	-	-	-	-	-	-

Subject/Code No: Principals of Artificial Intelligence/6CDS4-05 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	Understand and use various types of logic and knowledge representation schemes.	3	1	3	3	1	1	-	-	-	-	-	1
CO2	Implementation of AI concepts in game playing	2	3	2	3	2	2	-	-	-	-	-	-
CO3	Use of logics, calculus, theorems & probability to enhance knowledge and reasoning	2	3	2	2	2	2	-	-	-	-	-	2
CO4	Evaluate the various Supervised and Unsupervised Learning algorithms using appropriate Dataset	2	2	3	2	1	1	-	-	-	-	-	1
CO5	Design and evaluate Deep learning Algorithms	3	3	3	1	1	1	-	-	-	-	-	1



Subject/Code No: Cloud Computing/ 6CDS4-06 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	Know the nutshell of Cloud Computing from scratch.	2	-	-	-	-	2	2	-	-	2	-	3
CO2	Discuss the model, types of clouds, various service models, programming concepts and design architecture of cloud computing.	2	2	2	2	-	1	1	1	1	2	-	2
CO3	Know the Virtualization Technology, virtualization of various components of cloud and its implementation level.	2	1	1	1	1	-	-	-	1	1	-	1
CO4	Evaluate security issues, threats, challenges and security architecture for Data, Data Centre and Cloud Services as well as disaster recovery of Data.	3	2	1	2	2	-	-	-	-	-	-	2
CO5	Describe various cloud platforms in IT industry like AWS, Microsoft Azure.	3	-	2	1	1	2	-	-	-	-	-	2

Subject/Code No: Artificial Neural Network/ 6CDS5-11 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	Discussion on neural network and different learning techniques	3	3	3	3	-	-	-	-	-	-	-	-
CO2	Use different kind of loss functions and optimizations	3	3	3	3	3	-	-	-	-	-	-	-
CO3	Interpret and apply Back Propagation algorithm In Neural Network	3	1	1	1	1	-	-	-	-	-	-	-
CO4	Knowing of Self-Organization Maps	3	1	3	1	1	-	-	-	-	-	-	-
CO5	Identifying and analyze Dynamical Models and Hopfield Models	3	1	1	1	1	-	-	-	-	-	-	-

Subject/Code No: Artificial Neural Network/ 6CDS5-11 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	Discussion on neural network and different learning techniques	3	3	3	3	-	-	-	-	-	-	-	-
CO2	Use different kind of loss functions and optimizations	3	3	3	3	3	-	-	-	-	-	-	-
CO3	Interpret and apply Back Propagation algorithm In Neural Network	3	1	1	1	1	-	-	-	-	-	-	-
CO4	Knowing of Self-Organization Maps	3	1	3	1	1	-	-	-	-	-	-	-
CO5	Identifying and analyze Dynamical Models and Hopfield Models	3	1	1	1	1	-	-	-	-	-	-	-



Subject/Code No: Nature Inspired Computing / 6CDS5-12 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	Understand fundamental concepts of NP (nondeterministic polynomial time)-hardness and computational complexity	2	-	-	3	3	-	-	-	-	-	-	2
CO2	Understand the strengths, weaknesses and appropriateness of nature-inspired algorithms.	2	1	1	1		1						
CO3	Apply nature-inspired algorithms to optimization, design and learning problems.	3	2	2	2	-	2	-	-	-	-	-	-
CO4	Analyze the behavior systems of nature inspired algorithm applied in real world problems.	3	-	3	3	-	-	-	-	-	-	-	-
CO5	Understand the theory behind the design of immune networks and DNA computing and their potential applications.	3	3	-	-	-	3	-	-	-	-	-	3

Subject/Code No: Big Data Analytics & Hadoop / 6CDS-13 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	Understand the fundamental characteristics of big data (volume, velocity, variety, veracity) and explain their impact on various industries.	3	-	-	3	3	-	-	-	-	-	-	2
CO2	Evaluate different data storage and processing techniques within Hadoop for efficient management and analysis of big data.	2	2	2	2	-	2	-	-	2	-	-	-
CO3	Analyze the broader Hadoop ecosystem, including components such as HBase, Hive, Pig, and Spark, and understand their respective roles in data processing.	3	-	3	3	-	-	-	-	-	-	-	3
CO4	Apply data preprocessing techniques such as cleaning, transformation, and feature extraction to prepare data for analysis.	3	3	-	-	-	3	-	-	-	-	-	-
CO5	Apply advanced big data analytics techniques using Apache Spark's MLlib (Machine Learning Library) and GraphX to solve complex real-world problems in a capstone project.	2	2	2	2	-	-	-	-	-	-	-	2

Subject/Code No: Digital Image Processing Lab/ 6CDS4-21 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	Apply a proper image enhancement technique for given a set of noisy images.	3	-	-	3	3	-	-	-	-	-	-	3
CO2	Able to design and implement the various Linear filtering methods for image enhancement.	2	2	2	3	3	-	-	-	-	-	-	2
CO3	Implement the different Geometric transformations on images and understand two dimensional Fourier transform.	2	2	3	2	3	-	-	-	-	-	-	2
CO4	Develop any application using different image processing techniques.	2	2	2	3	3	-	-	-	-	-	-	2
CO5	To learn the spatial and frequency domain techniques of image compression.	2	3	2	2	3	-	-	-	-	-	-	2



Subject/Code No: Machine Learning Lab/6CDS4-22 LTP: 0+0+3

Semester: VI

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Know the filtration of data to get the desired results in data analysis	3	3	3	1	-	-	-	-	-	-	-	-
CO2	Apply machine learning models as per the real life problem statements	2	3	3	2	-	-	-	-	-	-	-	-
CO3	Use of supervised and unsupervised learning algorithms	3	3	2	2	-	-	-	-	-	-	-	-
CO4	Develop neural networks for learning non-linear functions in Python	2	2	2	2	-	-	-	-	-	-	-	-
CO5	Apply Machine Learning algorithms and Neural Networks to solve real world problems	2	2	2	2	-	-	-	-	-	-	-	-

Subject/Code No: Python Lab/ 6CDS4-23 LTP: 0+0+3

Semester: VI

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Know the fundamental data types of python.	2	2	3	-	2	-	-	-	-	-	-	-
CO2	Apply knowledge of if-else, while and for loop for decision control.	2	2	3	2	2	-	-	-	-	-	-	-
CO3	Understand various methods to manipulate String.	2	2	3	2	2	-	-	-	-	-	-	-
CO4	know functions and file handling in python.	2	2	2	2	3	-	-	-	-	-	-	-
CO5	Implement sorting algorithms for various scenarios.	2	2	2	-	2	-	-	-	-	-	-	-

Subject/Code No: Mobile Application Development Lab/ 6CDS4-24 LTP: 0+0+3

Semester: VI

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Know the components and structure of mobile application development frameworks for Android and windows OS based mobiles.	2	2	3	-	2	-	-	-	-	-	-	-
CO2	Understand how to work with various mobile application development frameworks	2	2	3	2	2	-	-	-	-	-	-	-
CO3	Apply the basic and important design concepts and issues of development of mobile applications.	2	2	3	2	3	-	-	-	-	-	-	-
CO4	Implement activities with dialogs, spinner, fragments and navigation drawer by applying themes	2	2	2	2	3	-	-	-	-	-	-	-
CO5	Develop mobile applications using SQLite.	2	2	2	2	2	-	-	-	-	-	-	-



Bachelor of Technology Computer Engineering (Indian Language)

Program Name: Computer Engineering (Indian Language)
(Session: 2024-25)

Subject/Code No: 3CSR2-01/Advanced Engineering Mathematics

Semester: 3rd LTP: 3L+0T+0P

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Recall and understand the fundamental concepts of probability and standard distributions which can describe real life phenomenon.	3	3		2						2		3
CO2	Analyze the various method of numerical solutions of Normal, Poisson and Binomial probability distribution.	3	3	3	3						3		3
CO3	Formulate the optimization problems in mathematical form with classification.	2	2	2	2								2
CO4	Interpret non-linear optimization problems and solve by appropriate methods.	3	3	3	3								2
CO5	Demonstrate linear optimization problems and solve by standard methods.	2	2	2	2								2

Subject/Code No: 3CSR1-02: Technical Communication Semester: 3rd

Semester LTP: 2L+0T+0P

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
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	5		1
CO4	Implement the basic concepts of technical communication in Technical Reports, articles and their formats.										6		2



Subject/Code No: 3CSR3-04/Digital Electronics
Semester: 3rd Semester LTP: 3L+0T+0P
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	3	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: 3CSR4-05/Data Structures and Algorithms
Semester: 3rd LTP: 3L+0T+0P
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.	2	2	2	2	2	2	2	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: 3CSR4-06/Object Oriented Programming

Semester: 3rd Semester LTP: 3L+0T+0P

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Describe the Object-Oriented Programming paradigm with the concept of objects and classes.	3	3	2	3	3							
CO2	Explain the memory management techniques using constructors, destructors and pointers	3	3	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	Summarize the exception handling mechanism, file handling techniques and Use of generic programming in Object oriented programming	3	3	3	3	3							

Subject/Code No: 3CSR4-07/Software Engineering

Semester: 3rd LTP: 3L+0T+0P

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
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: 3CSR4-21/Data Structures and Algorithms Lab

Semester: 3rd Semester LTP: 0L+0T+3P

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Recognize fundamental Stack and Queue operations to address a range of engineering problems.	3	2	2	1	1							1
CO2	Relate the principles of Linked Lists to offer solutions for computer-based issues.	2	2	2	2								
CO3	Discover different Search and Sorting methods to rationalize their application in diverse scenarios.	2	1	1	2								
CO4	Devise diverse operations on non-linear data structures such as trees and graphs.	2	2	1	1								
CO5	Propose a solution for a provided engineering problem utilizing Stack, Queue, Linked List, Tree and Sorting	2	2	2									



Subject/Code No: 3CSR4-22/Object Oriented Programming Lab

Semester: 3rd Semester LTP: 0L+0T+3P

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.	2	1			1							
CO2	Apply object-oriented programming concepts using class and objects	2	2	1		2							
CO3	Apply object-oriented programming concepts using class and objects	2	2	1		2							
CO4	Analyse and apply the generic classes concepts in programming problem	2	1	1		2							
CO5	Illustrate and evaluate the file Input Output mechanisms	3	1	1	1	2							

Subject/Code No: 3CSR4-23/Software Engineering Lab

Semester: 3rd Semester LTP: 0L+0T+3P

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 appropriate CASE tools and other tools in the software life cycle.	2	1										
CO2	Translate Software Requirements Specification (SRS) for a given problem in IEEE template.	1	1							1	1	1	1
CO3	Select DFD model (level-0, level-1 DFD and Data dictionary) of the project.	1	1	1									
CO4	Prepare all Structure and Behavior UML diagram of the given project.		1	1	1	1							
CO5	Test/Evaluate "Project Libre" a project management software tool to manage files.	1		1		1				1		1	

Subject/Code No: 3CSR4-24/Digital Electronics Lab

Semester: 3rd Semester LTP: 0L+0T+3P

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	1	1	1						1	1		1
CO2	Demonstrate basic combinational circuits and verify their functionalities	2	1	1		1				1	1		1
CO3	Apply the working mechanism and design guidelines of different sequential circuits in the digital system design	1	1	2		1				1	1		1
CO4	Construct different types of counter for real time digital systems	1	1	2		1				1	1		1
CO5	Distinguish the different types of shift registers	1	1	1						1	1		1



Subject/Code No: 4CSR2-01/Discrete Mathematics Structure

Semester: 4th LTP: 3L+0T+0P

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.	3	3	3	3								3
CO2	Describe the concept of mathematical logic to create the problem in appropriate form and test for validity of the problem.	3	3	3	3								3
CO3	Apply fundamental mathematical concepts such as sets, relations, Combinatorics technique to formulate the problems and solve by appropriate method.	3	3	3	3								3
CO4	Interpret the concept of groups, ring and field to analyze the complex problems.	2	2	2									2
CO5	Demonstrate the model of real-world problems using concept of Graph and solve the problems by standard result	2	2	2	2								2

Subject/Code No: 4CSR1-03/Managerial Economics and Financial Accounting

Semester: 4th LTP: 2L+0T+0P

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.		2	2	2					1		2	1



Subject/Code No: 4CSR3-04/Microprocessor & Interfaces

Semester: 4th Semester LTP: 3L+0T+0P

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
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	3	3		3							2
CO3	Evaluate the measures of Assembly Language Programming.	3	3	3	2	3							
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: 4CSR4-05/Database Management System

Semester: 4th Semester LTP: 3L+0T+0P

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
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.	3	3	2	1								
CO5	Generalize and assess the effectiveness of concurrency control mechanisms and recovery systems.	3	3	2									



Subject/Code No: 4CSR4-06/Theory of Computation

Semester: 4th LTP: 3L+0T+0P

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Understand the process of technical communication in terms of LSRW.	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.	3	2			1			1	2	3		3
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: 4CSR4-07/Data Communication and Computer Networks

Semester: 4th LTP: 3L+0T+0P

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
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.	3	3	1			2	1		3			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 lossy 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: 4CSR4-21/Microprocessor & Interfaces Lab

Semester: 4th Semester LTP: 0L+0T+2P

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	2	1	1		1							1
CO2	Apply interfacing concept between input and output devices.	2	1	1									
CO3	Elaborate the interfacing of various other devices with microprocessor.	2	2										
CO4	Compose the various program on different problems using Assembly Language Programming.	2	2	2									2
CO5	Implement standard microprocessor real time interfaces including digital-to-analog converters and analog-to-digital converters	1	1										

Subject/Code No: 4CSR4-22/ Database Management System Lab

Semester: 4th Semester LTP: 0L+0T+3P

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	2	1	1									
CO2	Manage integrity constraints within a database using a relational database management system (RDBMS).	2	1	1									
CO3	Construct and devise a graphical user interface (GUI) application using a fourth-generation programming language (3GL).	3	1	1						1			
CO4	Composing PL/SQL code encompassing stored procedures, stored functions, cursors, and packages.	2				2							
CO5	Produce SQL and Procedural interfaces to SQL comprehensively.	2	1							1			

Subject/Code No: 4CSR4-23/ Network Programming Lab

Semester: 4th Semester LTP: 0L+0T+3P

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	1					1					1	1
CO2	Illustrate the LAN Installation techniques and Configurations techniques	1	1			1						1	
CO3	Solving various Error correcting techniques and framing methods	1	1	1	1						1	1	
CO4	Practise the programs for client and server involving UDP/TCP sockets using socket programming.	1	1	1									1
CO5	Estimate the communication between client and server using Network Simulator.	1	1										



Subject/Code No: 4CSR4-24/ Linux Shell Programming Lab

Semester: 4th Semester LTP: 0L+0T+2P

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Summarize the concepts and commands in UNIX.	1	1	1						1			
CO2	Construct the directory layout of a typical UNIX system, maintain, and secure UNIX directories and files.	1	1	1	1								
CO3	Illustrate the knowledge to use the several shell quoting mechanisms correctly.	1	1	3	1								
CO4	Construct regular expression using filters and various commands to express the patterns.	1	1	2	1	1							
CO5	Write simple scripts to develop basic command output	1	1	1	1								

Subject/Code No: Java Lab 4CSR4-25

Semester: Semester: 4th Semester LTP: 0L+0T+2P

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Express and restate fundamentals of java, and tools for program designing environments.	1		2		1							
CO2	Construct classes and implement the principles of method overloading, inheritance, and access controls within those classes.	1	2	1	1	1							
CO3	Develop Java packages and incorporate the concept of interfaces, along with importing these packages in Java.	1	2	2		1							
CO4	Formulate the application by managing file operations, handling exceptions, and implementing threads.		1	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		1	2		1							

Subject/Code No: Information Theory & Coding/5CSR3-01

LTP: 2L+0T+0P

Semester: 5th

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
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/5CSR4-02

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/5CSR4-03

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/5CSR4-04

LTP: 3L+0T+0P Semester: 5th

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
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/5CSR4-05

LTP: 3L+0T+0P Semester: 5th

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
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)/5CSR5-11

LTP: 2L+0T+0P Semester: 5th

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
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: HCI (Elective)/5CSR5-12

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	Explain the key principles and concepts of Human-Computer Interaction (HCI)	2	3	3		2							2
CO2	Evaluate and compare different models and their applications in HCI	2	2	2	2								2
CO3	To assess and apply HCI guidelines and evaluation methods to make informed judgments about the usability and user experience of interactive systems.	2	2	3		3							
CO4	To understand, analyze, and apply various research methods in HCI	2	3	3									
CO5	To use various task modeling and formalism techniques and understanding the foundational concepts of CA	2	2	2		2							

Subject/Code No: Computer Graphics & Multimedia Techniques Lab/5CSR4-21

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/5CSR4-22

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/5CSR4-23

LTP: 0L+0T+2P

Semester: 5th

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
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/5CSR4-24

LTP: L+0T+2P

Semester: 5th

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
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/6CSR3-01

LTP: 2L+0T+0P

Semester: 6th

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
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/6CSR4-02

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/6CSR4-03

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/6CSR4-03

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/6CSR4-05

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/6CSR4-06

LTP: 3L+0T+0P Semester: 6th

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
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/6CSR5-11

LTP: 2L+0T+0P

Semester: 6th

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
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/6CSR5-13

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/6CSR4-21

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/6CSR4-22

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/6CSR4-23

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/6CSR4-24

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:7CSR4-01/Internet of Things

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

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 fundamental idea behind the Internet of Things (IoT).	2	1	2	2	1		1					
CO2	Apply the connection of diverse sensors to Arduino/Raspberry Pi.	2	2		2	2							
CO3	Execute wireless data transmission among distinct devices.	2	1	2		2			1				
CO4	Display proficiency in transferring sensor data to and from cloud-based servers.	1	1	1	1	2		1	1				
CO5	Evaluate the transformative impact of the Internet on Mobile Devices, Cloud Computing, and Sensor Networks.	1	2	1	1	1	1	1	1				



Subject/Code No: 7AG6-60.2/Environmental Engineering and Disaster Management

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

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	State the natural environment and its relationships with human activities and realize the importance of ecosystem and biodiversity for maintaining ecological balance and know the objective and scope of the course.	2					2	2	3				3
CO2	Examine different types of pollutants, their distinguishing traits, and comprehend the significance of ensuring a secure water supply system and water quality.	2					3	3	1				2
CO3	Evaluate strategies for managing solid waste, examining its attributes and the repercussions of solid waste on the environment. Assess both the quantity and attributes of solid waste, as well as its proper disposal methods. Recognize the significance of sanitation within this context.	3					3	3					
CO4	Assess the factors influencing the volume and attributes of wastewater, and analyze the processes involved in its treatment.	3					2	2					2
CO5	Generalize various types of Disasters and their social and environmental impact and the associated risk and vulnerability and plan the disaster management.	2					3	3					2

Subject/Code No:7CSR4-21/Internet of Things Lab

Semester: 7th Semester LTP: 0L+0T+4P

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 constituent Components within IoT Architecture.	2	1	2	1	1		1	1	1	1	1	
CO2	Construct connections between Devices and Sensors, applying theoretical understanding.	3	2	2	2	2						3	
CO3	Implement wireless data transmission techniques among various devices.	2	2	2	3	2		2		2			
CO4	Evaluate and select appropriate IoT Devices and Sensors based on provided Case Studies.	1	3	1	1					1	1		1
CO5	Execute the upload and download of sensor data on cloud and server, culminating in a comprehensive and proficient utilization demonstration.	3	1	1	1	1		1		1		1	1



Subject/Code No: 7CSR4-22/Cyber Security Lab

Semester: 7th Semester LTP: 0L+0T+4P

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Utilizing substitution and transposition techniques to achieve encryption and decryption of plain text, demonstrating comprehension and practical application.	3	3	1		3							
CO2	Design a solution for Key Exchange problem and understand the general attacks on system	3	3	1		3							
CO3	Analyse the data transferred in client server communication and working of various network protocol	3	3	3		1							1
CO4	Understand security-based tools like Wire shark, tcp dump, rootkits, snort etc.	3	3	1	3	1	3						
CO5	Apply encryption, decryption techniques for secure data transmission, and digital signature generation, demonstrating understanding and application.	3	3	2	2	2							2

Subject/Code No: 8CSR4-01/Big Data Analytics

Semester: 8th Semester LTP: 3L+0T+0P

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 building blocks of Big Data and review the growing field of Big Data Analytics	2	1	1	2	2							
CO2	Compose the algorithm of data intensive problem using map reduce example	1	1	3	1	1							
CO3	Study and implement Writable Classes in Hadoop I/O	2	3	2	2	3							
CO4	Design and Implementation of Big Data Analytics using pig to solve data intensive problems and to generate analytics	2	1	3	2	1							
CO5	Implement Big Data Activities using Hive	2	2	1	2	1							

Subject/Code No: 8TT6-60.2/Disaster Management

Semester: 8th Semester LTP: 3L+0T+0P

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 practicalities of hazards, disasters with associated natural/social phenomena Understand this with disaster management theory (cycle, phases)	2	2			3		3	1		2		
CO2	List the existing global frameworks and existing agreements(e.g. Sendai)	2	2		2		1	2	1				1
CO3	Choose a methods of community involvement as an essential part of successful DRR. Humanitarian Assistance/Support before and after disaster	1	1		1		2	2	1				2
CO4	Technological innovations in Disaster Risk Reduction: Advantages and problems.	1	2					3	1		1		2
CO5	Experience on conducting independent DM study including data search, analysis and presentation of disaster case study.	2	1				2	3	1				1



Subject/Code No: 8CSR4-21/Big Data Analytics Lab

Semester: 8th Semester LTP: 0L+0T+2P

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Summarize and implement the basic data structure algorithms like Linked list, stack, queue, set and map in Java.	3	3	3	3								
CO2	Illustrate the knowledge and implement different file management in hadoop	3	2	2	2	2							
CO3	Discuss the example of map reduce and develop the data application using variety of system	3	2	3	2								
CO4	Evaluate and perform different operation on Data using Pig Latin	3	3		3								
CO5	Illustrate different operations on relations and databases using Hive.	3				3							

Subject/Code No: 8CSR4-22/Software Testing & Validation Lab

Semester: 8th Semester LTP: 0L+0T+2P

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 Automation Testing Approach using various tool		3			3							
CO2	Analyse & discuss the performance of different websites using JMeter		3	2		2							
CO3	Calculate the coverage analysis of programs using Eclemma tool.					3							
CO4	Describe & calculate the mutation score for various programs using jumble testing tool.	3											
CO5	Generate Test sequences and compare using Selenium tool for different websites.		3	2	2	3							



Bachelor of Technology Internet of Things

Program Name: Internet of Things

(Session: 2024-25)

Subject/Code No: Advanced Engineering Mathematics/3CIT2-01

Semester: 3rd LTP: 3+0+0

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Understand and remember the basic principles of probability and standard distributions that can explain real-life phenomena.	3	3		2						2		3
CO2	Analyze the various method of numerical solutions of Normal, Poisson and Binomial probability distribution	2	3	3	2						3		3
CO3	Express the optimization problems mathematically, including their classification.	2	2	2	2								2
CO4	Analyze non-linear optimization problems and solve them using suitable methods.	2	3	3	1								2
CO5	Show how to solve linear optimization problems using standard methods.	2	2	3	3								2

Subject/Code No: Technical Communication 3CIT1-02/4CS1-02

Semester: 3rd LTP: 3+0+0

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012
CO1	Understand the process of technical communication in terms of LSRW.									1	3		1
CO2	Apply the principles of technical materials and texts to various technical documents.										3		1
CO3	Improve skills in the process of technical communication, focusing on Listening, Speaking, Reading, and Writing (LSRW).									1	2		1
CO4	Apply the basic concepts of technical communication to technical reports, articles, and their formats.										2		2
CO5	Evaluate the effectiveness of technical reports, proposals, and articles in conveying technical information and achieving their intended purposes											2	3



Subject/Code No: Digital Electronics 3CIT3-04

Semester: 3rd LTP: 3+0+0

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	2		3						3		3
CO2	Distinguish logic expressions and circuits using Boolean laws and K-map	3	2	3	2						3		3
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.	2	3	2	2								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.	3	3		2								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	2	3	2								2

Subject/Code No: Data Structures and Algorithms 3CIT4-05

Semester: 3rd LTP: 3+0+0

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.	2	3		2						2		3
CO2	Explain the concepts and applications of different types of queues such as circular queues, dequeues, and priority queues.	2	3	3	3						3		2
CO3	Discover different Search and Sorting methods to rationalize their application in diverse scenarios.	2	2	2	2								2
CO4	Practice the concept of Trees and their operations to furnish valid solutions.	2	3	2	3								2
CO5	Explain representations of Graphs and Assess collision resolution strategies like linear and quadratic probing, and double hashing in various hashing scenarios.	3	2	3	2								3



Subject/Code No: Object Oriented Programming 3CIT4-06

Semester: 3rd LTP: 3+0+0

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.	2	3		3						2		3
CO2	Explain inline functions, function overloading, and functions with default arguments in C++.	3	3	3	3						3		3
CO3	Define and Implement Inheritance, function overriding in derived classes and virtual function	3	2	2	3								2
CO4	Understand how to apply polymorphism techniques on the object-oriented problem.	2	3	3	2								2
CO5	Summarize the exception handling mechanism, file handling techniques and Use of generic programming in Object oriented programming	2	2	2	2								2

Subject/Code No: Software Engineering 3CIT4-07

Semester: 3rd LTP: 3+0+0

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Define the different software life-cycle models, software requirements specification, formal requirements specification, verification, and validation	3	3		3						3		3
CO2	Explain the objectives of software project management, resource estimation methods, LOC and FP estimation, effort estimation, the COCOMO model.	3	2	2	2						2		3
CO3	Interpret and deduce the engineering process of software requirement analysis.	3	3	2	2								2
CO4	Analyze the fundamentals of software design, principles of effective modular design, and the creation of data, architectural, and procedural designs, including the preparation of design documentation.	3	2	2	2								3
CO5	Collaborate the concept of object-oriented analysis and design in software development process.	2	3	3	2								3



Subject/Code No: Data Structures and Algorithms Lab 3CIT4-21

Semester: 3rd LTP: 0+0+3

Course Outcome Mapping with Program Outcome

CO Number	CO Definition	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	Remember the concepts of array storage and size of a word in C programming and Recall the differences between row major and column major storage in multi-dimensional arrays.	3	3	2	1						2		3
CO2	Understand the implementation of stack, queue, circular queue, and de-queue using a one-dimensional array.	3	3	2	3						3		3
CO3	Discover different Search and Sorting methods to rationalize their application in diverse scenarios.	2	3	2	3								2
CO4	Devise diverse operations on non-linear data structures such as trees and graphs.	3	2	3	3								2
CO5	Propose a solution for a provided engineering problem utilizing Stack, Queue, Linked List, Tree and Sorting	2	2	3	3								2

Subject/Code No: Object Oriented Programming Lab 3CIT4-22

Semester: 3rd LTP: 0+0+3

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		1						2		3
CO2	Apply object oriented programming concepts using class and objects	2	3	3	2						3		3
CO3	Apply knowledge of constant data members and member functions, as well as static data members and member functions within a class.	2	3	2	1						2		2
CO4	Analyse and apply the generic classes concepts in programming problem	3	3	3	3								2
CO5	Illustrate and evaluate the file Input Output mechanisms	3	3	2	2								2



Subject/Code No: Software Engineering Lab 3CIT4-23

Semester: 3rd LTP: 0+0+3

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 appropriate CASE tools and other tools in the software life cycle.	3	3		2						2		3
CO2	Discuss Software Requirements Specification (SRS) for a given problem in IEEE template.	3	2	2	3						2		3
CO3	Select DFD model (level-0, level-1 DFD and Data dictionary) of the project.	3	2	3	2								3
CO4	Prepare all Structure and Behavior UML diagram of the given project.	3	2	3	2								2
CO5	Test/Evaluate "Project Libre" a project management software tool to manage files.	3	3	2	3								3

Subject/Code No: Digital Electronics Lab 3CIT4-24

Semester: 3rd LTP: 0+0+3

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	3	2						3		3
CO2	Demonstrate basic combinational circuits and verify their functionalities	2	3	3	2						3		2
CO3	Apply the working mechanism and design guidelines of different sequential circuits in the digital system design	3	2	3	2								2
CO4	Construct different types of counter for real time digital systems	3	2	3	2								3
CO5	Distinguish the different types of shift registers	3	2	3	2								2



Subject/Code No: Discrete Mathematics Structure 4CIT2-01

Semester: 4th LTP: 3+0+0

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	3	3	2						3		3
CO2	Describe the concept of mathematical logic to create the problem in appropriate form and test for validity of the problem.	3	3		2						2		3
CO3	Apply fundamental mathematical concepts such as sets, relations, Combinatorics technique to formulate the problems and solve by appropriate method.	3	2	3	1						2		2
CO4	Interpret the concept of groups, ring and field to analyze the complex problems.	3	3	2	3								2
CO5	Demonstrate the model of real-world problems using concept of Graph and solve the problems by standard result and graph algorithms.	2	3	2	3								3

Subject/Code No: Managerial Economics and Financial Accounting 3CIT1-03/ 4CIT1-03

Semester: 4th LTP: 3+0+0

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.								1	1	2		3
CO2	Calculate and Classify the domestic product, national product and elasticity of price on demand and supply..							2		1	1		3
CO3	Draw the cost graphs, revenue graphs and forecast the impact of change in price in various perfect as well as imperfect market structures.							2		1		2	1
CO4	Compare the financial statements to interpret the financial position of the firm and evaluate the project investment decisions.							2			2	2	2
CO5	Use capital budgeting techniques to assess the viability of investment opportunities and make informed financial decisions.							1		1		2	2



Subject/Code No: Microprocessor & Interfaces 4CIT3-04

Semester: 4th LTP: 3+0+0

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.	2	2		3						2		3
CO2	Practice proficiency in programming, employing diverse addressing modes and data transfer instructions for microprocessors and microcontrollers.	3	2	3	2						2		3
CO3	Evaluate the measures of Assembly Language Programming.	3	2	3	2								3
CO4	Discriminate the interfacing of various circuits with microprocessor.	3	3	2	3								2
CO5	compare the different programming logic applications with 8085 microprocessors.	2	3	2	3								2

Subject/Code No: Database Management System 4CIT4-05

Semester: 4th LTP: 3+0+0

Course Outcome Mapping with Program Outcome

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



Subject/Code No: Theory of Computation 4CIT4-06

Semester: 4th LTP: 3+0+0

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	3	3						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	3	3	2	2						3		3
CO3	Apply the knowledge of Context Free grammar; he/she can generate the Context free grammar and Pushdown Automaton for evaluating the CFG.	3	2		3								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	2	2	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	2	3								3

Subject/Code No: Data Communication and Computer Networks 4CIT4-07

Semester: 4th LTP: 3+0+0

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 identifying the principles of layered protocol architecture, recognizing and categorizing system functions within the appropriate protocol layers, and demonstrating the interactions between these layers.	2	3	3	2						3		3
CO2	State and cite mathematical problems for data-link and network protocols.	3	3		2						2		3
CO3	Use network layer protocols and calculate number of subnets required for a network.	3		3	2								2
CO4	Compute the reliability of data transfer over transport layer by lossy channel bit errors problem.	3	3	3	2								2
CO5	Select and plan for common services, system services, such as name and address lookups, and communications applications.	3	2	3	2								2



Subject/Code No: Microprocessor & Interfaces Lab 4CIT4-21

Semester: 4th LTP: 0+0+3

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	2	3		3						2		3
CO2	Apply interfacing concept between input and output devices.	2		3	2						2		3
CO3	elaborate the interfacing of various other devices with microprocessor.	3	2	2	2								2
CO4	Compose the various programmes on different problems using Assembly Language Programming.	3	2	3									2
CO5	Implement standard microprocessor real time interfaces including digital-to-analog converters and analog-to-digital converters	2	3	2	3								3

Subject/Code No: Database Management System Lab 4CIT4-22

Semester: 4th LTP: 0+0+3

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	3		2						3		2
CO2	Manage integrity constraints within a database using a relational database management system (RDBMS).	2	3	3	2						3	2	3
CO3	Construct and Devise a graphical user interface (GUI) application using a fourth-generation programming language (4GL).	2	3	2	2							3	2
CO4	Composing PL/SQL code encompassing stored procedures, stored functions, cursors, and packages.	3	3	3	2								2
CO5	Produce SQL and Procedural interfaces to SQL comprehensively.	2	2	2	2							3	2

Subject/Code No: Network Programming Lab 4CIT4-23

Semester: 4th LTP: 0+0+3

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	3	3	3						2		3
CO2	Illustrate the LAN Installation techniques and Configurations techniques	2	3	3	2						3		3
CO3	Solving various Error correcting techniques and framing methods	2	2		2								3
CO4	Practise the programs for client and server involving UDP/TCP sockets using socket programming.	3	3	2	3								2
CO5	Estimate the communication between client and server using Network Simulator.	2	2	2	2								2



Subject/Code No: Linux Shell Programming Lab 4CIT4-24

Semester: 4th LTP: 0+0+3

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		2						2		3
CO2	Construct the directory layout of a typical UNIX system, maintain, and secure UNIX directories and files.	3	3	3	3						2	2	3
CO3	Illustrate the knowledge to use the several shell quoting mechanisms correctly.	2	2	2	2							2	3
CO4	Construct regular expression using filters and various commands to express the patterns.	3	3	2	3						2		2
CO5	Write simple scripts to develop basic command output	2	3		2							2	2

Subject/Code No: Java Lab 4CIT4-25

Semester: 4th LTP: 0+0+3

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.	2	3	2	2						2		3
CO2	Construct classes and implement the principles of method overloading, inheritance, and access controls within those classes.	2	3		2						3		3
CO3	Develop Java packages and incorporate the concept of interfaces, along with importing these packages in Java.	3		2	3								3
CO4	Formulate the application by managing file operations, handling exceptions, and implementing threads.	3	2	3	2								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	2	2						2		2



CHAPTER IX

Program wise CO-PSO Mapping Session: 2024-25

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: HCI (Elective)/ 5CS5-12

LTP: 2L+0T+0P Semester: 5th

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Explain the key principles and concepts of Human-Computer Interaction (HCI)	1	2	3
CO2	Evaluate and compare different models and their applications in HCI	2	2	3
CO3	To assess and apply HCI guidelines and evaluation methods to make informed judgments about the usability and user experience of interactive systems.	1	2	3
CO4	To understand, analyze, and apply various research methods in HCI	1	2	3
CO5	To use various task modeling and formalism techniques and understanding the foundational concepts of CA	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: 7CS4-01/Internet of Things

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

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Recognize the fundamental idea behind the Internet of Things (IoT).	3	3	3
CO2	Apply the connection of diverse sensors to Arduino/Raspberry Pi.	2	2	2
CO3	Execute wireless data transmission among distinct devices.	1	1	1
CO4	Display proficiency in transferring sensor data to and from cloud-based servers.	2	2	2
CO5	Evaluate the transformative impact of the Internet on Mobile Devices, Cloud Computing, and Sensor Networks.	2	2	2

Subject/Code No: 7AG6-60.2/Environmental Engineering and Disaster Management

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

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	State the natural environment and its relationships with human activities and realize the importance of ecosystem and biodiversity for maintaining ecological balance and know the objective and scope of the course.			3
CO2	Examine different types of pollutants, their distinguishing traits, and comprehend the significance of ensuring a secure water supply system and water quality.			3
CO3	Evaluate strategies for managing solid waste, examining its attributes and the repercussions of solid waste on the environment. Assess both the quantity and attributes of solid waste, as well as its proper disposal methods. Recognize the significance of sanitation within this context.			3
CO4	Assess the factors influencing the volume and attributes of wastewater, and analyze the processes involved in its treatment.			3
CO5	generalize various types of Disasters and their social and environmental impact and the associated risk and vulnerability and plan the disaster management.			3

Subject/Code No: 7CS4-21/Internet of Things Lab

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

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Recognize the constituent Components within IoT Architecture.	1	1	1
CO2	Construct connections between Devices and Sensors, applying theoretical understanding.	3	3	3
CO3	Implement wireless data transmission techniques among various devices.	1	1	1
CO4	Evaluate and select appropriate IoT Devices and Sensors based on provided Case Studies.	1	1	1
CO5	Execute the upload and download of sensor data on cloud and server, culminating in a comprehensive and proficient utilization demonstration.	1	1	1



Subject/Code No: 7CS4-22/Cyber Security Lab

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

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Utilizing substitution and transposition techniques to achieve encryption and decryption of plain text, demonstrating comprehension and practical application.	3	3	3
CO2	Design a solution for Key Exchange problem and understand the general attacks on system.	2	2	2
CO3	Analyse the data transferred in client server communication and working of various network protocol.	2	2	2
CO4	Understand security-based tools like Wire shark, tcp dump, rootkits, snort etc.	2	2	2
CO5	Apply encryption, decryption techniques for secure data transmission, and digital signature generation, demonstrating understanding and application.	3	3	3

Subject/Code No: 8CS4-01/Big Data Analytics

LTP: 3L+0T+0P Semester: 8th

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Classify the building blocks of Big Data and review the growing field of Big Data Analytics.	3	3	3
CO2	Compose the algorithm of data intensive problem using map reduce example.	1	1	1
CO3	Study and implement Writable Classes in Hadoop I/O.			
CO4	Design and Implementation of Big Data Analytics using pig to solve data intensive problems and to generate analytics.			
CO5	Implement Big Data Activities using Hive.	1	1	1

Subject/Code No: 8TT6-60.2/Disaster Management

LTP: 3L+0T+0P Semester: 8th

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Discuss the practicalities of hazards, disasters with associated natural/social phenomena Understand this with disaster management theory (cycle, phases).			3
CO2	List the existing global frameworks and existing agreements (e.g. Sendai).			3
CO3	Choose a methods of community involvement as an essential part of successful DRR. Humanitarian Assistance/Support before and after disaster.			3
CO4	Technological innovations in Disaster Risk Reduction: Advantages and problems.			3
CO5	Experience on conducting independent DM study including data search, analysis and presentation of disaster case study.			3



Subject/Code No: 8CS4-21/Big Data Analytics Lab

LTP: 0L+0T+2P Semester: 8th

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Summarize and implement the basic data structure algorithms like Linked list, stack, queue, set and map in Java.	3	3	3
CO2	Illustrate the knowledge and implement different file management in Hadoop.	2	2	2
CO3	Discuss the example of map reduce and develop the data application using variety of system.			
CO4	Evaluate and perform different operation on Data using Pig Latin.			
CO5	Illustrate different operations on relations and databases using Hive.	2	2	2

Subject/Code No: 8CS4-22/Software Testing & Validation Lab

LTP: 0L+0T+2P Semester: 8th

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Understand the Automation Testing Approach using various tool.	2		1
CO2	Analyse & discuss the performance of different websites using JMeter.	2		1
CO3	Calculate the coverage analysis of programs using Eclemma tool.	2		1
CO4	Describe & calculate the mutation score for various programs using jumble testing tool.	2		1
CO5	Generate Test sequences and compare using Selenium tool for different websites.	2		1



Department of Artificial Intelligence & Data Science

Program Name: Artificial Intelligence & Data Science

Subject/Code No: Technical Communication/3AID1-02

LTP: 2+0+0 **Semester:** III

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
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: Advanced Engineering Mathematics/3AID2-01

LTP: 3+0+0 **Semester:** III

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Develop the concept of Probabilistic models and Random Variable		3	2
CO2	Alaysis through statistical methods like Normal distribution, Binomial Distrution etc		3	2
CO3	Mathematical modeling for Industrial Problem using linear programing and solution by Graphical methods		3	3
CO4	Finding Solution of real time problems with Mathematical modelling		3	-
CO5	Evaluate and create model for problems related to transportation and assignment		3	3

Subject/Code No: Digital Electronics/3AID3-04

LTP: 3+0+0 **Semester:** III

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Understand and apply number system in digital design		3	3
CO2	Apply the laws of Boolean algebra to represent and simplify digital circuits		3	2
CO3	Calculate the parameters of logic families and define their characteristics.		2	3
CO4	Develop competence in Combinational Logic Problem formulation and Logic Optimization		3	2
CO5	Classify the different types of flip-flops and design various sequential circuits		3	3



Subject/Code No: Data Structure and Algorithms/3AID4-05

LTP: 3+0+0 Semester: III

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Know the concept of stack operations and its implementation to solve real time problems	3	1	
CO2	Recognize the knowledge of Linked List and Queues to design algorithms for complex engineering tasks	3	2	
CO3	Analyze and design efficient searching and sorting techniques	2	2	
CO4	Evaluate problems by storing data in tree structure and performing basic operations	3	3	
CO5	Apply graph concept for complex problem and understand hasing	3	3	

Subject/Code No: Object Oriented Programming/3AID4-06

LTP: 3+0+0 Semester: III

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO1	PSO2	PSO3
CO1	Knowing the basic knowledge of object-oriented programming language constructs.	3	3	-
CO2	Discussing and identifying the concept of reference, dynamic memory allocation and concept of various types of functions in classes.	3	3	-
CO3	Apply inheritance and it's types in real time problems.	3	3	-
CO4	Implement concept of polymorphism to perform different types of bindings.	3	3	-
CO5	Create application using I/O and file handling with exception handling.	3	3	-

Subject/Code No: Software Engineering / 3AID4-07

LTP: 3+0+0 Semester: III

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Decompose the given project in various phases of a lifecycle.	3	3	
CO2	Choose appropriate process model depending on the user requirements.	3	3	1
CO3	Perform various life cycle activities like Analysis, Design, Implementation, Testing and Maintenance.	3	3	
CO4	Know various processes used in all the phases of the product.	3	3	1
CO5	Analyse the knowledge, techniques, and skills in the development of a software product.	3	3	1



Subject/Code No: Data Structures Lab/3AID4-21

LTP: 0+0+3 Semester: III

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Understand and examine the concept of array & its storage	3	3	-
CO2	Illustrate the implementation of basic data structure using an array.	3	3	2
CO3	Analyse and compare different searching and sorting techniques	3	3	3
CO4	Develop programs to perform operations on Non-linear Data Structures such as Tree and Graphs	3	2	-
CO5	Design and use different sorting algorithms	3	3	-

Subject/Code No: Object Oriented Programming LAB/3AID4-22

LTP: 0+0+3 Semester: III

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Understand the concept of C++ programming language while evaluating different access specifiers to define member function.	3	3	1
CO2	Implement memory allocation techniques and various inbuilt functions.	3	3	1
CO3	Know inheritance and analyse the types of inheritance.	3	3	1
CO4	Apply the concept of polymorphism to perform different types of bindings.	3	3	1
CO5	Develop and use of application related to I/O and file handling with exception handling.	3	3	1

Subject/Code No: Software Engineering Lab/3AID4-23

LTP: 0+0+3 Semester: III

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Understand the software engineering methodologies involved in the phases for project development.	3	3	
CO2	Know about open-source tools used for implementing software engineering methods.	3	3	
CO3	Develop product-startups implementing software process models in software engineering methods.	3	3	
CO4	Understand Open-source Tools: StarUML / UMLGraph / Topcased.	3	3	
CO5	Discuss and analyse how to develop software requirements specifications for a given problem.	3	3	



Subject/Code No: Digital Electronics Lab/3AID4-24

LTP: 0+0+3 Semester: III

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	List different types of logic gates, identify their ICs and also verify their truth tables.		2	2
CO2	Demonstrate the functioning of basic logic gates, adder, and subtractor using universal gates.		2	2
CO3	Design a combinational circuit using MSI devices and verify its functionalities.		2	3
CO4	Develop various sequential circuit using Flip Flops and verify its functionalities.		2	3
CO5	Formulate Various types of counters, Shift registers SISO, SIPO, PISO, PIPO using Flip-Flops and verify its functionalities using simulation tool		2	2

Subject/Code No: Industrial Training/3AID7-30

LTP: 0+0+1 Semester: III

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Compose an interest in research-oriented fields and develop the ability to research for literature and prepare brief report	1	1	1
CO2	Identify the skills, competencies and points of view needed by professionals in the field most closely related to the course	2	1	
CO3	Discuss and identify about topics of current intellectual importance			2
CO4	Develop the communication skills and awareness about the industrial environment.		3	
CO5	Revise Skill development for presentation.	3	3	

Subject/Code No: Discrete Mathematical Structures/4AID2-01

LTP: 3+0+0 Semester: IV

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Explain the various fundamental concepts of the Set theory and Logics.	3		-
CO2	Illustrate the concept of relations and Diagraph to analyse the area of greatest impact for improvement.	3	2	-
CO3	Create the application part of lattices in distributed computing and Data mining.	2	2	-
CO4	Implimentaion of Graphs and their application in real time problem	3	2	-
CO5	Analyse the concept of Algebraic Structures.	-	3	-



Subject/Code No: Managerial Economics and Financial Accounting & 4AID1-03

LTP: 2+0+0 Semester: IV

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: Microprocessors & Interfaces & 4AID3-04

LTP: 3+0+0 Semester: IV

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Discuss working of functional components of computer system.			3
CO2	Demonstrate an overall functional structure of the Microprocessor.		3	3
CO3	Explain how interrupts are used to implement I/O control and data transfers.		3	3
CO4	To learn the design aspects of I/O and Memory Interfacing circuits.		3	3
CO5	Implement their practical approach through laboratory experiments.		3	3

Subject/Code No: Database Management System & 4AID4-05

LTP: 3+0+0 Semester: IV

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Develop database using E-R diagram to represent simple database application scenarios	3	3	
CO2	Identify data from database using query language		3	
CO3	Apply normalization process to refine database schema	3	3	
CO4	Describe transaction processing and Serializability		3	
CO5	Interpret the concept of Concurrency Control and concept of Failure and Recovery		3	



Subject/Code No: Theory of Computation & 4AID4-06

LTP: 3+0+0 Semester: IV

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Analyse the concept of Finite Automata and distinguish between Non- Deterministic Finite Automata and Deterministic Finite Automata. Analyse regular sets and its properties. Composition of Regular Expression from Finite Automata and vice-versa.	3	3	1
CO2	Understand the Context Free Grammar and its simplification.	3	3	1
CO3	Asses the Context Free Language and generation of Push Down Automata for Context Free Grammar.	3	3	1
CO4	Know the Turing Machine and its various types. Discuss the Hierarchy of formal languages.	3	3	1
CO5	Evaluating the P,NP,NP complete,NP hard problems with the help of examples.	3	3	1

Subject/Code No: Data Communication and Computer Networks & 4AID4-07

LTP: 3+0+0 Semester: IV

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Describe the concept of signals and illustrate the functionality of OSI & TCP/IP reference model.	3	1	1
CO2	Explain channel allocation, framing, flow control, and error control mechanisms and apply them using data link layer protocols.	3	2	
CO3	Determine the function of network layer, design subnets and calculate IP addresses for a network.	3	2	
CO4	Illustrate and Analyse different transport layer protocols and functions.	3	2	
CO5	Analyze the different protocols at Application layer.	3	2	

Subject/Code No: Microprocessor and Interface Lab & 4AID4-21

LTP: 0+0+2 Semester: IV

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	knowing and apply the fundamentals of assembly level programming of microprocessors and microcontroller.	2	3	2
CO2	implement standard microprocessor real time interfaces including GPIO, serial ports, digital-to-analog converters and analog-to-digital converters.		3	3
CO3	Interpret Troubleshoot interactions between software and hardware.	1	3	3
CO4	Analyze abstract problems and apply a combination of hardware and software to address the problem.	2	3	3
CO5	Use standard test and measurement equipment to evaluate digital interfaces.		3	3



Subject/Code No: Data Base Management System Lab & 4AID4-22

LTP: 0+0+3 Semester: IV

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Know how to make database schema for given scenrios	3	1	1
CO2	Apply Keys and Constraints on database using RDBMS.	3	2	
CO3	Formulate aggregate functions	3	2	
CO4	Compose pl/sql including stored procedures, stored functions, cursors concept	2	3	
CO5	Develop Triggers, SQL and Procedural interfaces	2	3	

Subject/Code No: Network Programming Lab & 4AID4-23

LTP: 0+0+3 Semester: IV

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Describe the functioning of various networking equipment's and Standard Network Topologies	3	1	1
CO2	Explain and Define the LAN Installation and Configurations techniques	3	2	
CO3	Design code for various Error correcting techniques and framing methods through C Language	3	2	
CO4	Analyze and verify client and server involving UDP/TCP sockets using Socket Programming.	2	3	
CO5	Demonstrate and determine the Communication Models between client and server using Network Simulator.	2	3	

Subject/Code No: Linux Shell Programming Lab/4AID4-24

LTP: 0+0+2 Semester: IV

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Know and apply Key Concepts and Commands for Shell Programming	3	3	2
CO2	Analyze the different security measures that can be implemented to protect the directory structure	3	3	
CO3	Define Approaches to Mastering Shell Quoting Mechanisms	2	3	2
CO4	Evaluate Patterns with simple Regular Expressions using Filters using various Command	3	2	3
CO5	Explain how to use scripting to enhance command output.	3	2	2



Subject/Code No: Java Lab/4AID4-25

LTP: 0+0+2 Semester: IV

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Use the syntax and semantics of java programming language and basic concepts of OOP.	2	2	2
CO2	Develop reusable programs using the concepts of inheritance, polymorphism, interfaces and packages.	2	2	2
CO3	Apply the concepts of Multithreading and Exception handling to develop efficient and error free codes.	3	2	2
CO4	Design event driven GUI and web related applications which mimic the real word scenarios.	3	2	2
CO5	Design the applications using applets and use of graphics in java.	3	2	2

Subject/Code No: Data Mining 5AID3-01

LTP: 2+0+0 Semester: V

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Know the Mathematical Foundations to Data Mining Tools	3	2	1
CO2	Apply Classical Models and Algorithms in Data Mining	2	3	2
CO3	Categorize Patterns through Association Rule Mining, Classification, and Clustering	3	1	2
CO4	Employ Appropriate Data Mining Algorithms for Practical Problem Solving	2	2	2
CO5	Analyze Data Mining Trends and Impacts	1	3	2

Subject/Code No: Compiler Design & 5AID4-02

LTP: 3+0+0 Semester: V

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Illustrate all phases of the Compiler and analyse it's the functioning	3	1	1
CO2	Determine the Parsing algorithms and various error handling in parser	3	2	
CO3	Analyse the Syntax directed definition and all types of Intermediate code generations.	3	2	
CO4	Classify various type of storage organization techniques and symbol list.	2	1	
CO5	Explain all code generation, block control graphs and Source-code optimization techniques	1	2	



Subject/Code No: Operating System 5AID4-03

LTP: 3+0+0 Semester: V

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
C01	Memorise the fundamental concepts of operating systems, processes, and process synchronization.	3	2	
C02	Explain different approaches to memory management.	3		2
C03	Analyze and design deadlock detection and prevention techniques as well as device management.	3	2	
C04	Recognize and describe the structure of file systems and directories.	2	2	2
C05	Discuss different case studies of operating systems.	1	3	2

Subject/Code No: Computer Graphics and Multimedia Techniques 5AID4-04

LTP: 3+0+0 Semester: V

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
C01	Analyse the fundamental concepts of computer graphics, the mathematical and geometrical issues related to computers, and assess alternative algorithmic solutions.	3	3	2
C02	Recognise and describe the different graphics primitives.	3	3	2
C03	Describe, demonstrate, and create several 2D transformation methods and clipping algorithms.	3	3	2
C04	Build the essential ideas of parallel and perspective projection and assess several 3D transformation algorithms	3	3	2
C05	Discuss different case studies of operating systems.	3	3	2

Subject/Code No: Analysis of Algorithm 5AID4-05

LTP: 3+0+0 Semester: V

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
C01	Argue the correctness of algorithms using inductive proofs and analyze worst-case running times of algorithms using asymptotic analysis.		3	
C02	Explain important algorithmic design paradigms and apply when an algorithmic design situation calls for it.		3	
C03	Explain the major graph algorithms and Employ graphs to model engineering problems, when appropriate.		3	
C04	Compare between different data structures and pick an appropriate data structure for a design situation.		3	
C05	Describe the classes P, NP, and NP Complete and be able to prove that a certain problem is NP-Complete.		3	



Subject/Code No: Fundamentals of Block Chain & 5AID5-11

LTP: 3+0+0 Semester: V

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Describe the basics of Blockchain, notation of Distributed Systems in Blockchain and analyse various problems.	2	2	
CO2	Discuss about Technology Stack of Blockchain with Protocols and analyse the feature of crypto Currency.	2	2	1
CO3	Explain and illustrate the essential components of a blockchain platform.	2	2	1
CO4	Determine and analyse the various Blockchain Technology.	2	2	
CO5	Illustrate various Types of Consensus Algorithms	3	1	

Subject/Code No: Probability & Statistics for Data Science & 5AID5-12

LTP: 3+0+0 Semester: V

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Gain Familiarity: with diverse data collection methods and develop proficiency in basic data visualization techniques. Understand measures of central tendency, dispersion, skewness, and kurtosis, and learn to interpret them	2	3	2
CO2	Develop Understanding: of fundamental probability concepts and the ability to calculate probabilities for different events.	2	3	2
CO3	Acquire Understanding: of various types of random variables, grasp the concepts of conditional probability, and distinguish between univariate and bivariate probability distributions. Learn about transforming continuous random variables and their practical applications	3	2	3
CO4	Acquire Knowledge: about the characteristics of random variables, including expectation and variance. Learn to compute various generating functions	3	3	3
CO5	Learn Hypothesis Testing: principles and techniques, and develop proficiency in analyzing hypotheses and their outcomes.	2	3	2

Subject/Code No: Programming for Data Science & 5AID5-13

LTP: 3+0+0 Semester: V

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	To know the mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	3	2	
CO2	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	3		2
CO3	Use designed solutions for complex engineering problems and designed 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.	3		3
CO4	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.	3		2
CO5	Apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.	3	2	



Subject/Code No: Computer Graphics and Multimedia Lab/5AID4-21

LTP: 2+0+0 Semester: V

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Implement basic transformations on objects using OpenGL.	3	3	2
CO2	Apply clipping and filling techniques for modifying an object.	3	3	2
CO3	Understand the practical implementation of modeling, rendering, viewing of objects in 2D.	3	3	2
CO4	Design multimedia applications	3	3	2
CO5	Identify multimedia compression techniques and applications.	3	3	2

Subject/Code No: Compiler Design Lab 5AID4-22

LTP: 0+0+2 Semester: V

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Understand Lexical analyzer and use this knowledge to implement its various sub-functions for any regular language.	3		
CO2	Design and code of Symbol Table in C language.	2	2	
CO3	Verify the code for Lexical analyzer for given language using C and LEX tools.	2	2	
CO4	Apply the Code of YACC Program for identification of strings and Operators.	3	2	
CO5	Analyze context free grammar and Code for First and Follows using programming language C.	2	1	

Subject/Code No: Analysis of Algorithm LAB & 5AID4-23

LTP: 0+0+2 Semester: V

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Analyze algorithms in terms of space and time complexity	3	3	-
CO2	Implement problems using brute force, divide and conquer and decrease and conquer techniques.	3	3	-
CO3	Simulate problems using greedy, dynamic programming and backtracking approaches.	3	3	-
CO4	Use different string-matching algorithms.	3	3	-
CO5	Explore the implementation of Problem classes Np, Np-Hard and Np-complete	3	3	-



Subject/Code No: Advanced Java Lab & 5AID4-24

LTP: 0+0+2 Semester: V

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Know the fundamentals of MVC with Applets and Swing.	3	3	2
CO2	Know and implement the concept of Java Database Connectivity (JDBC) and Client server programming.	3	3	2
CO3	Implement the concept of RMI and implement distributed application.	3	3	2
CO4	Design the web application by using the concept of JAVA Servlet.	3	3	2
CO5	Design the web application by using the concept of JSP.	3	3	2

Subject/Code No: Industrial Training & 5AID7-30

LTP: 0+0+1 Semester: V

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Participate in the projects in industries during his or her industrial training.		3	2
CO2	Describe use of advanced tools and techniques encountered during industrial training and visit.		3	1
CO3	Interact with industrial personnel and follow engineering practices and discipline prescribed in industry.		3	
CO4	Develop awareness about general workplace behavior and build interpersonal and team skills.		2	2
CO5	Prepare professional work reports and presentations.		3	1

Subject/Code No: Digital Image Processing 6AID3-01

LTP: 2+0+0 Semester: VI

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Describe digital image, digital image representation and need of digital image processing.	1	3	
CO2	Applying different type of transformation and filtering techniques on an image.	1	3	1
CO3	Identify various noise models and evaluate the values for restoration and degradation models.	2	3	1
CO4	Analyze various image compression techniques.	1	3	2
CO5	Analyze and evaluate various Image Transformation and Segmentation Techniques		3	1



Subject/Code No: Machine Learning (6AID4-02)

LTP: 3+0+0 Semester: VI

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Apply the supervised machine learning algorithms to perform real-time data analysis and generate predictions	3	3	1
CO2	Know and apply real-time data analysis through the use of unsupervised machine learning algorithms like clustering and association mining	3	3	
CO3	Evaluate feature extraction & selection methods and select appropriate machine learning model	2	3	1
CO4	Analyze various semi supervised learning & reinforcement learning algorithms	3	2	
CO5	Use advance concepts like recommender system and deep learning	3	2	1

Subject/Code No: Information System Security/ 6AID4-03

LTP: 2+0+0 Semester: VI

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Analyse and determine for any organization the security requirements and appropriate solutions.		2	2
CO2	Protect system from different types of threats, malicious software's vulnerabilities and attacks.		2	
CO3	Describe symmetric and public key encryption algorithms like DES, AES, RSA etc		3	
CO4	Identify ethical, professional responsibilities, risks and liabilities in computer and network environment, and best practices to write security policy.		2	2
CO5	Distinguish and analyse available network and protocols such as SSL, IPSes, TLS, etc.		3	

Subject/Code No: Computer architecture & Organization/6AID4-04

LTP: 3+0+0 Semester: VI

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	illustration of basics of Data representations, different operations, Analyse basics of computer architecture and design of basic computer	3	3	-
CO2	describe & implement different processing techniques to optimize assembly language programs	3	3	-
CO3	Analyse & differentiate basics of data transfer in different memory, RISC & CISC characteristics	3	3	-
CO4	Use arithmetic operations and input/output organisation and interface	3	3	-
CO5	know various memories, storage and communication techniques within them and with processor	3	3	-



Subject/Code No: Artificial Intelligence/6AID4-05

LTP: 2+0+0 Semester: VI

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Understand and use various types of logic and knowledge representation schemes.	3	3	-
CO2	Implantation of AI concepts in game playing	3	3	2
CO3	Use of logics, calculus, theorems & probability to enhance knowledge and reasoning	3	3	3
CO4	Evaluate the various Supervised and Unsupervised Learning algorithms using appropriate Dataset	3	2	-
CO5	Design and evaluate Deep learning Algorithms	3	3	-

Subject/Code No: Cloud Computing 6AID4-06

LTP: 3+0+0 Semester: VI

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Know the nutshell of Cloud Computing from scratch.	3	3	2
CO2	Discuss the model, types of clouds, various service models, programming concepts and design architecture of cloud computing.	3	3	2
CO3	Know the Virtualization Technology, virtualization of various components of cloud and its implementation level.	3	3	2
CO4	Evaluate security issues, threats, challenges and security architecture for Data, Data Centre and Cloud Services as well as disaster recovery of Data.	3	3	2
CO5	Describe various cloud platforms in IT industry like AWS, Microsoft Azure.	3	3	2

Subject/Code No: Artificial Neural Network/6AID5-11

LTP: 2+0+0 Semester: VI

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Discussion on neural network and different learning techniques	3	3	-
CO2	Use different kind of loss functions and optimizations	3	3	2
CO3	Interpret and apply Back Propagation algorithm In Neural Network	3	3	3
CO4	Knowing of Self-Organization Maps	3	2	-
CO5	Identifying and analyze Dynamical Models and Hopfield Models	3	3	-



Subject/Code No: Natural Language Processing 6AID5-12

LTP: 2+0+0 Semester: VI

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Understand key challenges in NLP and their corresponding solutions.	3	3	1
CO2	Formulate proficiency in NLP programming techniques.	3	3	1
CO3	Develop the capability to evaluate NLP problems effectively.	2	3	1
CO4	Know and Use the skill to extract essential insights from pertinent research papers.	3	3	1
CO5	Apply the concepts of natural language understanding, processing, and generation.	3	3	1

Subject/Code No: Digital Image Processing Lab 6AID4-21

LTP: 0+0+3 Semester: VI

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Apply a proper image enhancement technique for given a set of noisy images.			3
CO2	Able to design and implement the various Linear filtering methods for image enhancement.		3	3
CO3	Implement the different Geometric transformations on images and understand two-dimensional Fourier transform.		3	3
CO4	Develop any application using different image processing techniques.		3	3
CO5	To learn the spatial and frequency domain techniques of image compression.		3	3

Subject/Code No: Machine Learning LAB/6AID4-22

LTP: 0+0+3 Semester: VI

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Know the filtration of data to get the desired results in data analysis	3	3	-
CO2	Apply machine learning models as per the real-life problem statements	3	3	-
CO3	Use of supervised and unsupervised learning algorithms	3	3	-
CO4	Develop neural networks for learning non-linear functions in Python	3	3	-
CO5	Apply Machine Learning algorithms and Neural Networks to solve real world problems	3	3	-



Subject/Code No: Python Lab & 6AID4-23

LTP: 0+0+3 Semester: VI

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Know the fundamental data types of python.	3	3	2
CO2	Apply knowledge of if-else, while and for loop for decision control.	3	3	2
CO3	Understand various methods to manipulate String.	3	3	2
CO4	Know functions and file handling in python.	3	3	2
CO5	Implement sorting algorithms for various scenarios.	3	3	2

Subject/Code No: Mobile Application Development Lab & 6AID4-24

LTP: 0+0+3 Semester: VI

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Know the components and structure of mobile application development frameworks for Android and windows OS-based mobiles.	3	3	2
CO2	Understand how to work with various mobile application development frameworks	3	3	2
CO3	Apply the basic and important design concepts and issues of development of mobile applications.	3	3	2
CO4	Implement activities with dialogs, spinner, fragments and navigation drawer by applying themes	3	3	2
CO5	Develop mobile applications using SQLite.	3	3	2

Subject/Code No: Big Data Analytics 7AID4-01 LTP: 3+0+0 Semester: VII

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Illustrate the building block of Big Data and overview of big data analytics	3	2	2
CO2	Analyze the Big Data framework like Hadoop and describe map reduce in Big Data to generate analytics	3	2	
CO3	Design of Algorithms to solve Data Intensive Problems using Hadoop I/O structure.	3	2	
CO4	Implementation of Big Data Analytics using pig to solve data intensive problems and to generate analytics	3	3	
CO5	Determination of Big Data Analytics using hive and resolve data intensive problems	3	3	



Subject/Code No: Environmental Engineering and Disaster Management (7AG6-60.2) LTP: 3+0+0

Semester: VII

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	List and review research literature and analyze complex Environmental Engineering problems using fundamentals of mathematics, sciences and engineering.	2		
CO2	Develop solutions for Environmental Engineering problems and compose system components and processes to meet the specified needs with appropriate consideration for the public health and safety.		3	
CO3	Explain effectively environmental issues and solutions through written and oral presentations to engineering communities and society.			3
CO4	Know ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental and societal contexts.	2	2	
CO5	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety and welfare, as well as global, cultural, social, environmental and economic factors.	2		

Subject/Code No: Big Data Analysis Lab 7AID4-21 LTP: 0+0+3 Semester: VII

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Implement various data structure in JAVA	2	2	
CO2	Demonstrate and describe to do installation of Hadoop.	2	2	
CO3	Using map reduce paradigm develop the programmes in JAVA.	2	2	
CO4	Analyze and perform different operations on data using Pig Latin scripts.	2	1	
CO5	Illustrate and apply different operations on relations and databases using Hive.	2	1	

Subject/Code No: R. Programming Lab (7AID4-22) LTP: 0+0+3 Semester: VII

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Developing R Programming Skills and Data Structure Manipulation	3	3	
CO2	Knowing Data Importation, Cleansing, and Visualization	3	3	2
CO3	Applying Hypothesis Testing and Conducting Exploratory Data Analysis	2	3	
CO4	Employing Clustering, Diminishing Dimensionality, and Unveiling Linear Regression Insights	3	3	
CO5	Discussing Machine Learning Techniques and Practicing Web Scraping	3	3	



Subject/Code No: Industrial Training Seminar (7AID7-30) LTP: 0+0+3 Semester: VII
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Apply the knowledge to work on any project in computing.		3	2
CO2	Know how to write reports in industrial technical seminar.		3	1
CO3	Develop the communication skills to work with a group of workers and learn the proper behavior in a working environment.		3	
CO4	Know how to work with multi-tasking professionals and multidisciplinary team.		2	2
CO5	Develop skills to improve presentation and other soft skills.		3	1

Subject/Code No: Seminar (7AID7-40) LTP: 0+0+1 Semester: VII
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Define the motivation for any topic of interest and describe the thought process development for a technical presentation.	3	2	2
CO2	List relevant sources for a literature survey and construct a document based on technical publications.	3	2	2
CO3	Analyse the proof-of-concept and recognize patterns in related data.	2	2	2
CO4	Discuss effective presentation techniques and enhance soft skills.	3	2	2
CO5	Apply new and recent technology (e.g. Latex) to translate technical reports accurately.	3	2	2

Subject/Code No: Deep Learning and Its Applications / 8AID4-01 LTP: 3+0+0 Semester: VIII
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	To know the basic knowledge of Learning Algorithms	3	3	
CO2	To Analysis and design of the Neural Network Concepts so that Test and validate a trained network to generalizes	3		2
CO3	To Apply and development of a CNN-based application.	3	3	
CO4	Explain the architecture and applications of RNNs, Bidirectional RNNs, Encoder-Decoder sequence-to-sequence architectures, Back propagation Through Time for training RNNs, LSTM networks	2		3
CO5	To Develop and recognize the Theoretical foundations and practical implementations of auto encoders in real-world scenarios will be explored.	3	3	

Subject/Code No: Disaster Management & 8TT6-60.2 LTP: 3+0+0 Semester: VIII
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	To know types of disaster and hazards and related issues.		2	3
CO2	Describe various Hydro-meteorological and Geological Based Disasters.		2	3
CO3	Apply methods of community involvement as an essential part of successful DRR. Humanitarian Assistance/Support before and after disaster.		3	3
CO4	Formulate technological innovations in Disaster Risk Reduction: Advantages and problems		3	2
CO5	Use experience on conducting independent DM study including data search, analysis and presentation of disaster case study		2	2



Subject/Code No: Deep Learning & its application Lab /8AID4-21 LTP: 0+0+3 Semester: VIII
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Demonstrate recall of fundamental concepts in deep learning, including neural network architectures, activation functions, and optimization algorithms, through quizzes, exams, and class discussions.	3	1	2
CO2	Explain the principles underlying various deep learning techniques, such as convolutional neural networks (CNNs) for image processing and recurrent neural networks (RNNs) for sequential data, by summarizing key concepts and providing examples.	3	2	2
CO3	Apply deep learning algorithms to solve practical problems in computer vision, natural language processing, and other domains, by designing and implementing neural network models in programming assignments and projects.	3	3	
CO4	Analyze the performance of deep learning models and interpret their results using relevant metrics and visualization tools, evaluating the effectiveness of different architectures and optimization strategies through experiments and case studies.	2	2	3
CO5	Design novel deep learning solutions for complex problems, integrating multiple techniques and adapting them to new domains, by proposing innovative project ideas and implementing them with creativity and originality.	2	1	2

Subject/Code No: Robot Programming Lab /8AID4-22 LTP: 0+0+3 Semester: VIII
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Apply programming concepts to effectively program robots for various tasks.	2	3	2
CO2	Analyze and select effective algorithms for solving robotics problems.		3	3
CO3	Synthesize knowledge to design and implement functional robotic systems.	1	3	3
CO4	Evaluate robot performance and optimize algorithms for better efficiency.	2	3	3
CO5	Critically evaluate ethical implications and propose responsible strategies.		3	3

Subject/Code No: Project Lab /8AID7-50 LTP: 0+0+1 Semester: VIII
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Carry out a substantial research-based project which will provide the solution to the society	3	2	2
CO2	find out the need for practical implementation of the solution	3	2	2
CO3	provide design solutions by considering ethical issues	2	2	2
CO4	Exhibit the solutions to the stakeholders	3	2	2
CO5	Illustration of ideas using respective tools	3	2	2



Bachelor of Technology Computer Science & Engineering (Artificial Intelligence)

Program Name: B.Tech Computer Science & Engineering (Artificial Intelligence)

Subject/Code No: Technical Communication/3CAI1-02

LTP: 2+0+0 Semester: III

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
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: Advanced Engineering Mathematics/3CAI2-01

LTP: 3+0+0 Semester: III

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Develop the concept of Probabilistic models and Random Variable		3	2
CO2	Alaysis through statistical methods like Normal distribution, Binomial Distraction etc		3	2
CO3	Mathematical modeling for Industrial Problem using linear programing and solution by Graphical methods		3	3
CO4	Finding Solution of real time problems with Mathematical modelling		3	-
CO5	evaluate and create model for problems related to transportation and assignment		3	3

Subject/Code No: Digital Electronics/3CAI3-04

LTP: 3+0+0 Semester: III

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Understand and apply number system in digital design		3	3
CO2	Apply the laws of Boolean algebra to represent re-present and simplify digital circuits		3	2
CO3	Calculate the parameters of logic families and define their characteristics.		2	3
CO4	Develop competence in Combinational Logic Problem formulation and Logic Optimization		3	2
CO5	Classify the different types of flip-flops and design various sequential circuits		3	3



Subject/Code No: Data Structure and Algorithms/3CAI4-05

LTP: 3+0+0 Semester: III

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Know the concept of stack operations and its implementation to solve real time problems	3	1	
CO2	Recognize the knowledge of Linked List and Queues to design algorithms for complex engineering tasks	3	2	
CO3	Analyze and design efficient searching and sorting techniques	2	2	
CO4	Evaluate problems by storing data in tree structure and performing basic operations	3	3	
CO5	Apply graph concept for complex problem and understand hasing	3	3	

Subject/Code No: Object oriented Programming/3CAI4-06

LTP: 3+0+0 Semester: III

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Knowing the basic knowledge of object-oriented programming language constructs.	3	3	-
CO2	Discussing and identifying the concept of reference, dynamic memory allocation and concept of various types of functions in classes.	3	3	-
CO3	Apply inheritance and its types in real time problems.	3	3	-
CO4	Implement concept of polymorphism to perform different types of bindings.	3	3	-
CO5	Create application using I/O and file handling with exception handling.	3	3	-

Subject/Code No: Software Engineering/3CAI4-07

LTP: 3+0+0 Semester: III

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Decompose the given project in various phases of a lifecycle.	3	3	
CO2	Choose appropriate process model depending on the user requirements.	3	3	1
CO3	Perform various life cycle activities like Analysis, Design, Implementation, Testing and Maintenance.	3	3	
CO4	Know various processes used in all the phases of the product.	3	3	1
CO5	Analyse the knowledge, techniques, and skills in the development of a software product.	3	3	1



Subject/Code No: Data Structures Lab 3CAI4-21

LTP: 0+0+3 Semester: III

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Understand and examine the concept of array & its storage	3	3	-
CO2	Illustrate the implementation of basic data structure using an array.	3	3	2
CO3	Analyse and compare different searching and sorting techniques	3	3	3
CO4	Develop programs to perform operations on Non-linear Data Structures such as Tree and Graphs.	3	2	-
CO5	Design and use different sorting algorithms.	3	3	-

Subject/Code No: Object Oriented Programming Lab/3CAI4-22

LTP: 0+0+3 Semester: III

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Understand the concept of C++ programming language while evaluating different access specifiers to define member function.	3	3	1
CO2	Implement memory allocation techniques and various inbuilt functions.	3	3	1
CO3	Know inheritance and analyse the types of inheritance.	3	3	1
CO4	Apply the concept of polymorphism to perform different types of bindings.	3	3	1
CO5	Develop and use of application related to I/O and file handling with exception handling.	3	3	1

Subject/Code No: Software Engineering Lab/3CAI4-23

LTP: 0+0+3 Semester: III

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Understand the software engineering methodologies involved in the phases for project development.	3	3	
CO2	Know about open-source tools used for implementing software engineering methods.	3	3	
CO3	Develop product-startups implementing software process models in software engineering methods.	3	3	
CO4	Understand Open-source Tools: StarUML / UMLGraph / Topcased.	3	3	
CO5	Discuss and analyse how to develop software requirements specifications for a given problem.	3	3	



Subject/Code No: Digital Electronics Lab&3CAI4-24

LTP: 0+0+3 Semester: III

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	List different types of logic gates, identify their ICs and also verify their truth tables.		2	2
CO2	Demonstrate the functioning of basic logic gates, adder, and subtractor using universal gates.		2	2
CO3	Design a combinational circuit using MSI devices and verify its functionalities.		2	3
CO4	Develop various sequential circuit using Flip Flops and verify its functionalities.		2	3
CO5	Formulate Various types of counters, Shift registers SISO, SIPO, PISO, PIPO using Flip-Flops and verify its functionalities using simulation tool		2	2

Subject/Code No: Industrial Training & 3CAI7-30

LTP: 0+0+1 Semester: III

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Compose an interest in research-oriented fields and develop the ability to research for literature and prepare brief report	1	1	1
CO2	Identify the skills, competencies and points of view needed by professionals in the field most closely related to the course	2	1	
CO3	Discuss and identify about topics of current intellectual importance			2
CO4	Develop the communication skills and awareness about the industrial environment.		3	
CO5	Revise Skill development for presentation.	3	3	

Subject/Code No: Discrete Mathematical Structures & 4CAI2-01

LTP: 3+0+0 Semester: IV

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Explain the various fundamental concepts of the Set theory and Logics.	3		-
CO2	Illustrate the concept of relations and Diagraph to analyse the area of greatest impact for improvement.	3	2	-
CO3	Create the application part of lattices in distributed computing and Data mining.	2	2	-
CO4	Implementation of Graphs and their application in real time problem	3	2	-
CO5	Analyse the concept of Algebraic Structures.	-	3	-



Subject/Code No: Managerial Economics and Financial Accounting & 4CAI1-03

LTP: 2+0+0 Semester: IV

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: Microprocessors & Interfaces & 4CAI3-04

LTP: 3+0+0 Semester: IV

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Discuss working of functional components of computer system.			3
CO2	Demonstrate an overall functional structure of the Microprocessor.		3	3
CO3	Explain how interrupts are used to implement I/O control and data transfers.		3	3
CO4	To learn the design aspects of I/O and Memory Interfacing circuits.		3	3
CO5	Implement their practical approach through laboratory experiments.		3	3

Subject/Code No: Database Management System & 4CAI4-05

LTP: 3+0+0 Semester: IV

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Develop database using E-R diagram to represent simple database application scenarios	3	3	
CO2	Identify data from database using query language		3	
CO3	Apply normalization process to refine database schema	3	3	
CO4	Describe transaction processing and Serializability		3	
CO5	Interpret the concept of Concurrency Control and concept of Failure and Recovery		3	



Subject/Code No: Theory of computation & 4CAI4-06

LTP: 3+0+0 Semester: IV

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Analyse the concept of Finite Automata and distinguish between Non- Deterministic Finite Automata and Deterministic Finite Automata.	3	3	1
CO2	Understand the Context Free Grammar and its simplification.	3	3	1
CO3	Asses the Context Free Language and generation of Push Down Automata for Context Free Grammar.	3	3	1
CO4	Know the Turing Machine and its various types. Discuss the Hierarchy of formal languages.	3	3	1
CO5	Evaluating the P, NP, NP complete, NP hard problems with the help of examples.	3	3	1

Subject/Code No: Data Communication and Computer Networks&4CAI4-07

LTP: 3+0+0 Semester: IV

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Describe the concept of signals and illustrate the functionality of OSI & TCP/IP reference model.	3	1	1
CO2	Explain channel allocation, framing, flow control, and error control mechanisms and apply them using data link layer protocols.	3	2	
CO3	Determine the function of network layer, design subnets and calculate IP addresses for a network.	3	2	
CO4	Illustrate and Analyse different transport layer protocols and functions.	3	2	
CO5	Analyze the different protocols at Application layer.	3	2	

Subject/Code No: Microprocessor and Interface Lab & 4CAI4-21

LTP: 0+0+2 Semester: IV

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Knowing and apply the fundamentals of assembly level programming of microprocessors and microcontroller.	2	3	2
CO2	Implement standard microprocessor real time interfaces including GPIO, serial ports, digital-to-analog converters and analog-to-digital converters.		3	3
CO3	Interpret Troubleshoot interactions between software and hardware.	1	3	3
CO4	Analyze abstract problems and apply a combination of hardware and software to address the problem.	2	3	3
CO5	Use standard test and measurement equipment to evaluate digital interfaces.		3	3



Subject/Code No: Data Base Management System Lab & 4CAI4-22

LTP: 0+0+3 Semester: IV

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Know how to make database schema for given scenarios	3	1	1
CO2	Apply Keys and Constraints on database using RDBMS.	3	2	
CO3	Formulate aggregate functions	3	2	
CO4	Compose pl/sql including stored procedures, stored functions, cursors concept	2	3	
CO5	Develop Triggers, SQL and Procedural interfaces	2	3	

Subject/Code No: Network Programming Lab & 4CAI4-23

LTP: 0+0+3 Semester: IV

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Describe the functioning of various networking equipment's and Standard Network Topologies.	3	1	1
CO2	Explain and Define the LAN Installation and Configurations techniques	3	2	
CO3	Design code for various Error correcting techniques and framing methods through C Language	3	2	
CO4	Analyze and verify client and server involving UDP/TCP sockets using Socket Programming.	2	3	
CO5	Demonstrate and determine the Communication Models between client and server using Network Simulator.	2	3	

Subject/Code No: Linux Shell Programming Lab 4CAI4-24

LTP: 0+0+3 Semester: IV

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Know and apply Key Concepts and Commands for Shell Programming	3	3	2
CO2	Analyze the different security measures that can be implemented to protect the directory structure	3	3	
CO3	Define Approaches to Mastering Shell Quoting Mechanisms	2	3	2
CO4	Evaluate Patterns with simple Regular Expressions using Filters using various Command	3	2	3
CO5	Explain how to use scripting to enhance command output.	3	2	2



Subject/Code No: Java Lab/4CAI4-25

LTP: 0+0+3 Semester: IV

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Use the syntax and semantics of java programming language and basic concepts of OOP.	2	2	2
CO2	Develop reusable programs using the concepts of inheritance, polymorphism, interfaces and packages.	2	2	2
CO3	Apply the concepts of Multithreading and Exception handling to develop efficient and error free codes.	3	2	2
CO4	Design event driven GUI and web related applications which mimic the real word scenarios.	3	2	2
CO5	Design the applications using applets and use of graphics in java.	3	2	2

Subject/Code No: Data Mining 5CAI3-01

LTP: 2+0+0 Semester: V

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Know the Mathematical Foundations to Data Mining Tools	3	2	1
CO2	Apply Classical Models and Algorithms in Data Mining	2	3	2
CO3	Categorize Patterns through Association Rule Mining, Classification, and Clustering	3	1	2
CO4	Employ Appropriate Data Mining Algorithms for Practical Problem Solving	2	2	2
CO5	Analyze Data Mining Trends and Impacts	1	3	2

Subject/Code No: Compiler Design & 5CAI4-02 LTP: 3+0+0 Semester: V

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Illustrate all phases of the Compiler and analyse it's the functioning	3	1	1
CO2	Determine the Parsing algorithms and various error handling in parser	3	2	
CO3	Analyse the syntax directed definition and all types of Intermediate code generations.	3	2	
CO4	Classify various type of storage organization techniques and symbol list.	2	1	
CO5	Explain all code generation, block control graphs and Source-code optimization techniques	1	2	

Subject/Code No: Operating System 5CAI4-03

LTP: 3+0+0 Semester: V

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Memorise the fundamental concepts of operating systems, processes, and process synchronization.	3	2	
CO2	Explain different approaches to memory management.	3		2
CO3	Analyze and design deadlock detection and prevention techniques as well as device management.	3	2	
CO4	Recognize and describe the structure of file systems and directories.	2	2	2
CO5	Discuss different case studies of operating systems.	1	3	2



Subject/Code No: Computer Graphics and Multimedia Techniques 5CAI4-04

LTP: 3+0+0 Semester: V

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
C01	Analyse the fundamental concepts of computer graphics, the mathematical and geometrical issues related to computers, and assess alternative algorithmic solutions.	3	3	2
C02	Recognize and describe the different graphics primitives.	3	3	2
C03	Describe, demonstrate, and create several 2D transformation methods and clipping algorithms.	3	3	2
C04	Build the essential ideas of parallel and perspective projection and assess several 3D transformation algorithms	3	3	2
C05	Discuss different case studies of operating systems.	3	3	2

Subject/Code No: Analysis of Algorithm 5CAI4-05

LTP: 3+0+0 Semester: V

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
C01	Argue the correctness of algorithms using inductive proofs and analyze worst-case running times of algorithms using asymptotic analysis.		3	
C02	Explain important algorithmic design paradigms and apply when an algorithmic design situation calls for it.		3	
C03	Explain the major graph algorithms and Employ graphs to model engineering problems, when appropriate.		3	
C04	Compare between different data structures and pick an appropriate data structure for a design situation.		3	
C05	Describe the classes P, NP, and NP Complete and be able to prove that a certain problem is NP-Complete.		3	

Subject/Code No: Fundamentals of Block Chain & 5CAI5-11

LTP: 3+0+0 Semester: V

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
C01	Describe the basics of Blockchain, notation of Distributed Systems in Blockchain and analyse various problems.	2	2	
C02	Discuss about Technology Stack of Blockchain with Protocols and analyse the feature of crypto Currency.	2	2	1
C03	Explain and illustrate the essential components of a blockchain platform.	2	2	1
C04	Determine and analyse the various Blockchain Technology.	2	2	
C05	Illustrate various Types of Consensus Algorithms	3	1	



Subject/Code No: Programming for Data Science & 5CAI5-13

LTP: 3+0+0 Semester: V

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	To know the mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	3	2	
CO2	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	3		2
CO3	Use designed solutions for complex engineering problems and designed 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.	3		3
CO4	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.	3		2
CO5	Apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.	3	2	

Subject/Code No: Computer Graphics and Multimedia Lab/5CAI4-21

LTP: 0+0+2 Semester: V

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Implement basic transformations on objects using OpenGL.	3	3	2
CO2	Apply clipping and filling techniques for modifying an object.	3	3	2
CO3	Understand the practical implementation of modeling, rendering, viewing of objects in 2D.	3	3	2
CO4	Design multimedia applications	3	3	2
CO5	Identify multimedia compression techniques and applications.	3	3	2

Subject/Code No: Compiler Design Lab 5CAI4-22

LTP: 0+0+2 Semester: V

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Understand Lexical analyzer and use this knowledge to implement its various sub-functions for any regular language.	3		
CO2	Design and code of Symbol Table in C language.	2	2	
CO3	Verify the code for Lexical analyzer for given language using C and LEX tools.	2	2	
CO4	Apply the Code of YACC Program for identification of strings and Operators.	3	2	
CO5	Analyze context free grammar and Code for First and Follows using programming language C.	2	1	



Subject/Code No: Analysis of Algorithm LAB & 5CAI4-23

LTP: 0+0+2 Semester: V

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Analyze algorithms in terms of space and time complexity	3	3	-
CO2	Implement problems using brute force, divide and conquer and decrease and conquer techniques.	3	3	-
CO3	Simulate problems using greedy, dynamic programming and backtracking approaches.	3	3	-
CO4	Use different string-matching algorithms.	3	3	-
CO5	Explore the implementation of Problem classes Np, Np-Hard and Np-complete	3	3	-

Subject/Code No: Advanced Java Lab & 5CAI4-24

LTP: 0+0+2 Semester: V

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Know the fundamentals of MVC with Applets and Swing.	3	3	2
CO2	Know and implement the concept of Java Database Connectivity (JDBC) and Client server programming.	3	3	2
CO3	Implement the concept of RMI and implement distributed application.	3	3	2
CO4	Design the web application by using the concept of JAVA Servlet.	3	3	2
CO5	Design the web application by using the concept of JSP.	3	3	2

Subject/Code No: Industrial Training & 5CAI7-30

LTP: 0+0+1 Semester: V

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Participate in the projects in industries during his or her industrial training.		3	2
CO2	Describe use of advanced tools and techniques encountered during industrial training and visit.		3	1
CO3	Interact with industrial personnel and follow engineering practices and discipline prescribed in industry.		3	
CO4	Develop awareness about general workplace behavior and build interpersonal and team skills.		2	2
CO5	Prepare professional work reports and presentations.		3	1



Subject/Code No: Digital Image Processing 6CAI3-01

LTP: 2+0+0 Semester: VI

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Describe digital image, digital image representation and need of digital image processing.	1	3	
CO2	Applying different type of transformation and filtering techniques on an image.	1	3	1
CO3	Identify various noise models and evaluate the values for restoration and degradation models.	2	3	1
CO4	Analyze various image compression techniques.	1	3	2
CO5	Analyze and evaluate various Image Transformation and Segmentation Techniques		3	1

Subject/Code No: Machine Learning (6CAI4-02) LTP: 3+0+0 Semester: VI

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Apply the supervised machine learning algorithms to perform real-time data analysis and generate predictions	3	3	1
CO2	Know and apply real-time data analysis through the use of unsupervised machine learning algorithms like clustering and association mining	3	3	
CO3	Evaluate feature extraction & selection methods and select appropriate machine learning model	2	3	1
CO4	Analyze various semi supervised learning & reinforcement learning algorithms	3	2	
CO5	Use advance concepts like recommender system and deep learning	3	2	1

Subject/Code No: Information System Security/ 6CAI4-03 LTP: 2+0+0 Semester: VI

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Analyse and determine for any organization the security requirements and appropriate solutions.		2	2
CO2	Protect system from different types of threats, malicious software's vulnerabilities and attacks.		2	
CO3	Describe symmetric and public key encryption algorithms like DES, AES, RSA etc		3	
CO4	Identify ethical, professional responsibilities, risks and liabilities in computer and network environment, and best practices to write security policy.		2	2
CO5	Distinguish and analyse available network and protocols such as SSL, IPSes, TLS, etc.		3	



Subject/Code No: Computer architecture & Organization/6CAI4-04 LTP: 3+0+0 Semester: VI
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	illustration of basics of Data representations, different operations, Analyse basics of computer architecture and design of basic computer	3	3	-
CO2	describe & implement different processing techniques to optimize assembly language programs	3	3	-
CO3	Analyse & differentiate basics of data transfer in different memory, RISC & CISC characteristics	3	3	-
CO4	Use arithmetic operations and input/output organization and interface	3	3	-
CO5	know various memories, storage and communication techniques within them and with processor	3	3	-

Subject/Code No: Principles of Artificial Intelligence/6CAI4-05 LTP: 2+0+0 Semester: VI
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Understand and use various types of logic and knowledge representation schemes.	3	3	-
CO2	Implantation of AI concepts in game playing	3	3	2
CO3	Use of logics, calculus, theorems & probability to enhance knowledge and reasoning	3	3	3
CO4	Evaluate the various Supervised and Unsupervised Learning algorithms using appropriate Dataset	3	2	-
CO5	Design and evaluate Deep learning Algorithms	3	3	-

Subject/Code No: Cloud Computing 6CAI4-06 LTP: 3+0+0 Semester: VI
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Know the nutshell of Cloud Computing from scratch.	3	3	2
CO2	Discuss the model, types of clouds, various service models, programming concepts and design architecture of cloud computing.	3	3	2
CO3	Know the Virtualization Technology, virtualization of various components of cloud and its implementation level.	3	3	2
CO4	Evaluate security issues, threats, challenges and security architecture for Data, Data Centre and Cloud Services as well as disaster recovery of Data.	3	3	2
CO5	Describe various cloud platforms in IT industry like AWS, Microsoft Azure.	3	3	2



Subject/Code No: Artificial Neural Network/6CAI5-11 LTP: 2+0+0 Semester: VI
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Discussion on neural network and different learning techniques	3	3	-
CO2	Use different kind of loss functions and optimizations	3	3	2
CO3	Interpret and apply Back Propagation algorithm In Neural Network	3	3	3
CO4	Knowing of Self-Organization Maps	3	2	-
CO5	Identifying and analyze Dynamical Models and Hopfield Models	3	3	-

Subject/Code No: Natural Language Processing 6CAI5-12 LTP: 2+0+0 Semester: VI
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Understand key challenges in NLP and their corresponding solutions.	3	3	1
CO2	Formulate proficiency in NLP programming techniques.	3	3	1
CO3	Develop the capability to evaluate NLP problems effectively.	2	3	1
CO4	Know and use the skill to extract essential insights from pertinent research papers.	3	3	1
CO5	Apply the concepts of natural language understanding, processing, and generation.	3	3	1

Subject/Code No: Digital Image Processing Lab 6CAI4-21 LTP: 0+0+3 Semester: VI
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Apply a proper image enhancement technique for given a set of noisy images.			3
CO2	Able to design and implement the various Linear filtering methods for image enhancement.		3	3
CO3	Implement the different Geometric transformations on images and understand two-dimensional Fourier transform.		3	3
CO4	Develop any application using different image processing techniques.		3	3
CO5	To learn the spatial and frequency domain techniques of image compression.		3	3



Subject/Code No: Machine Learning LAB/6CAI4-22 LTP: 0+0+3 Semester: VI
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Know the filtration of data to get the desired results in data analysis	3	3	-
CO2	Apply machine learning models as per the real-life problem statements	3	3	-
CO3	Use of supervised and unsupervised learning algorithms	3	3	-
CO4	Develop neural networks for learning non-linear functions in Python	3	3	-
CO5	Apply Machine Learning algorithms and Neural Networks to solve real world problems	3	3	-

Subject/Code No: Python Lab & 6CAI4-23 LTP: 0+0+3 Semester: VI
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Know the fundamental data types of python.	3	3	2
CO2	Apply knowledge of if-else, while and for loop for decision control.	3	3	2
CO3	Understand various methods to manipulate String.	3	3	2
CO4	Know functions and file handling in python.	3	3	2
CO5	Implement sorting algorithms for various scenarios.	3	3	2

Subject/Code No: Mobile Application Development Lab & 6CAI4-24 LTP: 0+0+3 Semester: VI
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Know the components and structure of mobile application development frameworks for Android and windows OS-based mobiles.	3	3	2
CO2	Understand how to work with various mobile application development frameworks	3	3	2
CO3	Apply the basic and important design concepts and issues of development of mobile applications.	3	3	2
CO4	Implement activities with dialogs, spinner, fragments and navigation drawer by applying themes	3	3	2
CO5	Develop mobile applications using SQLite.	3	3	2



Subject/Code No: Deep Learning and its Applications/7AID4-01 LTP: 3+0+0 Semester: VII
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	To know the basic knowledge of Learning Algorithms	3	3	
CO2	To Analysis and design of the Neural Network Concepts so that Test and validate a trained network to generalizes	3		2
CO3	To Apply and development of a CNN-based application.	3	3	
CO4	Explain the architecture and applications of RNNs, Bidirectional RNNs, Encoder-Decoder sequence-to-sequence architectures, Back propagation Through Time for training RNNs, LSTM networks	2		3
CO5	To Develop and recognize the Theoretical foundations and practical implementations of auto encoders in real-world scenarios will be explored.	3	3	

Subject/Code No: Environmental Engineering and Disaster Management (7AG6-60.2) LTP: 3+0+0
Semester: VII

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	List and review research literature and analyze complex Environmental Engineering problems using fundamentals of mathematics, sciences and engineering.	2		
CO2	Develop solutions for Environmental Engineering problems and compose system components and processes to meet the specified needs with appropriate consideration for the public health and safety.		3	
CO3	Explain effectively environmental issues and solutions through written and oral presentations to engineering communities and society.			3
CO4	Know ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental and societal contexts.	2	2	
CO5	Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety and welfare, as well as global, cultural, social, environmental and economic factors.	2		

Subject/Code No: Deep Learning & its application Lab/7AID4-21 LTP: 0+0+3 Semester: VII
Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Demonstrate recall of fundamental concepts in deep learning, including neural network architectures, activation functions, and optimization algorithms, through quizzes, exams, and class discussions.	3	1	2
CO2	Explain the principles underlying various deep learning techniques, such as convolutional neural networks (CNNs) for image processing and recurrent neural networks (RNNs) for sequential data, by summarizing key concepts and providing examples.	3	2	2
CO3	Apply deep learning algorithms to solve practical problems in computer vision, natural language processing, and other domains, by designing and implementing neural network models in programming assignments and projects.	3	3	
CO4	Analyze the performance of deep learning models and interpret their results using relevant metrics and visualization tools, evaluating the effectiveness of different architectures and optimization strategies through experiments and case studies.	2	2	3
CO5	Design novel deep learning solutions for complex problems, integrating multiple techniques and adapting them to new domains, by proposing innovative project ideas and implementing them with creativity and originality.	2	1	2



Subject/Code No: Computer Vision Lab (7CAI4-22) LTP: 0+0+4

Semester: VII

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Understand the basic concepts of Data Science, its lifecycle, and the role of data visualization in analysis and decision-making.	3	3	-
CO2	Apply data cleaning, transformation, and exploratory data analysis (EDA) using Python.	3	3	2
CO3	Analyze advanced statistical analysis and create interactive web applications	3	3	3
CO4	Evaluate and build interactive dashboards in Power BI for effective data storytelling and decision-making.	3	2	-
CO5	Create advanced visualization techniques to develop comprehensive data analysis projects, adhering to ethical practices.	3	3	-

Subject/Code No: Industrial Training Seminar (7AID7-30) LTP: 0+0+1

Semester: VII

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Apply the knowledge to work on any project in computing.		3	2
CO2	Know how to write reports in industrial technical seminar.		3	1
CO3	Develop the communication skills to work with a group of workers and learn the proper behavior in a working environment.		3	
CO4	Know how to work with multi-tasking professionals and multidisciplinary team.		2	2
CO5	Develop skills to improve presentation and other soft skills.		3	1

Subject/Code No: Seminar (7AID7-40) LTP: 0+0+1

Semester: VII

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Define the motivation for any topic of interest and describe the thought process development for a technical presentation.	3	2	2
CO2	List relevant sources for a literature survey and construct a document based on technical publications.	3	2	2
CO3	Analyse the proof-of-concept and recognize patterns in related data.	2	2	2
CO4	Discuss effective presentation techniques and enhance soft skills.	3	2	2
CO5	Apply new and recent technology (e.g. Latex) to translate technical reports accurately.	3	2	2



Subject/Code No: Big Data Analytics/ 8AID4-01 LTP: 3+0+0

Semester: VIII

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Illustrate the building block of Big Data and overview of big data analytics	3	2	2
CO2	Analyze the Big Data framework like Hadoop and describe map reduce in Big Data to generate analytics	3	2	
CO3	Design of Algorithms to solve Data Intensive Problems using Hadoop I/O structure.	3	2	
CO4	Implementation of Big Data Analytics using pig to solve data intensive problems and to generate analytics	3	3	
CO5	Determination of Big Data Analytics using hive and resolve data intensive problems	3	3	

Subject/Code No: Disaster Management & 8TT6-60.2 LTP: 3+0+0

Semester: VIII

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	To know types of disaster and hazards and related issues.		2	3
CO2	Describe various Hydro-meteorological and Geological Based Disasters.		2	3
CO3	Apply methods of community involvement as an essential part of successful DRR. Humanitarian Assistance/Support before and after disaster.		3	3
CO4	Formulate technological innovations in Disaster Risk Reduction: Advantages and problems		3	2
CO5	Use experience on conducting independent DM study including data search, analysis and presentation of disaster case study		2	2

Subject/Code No: Big Data Analysis Lab /8AID4-21 LTP: 0+0+3

Semester: VIII

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Implement various data structure in JAVA	2	2	
CO2	Demonstrate and describe to do installation of Hadoop.	2	2	
CO3	Using map reduce paradigm develop the programmes in JAVA.	2	2	
CO4	Analyze and perform different operations on data using Pig Latin scripts.	2	1	
CO5	Illustrate and apply different operations on relations and databases using Hive.	2	1	



Subject/Code No: Robot Programming Lab /8CAI4-22 LTP: 0+0+3
Semester: VIII

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
C01	Apply programming concepts to effectively program robots for various tasks.	2	3	2
C02	Analyze and select effective algorithms for solving robotics problems.		3	3
C03	Synthesize knowledge to design and implement functional robotic systems.	1	3	3
C04	Evaluate robot performance and optimize algorithms for better efficiency.	2	3	3
C05	Critically evaluate ethical implications and propose responsible strategies.		3	3

Subject/Code No: Project Lab /8CAI7-50 LTP: 0+0+1
Semester: VIII

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
C01	Carry out a substantial research-based project which will provide the solution to the society	3	2	2
C02	find out the need for practical implementation of the solution	3	2	2
C03	provide design solutions by considering ethical issues	2	2	2
C04	Exhibit the solutions to the stakeholders.	3	2	2
C05	Illustration of ideas using respective tools	3	2	2



Bachelor of Technology Computer Science & Engineering (Data Science)

Program Name: B.Tech. Computer Science & Engineering (Data Science)

Subject/Code No: Technical Communication/3CDS1-02 **LTP:**3+0+0

Semester: III Semester

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
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
CO5	Understand the process of technical communication in terms of LSRW.		1	2

Subject/Code No: Advanced Engineering Mathematics/3CDS2-01 **LTP:**3+0+0

Semester: III Semester

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Develop the concept of Probabilistic models and Random Variable		3	2
CO2	Analysis through statistical methods like Normal distribution, Binomial Distribution etc		3	2
CO3	Mathematical modeling for Industrial Problem using linear programming and solution by Graphical methods		3	3
CO4	Finding Solution of real time problems with Mathematical modelling		3	-
CO5	Evaluate and create model for problems related to transportation and assignment		3	3

Subject/Code No: Digital Electronics/3CDS3-04

LTP:3+0+0

Semester: III

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Understand and apply number system in digital design		3	3
CO2	Apply the laws of Boolean algebra to represent and simplify digital circuits		3	2
CO3	Calculate the parameters of logic families and define their characteristics.		2	3
CO4	Develop competence in Combinational Logic Problem formulation and Logic Optimization		3	2
CO5	Classify the different types of flip-flops and design various sequential circuits		3	3



Subject/Code No: Data Structure and Algorithms/3CDS4-05 LTP:3+0+0

Semester: III

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Know the concept of stack operations and its implementation to solve real time problems	3	1	
CO2	Recognize the knowledge of Linked List and Queues to design algorithms for complex engineering tasks	3	2	
CO3	Analyze and design efficient searching and sorting techniques	2	2	
CO4	Evaluate problems by storing data in tree structure and performing basic operations	3	3	
CO5	Apply graph concept for complex problem and understand hasing	3	3	

Subject/Code No: Object oriented Programming/3CDS4-06 LTP:3+0+0

Semester: III

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Knowing the basic knowledge of object-oriented programming language constructs.	3	3	-
CO2	Discussing and identifying the concept of reference, dynamic memory allocation and concept of various types of functions in classes.	3	3	-
CO3	Apply inheritance and its types in real time problems.	3	3	-
CO4	Implement concept of polymorphism to perform different types of bindings.	3	3	-
CO5	Create application using I/O and file handling with exception handling.	3	3	-

Subject/Code No: Software Engineering/ 3CDS4-07 LTP: 3+0+0

Semester: III

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Decompose the given project in various phases of a lifecycle.	3	3	
CO2	Choose appropriate process model depending on the user requirements.	3	3	1
CO3	Perform various life cycle activities like Analysis, Design, Implementation, Testing and Maintenance.	3	3	
CO4	Know various processes used in all the phases of the product.	3	3	1
CO5	Analyse the knowledge, techniques, and skills in the development of a software product.	3	3	1

Subject/Code No: Data Structures Lab (3CDS4-21) LTP: 0+0+3

Semester: III

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Understand and examine the concept of array & its storage	3	3	-
CO2	Illustrate the implementation of basic data structure using an array.	3	3	2
CO3	Analyse and compare different searching and sorting techniques	3	3	3
CO4	Develop programs to perform operations on Non-linear Data Structures such as Tree and Graphs	3	2	-
CO5	Design and use different sorting algorithms	3	3	-



Subject/Code No: Object Oriented Programming Lab/3CDS4-22 LTP:0+0+3

Semester: III

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Understand the concept of C++ programming language while evaluating different access specifiers to define member function.	3	3	1
CO2	Implement memory allocation techniques and various inbuilt functions.	3	3	1
CO3	Know inheritance and analyse the types of inheritance.	3	3	1
CO4	Apply the concept of polymorphism to perform different types of bindings.	3	3	1
CO5	Develop and use of application related to I/O and file handling with exception handling.	3	3	1

Subject/Code No: Software Engineering Lab/3CDS4-23 LTP:0+0+3

Semester: III

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Understand the software engineering methodologies involved in the phases for project development.	3	3	
CO2	Know about open-source tools used for implementing software engineering methods.	3	3	
CO3	Develop product-startups implementing software process models in software engineering methods.	3	3	
CO4	Understand Open-source Tools: StarUML / UMLGraph / Topcased.	3	3	
CO5	Discuss and analyse how to develop software requirements specifications for a given problem.	3	3	

Subject/Code No: Digital Electronics Lab/3CDS4-24 LTP:0+0+3

Semester: III

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	List different types of logic gates, identify their ICs and also verify their truth tables.		2	2
CO2	Demonstrate the functioning of basic logic gates, adder, and subtractor using universal gates.		2	2
CO3	Design a combinational circuit using MSI devices and verify its functionalities.		2	3
CO4	Develop various sequential circuit using Flip Flops and verify its functionalities.		2	3
CO5	Formulate Various types of counters, Shift registers SISO, SIPO, PISO, PIPO using Flip-Flops and verify its functionalities using simulation tool		2	2



Subject/Code No: Industrial Training/3CDS7-30 LTP:0+0+1

Semester: III

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Compose an interest in research-oriented fields and develop the ability to research for literature and prepare brief report	1	1	1
CO2	Identify the skills, competencies and points of view needed by professionals in the field most closely related to the course	2	1	
CO3	Discuss and identify about topics of current intellectual importance			2
CO4	Develop the communication skills and awareness about the industrial environment.		3	
CO5	Revise Skill development for presentation.	3	3	

Subject/Code No: Discrete Mathematical Structures/4CDS2-01

LTP:3+0+0

Semester: IV

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
CO1	Explain the various fundamental concepts of the Set theory and Logics.	3		-
CO2	Illustrate the concept of relations and Diagraph to analyse the area of greatest impact for improvement.	3	2	-
CO3	Create the application part of lattices in distributed computing and Data mining.	2	2	-
CO4	Implementation of Graphs and their application in real time problem	3	2	-
CO5	Analyse the concept of Algebraic Structures.	0	3	-

Subject/Code No: Managerial Economics and Financial Accounting/4CDS1-03

LTP:2+0+0

Semester: IV

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: Micro Processors & Interfaces/4CDS3-04 LTP:3+0+0

Semester: IV

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Discuss working of functional components of computer system.			3
CO2	Demonstrate a overall functional structure of the Microprocessor.		3	3
CO3	Explain how interrupts are used to implement I/O control and data transfers.		3	3
CO4	To learn the design aspects of I/O and Memory Interfacing circuits.		3	3
CO5	Implement their practical approach through laboratory experiments.		3	3

Subject/Code No: Database Management System/4CDS4-05 LTP:3+0+0

Semester: IV

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Develop database using E-R diagram to represent simple database application scenarios	3	3	
CO2	Identify data from database using query language		3	
CO3	Apply normalization process to refine database schema	3	3	
CO4	Describe transaction processing and Serializability		3	
CO5	Interpret the concept of Concurrency Control and concept of Failure and Recovery		3	

Subject/Code No: Theory of Computation/4CDS4-06 LTP:3+0+0

Semester: IV

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Analyse the concept of Finite Automata and distinguish between Non- Deterministic Finite Automata and Deterministic Finite Automata. Analyse regular sets and its properties. Composition of Regular Expression from Finite Automata and vice-versa.	3	3	1
CO2	Understand the Context Free Grammar and its simplification.	3	3	1
CO3	Asses the Context Free Language and generation of Push Down Automata for Context Free Grammar.	3	3	1
CO4	Know the Turing Machine and its various types. Discuss the hierarchy of formal languages.	3	3	1
CO5	Evaluating the P, NP, NP complete, NP hard problems with the help of examples.	3	3	1

Subject/Code No: Data Communication and Computer Networks/4CDS4-07 LTP:3+0+0

Semester: IV

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Describe the concept of signals and illustrate the functionality of OSI & TCP/IP reference model.	3	1	1
CO2	Explain channel allocation, framing, flow control, and error control mechanisms and apply them using data link layer protocols.	3	2	
CO3	Determine the function of network layer, design subnets and calculate IP addresses for a network.	3	2	
CO4	Illustrate and analyze different transport layer protocols and functions.	3	2	
CO5	Analyze the different protocols at Application layer.	3	2	



Subject/Code No: Microprocessor and Interface Lab/4CDS4-21 LTP:0+0+2

Semester: IV

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Knowing and apply the fundamentals of assembly level programming of microprocessors and microcontroller.	2	3	2
CO2	Implement standard microprocessor real time interfaces including GPIO, serial ports, digital-to-analog converters and analog-to-digital converters.		3	3
CO3	Interpret Troubleshoot interactions between software and hardware.	1	3	3
CO4	Analyze abstract problems and apply a combination of hardware and software to address the problem.	2	3	3
CO5	Use standard test and measurement equipment to evaluate digital interfaces.		3	3

Subject/Code No: Data Base Management System Lab/4CDS4-22 LTP:0+0+3

Semester: IV

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Know how to make database schema for given scenarios	3	1	1
CO2	Apply Keys and Constraints on database using RDBMS.	3	2	
CO3	Formulate aggregate functions	3	2	
CO4	Compose pl/sql including stored procedures, stored functions, cursors concept	2	3	
CO5	Develop Triggers, SQL and Procedural interfaces	2	3	

Subject/Code No: Network Programming Lab/4CDS4-23 LTP:0+0+3

Semester: IV

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Describe the functioning of various networking equipment's and Standard Network Topologies	3	1	1
CO2	Explain and Define the LAN Installation and Configurations techniques	3	2	
CO3	Design code for various Error correcting techniques and framing methods through C Language	3	2	
CO4	Analyze and verify client and server involving UDP/TCP sockets using Socket Programming.	2	3	
CO5	Demonstrate and determine the Communication Models between client and server using Network Simulator.	2	3	



Subject/Code No: Linux Shell Programming Lab (4CDS4-24) LTP:0+0+2

Semester: IV

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Know and apply Key Concepts and Commands for Shell Programming	3	3	2
CO2	Analyze the different security measures that can be implemented to protect the directory structure	3	3	
CO3	Define Approaches to Mastering Shell Quoting Mechanisms	2	3	2
CO4	Evaluate Patterns with simple Regular Expressions using Filters using various Command	3	2	3
CO5	Explain how to use scripting to enhance command output.	3	2	2

Subject/Code No: JAVA LAB/4CDS4-25 LTP:0+0+2

Semester: IV

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Use the syntax and semantics of java programming language and basic concepts of OOP.	2	2	2
CO2	Develop reusable programs using the concepts of inheritance, polymorphism, interfaces and packages.	2	2	2
CO3	Apply the concepts of Multithreading and Exception handling to develop efficient and error free codes.	3	2	2
CO4	Design event driven GUI and web related applications which mimic the real word scenarios.	3	2	2
CO5	Design the applications using applets and use of graphics in java.	3	2	2

Subject/Code No: Data Mining & 5CDS3-01 LTP:3+0+0

Semester: V

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Know the Mathematical Foundations to Data Mining Tools	3	2	1
CO2	Apply Classical Models and Algorithms in Data Mining	2	3	2
CO3	Categorize Patterns through Association Rule Mining, Classification, and Clustering	3	1	2
CO4	Employ Appropriate Data Mining Algorithms for Practical Problem Solving	2	2	2
CO5	Analyze Data Mining Trends and Impacts	1	3	2



Subject/Code No: Compiler Design & 5CDS4-02 LTP:3+0+0

Semester: V

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Illustrate all phases of the Compiler and analyse its the functioning	3	1	1
CO2	Determine the Parsing algorithms and various error handling in parser	3	2	
CO3	Analyse the syntax directed definition and all types of Intermediate code generations.	3	2	
CO4	Classify various type of storage organisation techniques and symbol list.	2	1	
CO5	Explain all code generation, block control graphs and Source-code optimization techniques	1	2	

Subject/Code No: Operating System (5CDS4-03) LTP:3+0+0

Semester: V

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Memorise the fundamental concepts of operating systems, processes, and process synchronization.	3	2	
CO2	Explain different approaches to memory management.	3		2
CO3	Analyze and design deadlock detection and prevention techniques as well as device management.	3	2	
CO4	Recognize and describe the structure of file systems and directories.	2	2	2
CO5	Discuss different case studies of operating systems.	1	3	2

Subject/Code No: Data Visualization - R Programming / Power BI/ 5CDS-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	Understand the basic concepts of Data Science, its lifecycle, and the role of data visualization in analysis and decision-making.	3	3	-
CO2	Apply data cleaning, transformation, and exploratory data analysis (EDA) using R.	3	3	2
CO3	Evaluate advanced statistical analysis methods and create interactive web applications using R and Shiny.	3	3	3
CO4	Create interactive dashboards in Power BI for effective data storytelling and decision-making.	3	2	-
CO5	Analyze advanced visualization techniques and integrate R with Power BI to develop comprehensive data analysis projects, adhering to ethical practices.	3	3	-



Subject/Code No: Data Visualization - Analysis of Algorithm & 5CDS4-05 LTP:3+0+0

Semester: V

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Argue the correctness of algorithms using inductive proofs and Analyze worst-case running times of algorithms using asymptotic analysis.		3	
CO2	Explain important algorithmic design paradigms and apply when an algorithmic design situation calls for it.		3	
CO3	Explain the major graph algorithms and Employ graphs to model engineering problems, when appropriate.		3	
CO4	Compare between different data structures and pick an appropriate data structure for a design situation.		3	
CO5	Describe the classes P, NP, and NP Complete and be able to prove that a certain problem is NP-Complete.		3	

Subject/Code No: Fundamentals of Block Chain & 5CDS5-11 LTP:2+0+0

Semester: V

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Describe the basics of Blockchain, notation of Distributed Systems in Blockchain and analyse various problems.	2	2	
CO2	Discuss about Technology Stack of Blockchain with Protocols and analyse the feature of crypto Currency.	2	2	1
CO3	Explain and illustrate the essential components of a blockchain platform.	2	2	1
CO4	Determine and analyse the various Blockchain Technology.	2	2	
CO5	Illustrate various Types of Consensus Algorithms	3	1	

Subject/Code No: Probability & Statistics for Data Science & 5CDS5-12 LTP:3+0+0

Semester: V

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Gain Familiarity: with diverse data collection methods and develop proficiency in basic data visualization techniques. Understand measures of central tendency, dispersion, skewness, and kurtosis, and learn to interpret them	2	3	2
CO2	Develop Understanding: of fundamental probability concepts and the ability to calculate probabilities for different events.	2	3	2
CO3	Acquire Understanding: of various types of random variables, grasp the concepts of conditional probability, and distinguish between univariate and bivariate probability distributions. Learn about transforming continuous random variables and their practical applications	3	2	3
CO4	Acquire Knowledge: about the characteristics of random variables, including expectation and variance. Learn to compute various generating functions	3	3	3
CO5	Learn Hypothesis Testing: principles and techniques, and develop proficiency in analyzing hypotheses and their outcomes.	2	3	2



Subject/Code No: Programming for Data Science & 5CDS5-13 LTP:2+0+0

Semester: V

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	To know the mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	3	2	
CO2	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.	3		2
CO3	Use designed solutions for complex engineering problems and designed 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.	3		3
CO4	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.	3		2
CO5	Apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.	3	2	

Subject/Code No: R Programming Lab/ 5CDS-21 LTP:0+0+2

Semester: V

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Understand proficiency in basic R programming, including creating variables, performing mathematical operations, using control flow statements, and writing functions.	3	3	-
CO2	Apply data import/export, cleaning, and wrangling operations in R to prepare data for analysis.	3	3	2
CO3	Analyze and visualize data using R, applying both basic and advanced visualization techniques.	3	3	3
CO4	Create and deploy machine learning models and web applications using R, and handle big data for scalable solutions.	3	2	-
CO5	Evaluate tasks using R for improved efficiency and collaborate effectively on data analysis projects using R and Power BI.	3	3	-

Subject/Code No: Compiler Design Lab & 5CDS4-22 LTP:0+0+2

Semester: V

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Understand Lexical analyzer and use this knowledge to implement its various sub-functions for any regular language.	3		
CO2	Design and code of Symbol Table in C language.	2	2	
CO3	Verify the code for Lexical analyzer for given language using C and LEX tools.	2	2	
CO4	Apply the Code of YACC Program for identification of strings and Operators.	3	2	
CO5	Analyze context free grammar and Code for First and Follows using programming language C.	2	1	



Subject/Code No: Analysis of Algorithm LAB & 5CDS4-23 LTP:0+0+2

Semester: V

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Analyze algorithms in terms of space and time complexity	3	3	-
CO2	Implement problems using brute force, divide and conquer and decrease and conquer techniques.	3	3	-
CO3	Simulate problems using greedy, dynamic programming and backtracking approaches.	3	3	-
CO4	Use different string-matching algorithms.	3	3	-
CO5	Explore the implementation of Problem classes Np, Np-Hard and Np-complete	3	3	-

Subject/Code No: Advanced Java Lab & 5CDS4-24 LTP:0+0+2

Semester: V

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Know the fundamentals of MVC with Applets and Swing.	3	3	2
CO2	Know and implement the concept of Java Database Connectivity (JDBC) and Client server programming.	3	3	2
CO3	Implement the concept of RMI and implement distributed application.	3	3	2
CO4	Design the web application by using the concept of JAVA Servlet.	3	3	2
CO5	Design the web application by using the concept of JSP.	3	3	2

Subject/Code No: Industrial Training & 5CDS7-30 LTP:0+0+1

Semester: V

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Participate in the projects in industries during his or her industrial training.		3	2
CO2	Describe use of advanced tools and techniques encountered during industrial training and visit.		3	1
CO3	Interact with industrial personnel and follow engineering practices and discipline prescribed in industry.		3	
CO4	Develop awareness about general workplace behavior and build interpersonal and team skills.		2	2
CO5	Prepare professional work reports and presentations.		3	1



Subject/Code No: Digital Image Processing (6CDS3-01) LTP:2+0+0

Semester: VI

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Describe digital image, digital image representation and need of digital image processing.	1	3	
CO2	Applying different type of transformation and filtering techniques on an image.	1	3	1
CO3	Identify various noise models and evaluate the values for restoration and degradation models.	2	3	1
CO4	Analyze various image compression techniques.	1	3	2
CO5	Analyze and evaluate various Image Transformation and Segmentation Techniques		3	1

Subject/Code No: Machine Learning (6CDS4-02) LTP:3+0+0

Semester: VI

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Apply the supervised machine learning algorithms to perform real-time data analysis and generate predictions	3	3	1
CO2	Know and apply real-time data analysis through the use of unsupervised machine learning algorithms like clustering and association mining	3	3	
CO3	Evaluate feature extraction & selection methods and select appropriate machine learning model	2	3	1
CO4	Analyze various semi supervised learning & reinforcement learning algorithms	3	2	
CO5	Use advance concepts like recommender system and deep learning	3	2	1

Subject/Code No: Information System Security/ 6CDS4-03 LTP:2+0+0

Semester: VI

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Analyse and determine for any organization the security requirements and appropriate solutions.		2	2
CO2	Protect system from different types of threats, malicious software's vulnerabilities and attacks.		2	
CO3	Describe symmetric and public key encryption algorithms like DES, AES, RSA etc		3	
CO4	Identify ethical, professional responsibilities, risks and liabilities in computer and network environment, and best practices to write security policy.		2	2
CO5	Distinguish and analyse available network and protocols such as SSL, IPSes, TLS, etc.		3	



Subject/Code No: Computer architecture & Organization/6CDS4-04 LTP:3+0+0

Semester: VI

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	illustration of basics of Data representations, different operations, Analyse basics of computer architecture and design of basic computer	3	3	-
CO2	describe & implement different processing techniques to optimize assembly language programs	3	3	-
CO3	Analyse & differentiate basics of data transfer in different memory, RISC & CISC characteristics	3	3	-
CO4	Use arithmetic operations and input/output organisation and interface	3	3	-
CO5	know various memories, storage and communication techniques within them and with processor	3	3	-

Subject/Code No: Artificial Intelligence/6CDS4-05 LTP:3+0+0

Semester: VI

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Understand and use various types of logic and knowledge representation schemes.	3	3	-
CO2	Implantation of AI concepts in game playing	3	3	2
CO3	Use of logics, calculus, theorems & probability to enhance knowledge and reasoning	3	3	3
CO4	Evaluate the various Supervised and Unsupervised Learning algorithms using appropriate Dataset	3	2	-
CO5	Design and evaluate Deep learning Algorithms	3	3	-

Subject/Code No: Cloud Computing 6CDS4-06 LTP:3+0+0

Semester: VI

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Know the nutshell of Cloud Computing from scratch.	3	3	2
CO2	Discuss the model, types of clouds, various service models, programming concepts and design architecture of cloud computing.	3	3	2
CO3	Know the Virtualization Technology, virtualization of various components of cloud and its implementation level.	3	3	2
CO4	Evaluate security issues, threats, challenges and security architecture for Data, Data Centre and Cloud Services as well as disaster recovery of Data.	3	3	2
CO5	Describe various cloud platforms in IT industry like AWS, Microsoft Azure.	3	3	2



Subject/Code No: Artificial Neural Network/6CDS5-11 LTP:2+0+0

Semester: VI

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Discussion on neural network and different learning techniques	3	3	-
CO2	Use different kind of loss functions and optimizations	3	3	2
CO3	Interpret and apply Back Propagation algorithm In Neural Network	3	3	3
CO4	Knowing of Self-Organization Maps	3	2	-
CO5	Identifying and analyze Dynamical Models and Hopfield Models	3	3	-

Subject/Code No: Nature Inspired Computing / 6CDS5-12 LTP:2+0+0

Semester: VI

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Understand fundamental concepts of NP (nondeterministic polynomial time)-hardness and computational complexity	3	3	-
CO2	Understand the strengths, weaknesses and appropriateness of nature-inspired algorithms.	3	1	2
CO3	Apply nature-inspired algorithms to optimization, design and learning problems.	1	3	3
CO4	Analyze the behavior systems of nature inspired algorithm applied in real world problems.	1	2	3
CO5	Understand the theory behind the design of immune networks and DNA computing and their potential applications.	2	2	-

Subject/Code No: Big Data Analytics & Hadoop / 6CDS5-13 LTP:2+0+0

Semester: VI

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Understand the fundamental characteristics of big data (volume, velocity, variety, veracity) and explain their impact on various industries.	2	3	-
CO2	Evaluate different data storage and processing techniques within Hadoop for efficient management and analysis of big data.	3	2	2
CO3	Analyze the broader Hadoop ecosystem, including components such as HBase, Hive, Pig, and Spark, and understand their respective roles in data processing.	1	3	2
CO4	Apply data preprocessing techniques such as cleaning, transformation, and feature extraction to prepare data for analysis.	2	2	-
CO5	Apply advanced big data analytics techniques using Apache Spark's MLlib (Machine Learning Library) and GraphX to solve complex real-world problems in a capstone project.	3	2	-



Subject/Code No: Digital Image Processing Lab (6CDS4-21) LTP:0+0+3

Semester: VI

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Apply a proper image enhancement technique for given a set of noisy images.			3
CO2	Able to design and implement the various Linear filtering methods for image enhancement.		3	3
CO3	Implement the different Geometric transformations on images and understand two-dimensional Fourier transform.		3	3
CO4	Develop any application using different image processing techniques.		3	3
CO5	To learn the spatial and frequency domain techniques of image compression.		3	3

Subject/Code No: Machine Learning LAB/6CDS4-22 LTP:0+0+3

Semester: VI

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Know the filtration of data to get the desired results in data analysis	3	3	-
CO2	Apply machine learning models as per the real-life problem statements	3	3	-
CO3	Use of supervised and unsupervised learning algorithms	3	3	-
CO4	Develop neural networks for learning non-linear functions in Python	3	3	-
CO5	Apply Machine Learning algorithms and Neural Networks to solve real world problems	3	3	-

Subject/Code No: Python Lab & 6CDS4-23 LTP:0+0+3

Semester: VI

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Know the fundamental data types of python.	3	3	2
CO2	Apply knowledge of if-else, while and for loop for decision control.	3	3	2
CO3	Understand various methods to manipulate String.	3	3	2
CO4	know functions and file handling in python.	3	3	2
CO5	Implement sorting algorithms for various scenarios.	3	3	2



Subject/Code No: Mobile Application Development Lab & 6CDS4-24 LTP:0+0+3

Semester: VI

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
C01	Know the components and structure of mobile application development frameworks for Android and windows OS-based mobiles.	3	3	2
C02	Understand how to work with various mobile application development frameworks	3	3	2
C03	Apply the basic and important design concepts and issues of development of mobile applications.	3	3	2
C04	Implement activities with dialogs, spinner, fragments, and navigation drawer by applying themes	3	3	2
C05	Develop mobile applications using SQLite.	3	3	2



Bachelor of Technology Computer Engineering (Indian Language)

Program Name: B.Tech. Computer Engineering (Indian Language)

Subject/Code No: Advanced Engineering Mathematics/3CSR2-01

LTP: 3L+0T+0P **Semester:** 3rd

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
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/3CSR1-02

LTP: 2L+0T+0P **Semester:** 3rd

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
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
CO5			1	2

Subject/Code No: Digital Electronics/3CSR3-04

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/3CSR4-05

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 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/3CSR4-06

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/3CSR4-07

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/3CSR4-21

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/3CSR4-22

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/3CSR4-23

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	3	2	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	1	3
CO4	Select DFD model (level-0, level-1 DFD and Data dictionary) of the project.	2	1	3
CO5	Prepare all Structure and Behaviour UML diagram of the given project.	2	2	2



Subject/Code No: Digital Electronics Lab/3CSR4-24

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 counter 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/4CSR2-01

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/4CSR1-03

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/4CSR3-04

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 microprocessors.	3	2	3

Subject/Code No: Database Management System/4CSR4-05:

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/4CSR4-06:

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/4CSR4-07

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/4CSR4-21

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/4CSR4-22

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/4CSR4-23 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/4CSR4-24

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/4CSR4-25

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/5CSR3-01

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/5CSR4-02

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/5CSR4-03

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/5CSR4-03

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/5CSR4-05

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)/ 5CSR5-11

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: HCI (Elective)/ 5CSR5-12

LTP: 2L+0T+0P Semester: 5th

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Explain the key principles and concepts of Human-Computer Interaction (HCI)	1	2	3
CO2	Evaluate and compare different models and their applications in HCI	2	2	3
CO3	To assess and apply HCI guidelines and evaluation methods to make informed judgments about the usability and user experience of interactive systems.	1	2	3
CO4	To understand, analyze, and apply various research methods in HCI	1	2	3
CO5	To use various task modeling and formalism techniques and understanding the foundational concepts of CA	1	2	3

Subject/Code No: Computer Graphics & Multimedia Techniques Lab/5CSR4-21

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/5CSR4-22

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/5CSR4-23
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/5CSR4-24
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/6CSR3-01
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/6CSR4-02

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/6CSR4-03

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/6CSR4-04

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/6CSR4-05

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/6CSR4-06

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/6CSR5-11

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/6CSR5-13

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/6CSR4-21

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/6CSR4-22

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/6CSR4-23

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/6CSR4-24

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: 7CSR4-01/Internet of Things

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

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Recognize the fundamental idea behind the Internet of Things (IoT).	3	3	3
CO2	Apply the connection of diverse sensors to Arduino/Raspberry Pi.	2	2	2
CO3	Execute wireless data transmission among distinct devices.	1	1	1
CO4	Display proficiency in transferring sensor data to and from cloud-based servers.	2	2	2
CO5	Evaluate the transformative impact of the Internet on Mobile Devices, Cloud Computing, and Sensor Networks.	2	2	2



Subject/Code No: 7AG6-60.2/Environmental Engineering and Disaster Management

LTP: 3L+0T+0P

Semester: 7th

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	State the natural environment and its relationships with human activities and realize the importance of ecosystem and biodiversity for maintaining ecological balance and know the objective and scope of the course.			3
CO2	Examine different types of pollutants, their distinguishing traits, and comprehend the significance of ensuring a secure water supply system and water quality.			3
CO3	Evaluate strategies for managing solid waste, examining its attributes and the repercussions of solid waste on the environment. Assess both the quantity and attributes of solid waste, as well as its proper disposal methods. Recognize the significance of sanitation within this context.			3
CO4	Assess the factors influencing the volume and attributes of wastewater, and analyze the processes involved in its treatment.			3
CO5	generalize various types of Disasters and their social and environmental impact and the associated risk and vulnerability and plan the disaster management.			3

Subject/Code No: 7CSR4-21/Internet of Things Lab

LTP: 0L+0T+3P

Semester: 7th

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Recognize the constituent Components within IoT Architecture.	1	1	1
CO2	Construct connections between Devices and Sensors, applying theoretical understanding.	3	3	3
CO3	Implement wireless data transmission techniques among various devices.	1	1	1
CO4	Evaluate and select appropriate IoT Devices and Sensors based on provided Case Studies.	1	1	1
CO5	Execute the upload and download of sensor data on cloud and server, culminating in a comprehensive and proficient utilization demonstration.	1	1	1

Subject/Code No: 7CSR4-22/Cyber Security Lab

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

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
CO1	Utilizing substitution and transposition techniques to achieve encryption and decryption of plain text, demonstrating comprehension and practical application.	3	3	3
CO2	Design a solution for Key Exchange problem and understand the general attacks on system.	2	2	2
CO3	Analyse the data transferred in client server communication and working of various network protocol.	2	2	2
CO4	Understand security-based tools like Wire shark, tcp dump, rootkits, snort etc.	2	2	2
CO5	Apply encryption, decryption techniques for secure data transmission, and digital signature generation, demonstrating understanding and application.	3	3	3



Subject/Code No: 8CSR4-01/Big Data Analytics

LTP: 3L+0T+0P Semester: 8th

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
C01	Classify the building blocks of Big Data and review the growing field of Big Data Analytics.	3	3	3
C02	Compose the algorithm of data intensive problem using map reduce example.	1	1	1
C03	Study and implement Writable Classes in Hadoop I/O.			
C04	Design and Implementation of Big Data Analytics using pig to solve data intensive problems and to generate analytics.			
C05	Implement Big Data Activities using Hive.	1	1	1

Subject/Code No: 8TT6-60.2/Disaster Management

LTP: 3L+0T+0P Semester: 8th

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
C01	Discuss the practicalities of hazards, disasters with associated natural/social phenomena Understand this with disaster management theory (cycle, phases).			3
C02	List the existing global frameworks and existing agreements (e.g. Sendai).			3
C03	Choose a methods of community involvement as an essential part of successful DRR. Humanitarian Assistance/Support before and after disaster.			3
C04	Technological innovations in Disaster Risk Reduction: Advantages and problems.			3
C05	Experience on conducting independent DM study including data search, analysis and presentation of disaster case study.			3

Subject/Code No: 8CSR4-21/Big Data Analytics Lab

LTP: 0L+0T+2P Semester: 8th

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO ₁	PSO ₂	PSO ₃
C01	Summarize and implement the basic data structure algorithms like Linked list, stack, queue, set and map in Java.	3	3	3
C02	Illustrate the knowledge and implement different file management in Hadoop.	2	2	2
C03	Discuss the example of map reduce and develop the data application using variety of system.			
C04	Evaluate and perform different operation on Data using Pig Latin.			
C05	Illustrate different operations on relations and databases using Hive.	2	2	2



Subject/Code No: 8CSR4-22/Software Testing & Validation Lab

LTP: 0L+0T+2P Semester: 8th

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PSO 1	PSO 2	PSO 3
C01	Understand the Automation Testing Approach using various tool.	2		1
C02	Analyse & discuss the performance of different websites using JMeter.	2		1
C03	Calculate the coverage analysis of programs using Eclemma tool.	2		1
C04	Describe & calculate the mutation score for various programs using jumble testing tool.	2		1
C05	Generate Test sequences and compare using Selenium tool for different websites.	2		1



Department of Internet of Things

Program Name: Internet of Things

Subject/Code No: Advanced Engineering Mathematics/3CIT2-01

LTP: 3+0+0 Semester: 3rd

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PS01	PS02	PS03
CO1	Understand and remember the basic principles of probability and standard distributions that can explain real-life phenomena.	2	2	3
CO2	Analyze the various method of numerical solutions of Normal, Poisson and Binomial probability distribution	2	2	3
CO3	Express the optimization problems mathematically, including their classification.	2	2	3
CO4	Analyze non-linear optimization problems and solve them using suitable methods.	2	3	3
CO5	Show how to solve linear optimization problems using standard methods.	3	2	3

Subject/Code No: Technical Communication 3CIT1-02/4CS1-02

LTP: 3+0+0 Semester: 3rd

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PS01	PS02	PS03
CO1	Understand the process of technical communication in terms of LSRW.			1
CO2	Apply the principles of technical materials and texts to various technical documents.			1
CO3	Improve skills in the process of technical communication, focusing on Listening, Speaking, Reading, and Writing (LSRW).			1
CO4	Apply the basic concepts of technical communication to technical reports, articles, and their formats.			1
CO5	Evaluate the effectiveness of technical reports, proposals, and articles in conveying technical information and achieving their intended purposes			1

Subject/Code No: Digital Electronics 3CIT3-04

LTP: 3+0+0 Semester: 3rd

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PS01	PS02	PS03
CO1	Demonstrate basic principles of digital circuits and different number systems	2	3	2
CO2	Distinguish logic expressions and circuits using Boolean laws and K-map	2	3	2
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.	2	2	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		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.	2	3	2



Subject/Code No: Data Structures and Algorithms 3CIT4-05

LTP: 3+0+0 Semester: 3rd

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PS01	PS02	PS03
CO1	Recognize fundamental Stack operations to address a range of engineering problems.	2	2	3
CO2	Explain the concepts and applications of different types of queues such as circular queues, deques, and priority queues.	2	2	3
CO3	Discover different Search and Sorting methods to rationalize their application in diverse scenarios.	2	2	3
CO4	Practice the concept of Trees and their operations to furnish valid solutions.	2	3	3
CO5	Explain representations of Graphs and Assess collision resolution strategies like linear and quadratic probing, and double hashing in various hashing scenarios.	3	2	3

Subject/Code No: Object Oriented Programming 3CIT4-06

LTP: 3+0+0 Semester: 3rd

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PS01	PS02	PS03
CO1	Describe the Object-Oriented Programming paradigm with the concept of objects and classes.	3		2
CO2	Explain inline functions, function overloading, and functions with default arguments in C++.	3	2	2
CO3	Define and Implement Inheritance, function overriding in derived classes and virtual function	3		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

Subject/Code No: Software Engineering 3CIT4-07

LTP: 3+0+0 Semester: 3rd

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PS01	PS02	PS03
CO1	Define the different software life-cycle models, software requirements specification, formal requirements specification, verification, and validation	1	2	2
CO2	Explain the objectives of software project management, resource estimation methods, LOC and FP estimation, effort estimation, the COCOMO model.	2	3	2
CO3	Interpret and deduce the engineering process of software requirement analysis.	2	1	2
CO4	Analyze the fundamentals of software design, principles of effective modular design, and the creation of data, architectural, and procedural designs, including the preparation of design documentation.	2	1	2
CO5	Collaborate the concept of object-oriented analysis and design in software development process.	3	2	1



Subject/Code No: Data Structures and Algorithms Lab 3CIT4-21

LTP: 0+0+3 Semester: 3rd

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PS01	PS02	PS03
CO1	Remember the concepts of array storage and size of a word in C programming and recall the differences between row major and column major storage in multi-dimensional arrays.	3	3	2
CO2	Understand the implementation of stack, queue, circular queue, and de-queue using a one-dimensional array.	3	3	1
CO3	Discover different Search and Sorting methods to rationalize their application in diverse scenarios.	3	2	2
CO4	Devise diverse operations on non-linear data structures such as trees and graphs.	2	3	2
CO5	Propose a solution for a provided engineering problem utilizing Stack, Queue, Linked List, Tree and Sorting	3	3	

Subject/Code No: Object Oriented Programming Lab 3CIT4-22

LTP: 0+0+3 Semester: 3rd

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PS01	PS02	PS03
CO1	Create and explain Basic C++ Program using i/o variables and structures.	3		2
CO2	Apply object-oriented programming concepts using class and objects	3	2	2
CO3	Apply knowledge of constant data members and member functions, as well as static data members and member functions within a class.	3	2	2
CO4	Analyse and apply the generic classes concepts in programming problem	3		2
CO5	Illustrate and evaluate the file Input Output mechanisms	3	2	2

Subject/Code No: Software Engineering Lab 3CIT4-23

LTP: 0+0+3 Semester: 3rd

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PS01	PS02	PS03
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	Discuss 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	2
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	2



Subject/Code No: Digital Electronics Lab 3CIT4-24

LTP: 0+0+3 Semester: 3rd

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PS01	PS02	PS03
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 counter 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 4CIT2-01

LTP: 3+0+0 Semester: 4th

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PS01	PS02	PS03
CO1	Describe basic concept of Sets, Relations, Functions and Discrete Structure and apply appropriate methods to solve the problems.		2	3
CO2	Describe the concept of mathematical logic to create the problem in appropriate form and test for validity of the problem.		2	3
CO3	Apply fundamental mathematical concepts such as sets, relations, Combinatorics technique to formulate the problems and solve by appropriate method.		3	3
CO4	Interpret the concept of groups, ring and field to analyze the complex problems.		2	3
CO5	Demonstrate the model of real-world problems using concept of Graph and solve the problems by standard result and graph algorithms.			3

Subject/Code No: Managerial Economics and Financial Accounting 3CIT1-03/ 4CIT1-03

LTP: 3+0+0 Semester: 4th

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PS01	PS02	PS03
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
CO2	Calculate and Classify the domestic product, national product and elasticity of price on demand and supply..	1		3
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
CO4	Compare the financial statements to interpret the financial position of the firm and evaluate the project investment decisions.		1	2
CO5	Use capital budgeting techniques to assess the viability of investment opportunities and make informed financial decisions.			



Subject/Code No: Microprocessor & Interfaces 4CIT3-04

LTP: 3+0+0 Semester: 4th

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PS01	PS02	PS03
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 proficiency in programming, employing diverse addressing modes and data transfer instructions for microprocessors and microcontrollers.	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 microprocessors.	3	2	3

Subject/Code No: Database Management System 4CIT4-05

LTP: 3+0+0 Semester: 4th

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PS01	PS02	PS03
CO1	Create a tabular representation of a Database System using an Entity Relationship Diagram (ERD) to visualize the Create a tabular representation of a Database System using an Entity Relationship Diagram (ERD) to visualize the implementation of a real-world database scenario's implementation of a real-world database scenario..	3	2	3
CO2	Apply data deduction and manipulation techniques using query languages on a variety of databases.	3	2	
CO3	Use normal forms in the process of enhancing the database schema through refinement techniques.	3	1	2
CO4	Create transaction plans incorporating diverse scheduling types.	3		
CO5	Generalize and assess the effectiveness of concurrency control mechanisms and recovery systems.	2	1	2

Subject/Code No: Theory of Computation 4CIT4-06

LTP: 3+0+0 Semester: 4th

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PS01	PS02	PS03
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	2	3
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
CO4	Apply the knowledge of Turing Machine he/she can analyze the Type-0 grammar and can design and evaluate the Turing Machine	2	1	3
CO5	Apply the knowledge of Pumping Lemma Theorem students can check whether the given grammar Regular grammar/Context Free Grammar or not	2	2	1



Subject/Code No: Data Communication and Computer Networks 4CIT4-07

LTP: 3+0+0 Semester: 4th

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PS01	PS02	PS03
CO1	Capable of identifying the principles of layered protocol architecture, recognizing and categorizing system functions within the appropriate protocol layers, and demonstrating the interactions between these layers.	2	2	
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	3
CO4	Compute the reliability of data transfer over transport layer by lossy channel bit errors problem.	2	2	2
CO5	Select and plan for common services, system services, such as name and address lookups, and communications applications.	1	1	

Subject/Code No: Microprocessor & Interfaces Lab 4CIT4-21

LTP: 0+0+3 Semester: 4th

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PS01	PS02	PS03
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	2
CO4	Compose the various programmes 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 4CIT4-22

LTP: 0+0+3 Semester: 4th

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PS01	PS02	PS03
CO1	Create and execute a database schema for a specified problem domain	3		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 (4GL).	3	2	
CO4	Composing PL/SQL code encompassing stored procedures, stored functions, cursors, and packages.	3		2
CO5	Produce SQL and Procedural interfaces to SQL comprehensively.	3		2



Subject/Code No: Network Programming Lab 4CIT4-23

LTP: 0+0+3 Semester: 4th

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PS01	PS02	PS03
CO1	Identify the functioning of various networking equipment's	1	3	
CO2	Illustrate the LAN Installation techniques and Configurations techniques	2	1	1
CO3	Solving various Error correcting techniques and framing methods	2	3	
CO4	Practise the programs for client and server involving UDP/TCP sockets using socket programming.	1	1	2
CO5	Estimate the communication between client and server using Network Simulator.	2	1	

Subject/Code No: Linux Shell Programming Lab 4CIT4-24

LTP: 0+0+3 Semester: 4th

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PS01	PS02	PS03
CO1	Summarize the concepts and commands in UNIX.	2	2	1
CO2	Construct the directory layout of a typical UNIX system, maintain, and secure UNIX directories and files.	2	2	3
CO3	Illustrate the knowledge to use the several shell quoting mechanism correctly.	3	2	2
CO4	Construct regular expression using filters and various commands to express the patterns.	3	2	
CO5	Write simple scripts to develop basic command output	2	2	1

Subject/Code No: Java Lab 4CIT4-25

LTP: 0+0+3 Semester: 4th

Course Outcome Mapping with Program Specific outcome

CO Number	CO Definition	PS01	PS02	PS03
CO1	Express and restate fundamentals of java, and tools for program designing environments.	2	2	
CO2	Construct classes and implement the principles of method overloading, inheritance, and access controls within those classes.	2	2	
CO3	Develop Java packages and incorporate the concept of interfaces, along with importing these packages in Java.	2	3	1
CO4	Formulate the application by managing file operations, handling exceptions, and implementing threads.	2	2	2
CO5	Create applications utilizing Java applets and design various polygons. This task involves the application of knowledge and the synthesis of design skills	3	2	