SHRI G.S. INSTITUTE OF TECHNOLOGY & SCIENCE, INDORE

DEPARTMENT OF COMPUTER ENGINEERING

B. Tech. (Computer Science & Engineering)

Year: 2021-22

Department Vision and Mission

Vision

To become a strong centre of excellence for creating competent human resource in the field of Computer Science and Engineering meeting the dynamic societal and industrial needs.

Mission

M1: To produce technically competent professionals in Computer Science and Engineering having a blend of theoretical knowledge and practical skills.

M2: To encourage innovation, research and analytical activities with professional ethics and responsibilities through quality education.

M3: To provide learning ambience in collaboration with industries to keep pace with dynamic technological advancements and promote spirit of entrepreneurship**.**

M4: To motivate students to apply knowledge to resolve societal and environmental challenges and engage in continuous learning towards sustainable development.

Program Outcomes (POs)

B.Tech. Computer Science & Engineering

PO1	**Engineering knowledge**: Apply knowledge of mathematics and science with fundamentals of Computer Science & Engineering to be able to solve complex engineering problems related to CSE
PO2	**Problem analysis**: Identify Formulate review research literature and analyze complex engineering problems related to CSE and reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
PO3	**Design/Development of solutions**: Design solutions for complex engineering problems related to CSE 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
PO4	**Conduct Investigations of Complex problems**: Use research–based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	**Modern Tool Usage**: Create, Select and apply appropriate techniques, resources and modern engineering and it tools including prediction and modeling to computer science related complex engineering activities with an understanding of the limitations
PO6	**The engineer and society**: Apply Reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the CSE professional engineering practice.
PO7	**Environment and sustainability:** Understand the impact of the CSE professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of, and need for sustainable development.
PO8	**Ethics**: apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	**Individual and team work**: Function effectively as an individual and as a member or leader in diverse teams and in multi-disciplinary settings
PO10	**Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large such as able to comprehend and with write effective reports and design documentation, make effective presentations and give and receive clear instructions.
PO11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multi-disciplinary environments
PO12	**Life-long learning**: Recognize the need for and have the preparation and ability to engage in independent and life-long learning the broadest context of technological change

Program Educational Objectives (PEOs)

B.Tech. Computer Science & Engineering

PEO1: To inculcate self-assurance, integrity, technical, collaborative and communication abilities (Leadership) in students, to be able to inspire and guide the team they work in.

PEO2: To equip students with theoretical knowledge and practical skills to take on the challenges in the industries or research organizations.

PEO3: To promote among graduates, the quest for lifelong learning to remain professionally more efficient.

PEO4: To sensitize students towards professional ethics and practices to take up and resolve socially relevant challenges.

PEO5: To encourage graduates to gain multi-disciplinary knowledge leading to innovation, research and sustainable developmentto achieve the goal of self-reliant India.

Program Specific Outcomes (PSOs)

B.Tech. Computer Science & Engineering

PSO1 To develop conceptual understanding and application of learned concepts to different domains and build entrepreneurial attitude.

PSO2 To imbibe professional ethics, communication abilities and quest for continuous learning.

PSO3 To gain capability to use state of art techniques, skills and tools with mind-set inclined towards innovation and research.

DEPARTMENT OF COMPUTER ENGINEERING
B. E. I YEAR (4YDC)
CO 10507: PROGRAMMING FOR PROBLEM SOLVING

Hours per Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
3	1	2	4	1	70	30	20	30	150

PRE-REQUISITES: NIL

COURSE OBJECTIVES: This course aims to provide exposure to problem-solving through programming. It aims to train the student to the basic concepts of the C-programming language.

COURSE OUTCOMES:

After completing the course student should be able to:

1. To formulate simple algorithms for arithmetic and logical problems.
2. To translate the algorithms to programs and test and execute the programs and correct syntax and logical errors.
3. To apply programming to solve conditional and iterative statement, function, recursion, and arrays.
4. To use pointers and structures to formulate algorithms and programs. To use the concepts of OOPS.

Mapping of Course Outcomes with Program Outcomes

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

DEPARTMENT OF COMPUTER ENGINEERING
B.TECH. II YEAR (4YDC)
SEMESTER-A
CO 24057: OBJECT ORIENTED PROGRAMMING SYSTEMS

Hours per Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
3	1	2	4	1	70	30	40	60	200

PRE-REQUISITES: CO10504: Computer Programming

COURSE OBJECTIVES: The objective of course is to develop programming skills of students, using object oriented programming concepts, learn the concept of class and object using Java and develop real world applications.

COURSE OUTCOMES:
After completing the course student should be able to:

1. Explain various concepts of object oriented terminology.
2. Define and implement the concepts of data encapsulation, abstraction, inheritance and polymorphism.
3. Design and execute quality programs using exception handling.
4. Solve the real world business problems as per specifications.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	1	2	-	-	-	1	1	1	1	-	-	-
CO2	3	3	3	1	3	-	-	-	2	2	1	1	-	-	-
CO3	3	3	3	3	3	-	-	-	2	1	1	1	-	-	-
CO4	3	3	3	3	3	-	-	-	3	2	1	1	-	-	-

DEPARTMENT OF COMPUTER ENGINEERING
B.TECH. II YEAR (4YDC)
SEMESTER-A
CO 24009: COMPUTER ARCHITECTURE

Hoursper Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
3	-	2	3	1	70	30	40	60	200

PRE-REQUISITES: NIL

COURSE OBJECTIVES:

The main objective of this course is to compare various architectures of Computers and their components like memory etc. and to develop the skills of the students to write the assembly language programs for various instructions.

COURSE OUTCOMES:

After completing the course student should be able to:

1. Illustrate architecture of a computer, its components and their interconnection.
2. Describe execution of instruction in a computer.
3. Identify the addressing modes used in macro instruction.
4. Design programs in assembly language and justify the importance of parallel architecture.

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

DEPARTMENT OF COMPUTER ENGINEERING
B.TECH. II YEAR (4YDC)
SEMESTER-A
CO 24997: PROGRAMMING PRACTICES

Hoursper Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
-	1	2	-	2	-	-	40	60	100

PRE-REQUISITES: CO10504: Computer Programming

COURSE OBJECTIVES: To give hands-on experience to students on different components of good programming.

COURSE OUTCOMES:
After completing the course student should be able to:

1. Develop programs for complex real world problems.
2. Apply good programming practices in their code like Comments, indentation etc.
3. Utilize Debugger and its tools like gdb/gnu for error handling.
4. Demonstrate configuration and usage of different software tools used in industry.

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

DEPARTMENT OF COMPUTER ENGINEERING
B.TECH. II YEAR (4YDC)
SEMESTER-B
CO 24553: DISCRETE STRUCTURES

Hoursper Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
3	-	-	3	-	70	30	-	-	100

PRE-REQUISITES: MA10001: Mathematics - I, MA10501: Mathematics - II

COURSE OBJECTIVES: Course Objective: To enable a student to learn the basic concepts of discrete elements such as sets, combinatorics, relations, functions, graphs, trees and their applications in diverse domains.

COURSE OUTCOMES:
After completing the course student should be able to:

1. Solve problems which involve discrete structures such as sets, relations, functions, predicate and propositional logics.
2. Explain the notion of mathematical thinking, mathematical proofs, logical thinking, and combinatorics and be able to apply them in problem solving.
3. Describe the basic terminology and properties of graphs and trees and apply them to solve practical problems.
4. Apply algebraic techniques effectively to analyse basic discrete structures and algorithms for real world applications.

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

DEPARTMENT OF COMPUTER ENGINEERING
B.TECH. II YEAR (4YDC)
SEMESTER-B
CO 24507: DATA STRUCTURES

Hours Per Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
3	1	2	4	1	70	30	40	60	200

PRE-REQUISITES: CO10504: Computer Programming, CO24497: Programming Practices

COURSE OBJECTIVES: To introduce the fundamental concept of data structures and to emphasize the importance of data structures in developing and implementing algorithms.

COURSE OUTCOMES:
After completing the course student should be able to:

1. Explain the basic concepts of data structures and algorithms.
2. Describe basic concepts about stacks, queues, linked lists, trees, graphs and their implementation.
3. Apply data structures to efficiently organize the data for improving performance of the system.
4. Design and implement algorithms for solving problems with the help of fundamental data Structures.

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

DEPARTMENT OF COMPUTER ENGINEERING
B.TECH. II YEAR (4YDC)
SEMESTER-B
CO24508: OPERATING SYSTEMS

Hoursper Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
3	-	2	3	1	70	30	40	60	200

PRE-REQUISITES: CO24009: Computer Architecture

COURSE OBJECTIVES:
To enable a student in a high level understanding of how operating systems work with respect to Process management, Memory management, File Systems and I/O management.

COURSE OUTCOMES:
After completing the course student should be able to:

1. Describe the importance and objectives of an operating system and various services provided by the operating system.
2. Interpret the important functions of different modules of an Operating system, like process management, memory management, device management and file system, etc. and will be able to apply these concepts in given test cases.
3. Compare and contrast different policies of CPU scheduling, Inter-process Communication, Page replacement and disk scheduling algorithms etc.
4. Design and develop small modules, shell and utility programs using system calls of Linux or some educational operating system.

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

DEPARTMENT OF COMPUTER ENGINEERING
B.TECH. II YEAR (4YDC)
SEMESTER-B
CO 24992: COMPUTER WORKSHOP

Hoursper Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
-	-	2	-	1	-	-	40	60	100

PRE-REQUISITES: CO 24009: Computer Architecture

COURSE OBJECTIVES: This course will provide students a much needed knowledge of computer hardware and networking, enabling them to identify and rectify the onboard computer hardware, software and network related problems.

COURSE OUTCOMES:
After completing the course student should be able to:

1. Identify different components in a computer, their connection and arrangement.
2. Apply knowledge about computer peripherals to identify/rectify problems onboard.
3. Identify and install various peripheral devices, device drivers, device controllers and Interfaces.
4. Compare and contrast different kinds of memory and storage devices (HDD).

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

DEPARTMENT OF COMPUTER ENGINEERING
B.TECH. II YEAR (4YDC)
SEMESTER-B
CO 24991: DESIGN THINKING LAB-I

Hoursper Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
-	-	2	-	1	-	-	40	60	100

PRE-REQUISITES: NIL

COURSE OBJECTIVES:

1. To provide a social and thinking space for the recognition of innovation challenges and the design of creative solutions.
2. To immerse students into the world of innovation as a systematic process of tackling relevant business and/or social problems.

COURSE OUTCOMES:

After completing the course student should be able to:

1. Develop a fundamental understanding of the Design Process and how it can be applied to innovation and creative problem-solving.
2. Build empathy for target audiences by applying different techniques.
3. Develop and test innovative ideas through a rapid iteration cycle.
4. Design physical prototypes/a visual representation of an idea.

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

DEPARTMENT OF COMPUTER ENGINEERING
B.TECH. III YEAR (4YDC)
SEMESTER-A
CO 34002: THEORY OF COMPUTATION

Hours Per Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
3	1	-	4	-	70	30	-	-	100

PRE-REQUISITES: CO24553: Discrete Structures

COURSE OBJECTIVES:
This course will help students to learn several formal mathematical models of computation along with their relationships with formal languages and grammars. Students will also learn about solvable and unsolvable problems.

COURSE OUTCOMES:
After completing the course student should be able to:

1. Compare and analyze different theoretical computational models, languages and grammars.
2. Design and construct finite automata, pushdown automata and Turing machine for various problems.
3. Identify limitations of some computational models and possible methods of proving them.
4. Describe the concept of computable and non computable problems.

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

DEPARTMENT OF COMPUTER ENGINEERING
B.TECH. III YEAR (4YDC)
SEMESTER-A
CO 34005: DATA BASE MANAGEMENT SYSTEMS

Hoursper Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
3	1	2	4	1	70	30	40	60	200

PRE-REQUISITES:

1. CO24553: Discrete Structures
2. CO24508: Operating Systems

COURSE OBJECTIVES: The objective of this course is to enable students in developing a high level understanding of the concepts of Database management systems in contrast with traditional data management systems with emphasis on skills to apply these concepts in building, maintaining and retrieving data from these DBMS.

COURSE OUTCOMES:
After completing the course student should be able to:

1. Describe design of a database at various levels and compare and contrast traditional data processing with DBMS.
2. Design a database using Entity Relationship diagrams and other design techniques.
3. Apply fundamentals of relational model to model and implement a sample Database Management System for a given domain.
4. Evaluate and optimize queries and apply concepts of transaction management.

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

DEPARTMENT OF COMPUTER ENGINEERING
B.TECH. III YEAR (4YDC)
SEMESTER-A
CO 34007: COMPUTER NETWORKS

Hoursper Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
3	1	2	4	1	70	30	40	60	200

PRE-REQUISITES:EC24509: Digital Communication

COURSE OBJECTIVES: This course will help students to understand different network technologies, various challenges in its implementation and solutions to it.

COURSE OUTCOMES:
After completing the course student should be able to:

1. Explain different terminologies of computer network and compare the architecture of networks.
2. Evaluate the MAC layer performance.
3. Construct and evaluate the existing protocols at the network and transport layer.
4. Design and debug the IP networks.

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

DEPARTMENT OF COMPUTER ENGINEERING
B.TECH. III YEAR (4YDC)
SEMESTER-A
CO 34014: AGILE SOFTWARE METHODOLOGY

Hours Per Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
3	-	2	3	1	70	30	40	60	200

PRE-REQUISITES: NIL

COURSE OBJECTIVES:

1. Understand the differences between conventional and agile approaches.
2. Learn the background and origins of various agile concepts and methodologies.
3. Learn about Scrum development.
4. Understand frameworks and practices used by agile teams.
5. Learn about agile ways of gathering requirements, estimation, release planning, performance metrics, and scaling.

COURSE OUTCOMES:

After completing the course student should be able to:

1. Describe the fundamental principles and practices associated with software development process models.
2. Compare and contrast agile software development model with traditional development models.
3. Apply techniques and skills to build and mentor agile projects for effective software development using scrum.
4. Adapt existing agile testing techniques and knowledge to implement agile projects.

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

SEMESTER-A

CO 34451: SKILL DEVELOPMENT LAB

* Periods per Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
-	-	2	-	1	-	-	20	30	50

PRE-REQUISITES: CO10504: Computer Programming, CO24497: Programming Practices

COURSE OBJECTIVES: Learn various tools and programming languages prevalent in solving real world problems. Choose appropriate machine learning techniques and tools to solve problems.

COURSE OUTCOMES:

After completing the course student should be able to:

1. Describe in-depth about programming languages, tools and packages used in machine learning.
2. Examine the nature of a problem at hand and determine which machine learning tool can solve it efficiently enough.
3. Solve and implement real world problems using different machine learning tools.
4. Develop understanding of the strengths and weaknesses of popular machine learning tools.

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

DEPARTMENT OF COMPUTER ENGINEERING
B.TECH. III YEAR (4YDC)
SEMESTER-A
CO 34452: DESIGN THINKING LAB-II

* Periods per Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
-	-	2	-	1	-	-	20	30	50

PRE-REQUISITES: CO24991: Design thinking Lab-I

COURSE OBJECTIVES:

Design Thinking (DT) helps students to complete tasks and solve problems in structured ways. DT teaches how students can learn to self-manage tasks and projects while applying skills, strategies and dispositions to achieve reliable processes which facilitate meaningful outcomes.

COURSE OUTCOMES:

After completing the course student should be able to:

1. Develop a fundamental understanding of the Design Process and how it can be applied to innovation and creative problem-solving.
2. Build empathy for target audiences by applying different techniques.
3. Develop and test innovative ideas through a rapid iteration cycle.
4. Create physical prototypes/a visual representation of an idea.

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

DEPARTMENT OF COMPUTER ENGINEERING
B.TECH. III YEAR (4YDC)
SEMESTER-B
CO34553: MACHINE LEARNING

Hoursper Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
3	-	2	3	1	70	30	40	60	200

PRE-REQUISITES: MA10501: Mathematics - II, CO34451: Skill Development Lab

COURSE OBJECTIVES: The objective of this course is to impart necessary knowledge of different machine learning techniques and develop programming skills required to build machine learning based applications.

COURSE OUTCOMES:
After completing the course student should be able to:

1. Describe in-depth about theories, methods, and algorithms in machine learning.
2. Find and analyze the optimal hyper parameters of the machine learning algorithms.
3. Examine the nature of a problem at hand and determine whether machine learning can solve it efficiently.
4. Solve and implement real world problems using machine learning.

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

DEPARTMENT OF COMPUTER ENGINEERING
B.TECH. III YEAR (4YDC)
SEMESTER-B
CO 34554: FOUNDATION OF INFORMATION SECURITY

Hoursper Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
3	-	-	3	-	70	30	-	-	100

PRE-REQUISITES: CO34007:Computer Network

COURSE OBJECTIVES:

COURSE OUTCOMES:
After completing the course student should be able to:

1. Explain the concepts related to classical cryptography, symmetric cryptography and asymmetric cryptography.
2. Identify common network vulnerabilities and attacks, and their defense mechanism.
3. Apply concepts of Email, IP and web security in application development.
4. Summarize the concepts of security in various types of organizations.

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

DEPARTMENT OF COMPUTER ENGINEERING
B.TECH. III YEAR (4YDC)
SEMESTER-B
CO 34563: DESIGN & ANALYSIS OF ALGORITHMS

Hoursper Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
3	-	2	3	1	70	30	40	60	200

PRE-REQUISITES: CO24507:Data Structures

COURSE OBJECTIVES: Analyze the asymptotic performance of algorithms. Demonstrate a familiarity with major algorithms and data structures. Apply important algorithmic design paradigms and methods of analysis. Design efficient algorithms for common engineering design situations.

COURSE OUTCOMES:
After completing the course student should be able to:

1. Describe complexity of an algorithm and various notations to represent it.
2. Apply and evaluate different algorithm design techniques for getting the effective solutions of specified problems.
3. Compare and contrast different graph algorithms with its applications.
4. Explain computability and non-computability and various complexity classes.

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

DEPARTMENT OF COMPUTER ENGINEERING
B.TECH. III YEAR (4YDC)
SEMESTER-B
CO 34881: INTERNET OF THINGS

Hoursper Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
-	1	2	-	2	-	-	40	60	100

PRE-REQUISITES: CO24992: Computer Workshop, CO34007: Computer Network

COURSE OBJECTIVES:
The main objectives of this course is to design and develop the prototypes for various applications of IoT by the students.

COURSE OUTCOMES:
After completing the course student should be able to:

1. Identify various types of sensors and actuators.
2. Develop and demonstrate programs on various types of development boards.
3. Apply concepts of communication protocols for designing programs on ESP32.
4. Solve real world problems using the concepts of IoT.

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

DEPARTMENT OF COMPUTER ENGINEERING
B.TECH. III YEAR (4YDC)
SEMESTER-B (ELECTIVE-1)
CO 34601: DATA SCIENCE & ENGINEERING

Hoursper Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
3	-	2	3	1	70	30	40	60	200

PRE-REQUISITES: MA10501: Mathematics-II, CO34451: Skill Development Lab

COURSE OBJECTIVES: This course focuses on enabling students to learn, understand, and use data analytics, which include the study of statistical properties of data and preparing it appropriately for applying machine learning techniques focusing on performance evaluation.

COURSE OUTCOMES:
After completing the course student should be able to:

1. Describe in-depth about data, data types, data models and data distributions.
2. Compare and analyze different data preprocessing and data visualization techniques.
3. Examine the nature of the data at hand and determine the best suitable data engineering technique/algorithm.
4. Solve and implement real world problems using data engineering.

Target Attainment

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

DEPARTMENT OF COMPUTER ENGINEERING
B.TECH. III YEAR (4YDC)
SEMESTER-B (ELECTIVE-1)
CO 3____:COMPILER CONSTRUCTION

Hours per Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
3	-	2	3	1	70	30	40	60	200

PRE-REQUISITES: CO34002: Theory of Computation

COURSE OBJECTIVES:
This course focuses on enabling students to learn, understand, and design compiler and Interpreter, which include the study of phases of compiler, code optimization, linker, loader and lex and YACC tools.

COURSE OUTCOMES:
After completing the course student should be able to:

1. Apply fundamental concepts of system programming and different language translators.
2. Build lexical and syntax analyzers and use them in the construction of scanners and parsers
3. Apply the operations of semantic analysis, intermediate code generation and use of different code optimization schemes.
4. Design and implement a complete working compiler for a given language including linker and loader.

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

DEPARTMENT OF COMPUTER ENGINEERING
B.TECH. III YEAR (4YDC)
SEMESTER-B (ELECTIVE-1)
CO 3____:WIRELESS & MOBILE NETWORKS

Hours per Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
3	-	2	3	1	70	30	40	60	200

PRE-REQUISITES: CO34007: Computer Network

COURSE OBJECTIVES: This course will help students to understand different wireless and mobile network technologies, various challenges in its implementation and solutions to it.

COURSE OUTCOMES:
After completing the course student should be able to:

1. Describe utility of various network layer protocols and modify them according to the requirement of the environment in IP networks.
2. Identify and evaluate the existing protocols at the transport layer in TCP/IP protocol stack.
3. Compare and contrast the existing wireless protocols and mobility related issues.
4. Explain the underlying architecture of mobile networks and security issues.

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

DEPARTMENT OF COMPUTER ENGINEERING
B.TECH. III YEAR (4YDC)
SEMESTER-B (ELECTIVE-1)
CO 34602:OBJECT ORIENTED SOFTWARE ENGINEERING

Hours per Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
3	-	2	3	1	70	30	40	60	200

PRE-REQUISITES: CO 24057: Object Oriented Programming Systems, CO 34014: Agile Software Methodology

COURSE OBJECTIVES:
The objective of this course is to expose students to formal processes for the design,implementation and management of large software systems using object oriented software development approach.

COURSE OUTCOMES:
After completing the course student should be able to:

1. Compare and contrast Object-Oriented software development and conventional software development.
2. Apply best practices of Rational Unified Process in software development.
3. UseObject-Oriented analysis and design for moderately realistic Object-Oriented systems.
4. Construct UML diagrams (Structural and Behavioural) using the appropriate notations for various systems.

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

DEPARTMENT OF COMPUTER ENGINEERING
B.TECH. III YEAR (4YDC)
SEMESTER-B (ELECTIVE-1)

CO 3____: COMPUTER GRAPHICS

Hours per Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
3	-	2	3	1	70	30	40	60	200

PRE-REQUISITES: CO10504: Computer Programming

COURSE OBJECTIVES:

1. Interpret the mathematical foundation of the concepts of computer graphics.
2. Explain the core concepts of computer graphics, including viewing, projection, perspective, modelling and transformation in two and three dimensions.
3. Apply the concepts of colour models, lighting and shading models, textures, hidden surface elimination, anti-aliasing, and rendering.

COURSE OUTCOMES:

After completing the course student should be able to:

1. Define basics of computer graphics and its architecture.
2. Apply concepts of transformations, window and view-ports object representation on graphics objects.
3. Explain the concept of polygon filling, polygon shading and visible surface detection techniques in computer graphics applications.
4. Build interactive graphics applications using C, C++, Python, Java etc.

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

DEPARTMENT OF COMPUTER ENGINEERING
B.TECH. III YEAR (4YDC)
SEMESTER-B (ELECTIVE-1)
CO 3____: EMBEDDED SYSTEMS

Hours per Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
3	-	2	3	1	70	30	40	60	200

PRE-REQUISITES:

1. CO24508: Operating system
2. CO24992: Computer Workshop

COURSE OBJECTIVES:

The main objective of this course is to introduce various Microcontroller architecture and their functions.

COURSE OUTCOMES:

After completing the course student should be able to:

1. Describe working of various types of processors and microcontrollers.
2. Explain Embedded System Architecture.
3. Implement interfaces of various IO devices and peripherals with microcontrollers.
4. Use microcontrollers to simulate modules of Real Time Operating System.

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

DEPARTMENT OF COMPUTER ENGINEERING
B.TECH. III YEAR (4YDC)
SEMESTER-A (Open Elective-1)
CO 34298: ARTIFICIAL INTELLIGENCE

Hours per Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
3	1	-	4	-	70	30	-	-	100

PRE-REQUISITES: MA10501: Mathematics-II

COURSE OBJECTIVES: To enable students to learn the basic concepts, theories, applications and state-of-the-art techniques of artificial intelligence.

COURSE OUTCOMES:
After completing the course student should be able to:

1. Describe fundamentals of Artificial Intelligence (AI) and its foundations.
2. Apply formal methods of knowledge representation, logic and reasoning for problem solving.
3. Apply basic principles of AI in solutions using inference, perception, knowledge representation, and learning concept.
4. Demonstrate awareness and understanding of various applications of AI techniques in intelligent agents, expert systems and other machine learning models.

Target Attainment

Target Attainment

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

DEPARTMENT OF COMPUTER ENGINEERING
B.TECH. IV YEAR (4YDC)
SEMESTER-A (ELECTIVE-2)
CO 4____:COMPUTATIONAL INTELLIGENCE

Hours per Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
3	-	2	3	1	70	30	40	60	200

PRE-REQUISITES: CO10504:Computer Programming, CO34451: Skill Development Lab

COURSE OBJECTIVES:

1. To introduce basic concepts, theories and techniques of computational intelligence.
2. Help students to learn the applications of computational intelligence techniques in the diverse fields of science, engineering, medicine, finance etc.

COURSE OUTCOMES:

After completing the course student should be able to:

1. Describe in-depth about theories, methods, and algorithms in computational Intelligence.
2. Compare and contrast traditional algorithms with nature inspired algorithms.
3. Examine the nature of a problem at hand and determine whether a computational intelligent technique/algorithm can solve it efficiently enough.
4. Design and implement Computation Intelligence algorithms and approaches for solving real-life problems.

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

DEPARTMENT OF COMPUTER ENGINEERING
B.TECH. IV YEAR (4YDC)
SEMESTER-A (ELECTIVE-2)
CO 4____: ADVANCED DATA STRUCTURES

Hours per Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
3	-	2	3	1	70	30	40	60	200

PRE-REQUISITES: CO24507: Data Structures, CO34563: Design and Analysis of Algorithms

COURSE OBJECTIVES:
To provide a comprehensive skill for designing and implementation of data organization in real-world application development using advanced data structures..

COURSE OUTCOMES:
After completing the course student should be able to:

1. Explain the basic concepts of advanced data structures and algorithms.
2. Describe advanced concepts of lists, trees and graphs and their implementation.
3. Use data structures to efficiently organize data for improving performance of the system.
4. Design and implement state-of-art data structures algorithms for solving real life problems.

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

DEPARTMENT OF COMPUTER ENGINEERING
B.TECH. IV YEAR (4YDC)
SEMESTER-A (ELECTIVE-2)
CO 44242: CLOUD COMPUTING

Hours per Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
3	-	2	3	1	70	30	40	60	200

PRE-REQUISITES: CO34007: Computer Network

COURSE OBJECTIVES: Students will be able to understand the concept of service oriented architecture and gain knowledge of various cloud service model, deployment model, types of virtualization. Get detailed knowledge about cloud resource management and security issues.

COURSE OUTCOMES:
After completing the course student should be able to:

1. Describe the fundamentals of cloud computing and different types of service models and deployment models.
2. Explain the importance of virtualization and differentiate various types of hypervisors.
3. Compare and contrast different cloud file systems and demonstrate working of map reduce model.
4. Evaluate the performance of cloud computing and analyze security and resource optimization issues related to cloud computing environment.

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

DEPARTMENT OF COMPUTER ENGINEERING
B.TECH. IV YEAR (4YDC)
SEMESTER-A (ELECTIVE-2)
CO 4____: SOFTWARE ARCHITECTURES

Hours per Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
3	-	2	3	1	70	30	40	60	200

PRE-REQUISITES: CO34014: Agile Software Methodology

COURSE OBJECTIVES:
To provide a comprehensive skill for designing and implementation of enterprise application development using the software architectures.

COURSE OUTCOMES:
After completing the course student should be able to:

1. Explain the quality requirements of a software system and fundamentals terminologies of software architecture.
2. Use fundamental principles, guidelines, architectural styles, patterns, techniques, and tools to design and analyze software architecture of real world problems.
3. Implement a software architecture to solve specific problems.
4. Appraise the quality of software architectures.

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

DEPARTMENT OF COMPUTER ENGINEERING
B.TECH. IV YEAR (4YDC)
SEMESTER-A (ELECTIVE-2)
CO 4____:MULTIMEDIA SYSTEM

Hours per Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
3	-	2	3	1	70	30	40	60	200

PRE-REQUISITES: CO____**:** Computer Graphics

COURSE OBJECTIVES:
Students will be introduced to principles and current technologies of multimedia systems. Issues in effectively representing, processing, and retrieving multimedia data such as sound and music, graphics, image and video will be addressed. The students will gain hands-on experience in those areas by implementing some components of a multimedia streaming system as their term project. Latest Web technologies and some advanced topics in current multimedia research will also be discussed.

COURSE OUTCOMES:
After completing the course student should be able to:

1. Explain relevance and underlying infrastructure of the multimedia systems.
2. Describe core multimedia technologies and standards like Digital Audio, Graphics, Video, VR, data transmission/compression.
3. Define various factors involved in multimedia systems performance, integration and evaluation.
4. Design and implement a multimedia system.

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

DEPARTMENT OF COMPUTER ENGINEERING
B.TECH. IV YEAR (4YDC)
SEMESTER-A (ELECTIVE-2)
CO 4____: VLSI SYSTEM DESIGN

Hours per Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
3	-	2	3	1	70	30	40	60	200

PRE-REQUISITES:

1. EC_____: Digital Electronics
2. EC24509: Digital Communication

COURSE OBJECTIVES:

The main objective of this course is to introduce the fundamental concepts and structures of designing VLSI systems including CMOS devices and circuits

COURSE OUTCOMES:

After completing the course student should be able to:

1. Describe basic terminologies of VLSI system.
2. Explain the concepts of Physical Design Process like partitioning, Floor planning, Placement and Routing.
3. Apply mathematical methods and circuit-analysis models in analysis of CMOS.
4. Apply CMOS technology-specific layout rules in the placement and routing of transistors.

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

DEPARTMENT OF COMPUTER ENGINEERING
B.TECH. IV YEAR (4YDC)
SEMESTER-A (ELECTIVE-3)
CO 44251:DEEP LEARNING

Hours per Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
3	-	2	3	1	70	30	40	60	200

PRE-REQUISITES: CO 34451: Skill Development Lab, CO34553: Machine Learning

COURSE OBJECTIVES: Introduce deep learning fundamentals and major algorithms, the problem settings, and their applications to solve real world problems.

COURSE OUTCOMES:
After completing the course student should be able to:

1. Describe in-depth about theories, fundamentals, and techniques in Deep learning.
2. Identify the on-going research in computer vision and multimedia field.
3. Evaluate various deep networks using performance parameters.
4. Design and validate deep neural network as per requirements.

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

B. E. IV YEAR (4YDC)
SEMESTER-A (ELECTIVE-III)
CO 44252 : BIG DATA

*Hours per Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
3	-	2	3	1	70	30	40	60	200

PER-REQUISITES: Statistics, Java and DBMS.

COURSE OBJECTIVES: Students will be able to understand the challenges of Big data and gain knowledge about Hadoop Eco System and develop applications using data processing and analytics to solve real world problems.

COURSE OUTCOMES:
After completing the course student should be able to:

1. Explain the concept and challenges of Big data and Demonstrate knowledge of big data analytics.
2. Examine Hadoop Eco System and develop Big Data Solutions using it.
3. Experiment and evaluate various large-scale analytics tools like Spark, Kafka, Hbase.
4. Apply andAnalyze machine learning algorithms on Big Data.

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

DEPARTMENT OF COMPUTER ENGINEERING
B.TECH. IV YEAR (4YDC)
SEMESTER-A (ELECTIVE-3)
CO 4____:HUMAN COMPUTER INTERACTION

Hours per Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
3	-	2	3	1	70	30	40	60	200

PRE-REQUISITES: CO24497: Programming Practices

COURSE OBJECTIVES:

1. Describe and apply user-centered design methods to conduct formative and summative evaluations.
2. Explain and apply core theories and models from the field of HCI.
3. Design and implement useful, usable, and engaging graphical computer interfaces.
4. Discuss and critique research in the field of HCI.
5. Describe special considerations in designing user interfaces for wellness.

COURSE OUTCOMES:

After completing the course student should be able to:

1. Define the basics behind HCI design approaches and evaluate effective and usable graphical computer interfaces.
2. Apply an interactive design process and universal design principles for modeling HCI systems.
3. Design and Implement HCI approaches for solving real-life problems.
4. Analyze and discuss HCI issues in groupware, ubiquitous computing, virtual reality, multimedia, and Word Wide Web-related environments.

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

B.TECH. IV YEAR (4YDC)
SEMESTER-A (ELECTIVE-3)
CO 4____:REAL TIME SYSTEMS

Hours per Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
3	-	2	3	1	70	30	40	60	200

PRE-REQUISITES: CO24508: Operating System, CO34005: Data Base Management System

COURSE OBJECTIVES:

1. Develop an understanding of various Real Time systems Application
2. Obtain a broad understanding of the technologies and applications for the emerging and exciting domain of real-time systems
3. Get in-depth hands-on experience in designing and developing a real operational system.

COURSE OUTCOMES:

After completing the course student should be able to:

1. Define concepts of Real-Time systems.
2. Discuss features and characteristics of Real Time Operating Systems and Databases.
3. Analyze various real time systems.
4. Develop architectural design for a real-time system.

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

DEPARTMENT OF COMPUTER ENGINEERING
B.TECH. IV YEAR (4YDC)
SEMESTER-A (ELECTIVE-3)
CO 4____: SOFTWARE VERIFICATION

Hours per Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
3	-	2	3	1	70	30	40	60	200

PRE-REQUISITES: MA10501: Mathematics - II, CO34014: Agile Software Methodology

COURSE OBJECTIVES:
To enable a student to understand the process of software verification while performing software development.

COURSE OUTCOMES:
After completing the course student should be able to:

1. Describe proof methods for software verification,
2. Design human-readable, machine-checkable proofs of software correctness.
3. Identify current trends and methods for software verification.
4. Design and develop reusable formal proofs for concurrent programs.

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

DEPARTMENT OF COMPUTER ENGINEERING
B.TECH. IV YEAR (4YDC)
SEMESTER-A (ELECTIVE-4)
CO 4____: REINFORCEMENT LEARNING

Hours per Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
3	-	2	3	1	70	30	40	60	200

PRE-REQUISITES: CO 34451: Skill Development Lab, CO34553: Machine Learning

COURSE OBJECTIVES: Explore the foundations of reinforcement learning. Explore how an agent can learn by trial and error. Reinforcement Learning (RL) deals with problems that require sequential decision making. Study different algorithms for RL.

COURSE OUTCOMES:
After completing the course student should be able to:

1. Define the key features of reinforcement learning that distinguishes it from other machine learning techniques.
2. Describe criterias for analyzing reinforcement learning algorithms and evaluate algorithms using performance metrics.
3. Design and validate reinforcement learning models.
4. Implement real world problems using reinforcement learning.

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

DEPARTMENT OF COMPUTER ENGINEERING
B.TECH. IV YEAR (4YDC)
SEMESTER-A (ELECTIVE-4)
CO 4____:ADVANCED DATABASES

Hours per Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
3	-	2	3	1	70	30	40	60	200

PRE-REQUISITES: CO34005: Data Base Management Systems, CO_____: Advanced Data Structures

COURSE OBJECTIVES: To enable a student in high level understanding of design of advanced databases and their applications with emphasis on Big Data.

COURSE OUTCOMES:
After completing the course student should be able to:

1. Explain design issues of advanced databases and compare different types of data models.
2. Analyze design aspects for databases and query evaluation.
3. Compare and contrast different architectures used in distributed and parallel databases
4. Design and evaluate transactions using concurrency control protocols

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

DEPARTMENT OF COMPUTER ENGINEERING
B.TECH. IV YEAR (4YDC)
SEMESTER-A (ELECTIVE-4)
CO 44307: CYBER SECURITY AND FORENSICS

Hours per Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
3	-	2	3	1	70	30	40	60	200

PRE-REQUISITES: CO34007: Computer Networks, CO34554: Foundation of Information Security

COURSE OBJECTIVES:
To understand computer crimes and methods to investigate them.

COURSE OUTCOMES:
After completing the course student should be able to:

1. Define and explain computer crimes.
2. Assess threats and vulnerabilities in operating systems and computer networks and their security requirements
3. Plan and implement preliminary cyber forensic investigations.
4. Design a secure cyber system and comprehensive cyber security policy.

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

DEPARTMENT OF COMPUTER ENGINEERING
B.TECH. IV YEAR (4YDC)
SEMESTER-A (ELECTIVE-4)

CO 44308:WEB TECHNOLOGY

Hours per Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
3	-	2	3	1	70	30	40	60	200

PRE-REQUISITES: NIL

COURSE OBJECTIVES:

1. Understanding the structure of HTTP communication and the format of request-response messages.
2. Design and develop basic web pages using HTML and CSS.
3. Appreciate the functionality of web browsers and web servers.
4. Understand HTML DOM object hierarchy and to learn how to access HTML elements using DOM. The objective of this unit is to understand how to use JavaScript code in an HTML document and to learn about syntax and semantics of JavaScript programming language.
5. The objective of this unit is to understand the importance of XML and to learn the basic building blocks of XML documents.

COURSE OUTCOMES:

After completing the course student should be able to:

1. Create and design web pages using HTML and CSS.
2. Explain working of browser, server engines and XML scripts.
3. Apply the concept of Client-side and server-side programming to create responsive websites.
4. Define working of DOM model to represent web pages.

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

DEPARTMENT OF COMPUTER ENGINEERING
B.TECH. IV YEAR (4YDC)
SEMESTER-A (ELECTIVE-4)
CO 4__: VIRTUAL REALITY

Hours per Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
3	-	2	3	1	70	30	40	60	200

PRE-REQUISITES: MA10001: Mathematics – I

COURSE OBJECTIVES:
This course provides students with an opportunity to explore the research issues in Augmented Reality and Virtual Reality (AR & VR). It also makes the students know the basic concept and framework of virtual reality.

COURSE OUTCOMES:
After completing the course student should be able to:

1. Define the fundamentals of virtual reality systems and geometric modeling.
2. Compare and Contrast different types of transformation techniques.
3. Analyserendering problems and their solutions in VR.
4. Design and implement VR experiences.

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

DEPARTMENT OF COMPUTER ENGINEERING
B.TECH. IV YEAR (4YDC)
SEMESTER-A (ELECTIVE-4)
CO 4__: ROBOTICS

Hours per Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
3	-	2	3	1	70	30	40	60	200

PRE-REQUISITES: Basics of Applied Mechanics

COURSE OBJECTIVES:
To provide the basic understanding to the students related to the robots, various types of robots and their working.

COURSE OUTCOMES:
After completing the course student should be able to:

1. Define and identify the basic components of robotic systems.
2. Describe different types of kinematics and dynamics of robots.
3. Design and execute the basic program and functions for robotics.
4. Design and develop the basic robots for specific tasks.

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

DEPARTMENT OF COMPUTER ENGINEERING
B.TECH. IV YEAR (4YDC)
SEMESTER-A
CO 44401: SYSTEM OPERATIONS LAB

*Hours per Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
-	-	2	-	1	-	-	40	60	100

PRE-REQUISITES: CO24497: Programming Practices, CO24508: Operating System

COURSE OBJECTIVES:
To enable students for creation, design, development, installation, deployment and configuration of computer infrastructures in an organization.

COURSE OUTCOMES:
After completing the course student should be able to:

1. Configure and install Linux and Windows operating systems and softwares.
2. Install and configure different services like apache, file server, apt cacher etc.
3. Configure different security settings and backup plans as per requirements.
4. Design and deploy state-of-art infrastructure setup for real world applications.

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

DEPARTMENT OF COMPUTER ENGINEERING
B.TECH. IV YEAR (4YDC)
SEMESTER-B (ELECTIVE-5)
CO 4____: BIOINFORMATICS COMPUTING

*Hours per Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
2	-	-	2	-	70	30	-	-	100

PRE-REQUISITES: MA10501: Mathematics-II, CO34451: Skill Development Lab

COURSE OBJECTIVES: To provide knowledge and hands on training on various computational tools and techniques employed in bioinformatics computing.

COURSE OUTCOMES:
After completing the course student should be able to:

1. Describe fundamental principles and theories of bioinformatics computing.
2. Compare and analyze the different bioinformatics methodology.
3. Analyze problems in genomics.
4. Solve the real world problems using bioinformatics.

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

DEPARTMENT OF COMPUTER ENGINEERING
B.TECH. IV YEAR (4YDC)
SEMESTER-B (ELECTIVE-5)
CO 4____: HIGH PERFORMANCE COMPUTING

*Hours per Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
2	-	-	2	-	70	30	-	-	100

PRE-REQUISITES: CO24009: Computer Architecture**,** CO24508: Operating Systems

COURSE OBJECTIVES: Our objective is to develop such high-performance, practical solutions, and contribute to the needs of both scientific and engineering community

COURSE OUTCOMES:
After completing the course student should be able to:

1.Describe different high performance computing architectures and evaluate their performance.
2. Compare and contrast memory/processor performance by applying various optimization techniques.
3. Evaluate various proposed changes in different types of architecture, instructions set and memory using gem5 simulator.
4. Define pipelined processors, identify various hazards and select solutions for them

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

DEPARTMENT OF COMPUTER ENGINEERING
B.TECH. IV YEAR (4YDC)
SEMESTER-B (ELECTIVE-5)
CO 4____: MACHINE LEARNING FOR SECURITY

*Hours per Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
2	-	-	2	-	70	30	-	-	100

PRE-REQUISITES: CO34554: Foundation of Information Security, CO34553: Machine Learning

COURSE OBJECTIVES:

1. To enable students to understand different machine learning techniques and their application in domain of security.
2. To understand data collection from a computer network and system for application of machine learning

COURSE OUTCOMES:

After completing the course student should be able to:

1. Describe supervised and un-supervised machine learning models.
2. Apply machine learning techniques to different real-world information security problems.
3. Analyze data from various system and networks in order to perform analysis and make predictions.
4. Analyze the performance parameters of machine learning models in information security domain.

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

B. E. IV YEAR (4YDC)
SEMESTER-B (ELECTIVE-5)
CO_____: GAME DESIGN

*Hours per Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
2	-	-	2	-	70	30	-	-	100

PRE-REQUISITES: Any Programming Language (C/C++/Java/Python) COURSE OBJECTIVES:

1. To understand the basic concepts of game design, such as rules and play.
2. To analyse various types of game design rules, concepts and technique.
3. To develop game design solutions having theoretical, narrative, perceptual and aesthetic coherence.
4. To implement several real world games to gain experience of creating playable games.

COURSE OUTCOMES:
After completing the course student should be able to:

1. Understand fundamental concepts relating to games and design, such as rules and play.
2. Compare and contrast different types of game design rules, concepts and technique.
3. Develop game design solutions having theoretical, narrative, perceptual and aesthetic coherence.
4. Implement several real world games to gain experience of creating playable games.

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

DEPARTMENT OF COMPUTER ENGINEERING
B.TECH. IV YEAR (4YDC)
SEMESTER-B (ELECTIVE-5)
EC 4____: DIGITAL SIGNAL PROCESSING

*Hours per Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
2	-	-	2	-	70	30	-	-	100

PRE-REQUISITES: MA10001: Mathematics - I, EC24509: Digital Communication

COURSE OUTCOMES:

After completing the course student should be able to:

1. Define time and frequency domain representation of discrete time signals and systems.
2. Find the response of a discrete time system for arbitrary inputs to design DTS.
3. Evaluate numerically the response of DTS for finite time inputs.
4. Design and realize digital IIR, FIR filters.

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

DEPARTMENT OF COMPUTER ENGINEERING
B.TECH. IV YEAR (4YDC)
SEMESTER-B (ELECTIVE-5)
CO 4____: SECURITY IN RESOURCE CONSTRAINED ENVIRONMENT

*Hours per Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
2	-	-	2	-	70	30	-	-	100

PRE-REQUISITES:

1. CO34881: Internet of Things
2. CO_____: Embedded Systems
3. CO34554: Foundation of Information Security

COURSE OBJECTIVES:

To provide the students a basic understanding on IoT security, various types of security attacks in IoT and case studies.

COURSE OUTCOMES:

After completing the course student should be able to:

1. Explain IoT general models and security challenges.
2. Recognize IoT security and vulnerability threats.
3. Demonstrate different IoT protocols and their security measures.
4. Identify different types of attacks in the IoT domain and propose solutions to provide security.

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

DEPARTMENT OF COMPUTER ENGINEERING
B.TECH. IV YEAR (4YDC)
SEMESTER-B (ELECTIVE-6)
CO 4____: NATURAL LANGUAGE PROCESSING

*Hours per Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
2	-	-	2	-	70	30	-	-	100

PRE-REQUISITES: MA10501: Mathematics-II, CO34002: Theory of Computation

COURSE OBJECTIVES: Students will develop a basic understanding in natural language processing methods and strategies and will be able to evaluate the strengths and weaknesses of various Natural Language Processing (NLP) methods & technologies and gain an insight into the application areas of Natural language processing.

COURSE OUTCOMES:
After completing the course student should be able to:

1. Define different data models used in Information Retrieval using NLP.
2. Demonstrate current methods for statistical approaches to machine translation.
3. Apply syntactic parsing and semantic analysis on text.
4. Solve and implement real world problems using NLP.

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

DEPARTMENT OF COMPUTER ENGINEERING
B.TECH. IV YEAR (4YDC)
SEMESTER-B (ELECTIVE-6)
CO 4____: ADVANCED OPERATING SYSTEMS

*Hours per Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
2	-	-	2	-	70	30	-	-	100

PRE-REQUISITES: CO24497: Programming Practices, CO24508: Operating Systems

COURSE OBJECTIVES: To enable a student in high level understanding of advanced operating systems and their applications in diverse domains.

COURSE OUTCOMES:
After completing the course student should be able to:

1. Demonstrate understanding of design issues of advanced operating systems and
2. Compare different types of operating systems.
3. Analyze design aspects for different subsystems of diverse Operating Systems.
4. Compare & Contrast different architectures used in Distributed Operating Systems
5. Analyze synchronization amongst various components of a typical operating system.

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

DEPARTMENT OF COMPUTER ENGINEERING
B.TECH. IV YEAR (4YDC)
SEMESTER-B (ELECTIVE-6)
CO 4____: NETWORK MANAGEMENT AND MAINTENANCE

*Hours per Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
2	-	-	2	-	70	30	-	-	100

PRE-REQUISITES: CO34007: Computer Network

COURSE OBJECTIVES:o enable a student in high level understanding of network management and maintenance and their applications in diverse domains.

COURSE OUTCOMES:
After completing the course student should be able to:

1. Explain Directory Services, Network protocols and services and Remote Access.
2. Demonstrate the set-up and use of Virtual Private Network.
3. Configure various services on Windows server platform.
4. Identify issues in a network and provide solutions to troubleshoot those issues.

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

DEPARTMENT OF COMPUTER ENGINEERING
B. Tech. IV YEAR (4YDC)
SEMESTER-B (ELECTIVE-6)
CO 44706: SOFTWARE PROJECT MANAGEMENT

*Hours per Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
2	-	-	2	-	70	30	-	-	100

PRE-REQUISITES: CO34014: Agile Software Methodology

COURSE OBJECTIVES: To enable students to understand the fundamental principles of Software Project Management and be familiar with the process and techniques used for software project management.

COURSE OUTCOMES:
After completing the course student should be able to:

1. Demonstrate basic concepts and issues of software project management.
2. Demonstrate Planning, Execution and Evaluation of software projects.
3. Apply mechanisms for monitoring, tracking and risk management of software projects.
4. Design activities necessary to perform quality management and successful completion of Software Projects.

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

DEPARTMENT OF COMPUTER ENGINEERING
B.TECH. IV YEAR (4YDC)
SEMESTER-B (ELECTIVE-6)
CO 4____: IMAGE PROCESSING AND COMPUTER VISION

*Hours per Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
2	-	-	2	-	70	30	-	-	100

PRE-REQUISITES: MA10501: Mathematics-II, MA24003: Mathematics-III, CO_____: Computer Graphics

COURSE OBJECTIVES: This course offers in depth knowledge about image processing and computer vision which can be applied for advanced image processing like medical application, crime recognition etc.

COURSE OUTCOMES:
After completing the course student should be able to:

1. Describe in-depth about theories, methods, and algorithms of image processing and computer vision.
2. Compare and contrast traditional algorithms of image processing and computer vision.
3. Examine the nature of a computer vision based problem at hand and determine appropriate and efficient solutions.
4. Design and implement image processing and computer vision algorithms for solving real-life problems.

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

B. E. IV YEAR (4YDC)
SEMESTER-B (ELECTIVE-6)
CO 44707: BLOCK CHAIN TECHNOLOGY

*Hours per Week			Th. Credit	Pr. Credit	MAXIMUM MARKS				
L	T	P			TH	CW	SW	Pr.	Total
2	-	-	2	-	70	30	-	-	100

PRE-REQUISITES: Data Structure and Network Security

COURSE OBJECTIVES:

1. To explain the functional/operational aspects of Blockchain Technology.
2. To illustrate different consensus and cryptographic algorithm applied in Blockchain.
3. To elaborate functional/operational challenges of different cryptocurrencylike Bitcoin.
4. To demonstrate designing of Smart contract based platform Ethereum and enterprise based Hyperledger fabric.

COURSE OUTCOMES:

After completing the course student should be able to:

1. Define the functional/operational aspects of Blockchain Technology.
2. Identify and anlyse the consensus and cryptographic algorithm applied in Blockchain system.
3. Define the functional/operational challenges of different cryptocurrency ecosystem.
4. Creating and developing an Ethereum Smart contract for real world problem and also compare contrast Ethereum and Hyperledgerblockchain platforms.

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