MALNAD COLLEGE OF ENGINEERING, HASSAN

(An Autonomous Institution Affiliated to VTU, Belagavi)

Autonomous programme
Bachelor of Engineering

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

SCHEME and SYLLABUS

V Semester & VI Semester

(2023-24 Admitted Batch)

Academic Year 2025-2026

VISION

To become a prominent department of Computer Science & Engineering producing competent professionals with research and innovation skills, inculcating moral values and societal concerns.

MISSION

1. Impart world class engineering education to produce technically competent engineers.
2. Provide facilities and expertise in advanced computer technology to promote research.
3. Enhance Industry readiness and entrepreneurial abilities through innovative skills
4. Nurture ethical values and social responsibilities

PROGRAM EDUCATIONAL OBJECTIVES

PEO 1 : Graduates will be efficient software developers in diverse fields and will be successful professionals and/or pursue higher studies.

PEO 2 : Graduates will be capable to adapt to new computing technology for professional excellence and Research and will be lifelong learners.

PEO 3 : Graduates will work productively exhibiting ethical qualities for the betterment of society.

PEO 4 : Graduates will possess leadership qualities, work harmoniously in a team with effective communication skills.

PROGRAM OUTCOMES

Engineering Graduates will be able to:

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, andan engineering specialization to the solution of complex engineering problems.

2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, andengineering sciences.

3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. **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 toprovide valid conclusions.

5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. **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.

8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of theengineering practice.

9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. **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 anddesign documentation, make effective presentations, and give and receive clear instructions.

11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering andmanagement principles and apply these to one's own work, as a member and leader in a team, to manageprojects and in multidisciplinary environments.

12. **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.

PROGRAM SPECIFIC OUTCOMES (PSOs)

Upon graduation, students with a degree B.E. in Computer Science & Engineering will be able to:

PSO – 1: To make the students industry ready by facilitating them with software tools in recent technologies

PSO – 2: To develop IT based solutions for problems in diverse domains

Scheme & Syllabus for III Year

FIFTH SEMESTER					
Course Category	Course Code	Course Title	L-T-P	Credits	Contact Hours
HSMC	23CS501	Technology Management and Entrepreneurship	3-0-0	3	3
PCC	23CS502	Software Engineering and Project Management	3-2-0	4	5
PCC	23CS503	Data Communications	3-0-0	3	3
IPCC	23CS504	Computer Graphics and Visualization	3-0-2	4	5
PCC	23CS505	Web Programming Laboratory	0-0-4	2	4
PEC	23CS55X	Professional Elective Course - I	3-0-0	3	3
AEC	23RIP	Research Methodology and IPR	3-0-0	3	3
HSMC	23EVS	Environmental Studies	0-2-0	1	2
MC	23NYP3	NSS, YOGA,PE	0-0-2	AUDIT	2
			Total	23	30

Sl. No.	Professional Elective Course - I	
	Course Code	Course Title
1.	23CS551	Digital Image Processing
2.	23CS552	Data Mining and Warehousing
3.	23CS553	Internet of Things
4.	23CS554	Advanced Java

SIXTH SEMESTER					
Course Category	Course Code	Course Title	L-T-P	Credits	Contact Hours
IPCC	23CS601	Machine Learning	3-0-2	4	5
IPCC	23CS602	Computer Networks	3-0-2	4	5
PCC	23CS603	Finite Automata and Formal Languages	2-2-0	3	4
PI	23CS604	Mini Project	0-0-4	2	4
PI	23CS605	Main Project Phase - I	0-0-4	2	4
AEC	23CS606X	Ability Enhancement Course	0-0-2	1	2
PEC	23CS66X	Professional Elective Course - II	3-0-0	3	3
OEC	23OECS6X	Open Elective – I	3-0-0	3	3
MC	23NYP4	NSS, YOGA,PE	0-0-2	AUDIT	2
AEC/SDC	23ASK	Analytical Ability and Soft Skills	0-0-2	1	2
			Total	23	36
23CS604 - Mini Project: Student must develop a web based application using the concepts learnt in the courses - Database Management System (23CS404) and Web Programming (23CS505)					

Ability Enhancement Course		
1	23CS606A	Application Development Laboratory
2	23CS606B	Full Stack Web Development
3.	23CS606C	Automated Software Testing
4.	23CS606D	Devops

Sl. No.	Professional Elective Course - II	
	Course Code	**Course Title**
1.	23CS661	Introduction to Computer Vision
2.	23CS662	Artificial Intelligence
3.	23CS663	Wireless Networks
4.	23CS664	Management Information System

Sl. No.	Open Electives	
	Course Code	**Course Title**
1.	23OECS61	Introduction to Cloud Computing
2.	23OECS62	Introduction to JAVA programming
3.	23OECS63	Web Technology

Course Title	**TECHNOLOGY MANAGEMENT AND ENTREPRENEURSHIP**

Course Code	23CS501	(L-T-P)C	(3-0-0)3
Exam	3 Hrs.	Hours/Week	3
CIE	50 Marks	SEE	50 Marks
		Total Hours	40

Course Objective: To lead and manage teams, become entrepreneur and to prepare project proposal.

Course Outcomes(COs):Upon completion of the course, students shall be able to:

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1.	Explore corporate culture and management principles.	1	-
2.	Inculcate research and protection of ideas.	3,10,11,12	2
3.	Acquire skills for entrepreneurship and startups.	1,12	-
4.	Document and present the report on Industry visit.	8,10	-

Course Contents:

MODULE – 1	10 Hrs.

Planning, and Decision making: Planning: Preview, Nature of planning, the foundation for planning, some planning concepts. Decision Making: Preview, Nature of decision making, Types of decisions/decision making. Some human aspects of organizing: Preview, Staffing technical organizations, Authority and power, Delegation.

MODULE – 2	10 Hrs.

Motivating & Leading Technical People and Controlling: Motivating and leading technical people: Preview. Motivation. Leadership. Motivating and leading technical professionals (methods). Managing the Research Functions: Preview. Product and technology life cycles. Nature of R & D. Research strategy and organization. Selecting R & D projects. Protection of ideas. Intellectual Property Rights (IPR), Creativity.

MODULE -3	10 Hrs.

Entrepreneurship: Meaning Evolution of the concept, functions of an Entrepreneur, Characteristics of an Entrepreneur, types of entrepreneurs, Intrapreneur. Entrepreneurship: Concept of Entrepreneurship, Characteristics of Entrepreneurship ,Development of Entrepreneurship ,Stages in Entrepreneurial process, Role of Entrepreneurs in economic development, Entrepreneurship in India, Entrepreneurship barriers, Women entrepreneur – Concept & steps to develop Women Entrepreneur. Small Scale Industry: Definition, Characteristics, Objectives, Scope and role of SSI in economic Development, Advantages of SSI, Problems of SSI ,Steps to start an SSI.

MODULE -4	10 Hrs.

Government Policy towards SSI; Different Policies of SSI, Introduction to GATT/ WTO. Supporting Agencies of Government for SSI: Meaning, Nature of support; Objectives, functions. Ancillary Industry and Tiny Industry. Institutional Support: Different Schemes: SSIDC, SSIB, DICs/ Single Window Concept, TCOs, ICICI, NSIC, SIDO, IDBI, SIDBI, SFCS, IFCI. Preparation of Project: Meaning, Project identification ,Project selection, Project Report Need of Project, Contents ;formulation, Network Analysis Errors of project report, Project Appraisal, Feasibility Study-Market Feasibility Study, Technical Feasibility Study, Financial Feasibility Study, Social Feasibility Study

Text Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1.	Managing Engineering and Technology	Daniel Babcock & Lucy C. Morse	6th	PHI	2014

Reference Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1.	Entrepreneurship Development, Small Business Enterprises	Poornima.M.Charan timath	1st	Pearson Education	2006
2.	Dynamics of Entrepreneurial Development &Management	Vasant Desai	1st	Himalaya publishing House	-
3.	Management Fundamentals-Concepts, Application, Skill Development	Rober Lousier	1st	Thomson	-
4.	Principles of Management	P. C .Tripathi, P .N. Reddy	1st	Tata Mc Graw Hill	-

MOOCs:

1.https://nptel.ac.in/courses/110/106/110106141

2.https://nptel.ac.in/courses/127/105/127105007

Proposed Assessment Plan (for 50 marks of CIE):

Tool		Remarks	Marks
CIE	CIE1	Conducted for 20 marks & converted to 10	10
	CIE2	Conducted for 20 marks & converted to 10	10
	CIE3	Conducted for 20 marks & converted to 10	10
Activity Details		• Writing a proposal for SSI (10 marks) • Coding Exercise (10 marks)	20

Course Articulation matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-		-	-
CO2	-	-	2	-	-	-	-	-		3	2	2	-	2
CO3	3	-	-	-	-	-	-	-	-	-		3	-	-
CO4	-	-	-	-	-	-		2		-	3		-	-

Course Title	SOFTWARE ENGINEERING AND PROJECT MANAGEMENT

Course Code	23CS502	(L-T-P)C	(3-2-0)4
Exam	3 Hrs.	Hours/Week	5
CIE	50 Marks	SEE	50 Marks
		Total Hours	50

Course Objective: Use Software Engineering Principles for Application development

Course outcomes: At the end of course, student will be able to:

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1.	Explore diverse software development process	1	2
2.	Document SRS for a given scenario	1	2
3.	Design and validate a software product	3,5	2
4.	Apply appropriate project estimation and management techniques	9,11	2

Course Contents:

MODULE – 1	13 Hrs.

Introduction: Professional Software Development, Software Engineering Ethics. Case studies: An insulin pump control system, Software Processes: Software Processes models, Process activities, coping with change, The Rational Unified Process. Agile Software Development: Agile Methods, Plan- driven and Agile Development, Extreme programming. Agile Project Management. Scaling Agile Methods.

Self-Study: Case Studies- A patient information system for mental health care, A wilderness weather station

MODULE – 2	13 Hrs.

Requirements Engineering: Functional and non-functional requirements. The software Requirements Document. Requirements Specification, Requirements Engineering Processes. Requirements Elicitation and Analysis. Requirements validation. Requirements Management. System Models: Context models. Interaction models. Structural models. Behavioral models. Model-driven engineering.

Self-Study: Behavioral models as applied to case study.

MODULE -3	12 Hrs.

Design and Implementation: Object-oriented design using the UML, Design patterns, Implementation issues, Open source development. Software Testing: Development testing, Test-driven development, Release testing, User testing. Software Evolution: Evolution processes, Program evolution dynamics. Software maintenance.

Self-Study: Legacy system management

MODULE -4	12 Hrs.

Software Project Management: Software Project Management Complexities, Responsibilities of a software project Manager, Project Planning and Metrics for project size estimation, Project estimation techniques, Empirical estimation techniques, Scheduling, Organization and Team Structures.

Self-Study: COCOMO—A Heuristic Estimation Technique.

Text Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1.	Software Engineering (Chapters:1,2,3,4,5,7,8,9)	Ian Sommerville	9th	Person Education	2014
2.	Fundamentals of Software Engineering	Rajib Mall	1st	Prentice-Hall Of India Pvt. Ltd	2015

Reference Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1.	Software Engineering - A Practitioners Approach	Roger S. Pressman	7th	McGraw-Hill	2007
2.	Software Engineering Principles and Practice	Waman S. Jawadekar	1st	Tata McGraw-Hill	2004
3.	Software Engineering: A Concise introduction to Software Engineering	Pankaj Jalot	1st	Springer.	-

Proposed Assessment Plan (for 50 marks of CIE):

Tool		Remarks	Marks
CIE	CIE1	Conduction for 20 marks & reduced to 10 marks	10
	CIE2	Conduction for 20 marks & reduced to 10 marks	10
	CIE3	Conduction for 20 marks & reduced to 10 marks	10
Activity Details:		• Create SRS document for given scenario. • Scrum tool demonstration	20

MOOC Course:

https://nptel.ac.in/courses/106/105/106105182/

Tutorial:

1. Discuss on ethical and professional issues and why they are of concern to Software Engineers.
2. Requirement specification for (functional and nonfunctional) the specified scenario.
3. Write sequence diagram for the given case.
4. Write a SRS document for the given case study.
5. Write behavioral model and interaction model for the given scenario.
6. By referring to embedded device depict requirement specification.
7. Employ software testing tool to address a given problem.
8. Practice scrum tool for the Project management.

NOTE: Self-study components are assessed in tutorial.

Course Articulation matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	2
CO2	3	-	-	-	-	-	-	-	-	-	-	-	-	2
CO3	-	-	3		3	-	-	-	-	-	-	-	-	2
CO4	-	-	-	-	-	-	-	-	3	-	3	-	-	2

Course Title	DATA COMMUNICATIONS

Course Code	23CS503	L-T-P-C	(3-0-0)3
Exam Hrs.	3	Hours/ Week	3
CIE	50 Marks	SEE	50 Marks
		Total Hours	40

Course Objective: Students will gain knowledge of TCP/IP Protocol Model and functionalities of Data link Layer and Physical Layer

Course Outcomes (COs): Upon completion of the course, students shall be able to:

#	Course Outcomes	Mapping to POs	Mapping to PSOs
1.	Apply the concept of TCP/IP reference models, digital transmission methods.	1,4	-
2.	Analyze various transmission impairments, switching methods, multiplexing techniques and transmission media.	2,4	-
3.	Formulate and analyse the functionalities of different framing formats, medium access control methods, different coding techniques, error detection and correction methods.	2, 3	-
4.	Demonstrate the concepts of data communications using various networking tools and programming.	5, 12	1

Course Contents:

MODULE-1 **10 Hrs.**

Introduction: Data Communications; Networks; Network Types; Network Models: Protocol Layering; TCP / IP Protocol Suite; Physical Layer: Introduction to Physical Layer, Data and Signals; Periodic Analog Signals; Digital Signals; Transmission impairment; Data rate limits;

MODULE-2 **10 Hrs**

Digital Transmission: Digital-to-Digital conversion: Line Coding, Line Coding Schemes, Block Coding, and Scrambling; Analog-to-Digital conversion: Pulse Code Modulation (PCM), Delta Modulation (DM); Multiplexing: FDM, WDM, TDM, Multiplexing; Spread spectrum

MODULE-3 **10 Hrs**

Transmission Media: Twisted pair cable, Coaxial cable, Fiber-Optic cable, Radio waves, Microwaves, Infrared. Switching: Introduction; Circuit-Switched Networks: Three Phases and Delay; Packet Switching: Datagram Networks: Virtual Circuit Networks; Introduction to Data-Link Layer: Link-layer Addressing: Three Types of Addresses, Address Resolution Protocol (ARP); Error Detection and Correction: Introduction; Block coding: Error Detection; Cyclic codes: CRC, Polynomials, Cyclic Code Encoder using Polynomials, Cyclic Code Analysis, Checksum: Concept, Other Approaches to the Checksum; Forward Error Correction.

MODULE-4 **10 Hrs**

Data Link Control: DLC Services: Framing, Flow and Error control, Connectionless and Connection Oriented; Data Link Layer Protocols: Simple, Stop & Wait, Piggybacking; HDLC; Point to Point Protocol: Services and Framing; Media Access Control: Random Access: ALOHA, CSMA, CSMA/CD, CSMA/CA; Controlled Access: Reservation, Polling, Token Passing; Channelization: FDMA, TDMA, CDMA.

Text Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year

1.	Data Communications and Networking	Behrouz A. Forouzan	5th	Tata McGraw-Hill	2006

Reference Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1.	Communication Networks–Fundamental Concepts and Key architectures	Alberto Leon-Garcia and Indra Widjaja	2nd	Tata McGraw-Hill	-
2.	Data and Computer Communication	William Stallings	8th	Pearson Education	-

MOOC:
http://nptel.ac.in/keyword_search_result.php?word=data+communication

Proposed Assessment Plan (for 50 marks of CIE):

Tool		Remarks	Marks
CIE	CIE-1	CIE will be conducted for 20 marks and reduced to 10 marks	10
	CIE-2	CIE will be conducted for 20 marks and reduced to 10 marks	10
	CIE-3	CIE will be conducted for 20 marks and reduced to 10 marks	10
Activity Details		Group activity will be conducted for 20 marks	20

Course Articulation matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	2	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	2	-	-	-	-	-	-	-	-	-	-
CO3	-	3	2	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	3	-	-	-	-	-	-	2	2	-

Course Title	COMPUTER GRAPHICS AND VISUALIZATION		
Course Code	23CS504	L-T-P-C	(3-0-2)4

Exam Hrs.	3	Hours / Week	5
CIE	50 Marks	SEE	50 Marks
		Total Hours	50

Course Objective: To learn the concepts of computer graphics to design a 2D and 3D scene using OpenGL.

Course Outcomes (COs): Upon completion of the course, students shall be able to:

#	Course Outcomes	Mapping to POs	Mapping to PSOs
1.	Describe core concepts of computer graphics with OpenGL.	1	-
2.	Apply concepts of geometric transformations, projections, and illumination to render image.	2, 3	-
3.	Analyze line clipping and polygonal clipping algorithms	2, 3	-
4.	Design a 2D/3D image using graphical concepts throughOpenGL.	2, 3, 4, 5	2

Course Contents:

MODULE – 1	13 Hrs

Introduction: Applications of computer graphics; A graphics system; Images: Physical and synthetic; Imaging systems; The synthetic camera model; The programmer's interface: Pen Plotter Model, Graphics architectures; Graphics Programming: The Sierpinski gasket; Programming two - dimensional applications. The OpenGL: The OpenGL API; Primitives and attributes;

MODULE – 2	13 Hrs

The OpenGL (Continued): Color; Viewing; Control functions; The Gasket program; Polygons and recursion; The three-dimensional gasket.

Input and Interaction: Interaction; Input devices; Clients and Servers; Display lists; Display listsand modeling; Programming event-driven input; Menus, Animating interactive programs.

MODULE – 3	12 Hrs

Geometric Objects and Transformations: Scalars, points, and vectors; Three-dimensional primitives; Coordinate systems and frames; Frames in OpenGl; Modeling a colored cube; Affine transformations; Rotation, translation and scaling; Transformations in homogeneous coordinates; Concatenation of transformations; OpenGL transformation matrices

MODULE – 4	12 Hrs

Viewing: Classical and computer viewing; Viewing with a computer; Positioning of the camera-Positioning of the Camera Frame; Simple projections; Projections in OpenGL; Hidden-Surface Removal, Lighting and Shading: Light and Matter; Light Sources; The Phong Lighting Model; Polygonal Shading; Light sources in OpenGL; Specification of materials in OpenGL
Implementation: Clipping; Line- Segment Clipping; Bresenham's Algorithm

Text Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1.	Interactive Computer Graphics A	Edward Angel	5th	Addison-Wesley	2013

	Top-Down Approach with OpenGL (Chapters 1, 2, 3, 4, 5, 6, 7)				

Reference Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1.	Computer Graphics Using OpenGL	F.S. Hill,Jr,	2nd	Pearson education	2011
2.	Computer Graphics	James D Foley, Andries Van Dam, Steven K Feiner, John F Hughes	1st	Addison-wesley.	-

Lab Component:

Write C program using OpenGL functions to

1. Recursively subdivide a tetrahedron to from 3D Sierpinski gasket. The number of recursive steps is to be specified by the user.
2. Draw a Rocket and allow the user to change the color.
3. Create robot face using display list.
4. Generate square for right click and to exit for left click using mouse function.
5. Draw box at each location on the screen where the mouse cursor is located.
6. Create hierarchical menus.
7. Create a house like figure and rotate it about a given fixed point using OpenGL functions.
8. Create a Rotating Square.
9. Draw a color cube and spin it using OpenGL transformation matrices.
10. Clip the line segment A(-4,2) and B(-1,7) in a window defined by left bottom corner at (-3,1) and upper right corner at (2,6). Find the visible portion of the line segment using Cohen Sutherland line clipping algorithm.

Proposed Assessment Plan (for 50 marks of CIE):

Tool		Remarks	Marks
CIE	CIE1	Module 1	10
	CIE2	Module 2	10
	CIE3	Module 3 and part of Module 4	10
Activity Details		Programming test, Mini Project.	20

Course Articulation matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	3	-	-	-	-	-	-	-	-	-	-	-
CO3	-	3	3	-	-	-	-	-	-	-	-	-	-	-
CO4	-	3	3	3	3	-	-	-	-	-	-	-	-	2

Course Title	WEB PROGRAMMING		
Course Code	23CS505	L-T-P-C	(0-0-4)2

Exam Hrs.	3	Hours / Week	4
CIE	50 Marks	SEE	50 Marks
		Total Hours	30

Course Objective: Create web pages with client side and server-side scripting

Course Outcomes (COs): Upon completion of the course, students shall be able to :

#	Course Outcomes	Mapping to POs	Mapping to PSOs
1.	Create webpages using HTML/XHTML and CSS.	3	1,2
2.	Develop client-side script to design a webpage	3,5	1,2
3.	Develop server-side script to create a webpage	3,5	1,2
4.	Design, document and present the concept for the chosen problem.	5,9,10,12	1,2

Course Contents:

1. Create and test an HTML document that describes a table with the following contents: The columns of the table must have the headings “Pine,” “Maple,” “Oak,” and “Fir.” The rows must have the labels “Average Height,” “Average Width,” “Typical Life Span,” and “Leaf Type.” You can make up the data cell values.
2. Create a JavaScript that prompts the user for a number and then counts from 1 to that number displaying only the odd numbers using alert window.
3. Write a java script to validate the following fields in a registration page
   Name (should contains alphabets and the length should not be less than 6 characters)
   Password(should not be less than 6 characters)
   E-mail(should not contain invalid addresses)
4. Develop and demonstrate, using JavaScript script, a XHTML document that collects the USN (the valid format is: A digit from 1 to 4 followed by two upper-case characters followed by two digits followed by two upper-case characters followed by three digits; no embedded spaces allowed) of the user. Event handler must be included for the form element that collects this information to validate the input. Messages in the alert windows must be produced when errors are detected.
5. Design an HTML page that captures and displays the mouse cursor’s position when the user clicks anywhere on the page. Use JavaScript to show:
   - The x and y coordinates relative to the browser’s client area.
   - The x and y coordinates relative to the screen.
6. Create an XHTML page that collects name, email, userId and password. Design an Assistance to a r user filling out a form can be provided with an associated text area called help box the content of the help box can change depending on the placement of the mouse cursor.
7. Develop and demonstrate, using JavaScript, a XHTML document that contains three short paragraphs of text, stacked on top of each other, with only enough space for each showing so that the mouse cursor can be placed over some part of them. When the cursor is placed over the exposed part of any paragraph, it should rise to the top to become completely visible.

8. Write an XML file which displays the book details that includes the following:
    i. Title of book
    ii. Author name
    iii. Edition
    iv. Price

   Write a XSLT to validate the above XML file and display the details using XSL.
9. a) Write a PHP program to store current date-time in a COOKIE and display the Last visited on date-time on the web page upon reopening of the same page.
   b) Write a PHP program to Send SESSION ID to the Browser.
10. Develop a PHP-based student information dashboard. Each student has a unique name (used as the key in an associative array) and an associated value that could be their age or a descriptor (e.g., "wizard", "hobbit"). Display this information in various sorted orders depending on the administrator's preference.
11. Write XHTML form and PHP to insert name and age information entered by the user into a table created using MySQL and to display the current contents of this table.
12. Create a XHTML form with Name, Address and E-mail text fields and use PHP script to store the values in MySQL table and to Retrieve and display the data based on Name.

Activity :

Mini project (Carry out a mini project in a team of 2 to 4 members)

Text Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1.	Programming the World Wide Web	Robert W. Sebesta	8th	Pearson Education	2014

Proposed Assessment Plan (for 50 marks of CIE):

Tool		Remarks	Marks
CIE	CIE1	Lab CIE	10
	CIE2	Lab CIE	10
	Report	Submission of record	10
Activity Details		Group based activity to create web page	20

Course Articulation matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	3	-	-	-	-	-	-	-	-	-	3	3
CO2	-	-	3	-	2	-	-	-	-	-	-	-	3	3
CO3	-	-	3	-	2	-	-	-	-	-	-	-	3	3
CO4	-	-	-	-	3	-	-	-	3	3	-	3	3	3

Course Title	DIGITAL IMAGE PROCESSING		
Course Code	23CS551	L-T-P-C	(3-0-0)3

Exam Hrs.	3	Hours/ Week	3
CIE	50 Marks	SEE	50 Marks
		Total Hours	40

Course Objective: To study the image fundamentals and mathematical transforms necessary for image processing

Course Outcomes (COs): Upon completion of the course, students shall be able to:

#	Course Outcomes	Mapping to POs	Mapping to PSOs
1.	Clarify the basic principles of Digital image processing	1	-
2.	Apply concepts of Digital image processing, transformation, restoration, compression and segmentation	2,3	-
3.	Analyze image processing algorithms	3	-
4.	Develop image processing application for real time problems	3,4,8,12	1,2

Course Contents:

MODULE-1	10 Hrs.

Introduction: Basic concepts, Examples of fields that use Digital Image Processing, Fundamental steps in Digital Image Processing, Components of an Image Processing System. Digital Image Fundamentals: Elements of visual perception. Image sensing and acquisition: Image sampling and quantization. Basic concepts in sampling and quantization, Representing digital images, Spatial and Intensity resolutions, some basic relationships between pixels: An Introduction to the Mathematical tools used in digital image processing.

MODULE-2	10 Hrs

Intensity Transformations and Spatial Filtering: Background: The basics of intensity transformations and spatial filtering, Some basic intensity transformation functions, Histogram Processing. Fundamentals of spatial filtering: The mechanics of spatial filtering, Spatial correlation and convolution. Image Restoration: A model of the image restoration/degradation process. Noise Models: Spatial and Frequency properties of Noise.

MODULE-3	10 Hrs

Image Restoration: Some important noise probability density functions, Periodic noise, Estimation of noise parameters, Restoration in the presence of Noise only- Spatial Filtering, Mean Filters. Color Image Processing: Color fundamentals, Color models: The RGB color model. Image Compression: Fundamentals: Coding redundancy, Spatial and Temporal redundancy, Irrelevant information, Measuring image information, Fidelity Criteria.

MODULE-4	10 Hrs

Image Compression: Some basic compression methods: Arithmetic coding, LZW coding, Bit_Plane coding, Digital image watermarking. Image Segmentation : Fundamentals, Point, Line, and Edge Detection, background, Detection of Isolated Points, Line Detection, Edge Models, Basic Edge Detection: The Image Gradient and its Properties, Gradient Operators, Combining the Gradient with Thresholding, Thresholding: Foundation, The Basics of Intensity Thresholding, The Role of Noisein Image Thresholding, The Role of Illumination and Reflectance in Image Thresholding.

Text Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1.	Digital Image Processing	Rafael C. Gonzales, Richard	4th	Pearson	2018

		E. Woods		publications	

Reference Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1.	Fundamentals of Digital Image Processing	A.K. Jain	2nd	Pearson	2018
2.	Digital Image Processing and Analysis	B. Chanda , Dutta Majumdeer	2nd	Prentice-Hall of IndiaPvt.Ltd	2011
3.	Introduction to Digital Image Processing with Matlab	Rafael C. Gonzales, Richard E. Woods,Steven L.Eddins	2nd	Mcgraw Higher Ed	2010

MOOC:
http://nptel.ac.in/courses/106105032

Proposed Assessment Plan (for 50 marks of CIE):

Tool		Remarks	Marks
CIE	CIE1	CIE will be conducted for 20 marks and reduced to 10 marks	10
	CIE2	CIE will be conducted for 20 marks and reduced to 10 marks	10
	CIE3	CIE will be conducted for 20 marks and reduced to 10 marks	10
Activity Details: Group activity			20

Course Articulation matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	2	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-	-	
CO4	-	-	3	3		-	-	3	-	-	-	3	3	2

Course Title	DATA MINING AND WAREHOUSING		
Course Code	23CS552	L-T-P-C	(3-0-0)3

Exam Hrs.	3	Hours/ Week	3
CIE	50 Marks	SEE	50 Marks
		Total Hours	40

Course Objective: Students will be able to select appropriate Data mining and warehousing techniques for real-time application

Course Outcomes (COs): Upon completion of the course, students shall be able to:

#	Course Outcomes	Mapping to POs	Mapping to PSOs
1.	Describe the fundamentals of data mining and data warehousing	1	
2.	Apply various data preprocessing techniques to prepare data for mining	1	1
3.	Apply the process of Classification, Clustering and Association Analysis for a given problem	3	-
4.	Implement appropriate data mining algorithm for a given scenario using Python	3,5,9	2

Course Contents:

MODULE-1	10 Hrs.

Introduction: Data: Why Data Mining? What is Data Mining? What kinds of data can be mined? What kinds of pattern can be mined?, Which technologies are used? Major issues in data mining. Getting to know your data: Data objects and attribute types, Basic statistical description of data: measuring the central tendency, Measuring the dispersion of data, measuring data similarity and dissimilarity

MODULE-2	10 Hrs

Data Pre-processing: Data Pre-processing: An overview, Data cleaning, Data integration, Data Reduction: overview of data reduction strategies, wavelet transforms, Principal component analysis, attributes subset selection, Data Transformation: min-max normalization and Z-score normalization.

Data Warehouse and online Analytical processing: Data Warehouse: Basic Concepts ,Data Warehouse modelling: Data cube and OLAP , Data warehouse design and usage: A business analysis frame work for data warehouse design, Data warehouse design process, Data warehouse usage for information processing.

MODULE-3	10 Hrs

Classification: Preliminaries, General Approach to Solving a Classification Problem, Decision Tree Induction, Rule-based classification, K- Nearest- neighbour Classifier. Mining frequent patterns.

Association and correlations: Basic Concepts and Methods: Basic Concepts, Frequent item set mining methods: Apriori Algorithm, generating association rules from frequent item sets, Improving the efficiency of Apriori, A Pattern growth Approach for Mining Frequent item sets.

MODULE-4	10 Hrs

Cluster Analysis: Basic Concepts and Methods, Cluster Analysis, Partitioning Methods, Agglomerative versus divisive hierarchical clustering, DBSCAN. Data Mining Trends and research frontiers: Data Mining Applications, Data mining and society, Data mining trends

Text Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1.	Introduction to Data Mining	Pang-Ning Tan, Michael Steinbach, Vipin Kumar	1st	Pearson Education	2014
2.	Data Mining – Concepts and Techniques,	Jiawei Han and Micheline Kamber, V	3rd		2012

Reference Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1.	Insight into Data Mining – Theory and Practice	K.P. Soman, Shyam Diwakar, V.Ajay	1st	PHI	2006
2.	Introduction to Data Mining with Case Studies	G. K. Gupta	3rd	PHI	2009

MOOCs:

1. http://nptel.ac.in/courses/110106064/
2. http://nptel.ac.in/courses/106106093/

https://www.edx.org/course/analytics-for-decision-making

Proposed Assessment Plan (for 50 marks of CIE):

Tool		Remarks	Marks
CIE	CIE1	Conduction for 20 marks & reduced to 10 marks	10
	CIE2	Conduction for 20 marks & reduced to 10 marks	10
	CIE3	Conduction for 20 marks & reduced to 10 marks	10
Activity Details		Implement appropriate data mining algorithm for a given scenario using Python	20

Course Articulation matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-	3	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	3	-	3	-	-	-	3	-	-	-	-	3

Course Title	INTERNET OF THINGS		
Course Code	23CS553	L-T-P-C	(3-0-0)3

Exam Hrs.	3	Hours / Week	3
CIE	50 Marks	SEE	50 Marks
		Total Hours	40

Course Objective: Explore the interconnection, integration of the physical world and design IOT applications.

Course Outcomes (COs) : Upon the completion of the course the students will be able to:

#	Course Outcomes	Mapping to POs	Mapping to PSOs
1.	Explain the impact and challenges posed by IoT networks, and compare IoT architectures	1	-
2.	Illustrate smart objects, IoT Access Technologies, and protocols to leverage connectivity.	2	-
3	Design IoT applications using Raspberry Pi and analyze real-world smart city use-cases.	3,5	-

Course Contents:

MODULE – 1	10 Hrs

What is IoT, Genesis of IoT, IoT and Digitization, IoT Impact, Convergence of IT and IoT, IoT Challenges, IoT Network Architecture and Design, Drivers Behind New Network Architectures, Comparing IoT Architectures, A Simplified IoT Architecture, IoT Data Management and Compute Stack.

MODULE – 2	10 Hrs

Smart Objects: The "Things" in IoT, Sensors, Actuators, and Smart Objects, Sensor Networks, Connecting Smart Objects: Communications Criteria, IoT Access Technologies: IEEE 802.15.4, IEEE 802.15.4g and IEEE 802.15.4e.

MODULE – 3	10 Hrs

IP as the IoT Network Layer: The Business Case for IP, The need for Optimization, Optimizing IP for IoT, Profiles and Compliances. Application Protocols for IoT: The Transport Layer, IoT Application Transport Methods.

MODULE – 4	10 Hrs

IoT Physical Devices and Endpoints - RaspberryPi: Introduction to RaspberryPi, Exploring the RaspberryPi Board; Operating System setup on RaspberryPi, RaspberryPi commands, Programming RaspberryPi with Python. Smart City Use-Case Examples: Connected Street Lighting, Street Lighting Architecture, Smart Parking, Smart Parking Use Cases, Smart Parking Architecture, Smart Traffic Control, SmartTraffic Control Architecture, Smart Traffic Application.

Text Books:

Sl.No	Book Title	Authors	Edition	Publisher	Year
1.	IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things	David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry	1st	Pearson Education (Cisco Press Indian Reprint).	
2.	Internet of Things	Srinivasa K G, Siddesh G M Hanumantha Raju R	1st	CENGAGE Leaning India	2017

Reference Books:					
Sl.No	**Book Title**	**Authors**	**Edition**	**Publisher**	**Year**
1.	Internet of Things - A Hands on Approach	Arshdeep Bahga and Vijay Madisetti	1st	Universities Press	2015
2.	The Internet of Things: Key Applications and Protocols	Olivier Hersent, David Boswarthick, Omar Elloumi	2nd	Wiley	2012

Proposed Assessment Plan (for 50 marks of CIE):			
Tool		**Remarks**	**Marks**
CIE	**CIE1**	Conduction for 20 marks & reduced to 10 marks	10
	CIE2	Conduction for 20 marks & reduced to 10 marks	10
	CIE3	Conduction for 20 marks & reduced to 10 marks	10
Activity Details		Group based simulation activity	20

Course Articulation matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	2	-	-	-	-	-	-	-	-	-

ADVANCED JAVA			
Course Code	**23CS554**	**LTPC**	**(2-2-0)3**
Exam. Hours	**3**	**Hours / Week**	**4**
CIE:	**50 Marks**	**SEE:**	**50 Marks**
		Total Hours	**40**

Course Objective:	Students will be able to apply J2EE concepts to create an application.
Course Outcomes(COs):	Upon completion of the course, students shall be able to :

#	Course Outcomes	Mapping to POs	Mapping to PSOs
1.	Explain and use java enumerations, collections, type wrapper and Event handling in developing modular programs	1	-
2.	Design GUI using swings and applets	3,5	1
3.	Build database applications using JDBC.	3,5	1
4.	Develop distributed web application using Servlets and JSP.	3,5,12	1

Course Contents:

MODULE – 1	10 Hrs
Enumeration and Autoboxing: Enumeration fundamentals, values() and valuesOf() Methods, Java Enumerations are class types, example, Type Wrappers, Autoboxing and Autounboxing. Event Handling The delegation event model; Event classes; Sources of events; Event listener interfaces; Using the delegation event model; Adapter classes	

MODULE – 2	10 Hrs
User Interface components with Swing Components and containers, Layout managers, A first simple swing example, Event Handling, Creating a swing applet, Exploring Swing Controls-JLabel and ImageIcon, Jtextfield The Swing buttons, JTabbedPane, JScrollPane, JList, JCombobox.	

MODULE – 3	10 Hrs
The Collections Framework – Collections overview, The collection Interfaces, The collection classes, Accessing collection via an iterator. Database Access- The Concept of JDBC, JDBC Driver Types, JDBC Packages, A Brief Overview of the JDBC process, Database Connection, Statement Objects, Result Set	

MODULE – 4	10 Hrs
Servlets and JSP - Lifecycle of a sevelet, A simple servlet, The Servlet API, javax.servlet Package, Reading Servlet parameters, The javax.servlet.http Package, Handling HTTP Request and Responses, Using Cookies, Session tracking. Java Server Pages (JSP): JSP, JSP Tags, User Sessions, Cookies, Session Objects. RMI -. Java Remote Method Invocation: Remote Method Invocation concept; Server side, Client side.	

Text Books:

1.	Herbert Schildt: Java The Complete Reference Eighth Edition, McGraw Hill, 2013.
2.	Jim Keogh: J2EE The Complete Reference, Tata McGraw Hill, 2007.

Reference Books:

1.	Advanced Java Programming ,Uttam.K.Roy , Oxford Press,2015
2.	Java Fundamentals Herbert Schildt Dale Skrien, McGrawHill 2013
3.	"Head First Servlets and JSP" by Shroff,2nd Edition, O,Reilly Publications ,2008.

MOOCs	
1.	http://www.nptelvideos.com/java/java_video_lectures_tutorials.php
2.	https://www.youtube.com/watch?v=0KL_zftem4g/

Demonstration Programs

1. A traveler is travelling around the world. He wants to convert the Indian currency to the currency denomination of the other countries when he wants to purchase some items. Use enumerations concepts and help him to convert other countries currency to Indian currency.
2. Implement the stack operation which allows working on different data types.
3. A stopwatch is a handheld timepiece designed to measure the amount of time that elapses between its activation and deactivation. Great for races, games and other timed activities, this stopwatch is easy to use, making it perfect for both children and adults. Create a simple stop watch with start, pause and reset button using JLabel and JButton.
4. A substitution cipher is a method of encrypting by which units of plaintext are replaced with ciphertext, according to a fixed system; the "units" may be single letters, pairs of letters, and triplets of letters, mixtures of the above, and so forth. The receiver deciphers the text by performing the inverse substitution. Implement a simple substitution cipher for encoding and decoding a message using swing controls.
5. Design an application for online food ordering that allows the customer to order the food based on the menu display to him, using different swing components.
6. Create a student database to hold student name, usn, marks in five course and display the result as fail if he/she scores less than 40 in any one course else print pass. Also calculate the total percentage of marks. Display the information using the JDBC concepts.
7. A bank offers home loan to its customer at different interest rates based on the location. Create an application for home loan processing using servlets and JDBC. The application has to provide functionality to calculate EMI, pay EMI and display the customer details along with his loan details
8. Do the following with only JSPs (and no servlets) and using JSP scripting elements
    1. Create a method that take two int numbers and return their sum as int.
    2. Invoke the method from within template text using JSP elements (example o/p - Sum of 3 and 4 is 7.)
    3. Print above line using JSP elements.
9. Manage the user session on a browsing activity using session management and display its information.
10. Design a client server application using RMI.

Proposed Assessment Plan (for 50 marks of CIE):

Tool		Remarks	Marks
CIE	**CIE1**	Conduction for 20 marks & reduced to 10 marks	10
	CIE2	Conduction for 20 marks & reduced to 10 marks	10
	CIE3	Conduction for 20 marks & reduced to 10 marks	10
Activity Details:		Group based activity to implement java concepts	20

Course Articulation matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	3	-	2	-	-	-	-	-	-	-	1	-
CO3	-	-	3	-	2	-	-	-	-	-	-	-	1	-
CO4	-	-	3	-	2	-	-	-	-	-	-	1	1	-

Course Title	RESEARCH METHODOLOGY & INTELLECTUAL PROPERTY RIGHTS		
Course Code	23RIP	L-T-P	(3-0-0) 3
CIE	50	Hours/Week	3
SEE	50	Total Hours	40

Course Objective: To give an overview of technical research activities and patenting methodology.
Course outcomes: At the end of course, student will be able to:

#	Course Outcomes	Mapping to PO's	Mapping to PSO's
1.	Carry out Literature Review and write technical paper	2,3,4,8,12	-
2.	Describe the fundamentals of patent laws and the patent drafting procedure.	6,8,10,12	-
3.	Elucidate the copyright laws and subject matters of copyright	6,8, 10,12	-

MODULE-1	10 Hrs.

Introduction: Meaning of Research, Objectives of Engineering Research, and Motivation in Engineering Research, Types of Engineering Research. Ethics in Engineering Research: Ethics in Engineering Research Practice, Types of Research Misconduct, Ethical Issues Related to Authorship.
Literature Review and Technical Reading, New and Existing Knowledge, Analysis and Synthesis of Prior Art ,Bibliographic Databases, Web of Science, Google and Google Scholar, Effective Search: The Way Forward, Introduction to Technical Reading Conceptualizing Research, Critical and Creative Reading.

MODULE-2	10 Hrs.

Attributions and Citations: Giving Credit Wherever Due, Citations: Functions and Attributes, Impact of Title and Keywords on Citations, Knowledge Flow through Citation, Citing Datasets, Styles for Citations, Acknowledgments and Attributions.
Technical Writing and Publishing : Free Writing and Mining for Ideas, Attributes and Reasons of Technical Writing, Patent or Technical Paper?—The Choice, Writing, Journal Paper: Structure and Approach: Title, Abstract, and Introduction, Methods, Results, and Discussions, Table, Figures, Acknowledgments, and Closures

MODULE-3	10 Hrs.

Introduction To Intellectual Property: Role of IP in the Economic and Cultural Development of the Society, IP Governance, IP as a Global Indicator of Innovation, Origin of IP, Major Amendments in IP Laws and Acts in India.
Patents: Conditions for Obtaining a Patent Protection, To Patent or Not to Patent an Invention. Rights Associated with Patents. Enforcement of Patent Rights. Inventions Eligible for Patenting. Non-Patentable Matters. Patent Infringements.
Process of Patenting: Prior Art Search. Choice of Application to be Filed. Patent Application Forms. Jurisdiction of Filing Patent Application. Publication. Pre-grant Opposition. Examination. Grant of a Patent. Validity of Patent Protection. Post-grant Opposition. Do I Need First to File a Patent in India. Patent Related Forms. Fee Structure. Types of Patent Applications.

MODULE-4	10 Hrs

Copyrights and Related Rights: Classes of Copyrights. Criteria for Copyright. Ownership of Copyright. Copyrights of the Author. Copyright Infringements. Copyright Infringement is a Criminal Offence. Copyright Infringement is a Cognizable Offence. Copyrights and Internet. Non-Copyright Work. Copyright Registration. Judicial Powers of the Registrar of Copyrights. Fee Structure. Copyright Symbol. Validity of Copyright. Copyright Profile of India. Copyright and the word 'Publish'. Transfer of Copyrights to a Publisher. Copyrights and the Word 'Adaptation'. Copyrights and the Word 'Indian Work'. Joint Authorship. Copyright Society. Copyright Board. Copyright Enforcement Advisory Council (CEAC).

Trademarks: Eligibility Criteria. Who Can Apply for a Trademark. Acts and Laws. Designation of Trademark Symbols. Classification of Trademarks. Registration of a Trademark is Not Compulsory. Validity of Trademark. Types of Trademark Registered in India. Trademark Registry. Process for Trademarks Registration.

Self study: Case Studies on Patents. Case study of Curcuma (Turmeric) Patent, Case study of Neem Patent, IP Organizations In India.

Text Books:

1. Dipankar Deb, Rajeeb Dey, Valentina E, Balas, "Engineering Research Methodology", Springer, 2019.
2. Prof. Rupinder Tewari, Ms. Mamta Bhardwa, "Intellectual Property" , Professor Gurpal Singh Sandhu Honorary Director, Publication Bureau, Panjab University, 2021.

Reference Books:

1. David V. Thiel, "Research Methods for Engineers", Cambridge University Press, 2014.
2. N.K.Acharya, "Intellectual Property Rights", Asia Law House, 8th Edition, 2021.

MOOC:

https://onlinecourses.swayam2.ac.in/ntr24_ed08/preview

Proposed Assessment Plan (for 50 marks of CIE):

Tool		Remarks	Marks
CIE	CIE1		
	CIE2		
	CIE3		

Activity Details

Course Articulation matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	3	2	3	-	-	-	2	-	-	-	3	-	-
CO2	-	-	-	-	-	3	-	2	-	3	-	3	-	-
CO3	-	-	-	-	-	3	-	2	-	3	-	3	-	-

Course Title	ENVIRONMENTAL STUDIES		
Course Code	**23EVS**	**L-T-P**	**(0-0-2) 1**
Exam	**3 Hrs.**	**Hours/Week**	**2**
CIE	**100 Marks**	**Total Hours**	**20**

Course Objective: To create environmental awareness among the students.
Course Outcomes: At the end of the course, student will be able to:

#	Course Outcomes (CO)	Mapping to POs	Mapping to PSOs
1.	Acquire an awareness of sensitivity to the total environment and its allied problems.	7, 9,12	-
2.	Develop strong feelings of concern, sense of ethical responsibility for the environment and the motivation to act in protecting and improving it.	6,8	-
3.	Analyze and evaluate environmental measures in real world situations in terms of ecological, political, economical, societal and aesthetic factors.	6, 7,8, 9	-

MODULE-1	**5 Hrs**
Environment: Definition, Ecosystem, Balanced ecosystem, Effects of human activities on environment Agriculture Housing Industry Mining and Transportation.	
MODULE-2	**5 Hrs**
Natural Resources: Water resources, Availability and Quality, Water borne diseases, Water induced diseases, Fluoride problem in drinking water. Mineral Resources - Forest Resources - Material Cycles - Carbon, Nitrogen and Sulphur Cycles.	
MODULE-3	**5 Hrs**
Pollution: Effects of pollution - Water pollution - Air pollution Land pollution - Noise pollution.	
MODULE-4	**5 Hrs**
Current Environmental issu es of importance: Acid Rain, Ozone layer depletion - Population Growth, Climate change and Global warming. Environmental Impact Assessment and Sustainable Development Environmental Protection - Legal aspects. Water Act and Air Act.	

Text Books:

1. Environmental Studies - Dr. D.L Manjunath, Pearson Education -2006
2. Environmental Studies - Dr. S. M. Prakash - Elite Publishers - 2006

Reference Books:

1. Environmental Studies - Benny Joseph - Tata McGraw ill- 2005
2. Principles of Environmental Science and Engineering P. Venugopala Rao, Prentice Hall of India.
3. Environmental Science and Engineering - Meenakshi, Prentice Hall India.

Assessment Strategy

CIE	Schedule	Assessment Method	Marks	Duration (Min.)
CIE I	At the end of 8 weeks	Objective Questions	25	60
CIE II	At the end of 11 weeks	Objective Questions	25	60
Project	At the end of 14 weeks	Project/Presentation/Prototype development/Plantation	50	-

Proposed Assessment Plan (for 50 marks of CIE):														
Tool			**Remarks**										**Marks**	
CIE	**CIE1**													
	CIE2													
	CIE3													
Activity Details														
Course Articulation matrix														
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	-	-	-	-	-	-	3	-	3	-	-	3	-	-
CO2	-	-	-	-	-	3	-	3	-	-	-	-	-	-
CO3	-	-	-	-	-	3	3	3	2	-	-	-	-	-

NATIONAL SERVICE SCHEME (NSS)				
Course Code	**23NYP3**		**(L-T-P) C**	**(0-0-2)**
Exam Hrs	**-**		**Hours/ Week**	**2**
SEE	**-**		**Total Hours**	**24**

Course Outcomes: At the end of the course, the student will be able to

#	Course Outcomes	Mapping to POs	Mapping to PSOs
1.	Understand the importance of his / her responsibilities towards society	6	-
2.	Analyze the environmental and societal problems/issues and will be able to design solutions for the same.	3,6	-
3.	Evaluate the existing system and to propose practical solutions for the same for sustainable development	3,6	-
4.	Implement government or self-driven projects effectively in the field.	11	-
5.	Develop capacity to meet emergencies and natural disasters & practice national integration and social harmony in general.	11	-

MODULE 1	**8 HRS**
Developing Sustainable Water management system for rural areas and implementation approaches. Contribution to any national level initiative of Government of India. For eg. Digital India, Skill India, Swachh Bharat, Atmanirbhar Bharath, Make in India, Mudra scheme, Skill development programs etc.	
MODULE 2	**8 HRS**
Spreading public awareness under rural outreach programs.(minimum5 programs).	
MODULE 3	**8 HRS**
Social connect and responsibilities.	

Reference Books :
1. NSS Course Manual, Published by NSS Cell, VTU Belagavi.
2. Government of Karnataka, NSS cell, activities reports and its manual.
3. Government of India, NSS cell, Activities reports and its manual.

Proposed Assessment Plan (for 50 marks of CIE):

Tool		Remarks	Marks
CIE	CIE1		
	CIE2		
	CIE3		

Activity Details

Course Articulation matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2

PHYSICAL EDUCATION (PE)				
Course Code	**23NYP3**		**(L-T-P) C**	**(0-0-2)**
Exam Hrs	**-**		**Hours/ Week**	**2**
SEE	**-**		**Total Hours**	**24**

Course Outcomes: At the end of the course, the student will be able to

#	Course Outcomes	Mapping to POs	Mapping to PSOs
1.	Understand the fundamental concepts and skills of Physical Education, Health, Nutrition and Fitness.	9,10,11	-
2.	Familiarization of health-related Exercises, Sports for overall growth and development	9,11	-
3.	Create a foundation for the professionals in Physical Education and Sports	11	-
4.	Participate in the competition at regional/ state / national / international levels.	9,10,11	-
5.	Create consciousness among the students on Health, Fitness and Wellness in developing and maintaining a healthy lifestyle.	9,10,11	-

MODULE 1	**4 HRS**
Orientation - Fitness, Food & Nutritio	
MODULE 2	**4 HRS**
General Fitness & Components of Fitness - Agility – Shuttle Run, Flexibility – Sit and Reach, Cardiovascular Endurance – Harvard step Test	
MODULE 3	**16 HRS**
Specific games (Any one to be selected by the student) 1. Badminton (Fore hand low/high service, back hand service, smash, drop) 2. Basketball (Dribbling, passing, shooting etc.) 3. Athletics (Field events – Throws)	

Proposed Assessment Plan (for 50 marks of CIE):

Tool		Remarks	Marks
CIE	**CIE1**		
	CIE2		
	CIE3		

Activity Details

Course Articulation matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1														
CO2														
CO3														

YOGA				
Course Code	**23NYP3**		**(L-T-P) C**	**(0-0-2)**
Exam Hrs	**-**		**Hours/ Week**	**2**
SEE	**-**		**Total Hours**	**24**

Course Outcomes: At the end of the course, the student will be able to

#	Course Outcomes	Mapping to POs	Mapping to PSOs
6.	Understand the Philosophical and Scientific Basis of Yoga	11	-
7.	Demonstrate Proficiency in Basic Yoga Practices	9	-
8.	Analyze the Role of Yoga in Managing Stress and Enhancing Lifestyle	7,11	-
9.	Apply Yoga Principles for Personal and Professional Growth	10, 11	-

MODULE 1	**4 HRS**
Orientation - Fitness, Food & Nutritio	
MODULE 2	**4 HRS**
General Fitness & Components of Fitness - Agility – Shuttle Run, Flexibility – Sit and Reach, Cardiovascular Endurance – Harvard step Test	
MODULE 3	**16 HRS**

Proposed Assessment Plan (for 50 marks of CIE):

Tool		Remarks	Marks
CIE	**CIE1**		
	CIE2		
	CIE3		

Activity Details -

Course Articulation matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1														
CO2														
CO3														

Course Title	MACHINE LEARNING		
Course Code	23CS601	L-T-P-C	(3-0-2) 4
Exam Hrs.	3	Hours / Week	5
CIE	50 Marks	SEE	50 Marks
		Total Hours	50

Course Objective: To apply the techniques of machine learning for real time projects.

Course Outcomes (COs): Upon completion of the course, students shall be able to:

#	Course Outcomes	Mapping to POs	Mapping to PSOs
1.	Describe and Apply preprocessing, Modeling, Evaluation and concept learning for the given problem.	2, 3	-
2.	Design and Develop various supervised and unsupervised machine learning algorithms for solving the given problem	3, 5	1, 2
3.	Illustrate the Neural networks, Bayesian learning and other forms of learning for the given problem	3, 4, 5	1
4.	Implement various machine learning algorithms for a given data sets.	3, 5	1, 2

Course Contents

MODULE - 1	13 Hrs

Introduction to Machine learning: Human learning and its types, Machine learning and its types, Applications, tools and issues in machine learning, Activities in machine learning, Types of data, Exploring structure of data, Data quality and Preprocessing.

Modelling and Evaluation: Introduction, Selecting a model, training a model, model representation and interpretability, Evaluating performance of a model.

MODULE – 2	13 Hrs

Learning Problems and Concept Learning: Well Posed learning problems, Designing a Learning systems, Concept Learning Tasks, Search, Find-S, Version Spaces and Candidate Elimination Algorithm, Inductive bias.

Supervised Learning: Introduction, example, classification model, classification learning steps, and Common algorithms – KNN, Decision Tree, and Random forest model.

MODULE - 3	12 Hrs

Supervised Learning (contd..): SVM, Regression-Simple linear regression, Multiple linear regression, Assumptions in Regression analysis.

Unsupervised Learning: Supervised Vs Unsupervised, Application, clustering, Finding pattern using Association rule.

MODULE – 4	12 Hrs

Basics of Neural Networks: Exploring the artificial neuron, Types of activation function, Early implementations of ANN, Architectures of NN, Learning process in ANN, Backpropagation algorithm.

Bayesian learning: Introduction, Bayes theorem, Bayes theorem and concept learning, Bayesian Belief Networks.

Other types of Learning – Representation learning, Active Learning, Instance based Learning, Association rule Learning, Ensemble learning

Demonstration:

1. Demonstration of Python Libraries for Machine Learning-Pandas, Sklearn, numpy, matplotlib.
2. Demonstration of Exploratory Data Analysis and Data Visualization.

Practical Component:

1. Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file.
2. For a given set of training data examples stored in a .CSV file, implement and demonstrate the Candidate-Elimination algorithm to output a description of the set of all hypotheses consistent with the training examples.
3. Write a program to implement *k*-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem.
4. Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample.
5. Implement a clustering algorithm using K-means clustering for the given dataset.
6. Build an Artificial Neural Network by implementing the Back propagation algorithm and test the same using appropriate data sets.
7. Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file. Compute the accuracy of the classifier, considering few test data sets.

Text Books:

1. Saikat Dutt, Subramanian Chandramouli, Amit Kumar Das, Machine Learning, Pearson, 2019
2. Tom M. Mitchell, Machine Learning, McGraw-Hill Education (INDIAN EDITION), 2013.

Reference Books:

1. T. Hastie, R. Tibshirani, J. H. Friedman, The Elements of Statistical Learning, Springer; 1st edition, 2001
2. Bishop, C. ,M., Pattern Recognition and Machine Learning, Springer, 2006
3. Yegnanarayana B. Artificial Neural Netwroks PHI Learning Pvt., Ltd.
4. Ethem Alpaydin, Introduction to Machine Learning, 2nd Ed., PHI Learning Pvt. Ltd., 2013

MOOCS:

1. https://swayam.gov.in/nd1_noc19_cs52/preview
2. https://www.coursera.org/learn/machine-learning/
3. https://nptel.ac.in/courses/106105152

Proposed Assessment Plan (for 50 marks of CIE):

Tool		Remarks	Marks
CIE	CIE1	Conducted for 20 marks(Module 1) & reduced to 10 marks	10
	CIE2	Conducted for 20 marks(Module 2) & reduced to 10 marks	10
	CIE3	Conducted for 20 marks(Module 3) & reduced to 10 marks	10
	Lab CIE	Lab CIE Conducted for 10 marks	10
Activity Details		Project Based Activity for 10 marks	10
Total			50

Course Articulation matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	3	2	-		-	-	-	-	-	-	-	-	-
CO2	-	-	2	-	3	-	-	-	-	-	-	-	2	3
CO3	-	-	3	3	3	-	-	-	-	-	-	-	3	
CO4	-	-	3	-	3	-	-	-	-	-	-	-	2	3

Course Title	COMPUTER NETWORKS		
Course Code	23CS602	L-T-P-C	(3-0-2)4
Exam Hrs.	3	Hours/Week	5
CIE	50 Marks	SEE	50 Marks
		Total Hours	50

Course Objective: Students will be able to acquire knowledge of the working mechanisms of different types of Networks, Address Mechanisms, and Protocols.

Course Outcomes (COs): Upon completion of the course, students shall be able to:

#	Course Outcomes	Mapping to POs	Mapping to PSOs
1.	Recognize and usages of Network Layer Services and versions of IP.	1,12	-
2.	Design unicast and multicast routing techniques using basic algorithms.	2,3,5	-
3.	Implement the Transport Layer Protocols to provide different services.	3,4,5	1
4.	Apply Flow Control, Error Control, and Congestion Control mechanisms to design QoS. models.	2,4	-

Course Content

MODULE-1	13 Hrs
Network Layer: Network Layer Services, IPv4 Addresses: Address Space, Classful Addressing, Classless Addressing, DHCP, NAT; Network Layer Protocols: Internetwork Protocol: Datagram format, Fragmentation, Options, SecurityofIPV4 Datagrams; ICMPv4: Messages, MobileIP: Addressing, Agents, Three Phases, Inefficiency in MobileIP.	
MODULE-2	**13 Hrs**
Unicast Routing: Introduction: General Idea, Least Cost Routing; Routing Algorithms: Distance Vector ,Link-State Routing , Path-Vector Routing; Unicast Routing Protocols: Internet Structure,RoutingInformationProtocol(RIP),OpenShortestPathFirst(OSPF),BorderGatewayProtocolVersion4(BGP4);MulticastRouting:Introduction:Unicasting,Multicasting,Broadcasting;Multicasting Basics: Multicast Addresses, Delivery at Data-Link Layer, Collecting Information about Groups, Multicast Forwarding ,Two Approaches to Multicasting.	
MODULE-3	**12 Hrs**
Intradomain Multicast Protocols: Multicast Distance Vector (DVMRP), Multicast Link State (MOSPF) Protocol Independent Multicast(PIM); Inter domain Multicast Protocols: IGMP: Messages, Propagation of Membership Information, Encapsulation; Next Generation IP: IPV6Addressing ,The IPV6 Protocol; Transport Layer protocols: Introduction: Services, Port Numbers ,User Datagram Protocol(UDP):User Datagram, UDP Services, UDP Applications, Transmission Control Protocol:TCPServices, TCP Features, Segment, ATCP Connection,	
MODULE-4	**12 Hrs**
Windows in TCP; Flow Control, Error Control, TCP Congestion Control; TCP Timer and Options; Stream Control Transmission Protocol (SCTP): Services, Features, Packet Format and Association; Quality of Services: Data Flow Characteristics; Flow Control to Improve QoS: Scheduling, Traffic Shaping or Policing, Resource Reservation, Admission Control; Integrated Services (INTSERV): Flow Specification, Admission, Service Classes, Resource Reservation Protocol (RSVP). Differentiated services (Dffserv).	

Text Book:

Behrouz A. Forouzan, Data Communications and Networking, Tata McGraw-Hill,5thEdition

Reference Books:

1. AlbertoLeon-Garcia and Indra Widjaja, "Communication Networks–Fundamental Concepts and Key architectures", Tata McGraw-Hill,2nd Edition.
2. William Stallings, "Data and Computer Communication", Pearson Education,8thEdition.
3. Nader F. Mir, Computer and Communication Networks, PearsonEducation,2014.

MOOCs:

1. https://nptel.ac.in/courses/106105183

Laboratory Programs

1. Learn Networking Commands
2. Implement of error correction code (like CRC).
3. Simulate the transmission of ping messages over a network topology consisting of 6 nodes.
4. Simulate three nodes point– to – point network with duplex links between them. Set the queue size and vary the bandwidth and find the number of packets dropped.
5. Simulate five nodes point– to – point network with duplex links between them. Set the queue size and vary the bandwidth and find the number of packets sent with different types of traffic.
6. Implement distance vector algorithm to find the suitable path for transmission between sender and receiver.
7. Simulation of Link State Routing algorithm.
8. Simulation of Routing Information Protocol.
9. Simulate an Ethernet LAN using n nodes, change error rate and data rate and compare throughput.
10. Simulate an Ethernet LAN using n nodes and set multiple traffic nodes and plot congestion window for different source/destination.

Proposed Assessment Plan (for 50 marks of CIE):

Tool		Remarks	Marks
CIE	CIE1	Conduction for 20 marks & reduced to 10 marks	10
	CIE2	Conduction for 20 marks & reduced to 10 marks	10
	CIE3	Conduction for 20 marks & reduced to 10 marks	10
Activity Details		Conduction of lab CIE	20

Course Articulation matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	2	-	-
CO2	-	2	3	-	2	-	-	-	-	-	-	-	-	-
CO3	-	-	3	2	2	-	-	-	-	-	-	-	2	
CO4	-	3	-	3	-	-	-	-	-	-	-	-	-	-

Course Title	FINITE AUTOMATA AND FORMAL LANGUAGES		
Course Code	**23CS603**	**L-T-P-C**	**(2-2-0)3**
Exam Hrs.	**3**	**Hours / Week**	**4**
CIE	**50 Marks**	**SEE**	**50 Marks**
		Total Hours	**40**

Course Objective: To design grammar production for the programming constructs.

Course Outcomes (COs) : Upon Completion of the course, students shall be able to:

#	Course Outcomes	Mapping to POs	Mapping to PSOs
1.	Describe various automata to write grammar productions	1	-
2.	Apply appropriate automata to obtain grammar productions	1,2	-
3.	Design automata for a given programming construct	2,3	-
4.	Construct an automata and grammar for a given scenario using the simulation tool	3,5	1,2

Course Contents:

MODULE – 1	**10 Hrs**

Introduction to Finite Automata: Why Study Automata Theory? The Central Concepts of AutomataTheory. Finite Automata: An Informal Picture of Finite Automata, Deterministic Finite Automata, Non-Deterministic Finite Automata, Finite Automata with Epsilon-Transitions.

MODULE – 2	**10 Hrs**

Regular Expressions and Languages: Regular Expressions, Finite Automata and Regular Expressions, Applications of Regular Expressions.

Properties of Regular Languages: Proving Languages Not to Be Regular – Pumping Lemma, Closure Properties of Regular Languages, Equivalence and Minimization of Automata.

MODULE – 3	**10 Hrs**

Context-Free Grammars and Languages: Context-Free Grammars, Parse Trees, Applications ofContext-Free Grammars, Ambiguity in Grammars and Languages.

Pushdown Automata: Definition of the Pushdown Automata, The languages of a PDA, Equivalenceof PDA's and CFG's, Deterministic Pushdown Automata.

MODULE – 4	**10 Hrs**

Properties of Context-Free Languages: Normal Forms for Context-Free Grammars- Eliminating Useless symbols, Eliminating epsilon productions, Eliminating Unit productions, Chomsky Normal Form (CNF), Griebach Normal Form (GNF).

Introduction to Turing Machines: Problems that Computers cannot Solve, The Turing Machine Programming Techniques for Turing Machines.

Text Book:

John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman, Introduction to Automata Theory, Languages and Computation, 3rd Edition, Pearson Education, 2013.

Reference Books:

1. Peter Linz, An Introduction to Formal Languages and Automata, IV Edition, Narosa PublishingHouse, 2011.
2. John C Martin, Introduction to Languages and Automata Theory, 3rd Edition, Tata McGraw-Hill,2007.

MOOCs

http://elearning.vtu.ac.in

Tutorial Class

1. Introduction to JFLAP tool.
2. Designing of DFA, NFA, Grammar productions using JFLAP tool.
3. Assume a scenario of an online shopping store which uses electronic money. Identify the events and states for this scenario and design an automata individually for
    - Customer
    - Bank
    - Store
3. Design an automata to verify the authentication of the user before allowing them to access the confidential information.(Assume the user password is 101101)
4. Construct a Finite Automata to search your name in your class attendance list.
5. A shopping cart logs the sequence of actions: A for Add, R for Remove, and C for Checkout. You want to allow any number of add/remove steps but require that checkout is optional and may happen anytime.
6. Assume you go for shopping a trouser searching for particular fabric and of particular color. Design grammar for the above scenario.
7. A compiler checks for balanced parentheses in a code editor. You're asked to design a PDA that accepts strings with correctly nested parentheses, e.g., (()()), (), but not ((), ())(
8. A robot receives a command string and needs to reverse the first half and match it with the second half.
9. A robot writes a sequence with # as a temporary placeholder (e.g., 1#0#1). You need to clean the tape by removing all #s and shifting the rest.
10. A security system uses binary palindromes as access codes. You need to check if a string is a palindrome (e.g., 10101, 0110) using turing machine.

Proposed Assessment Plan (for 50 marks of CIE):

Tool		Remarks	Marks
CIE	CIE1	Conduction for 20 marks & reduced to 10 marks	10
	CIE2	Conduction for 20 marks & reduced to 10 marks	10
	CIE3	Conduction for 20 marks & reduced to 10 marks	10
Activity Details		Solving scenario based problems using simulation tool	20

Course Articulation matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-		-	-	-	-	-	-	-	-	-	-	-
CO2	3	3		-	-	-	-	-	-	-	-	-	-	-
CO3	-	2	3	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	3	-	3	-	-	-	-	-	-	-	2	2

MINI PROJECT			
Course Code	**23CS604**	**L-T-P-C**	**(0-0-4)2**
Exam Hrs.	**3**	**Hours / Week**	**4**
SEE	**50 Marks**	**Total Hours**	**30**
CIE	**50 Marks**		

Course Objective: Design and implement solution for an identified real world problem.

Course Outcomes (COs): Upon completion of course the students will be able to:

#	Course Outcomes	Mapping to POs	Mapping to PSOs
1.	Identify the requirements of a chosen real world problem	1,2,6,8	2
2.	Design the solution for the chosen problem and document the same.	1,3,4,11	1,2
3.	Implement the design using appropriate tools	3,5,9,12	1,2
4.	Demonstrate and document the project work in team.	1, 5,10,11	1,2

- A team of 3-4 students must develop the mini project. However, during the final evaluation, each student must demonstrate the project individually.
- The team must submit a Project Report (25 to 30 Pages) after completion with the following contents
    - Introduction
    - Requirements
    - System Architecture
    - Implementation
    - Testing
    - Conclusion and Future work
    - References
- The project will be evaluated in three phases as outlined below.

Rubrics for Evaluation of Mini Project (Inter-Discipline)

Phase I (Project Proposal Submission and Evaluation Scheme):

After finalizing the topic with the guidance of Supervisor, students should submit the project proposal along with Synopsis not exceeding 10 pages. Approval of synopsis is done for 15 marks by concerned project committee.

Sl. No	Performance Indicators	Needs Improvement (0-1 mark)	Average (2-3 marks)	Good (4-5 marks)	Max marks
1	Literature Survey	Survey of literature is not recent or no literature survey	Survey of literature is not clear	Literature survey is sufficient.	5
2	Synopsis writing	Objective of the work is not identified.	Objective of the work is identified but no evidence of Inter disciplinary approach found.	Objective of the work is identified with evidence of Inter disciplinary approach found.	5
3	Presentation	Contents not delivered completely.	Contents not delivered clearly.	Contents delivered clearly with confidence.	5
				Total	**15**

Phase II (Project Progress):					
Evaluation of project phase II is carried out by evaluation committee.					
Sl. No.	**Performance Indicators**	**Needs Improvement (0-1 marks)**	**Average (2-3 marks)**	**Good (4-5 marks)**	**Max marks**
1.	System design and development	System specification is not identified.	System specification is identified but not Satisfactory.	System specification is identified correctly.	5
2.	Identification of appropriate tool for application	Application tools are not identified.	Application tools identified but not used.	Application tools identified and used.	5
3.	Oral presentation	Entire contents not delivered.	Contents not delivered clearly.	Contents delivered Clearly with confidence.	5
				Total	15

Phase III (Project Demonstration with Report):					
Evaluation of this phase is done by evaluation committee.					
Sl. No	**Performance Indicators**	**Needs Improvement (0-1 marks)**	**Average (2-3 marks)**	**Good (4-5 marks)**	**Total marks allocated**
1.	Design and Implementation	Not done	Incomplete.	Complete.	5
2.	Demonstration	Incomplete	Complete but not satisfactory.	Complete and satisfactory	5
3.	Documentation	Organization and clarity of report and technical content is not clear and complete	Organization and clarity of report and technical content is clear but not complete.	Organization and clarity of report and technical content is clear and complete.	5
4.	Oral presentation	Presentation with ppt is not clear.	Presentation with ppt is clear but not satisfactory	Presentation with ppt is clear and satisfactory.	5
				Total	20

Semester End Evaluation				
Evaluation committee consists of panel of examiners containing external as well as internal evaluators. This evaluation is carried out for 50 marks.				
SN	Performance Indicators		Marks allocated	Marks awarded
1.	Project execution	Project specification	5	
		Progress	5	
2.	Methodology /Result Analysis	System Design	5	
		System Implementation	5	
		System Testing	5	
3.	Project Report	Organization and Clarity	5	
		Technical content	5	
		Conclusion and Future Work	5	
		Final presentation	10	
		Total Marks	50	

Rubrics for Semester End Exam

	Marks	Overall criteria
1.	48-50	Project is reaching professional standards.
2.	40-47	Project is excellent and may contain publishable material. Presentation is excellent.
3.	35-39	Project and presentation are very good. All design aims are met.
4.	30-34	Project and presentation are good. Most design aims are met.
5.	25-29	Minimum core of design aims has been met. Presentation is satisfactory.
6.	20-24	Design aims and implementation are met partially. Presentation is moderate.
7.	0-20	Most design aims are not met and implementation does not work. Presentation is not satisfactory.

Proposed Assessment Plan (for 50 marks of CIE):

Tool		**Remarks**	**Marks**
CIE	**CIE1**	Evaluation Phase -1	15
	CIE2	Evaluation Phase-2	15
	CIE3	Evaluation Phase-3	20

Course Articulation matrix

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3	-	-	-	3	-	3	-	-	-	-	-	3
CO2	3	-	3	3	-	-	-	-	-	-	3	-	3	3
CO3	-	-	3	-	3	-	-	-	2	-	-	2	3	3
CO4	3	-	-	-	3	-	-	-	-	3	3	-	3	3

Course Title	MAIN PROJECT PHASE - I		
Course Code	23CS605	L-T-P-C	(0-0-4)2
Exam Hrs.	3	Hours / Week	4
SEE	50 Marks	Total Hours	-

Course Objective:	To be able to identify a relevant problem that requires technical solution and conduct survey for the same.
Course Outcomes (COs):	Upon completion of the course the students will be able to:

#	Course Outcomes	Mappingto POs	Mappingto PSOs
1	Identify a problem, through Extensive literature Survey leading to publication of a survey paper.	1,2	-
2	Plan & design the solution to the chosen problem	3	1
3	Make oral presentation and documentation of the work carried out	8, 9, 10	-

Course Contents:

During VII semester, candidates in consultation with the guides shall carry out a literature survey to finalize the topic of the project. *The same project will be continued in Eighth semester*. Students are expected to present the project synopsis, system analysis, requirements specification and should publish a technical paper on the Literature Survey. The evaluation will be carried out in three stages

- Project Phase 1 – Team Formation, Topic Selection & Guide allotment (No marks)
- Project Phase 2 – Extensive Literature Survey, Problem Definition
- Project Phase 3 – Preliminary Design, Report Preparation and Publication

The evaluation of the project phases shall be carried out by the evaluation committee comprising of project guide & other faculty members. The committee will be constituted by the project coordinator in consultation with the Head of the department. *For Multidisciplinary projects guides will be allotted from each concerned branch*.

Phase 2

Performance Indicators	Low (40%)	Medium (70%)	High (100%)
Literature Survey and Problem Definition (20 Marks)	Literature Survey not pertaining to the title of the project (0-8)	Incomplete literature survey and improper problem definition (9-14)	Extensive literature survey with clear state-of-the-art problem definition (1520)
Preliminary Design (10 Marks)	Has no coherent strategies for problem Solving (0-4)	Has some strategies for problem – solving, but does not apply them consistently (5-7)	Formulates strategies for solving problems (8-10)
Group Participation(5 Marks)	Contributed less than peers; primarily listened without actively participating. Shared no ideas, which were often not aligned with the project (1-2)	Contributed nearly as much as others. They took part in discussions and occasionally offered suggestions. Consistently completed assigned tasks on time. (3-4)	Consistently completed their share of the work, going above and beyond—and willingly offered assistance to others. Contributed numerous valuable ideas, inspired peers, and communicated

			thoughts and needs effectively. Completed assigned tasks ahead of schedule (5)
Ethics(5 Marks)	Upholds the standards of honesty and integrity. (1-2)	Upholds the standards of honesty and integrity. Addressed few societal and environmental issues (3-4)	Upholds the standards of honesty and integrity. Addressed the society and environmental issues and responsibilities. (5)
Phase 3			
Presentation (10 marks)	Disorganized and ineffective presentation (0-4)	Organized, but ineffective presentation (5-7)	Effectively organized presentation (8-10)
Report Preparation (20 Marks)	Disorganized and contents are not sufficient (0-8)	Organized but not good content wise (9-14)	Effectively organized and well framed contents (15-20)
Paper Publication (20 Marks)	Paper submitted & awaiting results (0-8)	National conference International Conference (9-14)	Journal (15-20)
Punctuality (Project Dairy Maintenance) (10 marks)	Not meeting the guide regularly (0-4)	Meeting regularly but doesn't document details of every session (5-7)	Up to date dairy maintenance (8-10)

Proposed Assessment Plan (for 50 marks of CIE):

Tool	Remarks	Marks
Phase Evaluation	Phase 1	00
	Phase 2	40
	Phase 3	60

Course Articulation matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	3	-	-	-	-	-	-	-	-	-	3	-
CO3	-	-	-	-	-	-	-	3	3	3	-	-	-	-

Course Title	APPLICATION DEVELOPMENT LABORATORY		
Course Code	23CS606A	L-T-P-C	(0-0-2)1
Exam Hrs.	3	Hours / Week	2
CIE	50 Marks	SEE	50 Marks
		Total Hours	28

Course Objective: Design and develop apps for android devices.

Course Outcomes (COs): Upon completion of the course, students shall be able to:

#	Course Outcomes	Mapping to POs	Mapping to PSOs
1.	Develop simple applications, using built-in widgets and components of android studio.	3,5,8,12	1,2
2.	Document and present the apps designed.	9,12	1

Course Contents:

1. Develop an android application which accepts the SGPA of all the six semesters and displays your CGPA.
2. Develop an android application to login into a system which is redirected to the Home screen.
   The login should be successful on
   email: admin@example.com
   password: rtWi2p_10
   If the email/password is invalid display a Toast with an error message
3. Assume you are accepting employee details: Name, Designation, Salary, Phone number.Develop app that displays an alert message if phone number entered is more than 10 digits.
4. Design an app that displays the names of all planets in our universe. Clicking on “Solar System”in first activity should display all the planet’s names in second activity and it should return the total number of planets to first activity.
5. Develop a QUIZ app that displays a question with four answers as options. Clicking an option should display whether the selected option is right or wrong.
6. Assume you need to accept order online for fast food items. Design an app such that it accepts the order for multiple items and displays the total amount to be paid on placing the order.
7. Design an app to display menu options on clicking a button “FILE”. The menu options are: New, Open, Save, Save as, And Print. Clicking on any option should display the relevant information.
8. Design an app to accept your name, roll number and branch programmatically.
9. Develop an android application to list all the engineering branches of MCE and displays a brief information of any department which the user clicks on in a separate page.
10. Consider a scenario where you need to send an email to multiple users. Design an app to implement the same.
11. Develop an android application to display a gallery view (Grid View) of at least 10 images.
12. Develop an android application to render the text data into Text View from the remoteserver. Show progress bar when the data is loading or Toast message if data fails to load.

Proposed Assessment Plan (for 50 marks of CIE):

Tool		Remarks	Marks
CIE	CIE1	Lab CIE	20

	CIE2	Report	10
Activity Details		Design an app for a given scenario	20
		Total Marks	**50**

Course Articulation matrix

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	-	-	3	-	3	-	-	3	-	-	**-**	3	2	2
CO2	-	-	-	-	-	-	-	-	3	-	**-**	3	2	-

Course Title	FULL STACK DEVELOPMENT LABORATORY		
Course Code	23CS606B	L-T-P-C	(0-0-2)1
Exam Hrs.	3	Hours / Week	2
CIE	50 Marks	SEE	50 Marks
		Total Hours	28

Course Objective: To build functional, cross platform web applications.

Course Outcomes (COs): Upon completion of the course, students shall be able to:

#	Course Outcomes	Mapping to POs	Mapping to PSOs
1.	Design web pages using ReactJs, NodeJs and Django	2, 5	1
2.	Develop a complete web application for a given scenario	3, 5, 9, 12	1

Course Contents:

1. Build a basic server using Node.js and Express. Create routes to handle HTTP requests like GET and POST and respond with simple JSON data.
2. Extend the previous Node.js server by integrating a database (e.g., SQLite or MongoDB). Implement endpoints to perform CRUD operations on a dataset.
3. Design and implement a RESTful API using Node.js, Express, and a database of your choice. Define endpoints for managing resources, such as creating, reading, updating, and deleting data.
4. Create a library of reusable React components. Build components like buttons, cards, and modals and use them in a sample React application.
5. Write a program to create a simple calculator Application using React JS.
6. Create a Simple Login form using React JS.
7. Build a real-time chat application using React for the front end and Node.js with Socket.IO for the back end. Enable users to send and receive messages in real-time.
8. Develop a Django app that displays current date and time in server
9. Develop a simple Django app that displays an unordered list of fruits and ordered list of selected students for an event.
10. Develop a Django app that performs student registration on a course. It should also display a list of students registered for any selected course. Create students and course as models with enrolment as many to many fields.

Proposed Assessment Plan (for 50 marks of CIE):

Tool		Remarks	Marks
CIE	CIE1	Lab CIE	10
	CIE2	Lab CIE	10
	Report	Submission of report	10
Activity Details		Group based activity to develop web application	20

Course Articulation matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	2	-	-	3	-	-	-	-	-	-	-	3	-
CO2	-	-	3	-	3	-	-	-	-	3	-	2	3	-

Course Title	AUTOMATED SOFTWARE TESTING		
Course Code	**23CS606C**	**L-T-P-C**	**(0-0-2) 1**
Exam Hrs.	**3**	**Hours / Week**	**2**
SEE	**50 Marks**	**Total Hours**	**28**

Course Objective: To design and execute automated tests using Selenium tool for effective web application testing.

Course Outcomes (COs): Upon completion of course the students will be able to

#	Course Outcomes	Mapping to POs	Mapping to PSOs
1.	Gain hands-on experience with Selenium WebDriver	3,5	2
2.	Develop and implement data-driven and modular test automation frameworks.	3,5	2
3.	Apply best practices in automation testing, debugging, and maintenance	5,6,11	1,2

Course Contents

1: Introduction to Automated Testing

- Basics of Software Testing
- Manual vs. Automated Testing
- Benefits and Limitations of Automation
- Overview of Automation Tools
- Introduction to Selenium

2: Selenium Fundamentals

- Selenium Components: IDE, WebDriver, Grid
- Selenium Architecture and Features
- Setting up Selenium WebDriver
- Supported Browsers and Programming Languages
- Writing First Test Script (Hello World in Selenium)

3: WebDriver Programming Basics

- Locating Web Elements: ID, Name, XPath, CSS Selectors
- Browser Commands (Open, Close, Navigation)
- Working with Web Elements (Text boxes, Buttons, Drop-downs)
- Handling Alerts, Pop-ups, and Frames
- Waits in Selenium: Implicit and Explicit

4: Advanced WebDriver Concepts

- Data-Driven Testing using Excel or CSV
- Page Object Model (POM)
- Cross-Browser Testing
- Screenshot Capture and Logging
- Exception Handling in Selenium Scripts

5: Integration with Testing Frameworks

- Introduction to TestNG or JUnit
- Creating Test Suites and Groups
- Assertions and Annotations
- Parallel Test Execution
- Generating Test Reports

6: Automation Framework Design

- Types of Automation Frameworks
- Designing a Reusable Framework with POM and TestNG
- Utilities, Configuration Files, and Reporting Tools (like ExtentReports)

7: Selenium Grid and CI/CD Integration

- Introduction to Selenium Grid
- Setting up Nodes and Hubs
- Running Tests on Remote Browsers
- Integration with Jenkins or GitHub Actions

8: Real-time Project & Best Practices

- End-to-End Testing Scenario (e.g., E-commerce Application)
- Writing Scalable and Maintainable Test Scripts
- Debugging Techniques
- Test Optimization and Maintenance

Text Book:

1. Selenium WebDriver 3 Practical Guide: End-to-end automation testing for web and mobile browsers with Selenium WebDriver. *U. Gundecha, Birmingham, UK: Packt Publishing, 2018.*
2. Mastering Selenium WebDriver 3.0: Test automation for web applications. *M. Collin, Birmingham, UK: Packt Publishing, 2018.*

Proposed Assessment Plan (for 50 marks of CIE):

Tool		Remarks	Marks
CIE	**CIE1**	Laboratory CIE	**20**
	CIE2	Laboratory Record Submission and Continuous Evaluation	**10**
Activity Details: Develop a software web application testing			**20**

Course Articulation matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	-	3	-	3	-	-	-	-	-	-	-	-	3
CO2	-	-	3	-	3	-	-	-	-	-	-	-	-	3
CO3	-	-	-	-	3	3	-	-	-	-	3	-	-	-

Course Title	DevOps		
Course Code	23CS606D	L-T-P-C	(0-0-2)1
Exam Hrs.	3	Hours / Week	2
CIE	50 Marks	SEE	50 Marks
		Total Hours	28

Course Objective: Develop a DevOps application on real world problems

Course Outcomes (COs): Upon completion of the course, students shall be able to:

#	Course Outcomes	Mapping to POs	Mapping to PSOs
1.	Understand the role and significance of Maven and Gradle build tools in modern software development.	1, 5	1
2.	Apply Build Tool to manage Java applications using Maven and Gradle.	1, 3, 5	1
3.	Build, test, and deploy Java applications through a complete DevOps lifecycle using Jenkins, Ansible, and Azure DevOps.	5, 9, 11	1

Course Contents:

1.	**Demonstration:** • **Introduction to Maven and Gradle:** Overview of Build Automation Tools, Key Differences between Maven and Gradle, Installation and Setup. • **Working with Maven:** Creating a Maven Project, Understanding the POM File, Dependency Management and Plugins. **Working with Gradle:** Setting Up a Gradle Project, Understanding Build Scripts (Groovy and Kotlin DSL), Dependency Management and Task Automation
	Practical Exercise: Build and Run a Java Application with Maven, Migrate the Same Application to Gradle
2.	**Demonstration:** • **Introduction to Jenkins:** Practical Exercise and Wrap-Up: Build and Deploy a Complete DevOps Pipeline, Discussion on Best Practices and Q&A • **Continuous Integration with Jenkins:** Setting Up a CI Pipeline, Integrating Jenkins with Maven/Gradle, Running Automated Builds and Tests **Configuration Management with Ansible:** Basics of Ansible: Inventory, Playbooks, and Modules, Automating Server Configurations with Playbooks, Hands-On: Writing and Running a Basic Playbook
	Practical Exercise: Set Up a Jenkins CI Pipeline for a Maven Project, Use Ansible to Deploy Artifacts Generated by Jenkins
3.	**Demonstration:** • **Introduction to Azure DevOps:** Overview of Azure DevOps Services, Setting Up an Azure DevOps Account and Project • **Creating Build Pipelines:** Building a Maven/Gradle Project with Azure Pipelines, Integrating Code Repositories (e.g., GitHub, Azure Repos), Running Unit Tests and Generating Reports **Creating Release Pipelines:** Deploying Applications to Azure App Services, Managing Secrets and Configuration with Azure Key Vault, Hands-On: Continuous Deployment with Azure Pipelines

	Practical Exercise and Wrap-Up: Build and Deploy a Complete DevOps Pipeline, Discussion on Best Practices and Q&A

Course outcomes (Course Skill Set):

At the end of the course the student will be able to:

- Demonstrate different actions performed through Version control tools like Git.
- Perform Continuous Integration and Continuous Testing and Continuous Deployment using Jenkins by building and automating test cases using Maven & Gradle.
- Experiment with configuration management using Ansible.
  Demonstrate Cloud-based DevOps tools using Azure DevOps.

Suggested Learning Resources:

- https://www.geeksforgeeks.org/devops-tutorial/
- https://www.javatpoint.com/devops
- https://www.youtube.com/watch?v=2N-59wUIPVI

https://www.youtube.com/watch?v=87ZqwoFeO88

Proposed Assessment Plan (for 50 marks of CIE):

Tool		Remarks	Marks
CIE	CIE	CIE conducted for 20 marks	20
	Lab Report	Lab Report Submission	10
Activity Details		Project based activity	20

Course Articulation matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	3	-	-	-	-	-	-	-	3	-
CO2	3	-	3	-	3	-	-	-	-	-	-	-	3	-
CO3	-	-	-	-	3	-	-	-	2	-	2	-	3	-

Course Title	INTRODUCTION TO COMPUTER VISION		
Course Code	23CS661	L-T-P-C	(3-0-0)3
Exam Hrs.	3	Hours / Week	3
CIE	50 Marks	SEE	50 Marks
		Total Hours	40

Course Objective: To learn basic principles of image formation, image processing algorithms and different algorithms for recognition from single or multiple images (video).

Course Outcomes Course Outcome: Upon completion of the course, students shall be able to:

#	Course Outcomes	Mapping to POs	Mapping to PSOs
1. 1	Describe the fundamentals of Computer Vision	1	-
2.	Perform shape analysis	3	-
3.	Develop applications using computer vision techniques	2	-
4.	Describe video analysis and motion computation	1	-

Course Content

MODULE – 1	10 Hrs

Introduction and Image Formation: What is computer vision? A brief history, Geometric primitives and transformations, Photometric image formation, The digital camera. Pinhole Perspective, Weak Perspective, Cameras with Lenses, The Human Eye, Intrinsic Parameters and Extrinsic Parameters, Geometric Camera Calibration.

MODULE – 2	10 Hrs

Early Vision – One Image: Linear Filters and Convolution, Shift Invariant Linear Systems, Spatial Frequency and Fourier Transforms, Sampling and Aliasing, Filters as Templates, Local Image Features, Texture.

MODULE - 3	10 Hrs

Early Vision – Multiple Images: Stereopsis and Structure from Motion

Early Vision – Mid-level Vision: Segmentation by Clustering, Grouping and Model fitting, Tracking.

MODULE – 4	10 Hrs

High-level Vision: Registration, Smooth Surface and their Outlines, Range Data Detecting Objects in Images, Recognition.

Text Books:

1. Computer Vision: Algorithms and Applications (CVAA), Richard Szeliski, Springer, 2nd edition, 2020, http://szeliski.org/Book/
2. Computer Vision – A modern approach, by D. Forsyth and J. Ponce, Prentice Hall, 2nd edition, 2012

Reference Books:

1. R. C. Gonzalez, R. E. Woods. Digital Image Processing. Addison Wesley Longman, Inc., 1992.
2. D. H. Ballard, C. M. Brown. Computer Vision. Prentice-Hall, Englewood Cliffs, 1982.
3. Image Processing, Analysis, and Machine Vision. Sonka, Hlavac, and Boyle. Thomson.
4. Simon J. D. Prince, Computer Vision: Models, Learning, and Inference, Cambridge University, Press, 2012
5. Introductory Techniques for 3D Computer Vision, by E. Trucco and A. Verri, Publisher: Prentice Hall.
6. Building Computer Vision Applications Using Artificial Neural Networks - With Step-by-step Examples in Opencv And Tensorflow With Python, Shamshad Ansari,Apress, 2020

Proposed Assessment Plan (for 50 marks of CIE):			
Tool		**Remarks**	**Marks**
CIE	**CIE1**	Conducted for 20 marks & reduced to 10 marks	10
	CIE2	Conducted for 20 marks & reduced to 10 marks	10
	CIE3	Conducted for 20 marks & reduced to 10 marks	10
Activity Details: Real time scenarios activity and simulation of search algorithms by visualization			20

Course Articulation matrix

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	3	-	-	-	-	-	-	-	-	-	-	-
CO3	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	-	-	-	-	-	-	-	-	-	-	-	-	-

Course Title	ARTIFICIAL INTELLIGENCE		
Course Code	23CS662	L-T-P-C	(3-0-0)3
Exam Hrs.	3	Hours / Week	3
SEE	50 Marks	Total Hours	40

Course Objective: Students will be able to apply the concepts of Artificial Intelligence to construct knowledge-based systems.

Course Outcomes (COs): Upon completion of the course, students shall be able to:

#	Course Outcomes	Mapping to POs	Mapping to PSOs
1.	Classify different types of Artificial Intelligence agents and analyze various search strategies.	2	-
2.	Trace and *assess* the effectiveness of algorithms using various search strategies for a given problem	2	-
3.	Design simple knowledge-based systems using first-order logic	3	2
4.	Apply various learning techniques to improve decision-making.	3,4	-

Course Contents:

MODULE – 1	10 Hrs

Introduction: What is AI? Intelligent Agents: Agents and environment; Good behavior: The Concept of Rationality; The nature of environment; The structure of agents. Problem-solving: Problem-solving agents. Example problems; Searching for solution; Uninformed search strategies: Breadth-first search, Uniform-cost search.

MODULE – 2	10 Hrs

Uninformed search strategies: Depth-first search, Depth-limited search, Iterative deepening depth first search, Bidirectional search, Comparing uninformed search strategies; Informed (Heuristic) Search Strategies: Greedy best-first search, A* search, Optimality of A*, Memory-bounded heuristic search; Heuristic functions; Local Search Algorithms and Optimization Problems: Hill-climbing search, Simulated annealing, Local beam search, Genetic algorithms.

MODULE – 3	10 Hrs

On-line search agents and unknown Environments: Online search problems, Online search agents, online local search, learning in online search, Logical Agents: Knowledge-based agents; The Wumpus world; First-Order Logic: Representation revisited; Syntax and semantics of first-order logic; Using first-order logic, Knowledge engineering in first-order logic.

MODULE – 4	10 Hrs

Learning from Examples: Forms of Learning; supervised learning; Learning decision trees; Practical Machine Learning. Statistical and Reinforcement learning: Statistical learning, maximum likelihood parameter learning, Bayesian parameter, learning, passive reinforcement learning, active reinforcement learning.

Text Book:

Artificial Intelligence - A Modern Approach, Stuart Russell and Peter Norvig, Third edition, Pearson, 2014.

Reference Books:

1. Artificial Intelligence, Elaine Rich, Kevin Knight and Shivashankar B Nair, Third edition, McGraw-Hill Education, 2015.
2. Introduction to Artificial Intelligence and Expert Systems, Dan W Patterson, Pearson, 2015.

Proposed Assessment Plan (for 50 marks of CIE):

Tool		Remarks	Marks
CIE	CIE1	Conduction for 20 marks & reduced to 10 marks	10
	CIE2	Conduction for 20 marks & reduced to 10 marks	10
	CIE3	Conduction for 20 marks & reduced to 10 marks	10
Activity Details		Real world scenarios based activity and search algorithm simulation visualization.	20

Course Articulation matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-	-	2
CO4	-	-	3	3	-	-	-	-	-	-	-	-	-	-

Course Title	WIRELESS NETWORKS		
Course Code	23CS663	L-T-P-C	(3-0-0)3
Exam Hrs.	3	Hours/Week	3
CIE	50 Marks	SEE	50 Marks
		Total Hours	40

Course Objective: Students will be able to gain knowledge of wireless devices and different methodologies used in Wireless Communication Networks.

Course Outcomes(COs): Upon completion of the course, students shall be able to:

#	Course Outcomes	Mapping To POs	Mapping To PSOs
1	Explore the applications, types of transmissions, Multiplexing and satellite Systems.	1,2,12	-
2	Analyse energy efficiency, mobility, scalability of Global System and management schemes in wireless networks.	2,3	-
3	Demonstrate medium access control protocols, routing, IEEE standards and cellular networks.	3,4	-
4	Apply knowledge of network resources, security for mobile and wireless networking.	1,2	-

Course Contents:

MODULE–1	10 Hrs

Introduction: Wired Network vs. Wireless Network, Overview of Wireless Applications, Wireless Transmission: Path loss, Multi-path propagation, Doppler shift, Fading, Time Division Multiplexing, Frequency Division Multiplexing, Code, Spread Spectrum Technique, Satellite Communication;

MODULE–2	10 Hrs

Cellular System: Cellular Network Organization, Cellular System Evolution, Cellular Fundamentals: Capacity, Topology, Operation of Cellular Systems, Handoff, Power control, Case study: Global System for Mobile communication (GSM) Network, General Packet Radio Service (GPRS), Code Division Multiple Access (CDMA 2000), Cordless System, Wireless Local Loop, Mobility Management-Location Management, HLR-VLR scheme, Hierarchical scheme, Predictive location management schemes.

MODULE–3	10 Hrs

Wireless Network: Protocols: Media Access Protocol, Mobile IP, Mobile Transport Layer Protocol, Wireless Access Protocol, Ad-Hoc Networks and Routing, Standards: IEEE 802.11, Wi-Fi, Wireless Broadband-Wi-MAX, Bluetooth, IEEE 802.15, Security in Wireless Network, Hyper LAN.

MODULE–4	10 Hrs

Mobile Computing: Mobile Computing, Issues: Resource Management, Interference, Bandwidth, Cell Splitting, Frequency reuse, Mobile Data Transaction Models, File Systems, Mobility Management, Security.

Text Books:

1. William Stallings, "Wireless Communications & Networks", 2/E, Pearson Education India, Reprint 2007.
2. Jochen Schiller, "Mobile Communications", 2/E, Pearson Education India, reprint 2007

Reference Book:

1. Sandeep Singhal, "The Wireless Application Protocol" , Addison Wesley, India, reprint 2001
2. T S Rappaport, "Wireless Communications: Principles & Practice", 2/E, Pearson Education, 2002.
3. C E Perkins, "Ad Hoc Networking", Addison Wesley, 2000.

MOOCs:

1. https://onlinecourses.nptel.ac.in/noc20_ee61/preview

Proposed Assessment Plan (for 50 marks of CIE):

Tool		Remarks	Marks
CIE	CIE1	Conduction for 20 marks & reduced to 10 marks	10
	CIE2	Conduction for 20 marks & reduced to 10 marks	10
	CIE3	Conduction for 20 marks & reduced to 10 marks	10
Activity Details		Implement appropriate concepts of wireless network for a given scenario.	20

Course Articulation matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	-	-	-	-	-	-	-	2	-	-
CO2	-	3	2	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	2	-	-	-	-	-	-	-	-	-	-
CO4	3	3	-	-	-	-	-	-	-	-	-	-	-	-

Course Title	MANAGEMENT INFORMATION SYSTEMS		
Course Code	23CS664	L-T-P-C	(3-0-0)3
Exam Hrs.	3	Hours / Week	3
SEE	50 Marks	Total Hours	40

Course Objective: To describe the role of information technology and decision support systems in business.

Course Outcomes (COs) : Upon completion of the course, students shall be able to:

#	Course Outcomes	Mapping to POs	Mapping to POs
1.	Describe basic concepts and technologies used in the field of management information systems.	1, 11	-
2.	Compare the processes of developing and implementing information systems.	1, 2	-
3.	Outline the role of the ethical, social, and security issues of information systems.	1,8	-
4.	Apply information systems to accomplish the objectives of an organization.	1, 10	-

Course Contents:

MODULE – 1	10 Hrs
Management Information System (MIS): Concept , MIS: Definition ,Role of the Management Information System , Impact of the Management Information System , MIS and the User, Management as a Control System , MIS: A Support to the Management, Management Effectiveness and MIS, Organisation as a System, MIS: Organisation Effectiveness, MIS for a Digital Firms.	
MODULE – 2	**10 Hrs**
System Engineering-Analysis and design: System Concepts, System control, Types of system, Handling System Complexity, Classes of Systems, General Model of MIS, Need for system analysis, System analysis of the existing system, System analysis of a new requirements, System Development Model.	
MODULE – 3	**10 Hrs**
Decision Support Systems and Knowledge Management: Decision Support Systems (DSS): Concept and Philosophy ,DSS Models: Behavioural, Management Science and Operations Research Models, Group Decision Support System (GDSS), Artificial Intelligence (AI)system, Knowledge based Expert System (KBES) , DSS Application in E-enterprise, MIS and the Benefits of DSS.	
MODULE – 4	**1**
Technology of information system: Data processing, Transaction processing, application processing, Information system processing, OLAP for Analytical Information ,TQM of Information System, Human Factors and User Interface, Real Time Systems and Good Design, Case Tools and I-Case, Strategic Nature of IT Decision, Evaluation and Feasibility of IT Solutions, MIS: Choice of the 'Information Technology'.	

Text Book:

1. Jawadekar, W.S., "Management Information Systems", Tata McGraw Hill Private Limited, New Delhi, 2013,5th edition.

Reference Books:

1. Goyal, D.P.: "Management Information System", MACMILLAN India Limited, New Delhi, 2008.
2. Mahadeo Jaiswal, Monika Mital: "Management Information System", Oxford University Press, New Delhi.

3.Kenneth C. Laudon and Jane P. Laudon: "Management Information Systems" 9/e, Pearson Education, New Delhi.

Proposed Assessment Plan (for 50 marks of CIE):

Tool		Remarks	Marks
CIE	CIE1	Conduction for 20 marks & reduced to 10 marks	10
	CIE2	Conduction for 20 marks & reduced to 10 marks	10
	CIE3	Conduction for 20 marks & reduced to 10 marks	10
Activity Details		Group activity based on flipped classroom	20

Course Articulation matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3		-	-	-	-	-	-	-	-	2	-	-	-
CO2	3	3	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	-	-	-	-	-	-	2	-	-	-	-	-	-
CO4	3	-	-	-	-	-	-	-	-	3	-	-	-	-

Course Title	INTRODUCTION TO CLOUD COMPUTING		
Course Code	23OECS61	L-T-P-C	(3-0-0)3
Exam Hrs.	3	Hours / Week	3
CIE	50 Marks	SEE	50 Marks
		Total Hours	40

Course Objective: To expose students to frontier areas of cloud computing service models and applications.

Course Outcomes (COs): Upon completion of the course, students shall be able to:

	Course Outcomes	Mappingto POs	Mappingto PSOs
1.	Uncover the history, security and privacy issues that arise from cloud computing architectures intended for delivering Cloud based IT services.	1, 12	-
2.	Explore the key technical, organizational, architectural and virtualization techniques applied to different types of cloud environment with energy efficiency.	2,8	-
3.	Ascertain different cloud platforms, Cloud Computing services, challenges of cloud computing and tools used in real life scenarios.	2, 5 ,9,10	-
4.	Explore the security and privacy issues that arise from cloud computing architectures intended for delivering Cloud based IT services.	6,8	-

Course Contents:

MODULE – 1	10 Hrs
Introduction: Cloud computing at a glance, historical developments, building cloud computing environments, computing platforms and technologies. Principles of parallel and Distributed computing: Eras of computing, parallel vs. Distributed computing, elements of parallel computing, elements of distributed computing, technologies for distributed computing.	
MODULE – 2	**10 Hrs**
Virtualization: Introduction, characteristics of virtualized environments, Taxonomy of virtualization techniques, virtualization and cloud computing, pros and cons of virtualization technology. Cloud Computing architecture: Introduction, Cloud reference model, types of clouds, economics of the cloud, open challenges.	
MODULE – 3	**10 Hrs**
Cloud platforms in industry: Amazon Web Services, Google App Engine, Microsoft Azure. Advanced topics in cloud computing: Energy efficiency in clouds, Market based management of clouds, Federated clouds/Inter clouds, Third party cloud services.	
MODULE – 4	**10 Hrs**
Infrastructure security, IAM: Infrastructure security: network level, host level, application level, Identity and Access management: trust boundaries and IAM, why IAM? IAM challenges, IAM definitions, IAM architecture and practices, getting ready for cloud, IAM standards and protocols for cloudservices, IAM practices in the cloud, cloud authorization management. Security management in the cloud: security management standards, security management in the cloud,	

availability management, Saas, Paas. Iaas availability management, access control, security vulnerability, patch and configuration management. Privacy: What is privacy? What is data life cycle? What are the key privacy concerns in cloud? who is responsible for protecting privacy?

Text Books:

1. Mastering Cloud Computing, McGraw Hill publication, Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi
2. Cloud security and privacy an enterprise perspective on risks and compliances,2013, Tin Mather, Subra Kumarswamy, Shahed Latif

Reference Books:

1. Cloud Computing: Theory and Practice, Dan C Marinescue, first edition, MK publishers.
2. Cloud Computing- A practical approach, McGraw Hill publication, Anthony T. Velte, Toby J. Velte, Robert Elsenpeter.

MOOCs:

1. https://www.youtube.com/watch?v=Eg4AAGCE7X4
2. https://www.coursera.org/learn/cloud-computing
3. https://www.edx.org/course/introduction-cloud-computing-microsoft-cloud200x

Proposed Assessment Plan (for 50 marks of CIE):

Tool		**Remarks**	**Marks**
CIE	CIE1	Conducted for 20 marks and reduced to 10 marks	10
	CIE2	Conducted for 20 marks and reduced to 10 marks	10
	CIE3	Conducted for 20 marks and reduced to 10 marks	10
Activity Details		Group Activity will be conducted using various cloud platforms	20

Course Articulation matrix

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	-	-	-	-	-		-	-	-	-	3	-	-
CO2	-	3	-	-	-	-		2	-	-	-	-	-	-
CO3	-	3	-	-	3			-	2	2	-	-	-	-
CO4	-	-	-	-	-	2		2	-	-	-	-	-	-

Course Title	INTRODUCTION TO JAVA PROGRAMMING		
Course Code	23OECS62	L-T-P-C	(3-0-0)3
Exam Hrs.	3	Hours/Week	3
CIE	50 Marks	SEE	50 Marks
Total Hours			40

Course Objective: Develop java programs using object-oriented concepts.

Course Outcomes(COs):Upon completion of the course, students shall be able to:

#	Course Outcomes	Mapping To POs	Mapping To PSOs
1.	Describe the basic concepts of object-oriented programming.	1	-
2.	Develop reusable programs using the concepts of inheritance, polymorphism, interfaces and packages	2, 3	-
3.	Apply the concepts of String Handling and Exception handling to develop efficient and error free codes.	3	-

Course Contents:

MODULE–1	10 Hrs
Basic concepts of Java : The History and Evolution of java: OOP Concepts, History of java, The java Buzz words, The Evolution of java, Data types, Variables, The Scope and Life time of variables, Operators, Expressions, Control statements, Type conversion and casting, Command Line Arguments.	
MODULE–2	**10 Hrs**
Arrays: Declaration, Initialization and accessing values, One-Dimensional Arrays, Multi- dimensional arrays, Alternative Array Declaration Syntax, var-arg methods. Strings: Explore String class, String Buffer and String Builder classes.	
MODULE–3	**10 Hrs**
Class fundamentals. Declaration objects, Assigning object reference variables, Introducing Methods, Constructors, "this" keyword, Garbage collection. Inheritance basics, Using Super keyword, Types of inheritance, Member access rules, Constructor and calling sequence, Using abstract Classes, Using final keyword. Method overriding and overloading.	
MODULE–4	**10 Hrs**
Defining an interface, Implementing interface, Accessing interface properties. Defining Package, finding packages and class path, accessing Protection. Exception handling Fundamentals, exception types, Built-in Exceptions, Using try-catch-finally throw- throws Keywords	

Text Books:

3. Herbert Schildt, "Java The complete reference", 9th edition, McGraw Hill Education (India) Pvt. Ltd.

Reference Book:

1. An introduction to java programming and object oriented application development, R AJohson-Thomson.
2. Introduction to Java programming-comprehensive, Y. Daniel Liang, Tenth Edition, Pearson ltd 2015.
3. E Balagurusamy, Programming With Java : A Primer 5th Edition Tata McGraw Hill.

MOOCs:

1. http://nptel.ac.in/courses/106106147/
2. http://www.nptelvideos.com/java/java_video_lectures_tutorials.php
3. https://www.youtube.com/watch?v=0KL_zftem4g
4. https://www.coursera.org/specializations/object-oriented-programming

Proposed Assessment Plan (for 50 marks of CIE):

Tool		Remarks	Marks
CIE	CIE1	Conduction for 20 marks & reduced to 10 marks	10
	CIE2	Conduction for 20 marks & reduced to 10 marks	10
	CIE3	Conduction for 20 marks & reduced to 10 marks	10
Activity Details		Program execution on concept learnt	20

Course Articulation matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	2	3	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-	-	-

Course Title	WEB TECHNOLOGY		
Course Code	23OECS63	L-T-P-C	(3-0-0)3
Exam Hrs.	3	Hours / Week	3
CIE	50 Marks	SEE	50
		Total Hours	40

Course Objective:	Create web pages with client-side and server-side scripting.
Course Outcomes (COs):	Upon completion of the course, students shall be able to:

#	Course Outcomes	Mapping to POs	Mapping to PSOs
1.	Apply the knowledge of HTML/XHTML and CSS in designing webpage.	1	-
2.	Develop client-side script to design webpage.	3	-
3.	Design server-side script to create webpage.	3,5	-
4.	Create web pages using JavaScript, xml, PHP and MySQL for the real World applications.	1,3,5	-

Course Contents:

MODULE – 1	10 Hrs

Fundamentals of Web, XHTML: Internet, WWW, Web Browsers, and Web Servers; URLs; MIME; HTTP; the Web Programmers Toolbox. XHTML: Basic syntax; Standard structure; basic text markup; Images; Hypertext Links; Lists; Tables; Forms; the audio element, the video element, organization elements, time element

MODULE – 2	10 Hrs

CSS: Introduction; Levels of style sheets; Selector forms; Property value forms; Font properties. List properties; Color; Alignment of text; The box model; Background images; Theand tags.
JavaScript: Overview of JavaScript; Syntactic characteristics; Primitives, operations, and expressions; Screen output and keyboard input; Control statements; Object creation, and modification; Arrays; Functions; Pattern matching using regular expressions.

MODULE – 3	10 Hrs

JavaScript and HTML Documents: The JavaScript execution environment; Element access in JavaScript; Events and event handling; Handling events from the Body elements, Button elements, Text box and Password elements; The navigator object.
Dynamic Documents with JavaScript: Introduction to dynamic documents; Element positioning; Moving elements; Element visibility; Changing colors and fonts; Dynamic content; Stacking elements; Locating the mouse cursor.

MODULE – 4	10 Hrs

XML: Introduction; Syntax; Document structure; Namespaces, XML schemas, Displaying raw XML documents; Displaying XML documents with CSS; XSLT style sheets.
PHP: Origins and uses of PHP; Overview of PHP; General syntactic characteristics; Primitives, operations and expressions; Output; Control statements; Arrays; Functions; Pattern matching; Form handling; Cookies; Session tracking; Database Access using PHP and MySQL.

Text Book:

Robert W. Sebesta: Programming the World Wide Web, 8th Edition, Pearson Education, 2014.

Reference Books:

1. Deitel H.M. and Deitel P.J., "Internet and World Wide Web How to program", Pearson International, 2012, 4th Edition.
2. Randy Connolly, Ricardo Hoar, "Fundamentals of Web Development", Pearson, 2015.
3. ISRD Group: Internet Technology and Web Design, Tata McGraw Hill Publishing Ltd, 2011

MOOCs:

1. https://www.mooc-list.com/course/programming-and-web-beginners-coursera
2. https://archive.nptel.ac.in/courses/106/105/106105084/
3. https://www.coursera.org/specializations/web-design
4. http://www.w3c.org

Proposed Assessment Plan (for 50 marks of CIE):

Tool		Remarks	Marks
CIE	CIE1	Conduction for 20 marks & reduced to 10 marks	10
	CIE2	Conduction for 20 marks & reduced to 10 marks	10
	CIE3	Conduction for 20 marks & reduced to 10 marks	10
Activity Details		Group based activity to create web page.	20

Course Articulation matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	3	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	3	-	-	-	-	-	-	-	-	-
CO4	3	-	3	-	3	-	-	-	-	-	-	-	-	-

NATIONAL SERVICE SCHEME (NSS)				
Course Code	**23NYP4**		**(L-T-P) C**	**(0-0-2)**
Exam Hrs	**-**		**Hours/ Week**	**2**
SEE	**-**		**Total Hours**	**24**

Course Outcomes: At the end of the course, the student will be able to

#	Course Outcomes	Mapping to POs	Mapping to PSOs
1.	Understand the importance of his / her responsibilities towards society	6	
2.	Analyze the environmental and societal problems/issues and will be able to design solutions for the same.	3,6	
3.	Evaluate the existing system and to propose practical solutions for the same for sustainable development	3,6	
4.	Implement government or self-driven projects effectively in the field.	11	
5.	Develop capacity to meet emergencies and natural disasters & practice national integration and social harmony in general.	11	

Module 1	8 Hrs
Plantation and adoption of plants. Know your plants.	
Module 2	8 Hrs
Organize National integration and social harmony events /workshops /seminars. (Minimum 02 programs).	
Module 3	8 Hrs
Govt. school Rejuvenation and helping them to achieve good infrastructure.	

Reference Books :
1. NSS Course Manual, Published by NSS Cell, VTU Belagavi.
2. Government of Karnataka, NSS cell, activities reports and its manual.
3. Government of India, NSS cell, Activities reports and its manual.

Proposed Assessment Plan (for 50 marks of CIE):

Tool		Remarks	Marks
CIE	CIE1		
	CIE2		
	CIE3		

Activity Details

Course Articulation matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2

PHYSICAL EDUCATION (PE)				
Course Code	**23NYP4**		**(L-T-P) C**	**(0-0-2)**
Exam Hrs	**-**		**Hours/ Week**	**2**
SEE	**-**		**Total Hours**	**24**

Course Outcomes: At the end of the course, the student will be able to

#	Course Outcomes	Mapping to POs	Mapping to PSOs
1	Understand the fundamental concepts and skills of Physical Education, Health, Nutrition and Fitness.	9,10,11	-
2	Familiarization of health-related Exercises, Sports for overall growth and development	9,11	-
3	Create a foundation for the professionals in Physical Education and Sports	11	-
4	Participate in the competition at regional/state / national / International levels.	9,10,11	-
5	Create consciousness among the students on Health, Fitness and Wellness in developing and maintaining a healthy lifestyle.	9,10,11	-

Module 1	4 Hrs
Orientation - Postural deformities, Stress management	
Module 2	16 Hrs
Specific games (Any one to be selected by the student) 1.Throw ball 2. Table Tennis 3. Athletics (Field Events- Jumps) – Any event as per availability of Ground.	
Module 3	**4 Hrs**
Aerobics	

Proposed Assessment Plan (for 50 marks of CIE):

Tool		Remarks	Marks
CIE	CIE1		
	CIE2		
	CIE3		

Activity Details

Course Articulation matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2

YOGA				
Course Code	**23NYP4**		**(L-T-P) C**	**(0-0-2)**
Exam Hrs	**-**		**Hours/ Week**	**2**
SEE	**-**		**Total Hours**	**24**

Course Outcomes: At the end of the course, the student will be able to

#	Course Outcomes	Mapping to POs	Mapping to PSOs
1.	Understand the Philosophical and Scientific Basis of Yoga	11	-
2.	Demonstrate Proficiency in Basic Yoga Practices	9	-
3.	Analyze the Role of Yoga in Managing Stress and Enhancing Lifestyle	7,11	-
4.	Apply Yoga Principles for Personal and Professional Growth	10, 11	-

Module 1	4 Hrs
Ashtanga Yoga l. Dharana 2. Dhyana (Meditation) 3. Samadhi	
Module 2	**4 Hrs**
Different types of Asanas a. Sitting 1. Bakasana 2. Hanumanasana 3. Ekapada Rajakapotasana 4. Yogarnudra in Vajrasana b. Standing 1. Vatayanasana 2. Garudasana c. Balancing 1. Veerabhadrasana 2. Sheershasana	
Module 3	16 Hrs
Pranayama 1. Bhastrika 2. Bhramar	

Proposed Assessment Plan (for 50 marks of CIE):

Tool		Remarks	Marks
CIE	CIE1		
	CIE2		
	CIE3		

Activity Details

Course Articulation matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2

Course Title	ANALYTICAL ABILITY AND SOFT SKILLS		
Course Code	**23ASK**	**L-T-P**	**(0-0-2)1**
Exam	**1**	**Hours/Week**	**2**
SEE	**50 Marks**	**Total Hours**	**24**

This course will be conducted at the end of fifth semester for two weeks by TAP department.
Course Objective: To Enhance problem solving skills and communication skills
Course outcomes: At the end of course, student will be able to:

#	Course Outcomes	Mapping toPO's	Mapping to PSO's
1.	Apply methods to solve numerical and reasoning problems	2,3	-
2.	Lead a team in corporate offices	8,9	-
3.	Communicate effectively in professional ambience	10	-

Course Content

MODULE – 1

Hard Skills: Speed/Distance, Probability, Permutations/Combinations, Profit/Loss, Simple Interest/Compound Interest, Number theories, Number/Letter series, Coding/Decoding, Blood relations, Directions, Clock, Calendar. Logical reasoning problems

MODULE – 2

Soft Skills: Basic grammar, Spotting errors, Sentence formation, Email writing, Public speaking, Client communication, Leadership, Managerial skills, Stress management, Presentation Skills

MODULE -3

Technical Skills: Review of C programming, Simple coding, Syntax rules, MCQs on C language.

MODULE -4

Activities: GD, JAM, Mock Interview, Pick and speak, Presentation