DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

B.E. Computer Science and Engineering
Four Year Degree Programme
Choice Based Credit System
(Full - Time)

2019
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

VISION
To provide an academically ambient environment for individuals to develop and blossom as academically superior, socially conscious and nationally responsible citizens.

MISSION
- To impart high quality computer knowledge to the students by conducting education Programmes.
- To provide exposure to the students about the emerging technological advancements for meeting the demands of the industry.
- To advance discipline of computing through internationally recognized research and development.
- To foster an environment that promotes extension activities and continuing education.
- To discover new knowledge through innovative research and creative teaching and learning that lead to prosperity, economic and societal benefit to the people.

B. E. (CSE) - PROGRAMME EDUCATIONAL OBJECTIVES (PEO)

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<tr>
<th>Sl. No.</th>
<th>PEO</th>
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<tr>
<td>PEO1</td>
<td>To prepare graduates with potential to get employed in the right role and/or become entrepreneurs to contribute to the society.</td>
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<tr>
<td>PEO2</td>
<td>To provide the graduates with the requisite knowledge to pursue higher education and carry out research in the field of Computer Science.</td>
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<tr>
<td>PEO3</td>
<td>To equip the graduates with the required skills to stay motivated and adapt to a dynamically changing world so as to remain successful in their career.</td>
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<tr>
<td>PEO4</td>
<td>To communicate the graduates with effectively, work collaboratively and exhibit high levels of professionalism and ethical responsibility.</td>
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After the successful completion of the B.E(CSE) degree program the students will be able to:

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<th>Sl. No.</th>
<th>PROGRAMME OUTCOMES</th>
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<tr>
<td>PO1</td>
<td>Life-long Learning : Adapt the acquired knowledge for solving current and emerging issues and involved in lifelong learning.</td>
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<tr>
<td>PO2</td>
<td>Engineering Knowledge : Apply the engineering knowledge in various disciplines such as engineering, medicine, agriculture, banking, law, etc.</td>
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<td>PO3</td>
<td>Problem Analysis : Assess and analyze the problem, breaking into components with clear boundaries and interaction among them to achieve the expected outcome within the stipulated duration.</td>
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<td>PO4</td>
<td>Conduct Investigations : Utilize the knowledge acquired in programming laboratories for further analysis, modification and understanding of data for research.</td>
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<td>PO5</td>
<td>Design &amp; Development of Solutions : Identify and formulate algorithmic principles, mathematical knowledge and theory of Computer Science in modeling and design of computer based systems.</td>
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<td>PO6</td>
<td>The Engineer and Society : Transmit the healthy engineering solutions to customers/users or peers.</td>
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<td>PO7</td>
<td>Modern Tool Usage : Implement innovative notions and solutions to produce user friendly tools for the benefit of the society.</td>
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<td>PO8</td>
<td>Project Management : Develop and deploy software and/or hardware systems with assured quality and efficiency.</td>
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<td>PO9</td>
<td>Ethics : An understanding of professional, ethical, legal, security, and social issues and responsibilities for the computing profession.</td>
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<td>PO10</td>
<td>Communication Skills : An ability to communicate and engage effectively with diverse stakeholders.</td>
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<td>PO11</td>
<td>Environment and Sustainability : An ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability</td>
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<td>PO12</td>
<td>Individual and Team Work : An ability to function effectively on teams to accomplish shared computing design, evaluation, or implementation goals.</td>
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### B.E. (CSE) – MAPPING OF PO WITH PEO

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## SEMESTER I

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ET – 1st two letters of Course Code represent the courses that are common to all branches in FEAT
## DEPARTMENT OF COMPUTER SCIENCE ENGINEERING

### CURRICULUM - 2018

#### SEMESTER III

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**Total Credits for Semester III**: 23.5

#### SEMESTER IV

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**Total Credits for Semester IV**: 21.5

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**Total Credits:** 22.5

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**Total Credits:** 21.0
## DEPARTMENT OF COMPUTER SCIENCE ENGINEERING
### CURRICULUM - 2018

### SEMESTER VII

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### SEMESTER VIII

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### Glossary
- **L**: No. of Lecture Hours
- **T**: No. of Tutorial Hours
- **P**: No. of Practical Hours
- **CA**: Continuous Assessment Marks
- **FE**: Final Examination Marks
- **TR**: No. of Hours for Discussion on Industrial Training
- **S**: No. of Seminar Hours on Industrial Training / Project
- **PR**: No. of Hours for Discussion on Project work
- **Total**: Total Marks
- **Credits**: Credit points allotted to that course

### Total
- **17.5**
PE – PROFESSIONAL ELECTIVES

1. Perl Programming
2. Visual Programming
3. Web Technology
4. Real Time Systems
5. Distributed Systems
6. Mobile App Development
7. Software Testing and Quality Assurance
8. Mobile Computing
9. Cryptography and Network Security
10. Pervasive Computing
11. Adhoc and sensor Networks
12. Digital Image Processing
13. Machine Learning
14. Digital signal processing
15. Cloud Computing
16. Speech Processing and Synthesis
17. Information Retrieval Techniques
18. Data Mining
19. Web Application Framework
20. Open Source Programming
21. Soft Computing Techniques
**OE- OPEN ELECTIVES**

1. Internet of Things
2. Enterprise Resource Planning
3. E-Commerce
4. Supply Chain Management
5. Cyber Forensics
6. System Modeling and Simulation
7. Big Data Analytics
8. Social Network Analysis

**LIST OF HONORS ELECTIVE COURSES**

<table>
<thead>
<tr>
<th>S. No</th>
<th>Course Code</th>
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<tr>
<td>1</td>
<td>CSHESCN</td>
<td>Software Project Management (or) Nano Computing</td>
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# LIST OF MINOR ENGINEERING ELECTIVE COURSES

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<td>6</td>
<td>CSMISCN</td>
<td>Big Data Analytics (or) Social Network Analysis</td>
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</table>
COURSE OBJECTIVES:
- To learn, partial differential equations, Fourier series, Boundary value problems.
- To learn the transforms such as Sine, Cosine, Fourier transform and Z-transforms.
- To gain knowledge of the method to find the solution of difference equations.

UNIT - I Partial Differential Equations

UNIT – II Fourier Series
Dirichlet’s conditions - General Fourier series - Odd and Even functions - Half range sine series - Half range cosine series - Complex form of Fourier series – Parseval’s identity.

UNIT – III Boundary Value Problems
Solutions of one dimensional wave equation – One dimensional heat equation (without derivation) – Fourier series solutions in Cartesian co-ordinates.

UNIT – IV Fourier Transform

UNIT – V Z - Transform

TEXT BOOKS:

REFERENCES:

COURSE OUTCOMES:
At the end of this course, the students will be able to
2. Knowledge about Fourier series.
3. Understand Fourier transform.
4. Solve boundary value problems.
5. Understand Z-transform.
Mapping of Course Outcomes with Programme Outcomes

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ETES302  ENVIRONMENTAL STUDIES  

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COURSE OBJECTIVES:

- To make the students conversant with basic principles of natural resources, forest resources, ecosystem and bio-diversity.
- To get knowledge about pollution and its control.

UNIT - I Introduction
Multidisciplinary nature of environmental studies - Definition, scope and importance - Need for public awareness. Natural resources - Forest resources: use and over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forest and tribal people. Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams-benefits and problems. Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources. Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification - Role of an individual in conservation of natural resources- Equitable use of resources for sustainable lifestyles.

UNIT – II Concept of an Ecosystem
Structure and function of an ecosystem - Producers, consumers and decomposers - Energy flow in the ecosystem - Ecological succession - Food chains, food webs and ecological - pyramids - Introduction, types, characteristic features, structure and function of the following ecosystem - Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

UNIT – III Bio Diversity
Definition: genetic, species and ecosystem diversity - Bio geographical classification of India - Value of biodiversity : consumptive use, productive use, social, ethical, aesthetic and option values - Biodiversity at global, National and local levels - India as a mega-diversity nation - Hot-spots of biodiversity - Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts - Endangered and endemic species of India - Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.
UNIT – IV  Types of Pollution

UNIT – V  Environment and Human Health

TEXT BOOKS :

REFERENCES :

COURSE OUTCOMES :
At the end of this course, the students will be able to
1. To conversant with basic principles of natural resources, forest resources.
2. To conversant with basic principles of ecosystem and bio-diversity.
3. To identify the causes of pollution and its control measures.
5. Understand the principles of Act.
### Mapping of Course Outcomes with Programme Outcomes

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### COURSE OBJECTIVES:
- To study the qualitative and quantitative exposition of fundamental concepts of silicon and germanium semiconductor devices.
- To understand the principle, operation and characteristics of diode, bipolar junction transistor and metal oxide field effect transistor.
- To study the characteristics of operational amplifiers and its applications.

### UNIT - I Diode
P-N junction diode, I-V characteristics of a diode-review of half-wave and full-wave rectifiers-Zener diodes-clamping and clipping circuits.

### UNIT – II BJT
Structure and I-V characteristics of a BJT; BJT as a switch. BJT as an amplifier: small-signal model-biasing circuits- current mirror-common-emitter- common-base and common collector amplifiers-Small signal equivalent circuits, high-frequency equivalent circuits.

### UNIT - III MOSFET Structure
I-V characteristics. MOSFET as a switch. MOSFET as an amplifier: small-signal model and biasing circuits, common-source, common-gate and common-drain amplifiers-small signal equivalent circuits - gain, input and output impedances- transconductance-high frequency equivalent circuit.

### UNIT – IV Amplifiers
Differential amplifier; power amplifier-direct coupled multi-stage amplifier; internal structure of an operational amplifier-ideal op-amp- non-idealities in an op-amp (Output offset voltage-input bias current-input offset current-slew rate- gain bandwidth product).

### UNIT - V Analysis of op-amp Circuits
Detector-Square-wave and triangular-wave generators- Precision rectifier-peak detector- Astable Multivibrator.

TEXT BOOKS:

REFERENCES:

COURSE OUTCOMES:
At the end of this course, the students will be able to
1. Understand the characteristics of transistors.
2. Design and analyze various rectifier.
3. Knowledge about amplifier circuits.
4. Understand the fundamental concepts of MOSFETs and their applications for analog electronics circuits.
5. Understand the functioning of OP-AMP and design OP-AMP based circuits.

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Mapping of Course Outcomes with Programme Outcomes
COURSE OBJECTIVES:

- To understand the fundamentals of semiconductor devices, transistors and amplifiers.
- To introduce the laws of Boolean algebra and solve problems in combinational logic.
- To explain sequential logic and memory circuits and systems.

UNIT - I  Digital Circuits-Introduction

Digital signals - digital circuits, AND, OR, NOT, NAND, NOR and Exclusive-OR operations - Boolean algebra - examples of IC gates - number systems-binary, signed binary, octal hexadecimal number, binary arithmetic, one’s and two’s complements arithmetic, codes - error detecting and correcting codes - characteristics of digital ICs, digital logic families, TTL, Schottky TTL and CMOS logic, interfacing CMOS and TTL, Tri-state logic.

UNIT - II  Standard Representation for Logic Functions


UNIT - III  Flip Flops and Counters

A 1-bit memory, the circuit properties of Bi stable latch, the clocked SR flip flop, J-K-T and D-type flip flops- applications of flip flops- shift registers- applications of shift registers-serial to parallel converter- parallel to serial converter- ring counter- sequence generator- ripple (Asynchronous) counters- synchronous counters- counters design using flip flops-special counter IC’s- asynchronous sequential counters- applications of counters.

UNIT - IV  ADC and DAC Converters


UNIT - V  Memory Organization

Memory organization and operation-expanding memory size-classification and characteristics of memories- sequential memory- read only memory (ROM)-read and write memory(RAM)- content addressable memory (CAM)- charge de coupled device memory (CCD)- commonly used memory chips- ROM as a PLD- Programmable logic array-
Programmable array logic- complex Programmable logic devices (CPLDS)-Field Programmable Gate Array (FPGA).

**TEXT BOOKS :**
3.

**REFERENCES :**

**COURSE OUTCOMES :**
At the end of this course, the students will be able to
1. Understand the working of logic families and logic gates.
2. Design and implement Combinational and Sequential logic circuits.
3. Understand the process of Analog to Digital conversion and Digital to Analog conversion.
4. Be able to use PLDs to implement the given logical problem.
5. Knowledge about the Memories.

| Mapping of Course Outcomes with Programme Outcomes |
|-----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
|                 | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1             | ✓   |     |     |     |     | ✓   | ✓   | ✓   |     |     |     |     |
| CO2             | ✓   | ✓   |     |     |     | ✓   |     | ✓   | ✓   |     |     |     |
| CO3             |     | ✓   |     |     |     | ✓   | ✓   |     | ✓   |     |     |     |
| CO4             |     | ✓   | ✓   |     |     | ✓   |     | ✓   |     | ✓   |     |     |
| CO5             |     | ✓   | ✓   | ✓   |     | ✓   | ✓   |     | ✓   |     |     | ✓   |

**COURSE OBJECTIVES :**
- To impart the basic concepts of data structures and algorithms.
- To understand concepts about searching and sorting techniques.
- To understand basic concepts about stacks, queues, lists, trees and graphs.
- To enable them to write algorithms for solving problems with the help of fundamental data structures.
UNIT - I  Basic Terminologies
Elementary Data Organizations - Data Structure Operations: insertion, deletion, traversal etc.; Analysis of an Algorithm - Asymptotic Notations - Time-Space trade off. Searching- Linear Search and Binary Search Techniques- their complexity analysis.

UNIT – II ADT Stack and its operations

UNIT - III Linked Lists
Singly linked lists-Representation in memory-Algorithms of several operation- Traversing, Searching, Insertion into, Deletion from linked list; Linked representation of Stack and Queue- Header nodes-Doubly linked list: operations on it and algorithmic analysis-Circular Linked Lists- all operations their algorithms and the complexity analysis.

UNIT - IV Trees
Basic Tree Terminologies- Different types of Trees: Binary Tree, Threaded Binary Tree, Binary Search Tree, AVL Tree- Tree operations on each of the trees and their algorithms with complexity analysis- Applications of Binary Trees-B Tree, B+ Tree: definitions-algorithms and analysis.

UNIT - V Sorting and Hashing
Objective and properties of different sorting algorithms: Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort- Performance and Comparison among all the methods- Hashing- Graph: Basic Terminologies and Representations- Graph search and traversal algorithms and complexity analysis.

TEXT BOOKS :

REFERENCES :

COURSE OUTCOMES :
At the end of this course, the students will be able to
1. For a given algorithm student will able to analyze the algorithms to determine the time and computation complexity and justify the correctness.
2. For a given Search problem (Linear Search and Binary Search) student will able to implement it.
3. For a given problem of Stacks, Queues and linked list student will able to implement it and analyze the same to determine the time and computation complexity.

4. Student will able to write an algorithm Selection Sort, Bubble Sort, Insertion Sort, Quick Sort, Merge Sort, Heap Sort and compare their performance in term of Space and Time complexity.

5. Student will able to implement Graph search and traversal algorithms and determine the time and computation complexity.

| Mapping of Course Outcomes with Programme Outcomes |
|----------------------------------|---|---|---|---|---|---|---|---|---|---|---|
| PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
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| CO3 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| CO4 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| CO5 | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |

CSPC306 OBJECT ORIENTED PROGRAMMING

<table>
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<tbody>
<tr>
<td>• To get a clear understanding of object-oriented concepts.</td>
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<tr>
<td>• To understand the basics of objects and classes, Inheritance, Polymorphism.</td>
</tr>
<tr>
<td>• To know the principles of packages and interfaces.</td>
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<tr>
<td>• To define exceptions and use thread to develop applications.</td>
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</table>

UNIT – I Introduction

UNIT - II Member Functions and Overloading
UNIT - III Inheritance

UNIT – IV OOP in Java

UNIT - V Threads
Differences between multi-threading and multitasking, thread life cycle, creating threads, synchronizing threads, Inter-thread communication, daemon threads, thread groups.

TEXT BOOKS:

REFERENCES:

COURSE OUTCOMES:
At the end of this course, the students will be able to
1. Student should be able to analyze and design a computer program based on Object Oriented Principles.
2. Students will be able to solve a real world problems based on Object Oriented Principles.
3. Gain the basic knowledge on Object Oriented concepts.
4. Ability to develop applications using Object Oriented Programming concepts.
5. Ability to implement features of object oriented programming to solve real time problems.
Mapping of Course Outcomes with Programme Outcomes

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CSSP307  DIGITAL ELECTRONICS LAB  

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COURSE OBJECTIVES:
- To study and experiment the characteristics of semiconductor diode and Zener diode.
- To do estimation of parameters of amplifiers, oscillators and multivibrators.
- To implement the concepts of Digital Logic design such as logic gates, flip flops, multiplexer and demultiplexer.

LIST OF EXERCISES
2. Characteristics of Zener diode and Zener diode as a voltage regulator.
3. Estimation of ripple factor and efficiency in a full wave / Bridge rectifier with and without filter.
5. Frequency response of RC coupled amplifier.
6. Estimation of gain and efficiency in a class B power amplifier.
7. Measurement of frequency of the output voltage in a RC phase shift oscillator.
8. Estimation of the frequency of the output voltage of a Bistable Multivibrator.
11. Study of multiplexer and Demultiplexer.

COURSE OUTCOMES:
At the end of this course, the students will be able to
1. Understand the basic digital circuits and to verify their operation.
2. Construct basic combinational circuits and verify their functionalities.
3. Apply Boolean laws to simplify the digital circuits.
4. Understand the working principles of semiconductor diodes.
5. Understand the working principle of multiplexer and demultiplexer.
COURSE OBJECTIVES:

- To learn how the choice of data structures and algorithm design methods impacts the performance of programs.
- To learn object-oriented design principles and gain experience writing programs in C++.
- To study specific data structures such as linear lists, stacks, queues, binary trees, binary search trees, and graphs.
- To study specific algorithm design methods such as the greedy method, divide and conquer, dynamic programming, backtracking, and branch and bound.

LIST OF EXERCISES

1. Write a program to create a Stack and perform insertion and deletion operations on it.
2. Write a program to create a List and perform operations such as insert, delete, update and reverse.
3. Write a program to create a Queue and perform operations such as insertion and deletion.
4. Write a program to Implement Linear Search Algorithm.
5. Using iteration and recursion concepts write programs for finding the element in the array using the Binary Search method.
6. Write a program and simulate various graph traversing techniques.
7. Write a program and simulate various tree traversing techniques.
8. Write a program to Implement Binary Search Tree.
9. Write a program to simulate Bubble sort, quick sort and Merge sort algorithms.

COURSE OUTCOMES:

At the end of this course, the students will be able to

1. Design and analyze the time and space efficiency of the data structure.
2. Identify the appropriate data structure for given problem.
3. Have practical knowledge on the applications of data structure.
4. Handle operations like searching, insertion, deletion, traversing mechanism etc. on various data structures.
5. Formulate new solutions for programming problems or improve existing code using learned algorithms and data structures.
COURSE OBJECTIVES:

- To learn object-oriented design principles and gain experience writing programs in C++ and Java.
- Ability to develop applications using Object Oriented Programming Concepts.
- Ability to implement features of Object Oriented programming to solve real world problems.

LIST OF EXERCISES

**C++ Program**

1. Write a C++ program to design a class having static function names showcount() which has the property of displaying the number of objects created of the class.
2. Write a C++ program to find maximum of two numbers using friend function.
3. Write a C++ program using copy constructor to copy data of an object to another object.
4. Write a C++ program to design a class representing complex numbers and having functionality of performing addition and multiplication of two complex numbers using operator overloading.
5. Write a C++ program to design a student class representing student roll no. and a teats class (derived class of student) representing the scores of the student in various subjects and sports class representing the score in sports. The sport and test class should be inherited by the result class having the functionality to add the scores and display the final result for the student.
6. Write a C++ program to maintain the records of the person with details (Name and Age) and find the eldest among them. The program must use this pointer to return the result.
7. Write a C++ program to illustrate the use of virtual function in a class.
8. Write a C++ program showing data conversion between objects of different classes.
JAVA Program

9. Simple Java Applications
   a. Understanding References to an Instant of a Class
   b. Handling Strings

10. Simple Package Creation
    a. Creating User Defined Packages
    b. Creating User Defined Packages - Array of Objects

11. Interfaces
    a. Implementing User Defined Interfaces
    b. Implementing Pre Defined Exceptions

12. Threading
    a. Creation of Threading
    b. MultiThreading

13. Exception Handling Mechanism in Java
    a. Implementing Predefined Exceptions
    b. Implementing User Defined Exceptions

COURSE OUTCOMES:
At the end of this course, the students will be able to
1. Develop solutions for a range of problems using objects and classes using C++ and Java.
2. Use the Java SDK environment to create, debug and run simple Java programs.
3. Demonstrate how to achieve reusability using inheritance, interfaces and packages.
4. Demonstrate understanding and use of different exception handling mechanisms and concept of multithreading.
5. Be able to write computer programs to solve real world problems in Java and C++.

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CSBS401 | DISCRETE MATHEMATICS | L | T | P | C
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COURSE OBJECTIVES:
- Discrete Mathematics is designed to study various finite structures of Mathematics which are essential to develop the various concepts of Computer Science.
• The rise of the digital computer over the second half of the twentieth century has coincided with a growth of interest in these fields.
• Discrete Mathematics has now become a major area of Mathematics in its own right.

UNIT - I  Mathematical Logic

UNIT - II  Set Theory and Relations

UNIT - III  Lattice and Boolean Algebra

UNIT - IV  Group and Group code

UNIT - V  Graph Theory

TEXT BOOKS :

REFERENCES :

COURSE OUTCOMES :
At the end of this course, the students will be able to
1. Acquire the basic concepts in Mathematical Logic and theory of inferences.
2. Understand the concepts of Set theory, Relations and equivalence classes with matrix representation.
3. Familiarize Lattice theory, Boolean algebra and Group theory.
4. Design coding and encoding group codes concept.
5. Understand the basic concepts of Graph theory, Eulerian and Hamiltonian graphs.

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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.
- Synthesize efficient algorithms in common engineering design situations.

UNIT – I Introduction

UNIT – II Fundamental Algorithmic Strategies
Brute-Force – Greedy - Dynamic Programming- Branch- and-Bound and Backtracking methodologies for the design of algorithms - Illustrations of these techniques for Problem-Solving - Bin Packing, Knap Sack TSP. Heuristics – characteristics and their application domains.

UNIT – III Graph and Tree Algorithms
Traversal algorithms: Depth First Search (DFS) and Breadth First Search (BFS) - Shortest path algorithms - Transitive closure - Minimum Spanning Tree - Topological sorting, Network Flow Algorithm.

UNIT – IV Tractable and Intractable Problems
UNIT – V Advanced Topics
Approximation algorithms, Randomized algorithms, Class of problems beyond NP – P SPACE.

TEXT BOOKS :

REFERENCES :

COURSE OUTCOMES :
1. For a given algorithms analyze worst-case running times of algorithms based on asymptotic analysis and justify the correctness of algorithms.
2. Describe the greedy paradigm and explain when an algorithmic design situation calls for it.
3. Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Synthesize divide-and-conquer algorithms. Derive and solve recurrence relation.
4. Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it.
5. Develop the dynamic programming algorithms, and analyze it to determine its computational complexity.

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CSPC403 DATA BASE MANAGEMENT SYSTEM

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COURSE OBJECTIVES :
• To understand the fundamentals of DBMS and E-R Diagrams.
• To impart the concepts of the Relational model and SQL.
• To disseminate the knowledge on various Normal Forms.
• To inculcate the fundamentals of transaction management and Query processing.
• To give an introduction on current trends in database technologies.

UNIT – I Introduction

UNIT – II Relational Approach

UNIT – III Database Design

UNIT – IV Query Processing and Transaction Management

UNIT – V Trends in Database Technologies

TEXT BOOKS:

REFERENCES:

**COURSE OUTCOMES :**
At the end of this course, the students will be able to
1. Differentiate database systems from file systems by enumerating the features provided by database systems.
3. Formulate the solutions to a broad range of query and data update problems using SQL.
4. Understand the normalization theory and apply such knowledge to the normalization of a database.
5. Inculcate the various implementation techniques and current trends.

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**COURSE OBJECTIVES :**
- To introduce students with basic concepts of operating system its function and services.
- To teach the features of operating system and the fundamental theory associated with process, memory and file management component of operating systems.
- To provide the knowledge about UNIX operating system.

**UNIT - I Introduction**

**UNIT - II Processes and Scheduling**
Definition - Process Relationship - Different states of a Process - Process State transitions, Process Control Block (PCB), Context switching-Thread: Definition, Various states, Benefits of threads, Types of threads, Concept of multithreads-Process Scheduling-Foundation and Scheduling objectives - Types of Schedulers, Scheduling criteria-CPU
utilization, Throughput, Turnaround Time, Waiting Time, Response Time-Scheduling algorithms- Pre-emptive and Non pre-emptive, FCFS, SJF, RR-Multiprocessor scheduling- Real Time scheduling-RM and EDF.

UNIT - III Inter- Process Communications

UNIT – IV Memory Management
Basic concept-Logical and Physical address map, memory allocation-Contiguous Memory allocation –Fixed and variable partition– Internal and External fragmentation - Compaction; Paging- Principle of operation – Page allocation Hardware support for paging, Protection and sharing, Disadvantages of paging -Virtual Memory: Basics of Virtual Memory – Hardware and control structures – Locality of reference, Page fault , Working Set , Dirty page/Dirty bit – Demand paging. Page Replacement algorithms: Optimal, First in First Out (FIFO), Second Chance (SC), Not recently used (NRU) and Least Recently used (LRU).

UNIT – V File and Directories

TEXT BOOKS :

REFERENCES :
COURSE OUTCOMES:
At the end of this course, the students will be able to
1. Create processes and threads.
3. For a given specification of memory organization develop the techniques for optimally allocating memory to processes by increasing memory utilization and for improving the access time.
4. Design and implement file management system.
5. For a given I/O devices and OS (specify) develop the I/O management functions in OS as part of a uniform device abstraction by performing operations for synchronization between CPU and I/O controllers.

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COURSE OBJECTIVES:
- To understand and be able to use the basic programming principles such as data types, variable, conditionals, loops, recursion and function calls.
- To learn how to use basic data structures such as List, Dictionary and be able to manipulate text files and images.
- To understand the process and will acquire skills necessary to effectively attempt a programming problem and implement it with a specific programming language – Python.

UNIT - 1 Introduction
Index – The while Loop – The for Loop – Nested Loops – Keywords break and continue – Case Studies: Displaying Prime Numbers and Random Walk.

UNIT - II Python Function

UNIT - III Class and Object

UNIT - IV Files and Exception Handling

UNIT - V Database and GUI

TEXT BOOKS:

REFERENCES:

**COURSE OUTCOMES:**
At the end of this course, the students will be able to
1. Gain knowledge about the basic concepts of python programming.
2. Solve the basic design problems using object and classes.
3. Able to demonstrate systematic knowledge of backend and front end by developing an appropriate application.
4. Understand the principles of File operation.
5. Obtain the knowledge of DBM and SQL databases from python.

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**COURSE OBJECTIVES:**
- To understand the basic structure and operation of digital computer.
- To study the two types of control Unit techniques and the concept of pipelining.
- To study the hierarchical memory system including cache memories and virtual memory.
- To study the different ways of communicating with I/O devices and standard I/O interfaces.

**UNIT – I Introduction**
Functional Units – Basic operational concepts – Bus structures – Performance and metrics – Instructions and instruction sequencing – Instruction set architecture – Addressing modes – RISC – CISC.
UNIT – II Fundamental Concepts
ALU design – Execution of a complete instruction – Multiple bus organization – Hardwired control – Micro programmed control – Nano programming.

UNIT – III Memory

UNIT – IV I/O Devices

UNIT - V Parallel Processing
Concept of parallel processing, Pipelining, Forms of parallel processing, interconnect network - Data hazards – Instruction hazards – Influence on instruction sets – Data path and control considerations – Performance considerations – Exception handling.

TEXT BOOKS :

REFERENCES :

COURSE OUTCOMES :
At the end of this course, the students will be able to
1. Understand the functional Units of a computer, bus organizations and addressing modes.
2. Design and analyze the pipelining concepts.
3. Knowledge about the principles Hazards.
4. Analyze RAM, ROM, Cache memory and virtual memory concepts.
5. Evaluate the various I/O interfaces.
### Mapping of Course Outcomes with Programme Outcomes

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### COURSE OBJECTIVES:

- To enable students to understand and use a relational database system.
- To understand the role of a database management system in an organization.
- To understand basic database concepts, including the structure and operation of the relational data model.
- To construct simple and moderately advanced database queries using Structured Query Language (SQL).
- To understand and successfully apply logical database design principles, including E-R diagrams and database normalization.
- To design and implement a small database project using Microsoft Access.

### LIST OF EXERCISES

1. Implementation of queries for student database.
2. Data Definition Language – with constraint and without constraint.
3. Data Manipulation language – Insert, Delete, Update, Select and truncate.
4. Transaction Control Statement – Commit, Save point, Roll back.
5. Data Control Statement – Grant, Revoke.
6. Data Projection Statement – Multi column, alias name, arithmetic operations, Distinct records, concatenation, where clause.
7. Data Selection Statement – Between, and, not in, like, relational operators and logical operators.
8. Aggregate functions – count, maximum, minimum, sum, average, order by, group by, having.
10. Sub queries – in, not in, some, any, all, exist, not exist.
11. Set operations – union, union all, intersect, minus.
12. Database objects – synonym, sequences, views and index.
13. Cursor.
14. Functions and procedures.
15. Trigger.
17. Packages.
18. Factorial of a number.
19. Checking whether a number is prime or not.
20. Fibonacci series.

COURSE OUTCOMES:
At the end of this course, the students will be able to
1. Design and implement a database schema for a given problem-domain.
2. Populate and query a database using SQL DML/DDL commands.
3. Declare and enforce integrity constraints on a database using a state-of-the-art RDBMS.
5. Analyze front end tools to design forms, reports and menus.

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COURSE OBJECTIVES:
- To understand the basic concepts such as techniques, management of operating systems.
- To understand Operating System features and its difference from structured design.
- To use the Unix as a modeling and communication utilities.
- To utilize the step of the process to produce better software.

LIST OF EXERCISES

1. Job scheduling techniques.
2. Disk scheduling techniques.
3. Memory allocation techniques.
4. Memory management techniques.
5. Page replacement techniques.
9. Write a shell script to perform the file operations using UNIX commands.
10. Write a shell script to perform the operations of basic UNIX utilities.
11. Write a shell script for arrange ‘n’ numbers using ‘awk’.
12. Write a shell script to perform \(^n\text{Cr}\) calculation using recursion.
13. Write a shell script to sort numbers and alphabetic from a text file using single ‘awk’ command.
14. Write a Shell script to display all the files which are accessed in the last 10 days and to list all the files in a directory having size less than 3 blocks, greater than 3 blocks and equal to 3 blocks.
15. Write a Shell script to display the numbers between 1 and 9999 in words.
16. Write a Shell script for Palindrome Checking.

**COURSE OUTCOMES :**
At the end of this course, the students will be able to
1. Choose the best CPU scheduling algorithm for a given problem instance.
2. Identify the performance of various page replacement algorithms.
3. Develop algorithm for deadlock avoidance, detection and file allocation strategies.
4. Use disk management and disk scheduling algorithms for better utilization of external memory.
5. Experiment with Unix commands and shell programming.

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**COURSE OBJECTIVES :**
- To understand and be able to use the basic programming principles such as data types, variable, conditionals, loops, array, recursion and function calls.
- To learn how to use basic mathematical problems are evaluated and be able to manipulate text files and file operations.
- To understand the process and will acquire skills necessary to effectively attempt a programming problem and implement it with a specific programming language - Python.

**LIST OF EXERCISES**
Write a Python program for the following:
1. To check if a Number is Positive, Negative or Zero.
2. To check prime numbers.
3. To check Armstrong Number.
4. To Solve Quadratic Equation.
5. To Transpose a Matrix.
6. To Find the Size (Resolution) of Image.
7. To Display the Multiplication Table using FOR loop.
8. To Find ASCII Value of Character.
9. To Convert Decimal to Binary, Octal and Hexadecimal.
11. To Display Fibonacci sequence Using Recursion.
12. To Shuffle Deck of Cards.
13. To Merge Mails.
14. To Find Hash of File.
15. To Root search.

COURSE OUTCOMES :
At the end of this course, the students will be able to
1. Create, debug and test a software application using python programming language.
2. Understand and implement modular approach using python.
3. Develop real world applications using oops and exception handling provided by python.
4. Understand the concepts of file I/O and be able to read data from a text file using Python.
5. Plot data using appropriate Python visualization libraries.

| Mapping of Course Outcomes with Programme Outcomes |
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COURSE OBJECTIVES :
- Understand various computing models like Finite State Machine, Pushdown Automata and Turing Machine.
- Be aware of decidability and undecidability of various problems.
- Learn types of grammars.
UNIT- I Finite Automata

UNIT- II Grammars

UNIT - III Pushdown Automata

UNIT – IV Turing Machines
Definitions of Turing machines – Models – Computable languages and functions – Techniques for Turing machine construction – Multi head and Multi tape Turing Machines - The Halting problem – Partial Solvability – Problems about Turing machine-Chomskian hierarchy of languages.

UNIT – V Unsolvable Problems and Computable Functions

TEXT BOOKS :

REFERENCES :
COURSE OUTCOMES:
At the end of this course, the students will be able to
1. Design Finite state Machine, Pushdown Automata.
2. The decidability or undecidability of various problems.
3. The concept of different types of grammars.
5. Understand the principle of Turing Machine.

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COURSE OBJECTIVES:
- To develop, design and implement two dimensional and three dimensional graphical Structures.
- To acquire knowledge in OpenGL programming.
- To understand various aspects of multimedia.
- To learn the concept of sound, images and videos.

UNIT- I Introduction

UNIT- II 2D Concepts

UNIT- III 3D Concepts
UNIT- IV Multimedia Systems Design

UNIT- V Multimedia File Handling and Hypermedia

TEXT BOOKS :

REFERENCES :

COURSE OUTCOMES:
At the end of this course, the students will be able to
1. Design 2D and 3D graphical structures.
2. Apply 2D and 3D transformations.
3. Implement clipping techniques.
4. Create graphical structures using OpenGL.
5. Gain knowledge of multimedia systems.

| Mapping of Course Outcomes with Programme Outcomes |
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COURSE OBJECTIVES:
- To develop an understanding of modern network architectures from a design and performance perspective.
- To introduce the student to the major concepts involved in wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs).
- To provide an opportunity to do network programming.
- To provide a WLAN measurement ideas.

UNIT-I Data communication Components

UNIT-II Data Link Layer and Medium Access Sub Layer
Error Detection and Error Correction - Fundamentals, Block coding, Hamming Distance, CRC; Flow Control and Error control protocols - Stop and Wait, Go back – N ARQ, Selective Repeat ARQ, Sliding Window, Piggybacking, Random Access, Multiple access protocols - Pure ALOHA, Slotted ALOHA, CSMA/CD, CDMA/CA.

UNIT-III Network Layer
Switching, Logical addressing – IPV4, IPV6; Address mapping – ARP, RARP, BOOTP and DHCP – Delivery, Forwarding and Unicast Routing protocols.

UNIT-IV Transport Layer and Application Layer

UNIT-V Services Mechanism

TEXT BOOKS:
REFERENCES:

COURSE OUTCOMES:
At the end of this course, the students will be able to
1. Explain the functions of the different layer of the OSI Protocol.
2. Draw the functional block diagram of wide-area networks (WANs), local area networks (LANs) and Wireless LANs (WLANs) describe the function of each block.
3. For a given requirement (small scale) of wide-area networks (WANs) local area networks (LANs) and wireless LANs (WLANs) design it based on the market available component.
4. For a given problem related TCP/IP protocol developed the network programming.
5. Configure DNS DDNS, TELNET, EMAIL, File Transfer Protocol (FTP), WWW, HTTP, SNMP, Bluetooth, Firewalls using open source available software and tools.

Mapping of Course Outcomes with Programme Outcomes

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COURSE OBJECTIVES:
- To study the architecture of 8086 microprocessor and other processors.
- To learn the design aspects of I/O and memory interfacing circuits.
- To study about I/O peripheral communication and bus interfacing.
- To study the architecture of 8051 microcontroller.
UNIT-I  Introduction to 8086

UNIT-II  8086 Processesese

UNIT-III Interfacing

UNIT-IV Microcontroller

UNIT-V Advanced Topics

TEXT BOOKS :

REFERENCES :
COURSE OUTCOMES:
At the end of this course, the students will be able to
1. Develop the 8086 based assembly language programs for different applications.
2. Familiarize the architecture and instruction set of various advanced processors.
3. Acquire knowledge in interfacing the memory and I/O devices with microprocessor.
4. Design 8051 microcontroller based computing systems.
5. Knowledge about ADC and DAC.

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Mapping of Course Outcomes with Programme Outcomes

COURSE OBJECTIVES:
- To develop, design and implement two dimensional and three dimensional graphical structures.
- To provide knowledge in OpenGL programming.
- To understand various aspects of multimedia and to learn the concept of sound, images and videos.

LIST OF EXERCISES
1. Implementation of Bresenham’s Algorithm – Line and Circle.
2. Implementation of Bresenham’s Algorithm – Ellipse.
4. Two Dimensional transformations - Translation, Rotation, Scaling, Reflection, Shear.
5. Cohen Sutherland 2D line clipping and Windowing.
7. Three dimensional transformations - Translation, Rotation, Scaling.
8. Drawing three dimensional objects and Scenes.
9. Line DDA, chain of diamonds, chessboard.
GIMP:
11. Creating Logos.
12. Simple Text Animation.

Audacity:
13. Silencing, Trimming and Duplicating the Audio signal.
14. Giving the Advanced Effect to the Audio Signal.

Windows Movie Maker:
15. Applying Effect to Video.

Swish:
17. Text Effects.
18. Pre-Loader.

Flash:
19. Changing the shape of the Object.
20. Imaging Viewing using Mask.

Photo Impact:
22. Image Slicing.

COURSE OUTCOMES:
At the end of this course, the students will be able to
1. To understand the various computer graphics hardware and display technologies
2. 2D and 3D viewing technologies.
3. Various 2D and 3D objects transformation techniques.
4. To understand the multimedia concepts for animation.
5. Design and implement computer animation with morphing.

| Mapping of Course Outcomes with Programme Outcomes |
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CSCP508  COMPUTER NETWORKS LAB   L  T  P  C
COURSE OBJECTIVES:
- To understand the working principle of various communication protocols.
- To analyze the various routing algorithms.
- To know the concept of data transfer between nodes.

LIST OF EXERCISES
1. Networking Commands.
2. Implementation of Socket program for Echo.
3. Implementation of client and server for chat using TCP.
4. File transfer between client and server using TCP/IP.
5. Implementation of Remote command execution.
6. Client and Server application using UDP.
8. Socket Program to download a web page.
10. Implementation of server in C and Client in Java.

COURSE OUTCOMES:
At the end of this course, the students will be able to
1. Execute and Evaluate Network Administration Commands.
2. Demonstrate the Installation and Configuration of Network Simulator.
3. Implement the Socket programming for Client Server Architecture.
4. Analyze the Packet Contents of different Protocols.
5. Implementation of the routing Protocols.

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Mapping of Course Outcomes with Programme Outcomes
COURSE OBJECTIVES:

- To understand the basic concept of microprocessor and its applications.
- To study the architecture of 8085 and 8086 microprocessors.
- To acquire the in-depth knowledge in assembly language programming using 8085 microprocessor.
- To familiarize with the microprocessor interfacing and its applications.

LIST OF EXERCISES

1. Study of 8085 and study of 8086 microprocessor.
2. 8-bit Arithmetic Operation.
3. 16-bit Arithmetic Operation.
4. Find the number of even and odd number in a block of data.
5. Fibonacci series.
6. Hexadecimal to binary conversion.
7. Matrix Addition.
8. Sorting an array of numbers.
9. Searching a string.
10. Digital clock.
11. Square wave generation using 8253IC.
12. Stepper motor interface using 8255IC.
13. Data transfer using USART.
15. Message display 8279IC.
16. Simulation of traffic light control signal.

COURSE OUTCOMES:

At the end of this course, the students will be able to

1. Write Assembly level programs using the 8085 and 8086 instruction set.
2. Write modular programs using procedures and macros.
3. Interface 8086 to 8255, Keyboard, display and stepper motors.
4. Generate waveforms using Microprocessors.
5. Simulate traffic light control signal.

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COURSE OBJECTIVES:
- To understand and list the different stages in the process of compilation.
- Identify different methods of lexical analysis.
- Design top-down and bottom-up parsers.
- Identify synthesized and inherited attributes.
- Develop syntax directed translation schemes.
- Develop algorithms to generate code for a target machine.

UNIT – I Introduction to Compilers
Programming Language basics-Language processors – Analysis of the source program – Translators-Compilation and Interpretation- The Phases of Compiler-Errors Encountered in Different Phases-The Grouping of Phases-Compiler Construction Tools – Applications of Compiler Technology.

UNIT – II Lexical analysis

UNIT – III Syntax analysis

UNIT – IV Syntax-directed translation & run time environment

UNIT-V Code Generation
TEXT BOOKS:

REFERENCES:

COURSE OUTCOMES:
At the end of this course, the students will be able to
1. For a given grammar specification develop the lexical analyser.
2. For a given parser specification design top down and bottom-up parsers.
3. Develop syntax directed translation schemes.
4. Develop algorithms to generate code for a target machine.
5. Develop algorithms for intermediate code.

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COURSE OBJECTIVES:
• To understand the phases of development of a Software Project.
• To understand the major considerations for enterprise integration and deployment concepts of requirements engineering and Analysis Modeling.
• To learn various testing, maintenance measures and risk management methods.
• To learn the Software quality management and configuration management concepts.

UNIT - I Introduction to Software Process

UNIT- II Design Concepts

UNIT- III Quality Management

UNIT- IV Configuration Management

UNIT- V Software Project Estimation

TEXT BOOKS :
REFERENCES:

COURSE OUTCOMES:
At the end of this course, the students will be able to
6. Comprehend the basic elements of Software Project Models.
7. Visualize the significance of the different kind of Software Testing methods.

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COURSE OBJECTIVES:
- To make the students experiment on the basic techniques of compiler construction and tool.
- To perform syntax-directed translation of a high-level programming language into an executable code.
- To design and implement language processors in C by using tools to automate parts of the implementation process.
- To provide deeper insights into the more advanced semantics aspects of programming languages, code generation, machine independent optimizations, dynamic memory allocation, and object orientation.

LIST OF EXERCISES
1. Implementation of Lexical Analyser for IF Statement.
2. Implementation of Lexical Analyser for Arithmetic Expression.
3. Construction of NFA from Regular Expression.
4. Construction of DFA from NFA.
5. Implementation of Shift Reduce Parsing Algorithm.

**COURSE OUTCOMES:**
At the end of this course, the students will be able to
1. Understand the Lexical Analyzer Operation.
2. Implementation of language Recognizer.
3. Implementation of Various Parsers.
5. Construction Symbol tables.

| Mapping of Course Outcomes with Programme Outcomes |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
| PO1  | PO2  | PO3  | PO4  | PO5  | PO6  | PO7  | PO8  | PO9  | PO10 | PO11 | PO12 |
| CO1  | ✓    |      |      |      |      |      | ✓    | ✓    |      |      |      |
| CO2  | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    |      | ✓    | ✓    | ✓    | ✓    |
| CO3  | ✓    |      | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    |      |      |
| CO4  | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    |      |      |
| CO5  | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    |      |      |

**COURSE OBJECTIVES :**
- To provide the students with simple experiments to understand the basic aspects about the behavior of the testing techniques to detect the errors in the software.
- To understand standard principles to check the occurrence of defects and its removal.
- To learn the functionality of automated testing tool.

**LIST OF EXERCISES**
1. Write a C program for matrix multiplication to understand the causes of failures.
2. Write a C program for Binary Search - Path Testing.
3. Write a C program to derive test cases based on boundary value analysis
4. Write a C program for cause effect graph to check whether defect is found in the program.
5. Write a C program to perform data flow testing for the given code and find out all d-use Pairs.
6. Write a C program to demonstrate the working of the looping constructs.
7. Write and test a program to count number of check boxes on the page checked and
unchecked count using selenium tool.
8. Write and test a program to provide total number of objects available on the page using selenium tool.
9. Write and test a program to login a specific web page using selenium tool.
10. Write and test a program to select the number of students who have scored more than 60 in any one subject (or all subjects).
11. Write a Java script to develop a web page which calculates the GCD of 2 numbers using Selenium tool.
12. Write and test a program to update 10 student records into table into Excel file using selenium tool.

COURSE OUTCOMES:
At the end of this course, the students will be able to
1. Investigate the Reasons for Bugs and Analyze the principles in Software Testing.
2. Implement various Test Processes for Quality Improvement.
3. Design Test Planning.
5. Manage the Test Processes and Track the Progress of a Project.

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ETHS701 ENGINEERING ETHICS

COURSE OBJECTIVES:
- To provide basic knowledge about engineering Ethics, Variety of moral issues and Moral dilemmas, Professional Ideals and Virtues.
- To provide basic familiarity about Engineers as responsible Experimenters, Research Ethics, Codes of Ethics, Industrial Standards, Exposure to Safety and Risk, Risk Benefit Analysis.
- To have an idea about the Collegiality and Loyalty, Collective Bargaining, Confidentiality, Occupational Crime, Professional, Employee, Intellectual Property Rights.
- To have an adequate knowledge about MNC’s, Business, Environmental, Computer Ethics, Honesty, Moral Leadership, sample Code of Conduct.
UNIT-I Introduction

UNIT-II Challenges

UNIT – III Risk Analysis

UNIT – IV Loyalty

UNIT – V Business Ethics

TEXT BOOKS:

REFERENCES :

COURSE OUTCOMES:
At the end of this course, the students will be able to
1. Understand the relationship between the engineer and the society.
2. Learn the importance of codes in engineering practice.
3. Acquire knowledge on the legal, moral and ethical aspects in engineering.
4. Understand the Risk analysis in Ethics.
5. Knowledge about Collegiality and Loyalty
### Mapping of Course Outcomes with Programme Outcomes

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### COURSE OBJECTIVES:
- To familiarize the students about the trends and challenges of Embedded System.
- To impart the knowledge in RTOS and scheduling algorithms.
- To understand the concepts of Internet of Things.
- To introduce network and communication protocols of IoT.
- To introduce Internet of Everything and its benefits.

### UNIT – I Introduction to Embedded Systems
Introduction, Applications of embedded system, Features and Attributes of Embedded System, Challenges in Embedded System, Selection of Processors, Recent trends in embedded system, Embedded Firmware design approaches and development languages, embedded development life cycle.

### UNIT – II Real Time Operating Systems

### UNIT – III Introduction to IoT
Defining IoT, Characteristics of IoT, Physical design of IoT, Logical design of IoT, Functional blocks of IoT, Communication models & APIs, Machine to Machine, Difference between IoT and M2M, Software defined Network (SDN).

### UNIT - IV Network and Communication Aspect
UNIT - V Rasperry PI with Python and Arduino

TEXT BOOKS:

REFERENCES:

COURSE OUTCOMES:
At the end of this course, the students will be able to
1. Recognize the key features of embedded systems in terms of computer hardware and be able to discuss their functions.
2. Know the extra-functional that are imposed on embedded systems.
3. Identify the key factors affecting the evolution of computing hardware.
4. Understand the concepts of IoT and IoE.
5. Analyze basic protocols in wireless sensor network.

| Mapping of Course Outcomes with Programme Outcomes |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|                | PO1  | PO2  | PO3  | PO4  | PO5  | PO6  | PO7  | PO8  | PO9  | PO10 | PO11 | PO12 |
| CO1             | ✓    |      |      |      |      |      | ✓    | ✓    |      |      |      |      |
| CO2             |      | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    |      |      |      |      | ✓    |
| CO3             | ✓    | ✓    | ✓    | ✓    | ✓    |      |      |      |      |      | ✓    | ✓    |
| CO4             |      | ✓    |      |      |      |      |      |      |      |      | ✓    |      |
| CO5             | ✓    |      | ✓    | ✓    | ✓    | ✓    | ✓    |      |      |      | ✓    | ✓    |
COURSE OBJECTIVES:

- To understand the working principle of Embedded System.
- To make use various sensors in IoT.
- To know how to use various tools in IoT for designing applications.

LIST OF EXERCISES

Embedded System
1. Alphanumeric LCD interface using 8051.
2. Study of ARM evaluation system.
3. Flashing of LEDs using ARM (LPC2148).
4. Interfacing keyboard and LCD using ARM (LPC2148).
5. Temperature sensor interface using ARM (LPC2148).

IoT
6. Distance Measurement.
7. Identifying Moisture content in Agricultural Land.
10. Identifying Room Temperature.
11. How to Control PWM Signals.
12. Designing a Calculator using NumPi.
15. Identification of Earthquake.
17. Accessing GPIO using Google Assistance.
18. How to create a video player.
19. Uploading data to cloud and monitoring in cloud.
20. Connecting social media (twitter).

COURSE OUTCOMES:
At the end of this course, the students will be able to
1. Comprehend the basic elements of Microcontroller and their Programming.
2. Knowledge of Various Sensors.
4. Evaluate networking technologies for application within IoT.
5. Identify the Kits required for solving the Real World Problem and to write the Code.
### Mapping of Course Outcomes with Programme Outcomes

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Note: * - Four weeks during the summer vacation before the end of sixth semester

### COURSE OBJECTIVES:

- To work/train on a technical topic/field work related to Computer Science and Engineering to acquire the ability of written/oral presentation and to have a practical knowledge in carrying out the Computer Science and Engineering related problems.
- To acquire the ability of writing technical papers for Conferences.
- To train and develop skills in solving problems during execution of the problems related to Computer Science and Engineering.

The students will work for two periods per week guided by student counsellor. They will be asked to present a seminar of not less than 15 minutes and not more than 30 minutes on any technical topic of student’s choice related to Computer Science and Engineering and to engage in discussion with audience. They will defend their presentation. A brief copy of their presentation also should be submitted. Evaluation will be done by the student counsellor based on the technical presentation, the report and also on the interaction shown during the seminar.

The students will individually undertake a training program in reputed concerns in the field of Computer Science and Engineering during summer vacation (at the end of sixth semester) for a minimum stipulated period of four weeks. At the end of training the student has to submit the detailed report on the training undertaken within ten days from the commencement of the seventh semester. The student will be evaluated by a team of staff members nominated by the Head of the Department through a viva-voce examination.

### COURSE OUTCOMES:

At the end of this course, the students will be able to

1. Face the audience and to interact during group discussion in the corporate interviews confidently.
2. To acquire the ability to work in the actual environment and to use the technical resources.
3. Apply prior acquired knowledge in problem solving and to demonstrate the use, interpretation and application of an appropriate international Computer Science and Engineering standard in a specific situation.
4. Analyze a given Computer Science and Engineering problem and to identify and implement appropriate problem solving methodology to propose a meaningful solution.
5. Present the solution acquired in the form of written and oral presentation.

| Mapping of Course Outcomes with Programme Outcomes |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|
|                                   | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1                               | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓     |
| CO2                               | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   |     |     |       |
| CO3                               | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   |     |       |
| CO4                               | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   |     |     |       |
| CO5                               | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   |     |       |

CSPV803 | PROJECT WORK AND VIVA VOCE | L | PR | S | C |
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**COURSE OBJECTIVES:**

- To develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same.
- To train the students in preparing project reports and to face reviews and viva voce examination.

**COURSE OUTCOMES:**

At the end of this course, the students will be able to

1. Take up any challenging practical problems and find solution by formulating proper methodology.
2. Carry out any experiment based on Computer software and Hardware available.
3. Present the conclusions with understandability using appropriate tables and graph in the form of report.
4. Analyses any short coming while implementing a technical problem and to handle the same.
5. Implement any research problem in current thrust area using the gained practice knowledge.

| Mapping of Course Outcomes with Programme Outcomes |
|-----------------------------------|---|---|---|---|---|---|---|---|---|---|---|
|                                   | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1                               | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓     |
| CO2                               | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   |     |     |       |
| CO3                               | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   |     |       |
| CO4                               | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   |     |     |       |
| CO5                               | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   |     |       |
COURSE OBJECTIVES:
- To understand the basic Perl language features.
- To understand Perl language as a tool for convenient text, data storage and file processing.
- Execute programs from Perl environment and process their result.

UNIT - I  An overview of Perl

UNIT - II  Lists and Hashes
Introduction to lists, Simple lists, Complex lists, Accessing list values, List slices, Ranges, Combining ranges and Slices. Arrays – Accessing single and Multiple elements from an array – Interpolating Arrays into Strings – For Control Structure – Array functions (pop, push, shift, unshift, and sort) – Array manipulations; Introduction to Hashes – Hash element access – Hash functions – Typical use of hash.

UNIT - III  Files and Data

UNIT - IV  Subroutines and Unit

UNIT - V  Regular Expressions

TEXT BOOKS:
REFERENCES:

COURSE OUTCOMES:
At the end of this course, the students will be able to
1. Ability to apply prerequisite basic programming concepts to Perl.
2. Write, compile, and run Perl programs, analyze the effects of using Perl structures that implement decisions, loops, and store arrays and use these structures in a well-designed, OOP program.
3. Create Perl programs that make use of various directories and use several files linked together.
4. Understand the concepts of Subroutines.
5. Knowledge about the Files.

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COURSE OBJECTIVES:
• To get an introduction about .NET concepts.
• To enable the students to develop applications in VB.NET.
• To know about the implementation of object oriented concepts using VB.NET.
• To understand some advanced concepts in .NET technologies.

UNIT - I Visual Basic Fundamentals
UNIT – II Programming with .NET
Introduction to Data Types- Using Variables- Variable Scope- Converting Data Types-
Creating and Using Structures- Storing Data in Arrays- Conditional Expressions- Using
Decision Structures- Using Conditional Loop Structures- Restricting User Input-
Validating Field Data- Validating Form Data- Built-In Functions- Mathematical and String
Functions- User Defined Functions and Procedures.

UNIT – III Programming with Controls
Properties, Events and Methods of Form, Label, Textbox, List Box,Combo Box, Radio
Button, Button, Check Box, Progress Bar, Date Time Picker, Calendar, Picture Box,
Scrollbar, VScrollBar, Group Box, Tooltip, Timer. Creating MDI Parent and Child.

UNIT – IV Object Orientation with .Net
Understanding Classes- Working with Classes- Using Shared Members- Inheritance-
Polymorphism- Namespaces- Types of Errors- Using the Debugger- Handling Exceptions-
Creating Menus- Creating Status Bars- Creating Toolbars.

UNIT – V Advance Concepts
Working with Web Forms- Using XML Web Service- Database Concepts- Overview of
ADO.NET- Working with Data- Introduction to Deployment- Deploying a Windows-
based Application.

TEXT BOOKS :
   Hills, 2009.

REFERENCES :
   Incorporated, 2002.

COURSE OUTCOMES :
At the end of this course, the students will be able to
1. Understand .NET Framework and describe some of the major enhancements to the
   new version of Visual Basic.
2. Describe the basic structure of a Visual Basic.NET project and use main features of
   the integrated development environment (IDE).
3. Create applications using Microsoft Windows Forms.
4. Understand the concepts of XML.
5. Knowledge about the classes.
Mapping of Course Outcomes with Programme Outcomes

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COURSE OBJECTIVES:
- To understand the concept of static web designing using HTML.
- To understand the concept of dynamic web designing using Java Script and XML.
- To understand the concept of server-side web designing using PHP.
- To develop the different technologies used in the World Wide Web including XML, Perl, Rails and PHP.

UNIT - I XHTML

UNIT – II Introduction to SGML

UNIT - III Overview of PERL

UNIT - IV Overview of PHP
Origin and Use of PHP - PHP- General Syntactic Characteristics Operations and Expressions- Control Statements- Arrays- Functions-Pattern Matching- Form Handling.
Files-Cookies-Session Tracking - Database Connectivity, Simple programs in PHP and MySQL.

UNIT - V RAILS

TEXT BOOKS:

REFERENCES:

COURSE OUTCOMES:
At the end of this course, the students will be able to
1. Develop web pages using basic HTML.
2. Apply XML techniques in web design.
3. Implement CGI using Perl.
4. Implement PHP & MySQL database connectivity for real world applications.
5. Use AJAX with Rails.

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65
COURSE OBJECTIVES:

- To introduce the fundamental problems, concepts, and approaches in the design and analysis of real-time systems.
- To emphasize the issues related to the design and analysis of systems with real-time constraints.
- To study the real time applications and their functional semantics.
- To provide a comprehensive idea about time management, language and tool support, real time operating systems, scheduling and communication, and related fault tolerance issues.

UNIT - I Introduction

UNIT – II Task Assignment and Scheduling
Classical Uniprocessor scheduling Algorithms - Clock-driven approach, weighted round robin approach, Priority driven approach, dynamic versus static systems, Effective release times and deadlines, Optimality of EDF and LST algorithms, Challenges in validating timing constraints in priority driven systems, Offline versus online scheduling. Task Assignment - Mode Changes - Fault Tolerant Scheduling.

UNIT – III Real-Time Communication

UNIT – IV Real-time Memory Management
UNIT – V Programming Languages and Tools
Desired language characteristics, Data typing, control structures, Facilitating hierarchical decomposition, packages, Run-Time error (exception) handling, overloading and generics - Multitasking, Low-level programming, Task scheduling - Timing specifications, Run-time-support Programming environments.

TEXT BOOKS :

REFERENCES :

COURSE OUTCOMES :
At the end of this course, the students will be able to
1. Apply formal software engineering methods and practices to the design, analysis and development of several small real-time systems.
2. Characterize various real-time approaches for reliability and fault tolerance issues.
3. Acquire the basic programming skills in the development of real-time computing systems.
4. Understand the general purpose and full featured real-time operating systems.
5. Characteristics of Memory Management.

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67
COURSE OBJECTIVES:

- To demonstrate the understanding of the fundamentals of Android operating systems.
- To demonstrate the skills of using Android software development tools.
- To demonstrate the ability to develop software with reasonable complexity on mobile platform.
- To demonstrate the ability to debug programs running on mobile devices.

UNIT – I Android

UNIT – II Building User Interface
Fundamental Android UI design - Android User Interface fundamentals - Layouts - Linear - Relative - Grid Layouts - Fragments - Creating new fragments - The Fragments Lifecycle - Introducing the Fragment Manager - Adding Fragments to Activities - Interfacing between Fragments and Activities.

UNIT – III Intents And Broadcasts Receivers

UNIT – IV Files , Saving State And Preferences

UNIT – V Advanced Topics
Alarms - Creating and using alarms - Using Location Based Services - Using the Emulator with Location-Based Services - Finding the Current Location - Using the Geocoder - Creating Map-Based Activities.

TEXT BOOKS:

REFERENCES:

COURSE OUTCOMES:
At the end of this course, the students will be able to
1. Understand the existing state of mobile app development via researching existing apps, meeting with industry professionals, and formulating new ideas.
2. Display proficiency in coding on a mobile programming platform.
3. Understand the limitations and features of developing for mobile devices.
4. Create a complete Mobile app with a significant programming component, involving the sensors and hardware features of the phone.
5. Understand the economics and features of the app marketplace by offering the app for download.

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COURSE OBJECTIVES:
• To understand the foundations of Distributed System.
• To introduce the idea of peer to peer services and file system.
• To understand the components and support required for distributed system.
• To understand the remote method invocation and objects.
• To understand the design process and resource management systems.

UNIT - I Introduction
UNIT - II System Model

UNIT - III Peer to peer Systems

UNIT – IV Clocks, events and process states

UNIT – V Process Management

TEXT BOOKS :

REFERENCES :

COURSE OUTCOMES :
At the end of this course, the students will be able to
1. Acquiring Knowledge on foundations of Distributed System.
2. Familiarizing the idea of peer to peer services and file system.
3. Familiarizing the components and support required for distributed system.
4. Acquiring Knowledge on remote method invocation and objects.
5. Gaining experienced skills on design process and resource management systems.

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COURSE OBJECTIVES:
- To impart knowledge on software testing, quality and Software Quality Assurance (SQA).
- To introduce the various software testing techniques and different levels of testing.
- To introduce the SQA standards and components of SQA system.
- To explain the components of quality plan for software projects.

UNIT - I Phases of Software Project
Quality, Quality assurance and quality control – Testing, Verification and Validation – White box testing – Static testing – Structural testing – Black box testing – Definition, need for black box testing – Black box testing techniques - Requirements based testing, Positive and Negative testing, Boundary Value Analysis, Decision Tables, Equivalence Partitioning, Graph based Testing, Compatibility Testing, Domain Testing.

UNIT - II Integration Testing
Integration testing as a type of testing - Integration testing as a phase of testing – Scenario testing – Defect bash - System and Acceptance testing – System testing overview – Need for System testing – Functional system testing – Non-functional testing – Acceptance testing.

UNIT – III Performance Testing
UNIT - IV Software Quality
Definition - Software quality assurance – definition and objectives - Software quality assurance and software engineering - Software quality factors - The components of the software quality assurance system – The SQA system - SQA architecture-Pre-project components - Software project life cycle components - Infrastructure components for error prevention and improvement - Management SQA components - SQA standards, system certification, and assessment components - Organizing for SQA – The human components - Considerations guiding construction of an organization’s SQA system.

UNIT – V Development plan and Quality Plan
Objectives - Elements of the development plan - Elements of the quality plan - Development and quality plans for small projects and for internal projects - Integrating quality activities in the project life cycle - Classic and other software development methodologies - Factors affecting intensity of quality assurance activities in the development process - Verification, validation and qualification - A model for SQA defect removal effectiveness and cost.

TEXT BOOKS :

REFERENCES :

COURSE OUTCOMES :
At the end of this course, the students will be able to
1. Techniques and skills on use of modern software testing tools to support software testing projects.
2. Planning a test project, design test cases and data, conduct testing operations, manage software problems and defects, generating a test report.
3. Advanced software testing topics, such as object-oriented software testing methods, and component-based software testing issues, challenges, and solutions.
5. Understand the concepts of Qualification and Validation.
Mapping of Course Outcomes with Programme Outcomes

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COURSE OBJECTIVES:
- To study the concepts of mobile computing.
- To study the concepts of medium access control protocol.
- To understand the concepts of GSM.
- To study the concepts of mobile IP and mobile TCP.

UNIT – I Mobile Computing

UNIT – II MAC
Motivation for a specialized MAC –SDMA–FDMA– TDMA–CDMA and comparison of these methods.

UNIT – III GSM
Mobile services - system architecture - radio interface – protocols - localization and calling - handover – security - new data services – DECT : system and protocol architecture – TETRA.

UNIT – IV Infrared Transmission
Introduction - Infrared vs. radio transmission - Infrastructure and ad-hoc networks - IEEE 802.11: system and protocol architecture - physical and MAC layer – HIPERLAN: protocol architecture - physical layer and MAC sub layer - Bluetooth: physical and MAC layer.

UNIT – V Mobile IP

TEXT BOOKS:
REFERENCES:

COURSE OUTCOMES:
At the end of this course, the students will be able to
1. Understand the principles and concepts of mobile communication.
2. Analyze and compare the multiplexing techniques.
3. Describe the architecture of GSM.
4. Understand the protocol architecture of Bluetooth and HIPERLAN.

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COURSE OBJECTIVES:
- To Study the concepts of Computer Security and Cryptography.
- To Understand the Symmetric Key Algorithms and AES.
- To Study the concepts of Asymmetric Key Algorithms- Digital Signatures and RSA.
- To Understand the Network Security, Firewalls and Virtual Private Networks and Internet Security Protocols.

UNIT – I Introduction
Need for security -Principles of Security - Types of Attacks - Plain text and Cipher Text – Substitution techniques- Caesar Cipher- Mono alphabetic Cipher- Polygram-Polyalphabetic Substitution- Play air- Hill Cipher- Transposition techniques- Encryption and Decryption- Symmetric and Asymmetric Key Cryptography- Steganography- Key Range and Key Size-Possible Types of Attacks.
UNIT – II Cryptography Algorithms
Algorithms types and modes- Overview of Symmetric key Cryptography- Data Encryption Standard (DES)-International Data Encryption Algorithm (IDEA)- RC4- RC5- Blowfish- Advanced Encryption Standard (AES).

UNIT – III Asymmetric Key Cryptography
Brief history of Asymmetric Key Cryptography- Overview of Asymmetric Key Cryptography- RSA algorithm- Symmetric and Asymmetric key cryptography together- Digital Signatures-Knapsack Algorithm- Some other algorithms (Elliptic curve Cryptography- ElGamal-problems with the public key exchange).

UNIT – IV Primary Key Management

UNIT – V TCP/IP and Firewalls

TEXT BOOKS :

REFERENCES :

COURSE OUTCOMES:
At the end of this course, the students will be able to
1. Understand the concepts of Computer Security, Cryptography, Symmetric Key Algorithms, AES, Asymmetric Key Algorithms- Digital Signatures, RSA.
2. Understand the Digital Certificates, Public Key Infrastructure (PKI).
4. Understand the concepts of 3G.
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### COURSE OBJECTIVES:
- To introduce the characteristics, basic concepts and systems issues in pervasive computing.
- To illustrate architecture and protocols in pervasive computing and to identify the trends and latest development of the technologies in the area.
- To analyze and compare the performance of different data dissemination techniques and algorithms for mobile real-time applications.

### UNIT - I Introduction

### UNIT – II Device Technology

### UNIT – III WAP

### UNIT – IV Server Side Programming in Java
UNIT – V Application

TEXT BOOKS :

REFERENCES :

COURSE OUTCOMES:
At the end of this course, the students will be able to
1. Develop an attitude to propose solutions with comparisons for problems related to pervasive computing system through investigation.
2. Gives knowledge about the strengths and limitations of the tools and devices for development of pervasive computing systems.
3. Discovers the characteristics of pervasive computing applications including the major system components and architectures of the systems.
5. Understand about interface.

| Mapping of Course Outcomes with Programme Outcomes |
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| CO5         |     |     |     | ✓   | ✓   |     |     |     |     |     |     | ✓   |
COURSE OBJECTIVES:
- Understand the design issues in ad hoc and sensor networks.
- Learn the different types of MAC protocols.
- Be familiar with different types of ad hoc routing protocols.
- Learn the architecture and protocols of wireless sensor networks.

UNIT – I Routing

UNIT – II Quality of Services

UNIT – III Energy Management

UNIT – IV Sensor Networks

UNIT – V Hybrid Wireless Networks

TEXT BOOKS:

REFERENCES:
COURSE OUTCOMES:
At the end of this course, the students will be able to
1. Understand the principles of mobile ad hoc networks (MANETs) and what distinguishes them from infrastructure-based networks.
2. Analyze the protocol design issues of ad hoc and sensor networks.
3. Understanding the principles and characteristics of wireless sensor networks.
4. Knowledge of the current topics in MANETs and WSNs, both from an industry and research point of view.
5. Knowledge about the Hybrid Wireless Networks.

Mapping of Course Outcomes with Programme Outcomes

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CSPESCN DIGITAL IMAGE PROCESSING

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COURSE OBJECTIVES:
- To introduce basic concepts like acquiring, storing and processing of images.
- To provide details about enhancing the quality of images.
- To introduce techniques for extraction and processing of region of interest.
- To understand the applications of Image Processing.

UNIT - I Fundamentals

UNIT - II Image Enhancement

UNIT - III Image Segmentation
UNIT - IV Multi Resolution Analysis and Compression

UNIT - V Morphological Processing and Representation

TEXT BOOKS:

REFERENCES:

COURSE OUTCOMES:
At the end of this course, the students will be able to
1. Understand the basic image enhancement techniques in spatial & frequency domains.
2. Understand the basic multi-resolution techniques.
3. Understand the basic of segmentation methods.
4. Apply this concept for image handling in various fields.
5. Knowledge about Morphological operations.

| Mapping of Course Outcomes with Programme Outcomes |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
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| CO2 |      | ✓ | ✓ | ✓ |      |      |      |      |      |      |      |
| CO3 | ✓ |      |      | ✓ | ✓ | ✓ |      |      |      |      |      |
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| CO5 |      |      | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |      |      |      | ✓ |
COURSE OBJECTIVES:
- To introduce the fundamental concepts of machine learning and its applications
- To learn the classification, clustering and regression machine learning algorithms
- To understand the methods of solving real-life problems using the machine learning techniques

Unit – I Introduction

Unit – II Maximum-likelihood and Bayesian Parameter Estimation

Unit – III Component analysis and discriminants

Unit – IV Classification Algorithms

Unit – V Clustering and Regression Algorithms
k-means clustering - fuzzy k-means clustering - Gaussian mixture models - autoassociative neural network. Regression analysis - support vector regression - Introduction to combining multiple learners.

TEXT BOOK:

REFERENCES:
COURSE OUTCOMES:
At the end of this course, the students will be able to
1. Understand the basic concepts of machine learning
2. Understand the classification, clustering and regression algorithms
3. Implement the classification, clustering and regression algorithms
4. Combine the evidence from two or more models/methods for designing a system.
5. Design and implement a method for solving real life problem using a suitable machine learning technique

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CSPESCN | DIGITAL SIGNAL PROCESSING | L | T | P | C |
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COURSE OBJECTIVES:
- To study the basic components of DSP systems.
- To study DFT and its computation.
- To study the design techniques for digital filters (IIR & FIR).
- To study the finite word length effects and applications in signal processing.

UNIT - I Basic of Digital Signal Processing Systems

UNIT – II Introduction to DFT
Properties of DFT - Filtering methods based on DFT - Relation between DTFT and DFT - FFT computations using Decimation in time and Decimation in frequency algorithms - Overlap-add and save methods.

UNIT – III Filters
UNIT – IV Quantization
Fixed point and floating point number representations - Comparison - Truncation and Rounding errors - Quantization noise - derivation for quantization noise power - coefficient quantization error - Product quantization error - Overflow error - Round off noise power - limit cycle oscillations due to product round off and overflow errors - signal scaling.

UNIT – V Multirate Signal Processing
Speech Compression - Adaptive Filter - Musical Sound Processing - Image enhancement - Applications of Multi rate signal Processing

TEXT BOOKS:

REFERENCES:

COURSE OUTCOMES:
At the end of this course, the students will be able to
1. Design both analog and digital filters.
2. Design DSP processors.
3. Do projects in Signal processing, Image processing and Speech Processing.
4. Understand the Multirate signal processing.
5. Knowledge about quantization.

| Mapping of Course Outcomes with Programme Outcomes |
|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|                | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1             | ✓   | ✓   |     |     | ✓   | ✓   | ✓   | ✓   | ✓   |     |     | ✓   |
| CO2             |     | ✓   | ✓   | ✓   | ✓   | ✓   |     |     |     |     |     | ✓   |
| CO3             |     |     | ✓   | ✓   | ✓   | ✓   |     |     |     |     |     | ✓   |
| CO4             |     | ✓   | ✓   |     |     |     |     |     |     |     |     |     |
| CO5             | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   |     |

83
COURSE OBJECTIVES:

- To know the fundamentals of cloud computing.
- To acquire the knowledge of cloud computing technologies and architecture.
- To be familiar with cloud services and applications of cloud computing.

UNIT – I Introduction

UNIT – II The Role of Networks in Cloud Computing

UNIT – III Enterprise Architecture

UNIT - IV Cloud Services and Cloud Roles
Infrastructure as a Service - Platform as a Service - Software as a Service - Grids and Clouds - Application Scalability - Automating Scalability - General Cloud Architectures for Scaling - Delivering Scientific Computing services in the Cloud - A Dynamic Collaborative Cloud Services Platform.

UNIT - V Amazon Web Services
Google App Engine - Microsoft Azure - Scientific Applications - Business and Consumer Applications - Case Study: Cloud as Infrastructure for an Internet Data Center - Cloud Computing for Software Parks - Cloud Computing Supporting SaaS.

TEXT BOOKS:
REFERENCES:

COURSE OUTCOMES:
At the end of this course, the students will be able to
1. Identify the fundamentals and technologies of cloud computing.
2. Address different cloud architectures and cloud services.
3. Explore various applications by integrating the cloud services.
4. Fundamentals of Web services.
5. Knowledge about Cloud Platform.

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COURSE OBJECTIVES:
• To provide Knowledge with speech signals and their representations.
• To analyze the feature extraction techniques in both frequency and spectral domain.
• To provide knowledge on pattern comparison Techniques
• To provide the overview of speech based applications (speech recognition and synthesis).

UNIT – I Basic Concepts

UNIT – II Speech Analysis
UNIT – III Speech Modeling

UNIT – IV Speech Recognition
Large Vocabulary Continuous Speech Recognition: Architecture of a large vocabulary continuous speech recognition system – acoustics and language models – n-grams, context dependent sub-word units; Applications and present status.

UNIT – V Speech Synthesis
Text-to-Speech Synthesis: Concatenative and waveform synthesis methods, sub- word units for TTS, intelligibility and naturalness – role of prosody. Applications and present status.

TEXT BOOKS:

REFERENCES:

COURSE OUTCOMES:
At the end of this courses Students will able to
1. Understand the basic characteristics of speech signals.
2. Recall various feature extraction techniques used in many speech related projects.
3. Understand the algorithms for speech models.
4. Develop a speech recognition system.
5. Work on various speech based applications in their projects.

| Mapping of Course Outcomes with Programme Outcomes |
|------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
|            | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1        | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   |     |      |      |      |
| CO2        | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   |     |      |      |      |
| CO3        | ✓   |     | ✓   | ✓   | ✓   |     | ✓   |     |     |      |      |      |
| CO4        | ✓   |     | ✓   | ✓   | ✓   | ✓   |     | ✓   | ✓   |      |      |      |
| CO5        |     |     |     |     |     |     |     | ✓   |     |      |      |      |
COURSE OBJECTIVES:
- To understand the basics of Information Retrieval.
- To understand machine learning techniques for text classification and clustering.
- To understand various search engine system operations.
- To learn different techniques of recommender system.

UNIT - I Introduction

UNIT - II Basic IR models

UNIT - III Classification, Searching and Indexing

UNIT - IV Web – Search Engine Architectures

UNIT - V Content-based Recommender Systems

TEXT BOOKS:
REFERENCES:

COURSE OUTCOMES:
At the end of this course, the students will be able to
1. Understand the basics of Information Retrieval and its models.
2. Use an open source search engine framework and explore its capabilities.
3. Apply appropriate method of classification or clustering.
4. Design and implement innovative features in a search engine.
5. Design and implement a recommender system.

| Mapping of Course Outcomes with Programme Outcomes |
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| CO1            | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    |
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| CO5            | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    | ✓    |

COURSE OBJECTIVES:
• To Understand Data mining principles and techniques and Introduce DM as a cutting edge business intelligence.
• To expose the students to the concepts of Data warehousing Architecture and Implementation.
• To study the overview of developing areas – Web mining, Text mining and ethical aspects of Data mining.
• To identify Business applications and Trends of Data mining.

UNIT – I Evolution of Decision Support Systems
Data warehousing Components – Building a Data warehouse - Data Warehouse and DBMS - Data marts – Metadata - Multidimensional data model - OLAP Vs OLTP - OLAP operations - Data cubes - Schemas for Multidimensional Database: Stars, Snowflakes and Fact constellations.

UNIT – II Types of OLAP Servers
Three – Tier data warehouse architecture - distributed and virtual data warehouses - Data warehouse implementation - tuning and testing of data warehouse - Data Staging (ETL) Design and Development - data warehouse visualization - Data Warehouse Deployment – Maintenance – Growth - Business Intelligence Overview - Data Warehousing and Business Intelligence Trends - Business Applications - tools- SAS.
UNIT – III Data Mining
KDD versus data mining - Stages of the Data Mining Process - task primitives - Data Mining Techniques - Data mining knowledge representation – Data mining query languages - Integration of a Data Mining System with a Data Warehouse – Issues - Data preprocessing – Data cleaning - Data transformation - Feature selection - Dimensionality reduction - Discretization and generating concept hierarchies - Mining frequent patterns – association - correlation.

UNIT – IV Decision Tree Induction

UNIT – V Statistics and Data Analysis

TEXT BOOKS :
1. Jiawei Han and Micheline Kamber, Data Mining: Concepts and Techniques, Morgan Kaufmann Publishers, third edition, 2011.

REFERENCES : 

COURSE OUTCOMES :
At the end of this course, the students will be able to
1. Evolve Multidimensional Intelligent model from typical system.
2. Discover the knowledge imbibed in the high dimensional system.
3. Evaluate various mining techniques on complex data objects.
4. Evaluate the performance of different data-mining algorithms.
5. Understand and apply the data mining techniques , such as text mining and web mining.
Mapping of Course Outcomes with Programme Outcomes

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COURSE OBJECTIVES:
- To understand programming constructs of Ruby.
- To learn Rails Techniques.
- To use Rails conventions to avoid redundant code.
- To deploy Ruby on Rails.

UNIT - I Introduction

UNIT – II Rails

UNIT – III Ruby

UNIT – IV Developing Book Shelf
UNIT – V Prototype

TEXT BOOKS :

REFERENCES :

COURSE OUTCOMES :
At the end of this course, the students will be able to
1. Able to understand Rails framework and also know program constructs in Ruby.
2. Able to develop application in Ruby on Rail.
3. Acquire knowledge about Object-Relational Mapping with ActiveRecord.
4. Apply knowledge to deploy Rails.
5. Understand the knowledge of Protocol.

| Mapping of Course Outcomes with Programme Outcomes |
|-----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
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CSPESCN | OPEN SOURCE PROGRAMMING | L | T | P | C |
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COURSE OBJECTIVES :
- To learn about Unix commands and Unix programming.
- To familiarize students with the Unix Utilities.
- To learn the Unix file systems.
UNIT - I Introduction to Open Source

UNIT - II Introduction to PHP

UNIT - III Working with Files and Directories
Getting information on files – Opening and closing files – Reading and writing to files – Reading and writing entire files – Testing – Reading and writing strings of characters – Working with file permissions – Working with directories – Introduction to databases and SQL.

UNIT - IV Exploring Python

UNIT – V Files Operations Commands

TEXT BOOKS :

REFERENCES :

COURSE OUTCOMES :
At the end of this course, the students will be able to
1. Understand the fundamentals of Linux operating system.
2. Describe the working of PHP programming.
3. Elucidate the concepts of file handling and database programming in PHP.
4. Analyze the basic concepts in Python.
5. Explain the programming concepts of files and error handling using Python.
### Mapping of Course Outcomes with Programme Outcomes

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### COURSE OBJECTIVES:

- To learn the various soft computing frameworks.
- To be familiar with design of various neural networks.
- To be exposed to fuzzy logic.
- To learn genetic programming.

### UNIT - I Artificial neural network Introduction


### UNIT - II Learning Networks


### UNIT – III Membership Function


### UNIT – IV Genetic Algorithm and Search Space

UNIT – V Neuro- Fuzzy Hybrid Systems

TEXT BOOKS :

REFERENCES :

COURSE OUTCOMES:
At the end of this course, the students will be able to
1. Apply various soft computing frame works.
3. Apply fuzzy logic and reasoning to handle uncertainty and solve engineering problems.
4. Apply genetic algorithms to combinatorial optimization problems.
5. Applications of soft computing to solve problems in varieties of application domains.

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94
COURSE OBJECTIVES:

- To understand the concepts of Internet of Things.
- To introduce network and communication protocols of IoT.
- To build IoT applications.

UNIT – I Introduction to IoT
Defining IoT- Characteristics of IoT- Physical design of IoT- Logical design of IoT- Functional blocks of IoT- Communication models & APIs, Machine to Machine-Difference between IoT and M2M-Software defined Network(SDN).

UNIT – II Network and Communication Aspects

UNIT – III Challenges of IoT
Design challenges- Development challenges- Security challenges- Other challenges- Applications of IoT- Home automation, Industry applications, Surveillance applications- Other IoT applications.

UNIT – IV Raspberry PI with Python and Arduino
Introduction to Python - Building IOT with RASPERRY Pi- IoT Systems - IoT Physical Devices & Endpoints - IoT Device - Building blocks - Raspberry Pi - Board - Linux on Raspberry Pi - Raspberry Pi Interfaces - Programming Raspberry Pi with Python - Other IoT Platforms – Arduino.

UNIT – V Development IoTs
Developing sensor based application through embedded system platform, - Industrial automation, smart grid, Commercial building automation, Smart cities - participatory sensing - Data Analytics for IoT

TEXT BOOKS:

REFERENCES:
COURSE OUTCOMES:
At the end of this course, the students will be able to
1. Understand the concepts of Internet of Things.
2. Analyze basic protocols in wireless sensor network.
3. Design IoT applications in different domain and be able to analyze their performance.
4. Implement basic IoT applications on embedded platform.
5. Explore IoT using Rasperry Pi and Arduino.

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<th>Mapping of Course Outcomes with Programme Outcomes</th>
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<td>PO1 PO2 PO3 PO4 PO5 PO6 PO7 PO8 PO9 PO10 PO11 PO12</td>
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CSOESCN ENTERPRISE RESOURCE PLANNING

COURSE OBJECTIVES:
- To know the basics of ERP.
- To understand the key implementation issues of ERP.
- To know the business units of ERP.
- To be aware of some popular products in the area of ERP.
- To appreciate the current and future trends in ERP.

UNIT – I ERP
Enterprise - An Overview – Basic ERP Concepts – Risks of ERP - Benefits of ERP - ERP and Related Technologies – Business Intelligence(BI) - Business Process Reengineering (BPR) - Data Warehousing - Data Mining – OLAP – SCM.

UNIT - II ERP Implementation

UNIT – III Maintenance and Management
UNIT - IV ERP Market Place

UNIT – V Advanced Topics

TEXT BOOKS:

REFERENCES:

COURSE OUTCOMES:
At the end of this course, the students will be able to
1. Design and develop ERP implementation cycle.
2. Have awareness of core and extended units of ERP.
3. Know about the business units of ERP.
4. Know about different ERP vendors.
5. Understand the latest implementation methodologies of ERP.

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97
COURSE OBJECTIVES:
- To provide basic knowledge about the types of Electronic payment systems.
- To provide guiding principles behind the design and strategy of the customer web interface.
- To illustrate the concepts of various On-Demand Education and Software Agents.
- To understand the traditional and new communication/marketing approach.

UNIT – I E-Commerce Infrastructure

UNIT - II E-Commerce and Web

UNIT - III Electronic Payment Systems and EDI

UNIT - IV Inter Organizational E-Commerce and Marketing

UNIT - V On-Demand Education and Software Agents

TEXT BOOKS:

REFERENCES:

**COURSE OUTCOMES:**
At the end of this course, the students will be able to
1. Identify and analyze the construction and working principles of E-Commerce.
2. Develop and implement the Electronic Payment Systems and EDI.
4. Understand Web marketing approaches and elements of branding.
5. Understand the software agents and the technology behind the agents.

| Mapping of Course Outcomes with Programme Outcomes |
|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
|                                | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1                            | √   |     |     |     |     |     |     |     |     |     |     |     |
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**COURSE OBJECTIVES:**
- To understand the importance of major decisions in supply chain management.
- To present the vision of supply chain management and their role in enterprise competitiveness.
- To appreciate the current trends in SCM.

**UNIT - I Introduction**

**UNIT - II Different Approaches**
UNIT - III Design

UNIT - IV Management

UNIT - V Integration

TEXT BOOKS :

REFERENCES :

COURSE OUTCOMES :
At the end of this course, the students will be able to
1. Acquire fundamental concepts in Supply Chain Management.
2. Build a competitive supply chain using strategies, models, techniques and information technology
3. Know about current trends in Supply Chain Management
4. Manage a competitive supply chain using models, techniques and information technology
5. How to align the management of a supply chain with corporate goals and strategies.
Mapping of Course Outcomes with Programme Outcomes

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CSOESCN | CYBER FORENSICS | L | T | P | C
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COURSE OBJECTIVES:

- To study the fundamentals of Computer Forensics.
- To learn, analyse and validate Forensics Data.
- To study the tools and tactics associated with Cyber Forensics.

UNIT – I Introduction


UNIT – II Computer Forensics Evidence and Capture


UNIT – III Computer Forensic Analysis


UNIT – IV Information Warfare


UNIT – V Computer Forensic Cases


TEXT BOOKS:


REFERENCES:

COURSE OUTCOMES:
At the end of this course, the students will be able to
1. Identify the present indicators that a Cyber Security incident has occurred.
4. Work in teams to analyze and resolve Cyber Security issues.
5. To identify methods for data recovery and to apply the methods for preservation of digital evidence.

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COURSE OBJECTIVES:
- To understand the system concept and apply functional modeling method to model the activities of a static system.
- To understand the behavior of a dynamic system and create an analogous model for a dynamic system.
- To understand and simulate the operation of a dynamic system and make improvement according to the simulation results.
UNIT-I Introduction

UNIT - II Statistical Models

UNIT - III Input Modeling

UNIT – IV Model Building
Verification of Simulation Models – Calibration and Validation of Models – Validation of Model Assumptions – Validating Input – Output Transformations.

UNIT – V Simulation Tools
Model Input – High level computer system simulation – CPU – Memory Simulation – Comparison of systems via simulation – Simulation Programming techniques - Development of Simulation models – Simulation Project Management.

TEXT BOOKS :

REFERENCES:

COURSE OUTCOMES :
At the end of this course, the students will be able to
1. Acquire knowledge of Simulation Terminologies and Classification.
2. Familiarize the idea of Mathematical Models.
3. Familiarize the Simulation Data.
4. Gain experience skills on Verification and Validation of Simulation Models.
5. Familiarize on Simulation Tools and Simulation Project Management.

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COURSE OBJECTIVES:
- To introduce fundamental techniques and tools required for big data analytics.
- To learn basic tools for statistical analysis, R, and key methods used in machine Learning.
- To learn MapReduce techniques for parallel processing and Hadoop.

UNIT – I Introduction

UNIT – II R Programming
R basics – Reading and getting data into R – Ordered and unordered factors – Arrays and matrices – Lists and data frames – Reading data from files – Probability distributions – Statistical models in R – Manipulating objects – Data distribution – Simple programs using R.

UNIT – III Map Reduce
UNIT – IV Data Analysis Techniques
Case Studies: Social Network Analysis – Text analysis – Marketing analysis.

UNIT – V Data Visualization

TEXT BOOKS:

REFERENCES:

COURSE OUTCOMES:
At the end of this course, the students will be able to
1. Understand fundamental techniques and tools required for data analytics.
2. Use basic tools for statistical analysis, R, Hadoop, and key methods used in machine learning.
3. Apply MapReduce techniques for parallel processing.
4. Apply fundamental algorithmic ideas to process data, and apply hypotheses and data into actionable predictions.
5. Document and transfer the results, and effectively communicate the findings using visualization techniques.

| Mapping of Course Outcomes with Programme Outcomes |
|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|       | CO1   | CO2   | CO3   | CO4   | CO5   | PO1   | PO2   | PO3   | PO4   | PO5   | PO6   | PO7   | PO8   | PO9   | PO10  | PO11  | PO12  |
| PO1   | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     |
| PO2   | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     |
| PO3   | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     |
| PO4   | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     |
| PO5   | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     |
| PO6   | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     |
| PO7   | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     |
| PO8   | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     |
| PO9   | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     |
| PO10  | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     |
| PO11  | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     |
| PO12  | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     | ✓     |

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COURSE OBJECTIVES:
- To understand the concept of semantic web and related applications.
- To learn knowledge representation using ontology.
- To understand human behavior in social web and related communities.
- To learn visualization of social networks.

UNIT – I Introduction

UNIT – II Knowledge Representation

UNIT - III Evolution

UNIT – IV Data Management

UNIT – V Graph Theory
TEXT BOOKS:

REFERENCES:

COURSE OUTCOMES:
At the end of this course, the students will be able to
1. Know basic notation and terminology used in network science.
2. Work on the internals components of the social network.
3. Model and visualize the social network.
4. Understand the behaviour of the users in the social network.
5. Be able to visualize social networks through various representations.

| Mapping of Course Outcomes with Programme Outcomes |
|-------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
|                             | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1                          | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓    | ✓    | ✓    |
| CO2                          | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓    | ✓    | ✓    |
| CO3                          | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓    | ✓    | ✓    |
| CO4                          | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓    | ✓    | ✓    |
| CO5                          | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓   | ✓    | ✓    | ✓    |
COURSE OBJECTIVES:
- To understand the activities in project management.
- Plan effectively the software projects and create project plans which address the challenges of real-world management.
- To impart knowledge on project monitoring and control.
- To study about managing people and teams.

UNIT - I Software Project Planning
Project Definition–Contract Management–Activities Covered By Software Project Management – Overview of Project Planning – Stepwise Project Planning.

UNIT - II Assessment and Evaluation Techniques

UNIT - III Project Scheduling and Risk Management

UNIT - IV Monitoring and Managing Contracts

UNIT - V Organizational Behaviour

TEXT BOOKS:

REFERENCES:

COURSE OBJECTIVES:
- To know the structure of Nanocomputing.
- To learn Reliability of Nano computing.
- To understand the concepts of QCA implementation.
- To study the concepts of mobile IP and mobile TCP.

UNIT - I Nano Computing Fundamentals

UNIT – II Nano Computing with Imperfections

UNIT – III Reliability of Nano Computing

UNIT – IV Nano Scale Quantum Computing

UNIT-V QCA Designer and QCA Implementation

TEXT BOOKS:
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<th>COURSE OBJECTIVES:</th>
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<td>Search and discover intelligent characteristics of existing AI projects.</td>
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<td>Map a new problem and show different search strategies for that problem.</td>
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<td>Program a new game/problem in Prolog and evaluate different Knowledge representation schemes for typical AI problems.</td>
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<tr>
<td>Design and implement an AI problem to be solved using Machine Learning Techniques.</td>
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<tr>
<td>Design and implement futuristic AI applications.</td>
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UNIT I Introduction

UNIT II Knowledge Representation and Reasoning
Issues in knowledge representation-Predicate logic-Symbolic reasoning under uncertainty-statistical reasoning-weak,strong slot and filter structures. Ontological Engineering-Categories and Objects-Actions, situations and Events.

UNIT III Problem Solving Methods

UNIT IV Advanced Topics
UNIT V Applications

TEXT BOOKS:

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Course Objectives:
- To comprehend graphs as modeling and analysis tool.
- To introduce various data structures with graph theory.
- To learn fundamentals behind principle of counting and combinatory.

UNIT – I Introduction

UNIT – II Trees, Connectivity & Planarity

UNIT – III Matrices, Clouring and Directed Graph
UNIT – IV Permutations & Combinations

UNIT – V Generating Functions

TEXT BOOKS :
1. Narsingh Deo, Graph theory, Prentice Hall India, 2008.
2. Douglas B. West, Introduction to Graph Theory, Prentice Hall India Ltd., 2001

REFERENCES :
3. “Graph Theory” by Frank Harary

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COURSE OBJECTIVES:
- To present the mathematical, statistical and computational challenges of building neural networks.
- To study the concepts of deep learning.
- To introduce dimensionality reduction techniques.
- To enable the students to know deep learning techniques to support real-time applications.
- To examine the case studies of deep learning techniques.

UNIT - I Introduction
Introduction to machine learning- Linear models (SVMs and Perceptrons, logistic regression) - Intro to Neural Nets: What a shallow network computes- Training a network: loss functions, back propagation and stochastic gradient descent- Neural networks as universal function approximate

UNIT - II Concepts of Deep Learning
UNIT - III Metric Learning
Linear (PCA, LDA) and manifolds, metric learning - Auto encoders and dimensionality reduction in networks - Introduction to Convnet - Architectures – AlexNet, VGG, Inception, ResNet - Training a Convnet: weights initialization, batch normalization, hyper parameter optimization

UNIT - IV Optimization

UNIT - V Advanced Techniques
Imagenet- Detection-Audio WaveNet-Natural Language Processing Word2Vec - Joint Detection- BioInformatics- Face Recognition- Scene Understanding- Gathering Image Captions

TEXT BOOKS :

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Course objectives:
- To introduce the basic concepts of linear programming.
- To educate on the advancements in Linear programming techniques.
- To introduce non-linear programming techniques.
- To introduce the interior point methods of solving problems.
- To introduce the dynamic programming method.

UNIT-I Linear Programming

UNIT-II Advances in LPP
Dualit theory-Dual simplex method-Sensitivity analysis—Transportation problems–Assignment problems-Traveling sales man problem-Data Envelopment Analysis
UNIT-III Non-linear Programming
Classification of Non Linear programming – Lagrange multiplier method – Karush – Kuhn Tucker conditions – Reduced gradient algorithms – Quadratic programming Method – Penalty and Barrier method.

UNIT-IV Interior Point Methods

UNIT-V Dynamic programming
Formulation of Multi stage decision problem – Characteristics – Concept of sub optimization and the principle of optimality – Formulation of Dynamic programming – Backward and Forward recursion – Computational procedure – Conversion of final Value problem in to Initial value problem

TEXT BOOKS:

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COURSE OBJECTIVES:
- To understand the need and fundamentals of parallel computing paradigms.
- To learn the nuances of parallel algorithm design.
- To understand the programming principles in parallel and distributed computing Architectures.
- To learn few problems those are solved using parallel algorithms.

UNIT – I Introduction to Parallel Computing

UNIT – II Parallel Algorithm Design
and All-to-One Reduction –All to -All Broadcast and Reduction –All -Reduce and Prefix
Sum Operations –Scatter and Gather –All -to-All Personalized Communication -Circular
Shift –Improving the Speed of some Communication Operations.

UNIT – III Programming using Message Passing and Shared Address Space
Principles of Message Passing Programming –Building Blocks –Send and Receive
Operations –MPI –Message Passing Interface –Topologies and Embedding –Overlapping
Communication with Computation –Collective Communication and Computation
Directive based Parallel Programming –Applications of Parallel Programming -Matrix-
Matrix Multiplication –Solving Systems of Equations–Sorting Networks -Bubble Sort
Variations –Parallel Depth First Search.

UNIT – IV Distributed Computing Paradigm
Paradigms for Distributed applications–Basic algorithms in Message passing Systems–
Leader Election in Rings –Mutual Exclusion in Shared Memory.

UNIT – V Fault Tolerant Design
Synchronous Systems with Crash Failures–Byzantine Failures–Impossibility in
Asynchronous Systems -Formal Model for Simulation –Broadcast and Multicast–
Specification of a Broadcast Service –Implementing a Broadcast Service –Multicast in
Groups -Distributed Shared Memory–Linearizable–Sequentially Consistent Shared
Memory –Algorithms.

TEXT BOOKS :
1. Ananth Grama, Anshul Gupta, George Karypis and Vipin Kumar, ―Introduction to
2. Haggit Attiya and Jennifer Welch, ―Distributed Computing – Fundamentals,

REFERENCES :
2. Norman Matloff, —Parallel Computing for Data Science –With Examples in R,
4. M.L. Liu, —Distributed Computing –Principles and Applicationsl, 1st edition,

CSHESCN DIGITAL WATERMARKING AND STEGANOGRAPHY L T P C
3 0 0 3

COURSE OBJECTIVES :
• To provide the basic knowledge of various methods in watermarking.
• To know the current watermarking techniques.
• To understand the types of watermarking and optimization techniques.
To understand the basic principles and different types of steganography.
To make them understand the steganalysis.

UNIT-I Watermarking

UNIT-II Survey of Current Watermarking Techniques
Cryptographic and psycho visual aspects – Choice of a workspace – Formatting the watermark bits – Merging the watermark and the cover – Optimization of the watermark receiver – Extension from still images to video.

UNIT-III Steganography

UNIT-IV Techniques for Steganography

UNIT-V Steganalysis

TEXT BOOKS:

REFERENCES: