Department of Computer Science & Engineering and Information Technology

DIGITAL ELECTRONICS
160301 (DC-1)

COURSE OBJECTIVES

- To perform the analysis and design of various digital electronic circuits.
- To learn various number systems, boolean algebra and logic gates.
- To understand the concept of counters, latches and flip-flops.

Unit-I

Introduction to Digital Electronics, Needs and Significance, Different Number System: Binary Numbers, Octal and Hexadecimal Numbers, Conversions, Complement's, Signed Binary Numbers, Binary Arithmetic's, Binary Codes: BCD, ASCII Codes.

Unit-II

Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Boolean Relations, Digital Logic Gates, De Morgan's Theorem, Karnaugh Maps and simplifications.

Unit-III

Combinational Circuits, Half Adder, Full Adder, Binary Adder-Subtractor, Binary Multiplier, Comparator, Decoders, Encoders, Multiplexers.

Unit-IV

Sequential Circuits, Latches, Flip-Flops: RS Latches, Level Clocking, D Latches, Edge-triggered D Flip-flop, Edge-triggered JK Flip-flop, JK Master-slave Flip-flop; Registers, Shift Registers, Counters, Ripple Counters, Synchronous Counters.

Unit-V

Introduction to Memory, Memory Decoding, Error Detection and Correction, Programmable Logic Array, Programmable Array Logic, Sequential Programmable Devices, RTL and DTL Circuits, TTL, ECL, MOS, CMOS, Application Specific Integrated Circuits.

RECOMMENDED BOOKS

- Digital Design,Morris Mano M. and Michael D. Ciletti, IV Edition, Pearson Education.
- Digital Electronics: Principles, Devices and Applications,Anil K. Maini, Wiley.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. **Explain** the computer architecture for defining basic component and functional unit.

CO2. **Recall** different number system and solve the basic arithmetic operations.

CO3. **Develop** the understanding of combinational circuits.

CO4. **Analyze** the basic concept of sequential circuits.

CO5. **Compare** various memories.

CO6. **Solve** the Boolean functions using logic gates.

Department of Computer Science & Engineering and Information Technology

DATA STRUCTURES
160302 (DC-2)

COURSE OBJECTIVES

- To be familiar with the use of data structures as the foundational base for computer solutions to problems.
- To understand various techniques of searching and sorting.
- To understand basic concepts about stacks, queues, lists, trees and graphs.

Unit-I

Introduction to Data Structures: Algorithms & their characteristics, Asymptotic notations. Arrays and its representations, Index to address translation. **Link list:** Introduction, Implementation of linked list, Operations, Circular link list, Doubly linked list, Polynomial manipulation using linked list.

Unit-II

Stacks: concepts and implementation of stacks, Operations on Stack, Conversion of infix to postfix notation, Evaluation of postfix expression, recursion.

Queues: concepts and implementation, Operations on Queues, Dequeue, Priority queues, Circular queues and application.

Unit-III

Trees: Types, Terminology, Binary tree -Representations, Traversal, Conversion of General Tree to Binary Tree, Binary search tree, Threaded binary tree and Height balanced tree.

Unit-IV

Searching & Sorting: Linear search, Binary Search, Bubble sort, Selection sort, Insertion sort, Quick sort, Merge sort, Radix Sort and Heap sort, Comparison between Sorting Techniques, Hashing and Collision resolution techniques.

Unit-V

Graphs: Background, Graph theory terminologies, Representation of graphs- sequential & linked representation, path matrix, Graph Traversals- BFS, DFS, spanning trees, Applications of graph.

RECOMMENDED BOOKS

- Data Structures, Algorithms and Applications in C++, Sartaj Sahni, 2nd Edition.
- An Introduction to Data Structures with Applications, Jean-Paul Tremblay, Mcgraw hill.
- Data Structures & Algorithms, Aho, Hopcroft & Ullman, original edition, Pearson Publication.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. **Outline** the basics of Algorithms and their performance criteria's.

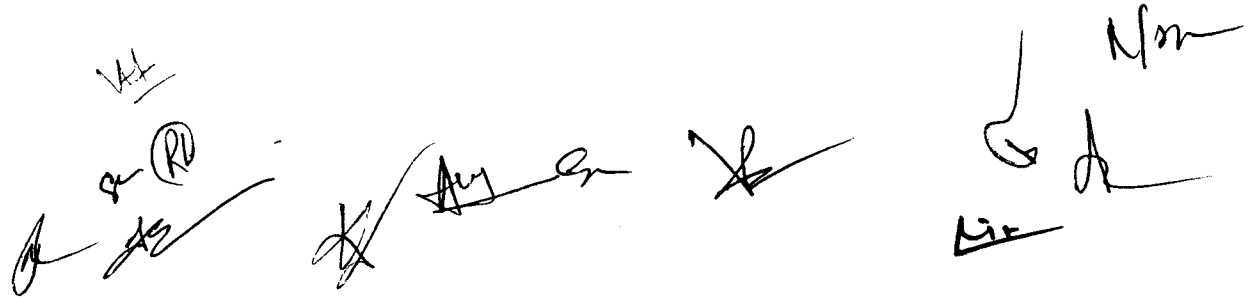
CO2. **Explain** the working of linear/Non Linear data structures.

CO3. **Identify** the appropriate data structure to solve specific problems.

CO4. **Analyze** the performance of various Data Structures & their applications.

CO5. **Evaluate** the time/space complexities of various data structures & their applications.

CO6. **Design** the optimal algorithmic solutions for various problems.



Department of Computer Science & Engineering and Information Technology

COMPUTER GRAPHICS
160303 (DC-3)

COURSE OBJECTIVES

- To provide an introduction to the theory and practice of computer graphics.
- To give a good exposure related to Computer Graphics algorithms and to design various graphics primitives.
- To enhance the proficiency in programming skills related to animation and graphics object design

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Unit-I

Introduction to Computer Graphics: Interactive Computer Graphics, Application of Computer Graphics, Random and Raster Scan Displays, Storage Tube Graphics Display, Calligraphic Refresh Graphics Display, Flat Panel Display, Refreshing, Flickering, Interlacing, Resolution, Bit Depth, Aspect Ratio etc.

Unit-II

Scan Conversion Technique: Image representation, Line drawing: DDA, Bresenham's Algorithm. Circle Drawing: General Method, Mid-Point, DDA, Bresenham's Circle Generation Algorithm, Ellipse Generation Algorithm, Curves: Parametric Function, Bezier Method, B-Spline Method.

Unit-III

2D & 3D Transformations: Translation, Rotation, Scaling, Reflection, Shearing, Inverse Transformation, Composite Transformation, World Coordinate System, Viewing Transformation, Representation of 3D object on Screen, Parallel and Perspective Projections. **Clipping:** Point clipping, Line Clipping, Simple Visibility Line Clipping Algorithm, Cohen Sutherland Line Clipping Algorithm etc, Polygon Clipping, Convex and Concave Polygon, Sutherland Hodgeman Polygon Clipping Algorithm etc, Area Filling, Hidden **Surface Elimination:** Z- Buffer algorithm and Painter's Algorithm.

Unit-IV

Basic Illumination Models: Diffuse Reflection, Specular Reflection, Phong Shading, Gouraud Shading, Color Models like RGB, YIQ, CMY, HSV etc.

Unit-V

Multimedia System: An Introduction, Multimedia hardware, Multimedia System Architecture. Data & File Format standards. i.e RTF, TIFF, MIDI, JPEG, DIB, MPEG,Audio: digital audio, MIDI, processing sound, sampling, compression.

Video: Avi, 3GP,MOV, MPEG , compression standards, compression through spatial and temporal redundancy. Multimedia Authoring.

RECOMMENDED BOOKS

- Donald Hearn and M.P. Becker: Computer Graphics, PHI Publication
- FoleyVandam, Feiner, Hughes: Computer Graphics principle and Practice
- Rogers:Principles of Computers Graphics, TMH
- Sinha and Udai: Computer Graphics, TMH
- Digital Image Processing by Gonzalez.

COURSE OUTCOMES

After completion of the course students will be able to:

CO1. **Explain** interactive Computer Graphics, various display devices and explore applications of computer graphics.

CO2. **Illustrate** various line generations, circle generation, curve generation and shape generation algorithms.

CO3. **Apply** various 2-Dimensional and 3-Dimensional transformations and projections on images.

CO4. **Classify** methods of image clipping and various algorithms for Line and Polygon clipping.

CO5. **Choose** appropriate filling algorithms, Hidden Surface Elimination algorithm and apply on various images.

CO6. **Discuss** various color models, shading methods, animation and Digital Image Processing.

Department of Computer Science & Engineering and Information Technology

OBJECT ORIENTED PROGRAMMING AND METHODOLOGY
160304 (DC-4)

COURSE OBJECTIVES

- To study about the concept of object oriented programming.
- To create C++ programs that leverage the object oriented features of the C++ Language.
- To apply object oriented or non-object oriented techniques to solve bigger computing problems.

Unit-I

Introduction to C++ and Object Oriented Concepts: Basics of C++, Tokens, I/O Statements, Structure of Program, Operators and Expressions, Flow of Control, Arrays, Structures, Functions and its type, Function Prototyping, Pointers, Pointer Variables, Pointers and Arrays, Array of Pointers, Pointers and Structures, Dynamic Memory Allocation.

Programming Techniques: Unstructured & Structured Programming, Object Oriented Paradigm, Features of Oops, Comparison with Procedural Oriented Programming & Object Oriented Programming, Abstract Data Types, Reference Variable, Scope Resolution Operator.

Unit-II

Classes & Objects: Specification of Class, Visibility Modes: Private, Public, Protected, Defining Member Functions, Creating of Objects, Characteristics of Object, Static Data Member, Static Member Function, Array of Objects, Object as Arguments, Inline Function, Default Arguments, Friend Function, Recursion.

Constructors and Destructors: Introduction, Types of Constructors-DefaultConstructor, User Defined Constructor, Parameterized Constructor, Copy Constructor, Constructor with Default Arguments, Rules of Constructor Definition and Usage, Destructors.

Unit-III

Polymorphism: Introduction, Type of Polymorphism: Compile Time Polymorphism & Run Time Polymorphism, Function Overloading, Operator Overloading: Binary

Operators, Arithmetic Assignment Operators, Unary Operators, Rules for Operator Overloading, Pitfalls of Operator Overloading, Data Conversion, Type Casting.

Unit-IV

Inheritance: Introduction to Code Reuse, Visibility Modes, Types of Inheritance: Single Level, Multilevel, Multiple, Hybrid, Multipath. Virtual Base Classes, Abstract Classes, Constructors in Derived Classes, Nesting of Classes, Overriding Member Function. Containership: Classes with in Classes, Function Overriding.

Unit-V

Pointer & File Concept: Pointers Overview, Pointers to Objects, This Pointer, Pointers to Derived Classes, Virtual Functions & Pure Virtual Function, Association, Type of Association, Aggregation, File Concepts, Study of Various Files and Streams, Opening and Closing of Files- Functions Get(), Getline(), Put(), Opening The Files Using Function Open(), File Manipulator Function.

RECOMMENDED BOOKS

- C++ How to Program, H M Deitel and P J Deitel, Prentice Hall.
- Programming with C++, D Ravichandran, T.M.H.
- Computing Concepts with C++ Essentials, Horstmann, John Wiley.
- The Complete Reference in C++, Herbert Schildt, TMH.
- Object-Oriented Programming in C++, E Balagurusam.
- Fundamentals of Programming C++, Richard L. Halterman.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. **Tell** the concepts of classes & objects and their significance in real world.

CO2. **Explain** the benefits of object oriented design.

CO3. **Build** C++ classes using appropriate encapsulation and design principles.

CO4. **Analyze** the utilization of inheritance and polymorphism in the solution of problems.

CO5. **Choose** appropriate object orient programming concepts for solving real world problems.

CO6. **Develop** solutions to problems demonstrating usage of control structures, modularity, I/O and other standard language constructs.

Department of Computer Science & Engineering and Information Technology

DATA STRUCTURES
(160302)

LIST OF PROGRAMS

1. WAP that uses functions to perform the following:
   a) Create a singly linked list of integers.
   b) Delete a given integer from the linked list.
   c) Display the contents of the list after deletion.

2. WAP to perform the following using functions:
   a) Create a doubly linked list of integers.
   b) Delete a given integer from the doubly linked list.
   c) Display the contents of the list after deletion.

3. WAP that uses stack operations to convert a given infix expression into its postfix equivalent.

4. WAP to implement a double ended queue using array and doubly linked list respectively.

5. WAP to perform the following using functions:
   a) Create a binary search tree of characters.
   b) Traverse the above Binary search tree recursively in Postorder.

6. WAP to perform the following using functions:
   a) Create a binary search tree of integers.
   b) Traverse the Binary search tree non recursively in inorder.

7. WAP for implementing the following sorting methods to arrange a list of integers in ascending order:
   a) Insertion sort
   b) Merge sort

8. WAP for implementing the following sorting methods to arrange a list of integers in ascending order:
   a) Quick sort
   b) Selection sort

9. WAP to count the number of nodes in the binary search tree.

10. WAP to implement stack using linked list.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. **Select** the appropriate data structure based on their time/space complexity for the given problem.

CO2. **Illustrate** various sorting and searching algorithms.

CO3. **Apply** the concepts of trees and graphs.

CO4. **Compare** different implementations of data structures and recognize their advantages and disadvantages.

CO5. **Evaluate** problems using stack and linked lists.

CO6. **Design** programs using linear and non-linear data structures.

Department of Computer Science & Engineering and Information Technology

COMPUTER GRAPHICS & MULTIMEDIA
(160303)

LIST OF PROGRAMS

1. WAP to implement line generation using DDA algorithm.
2. WAP to implement line using Bresenham's line generation algorithm.
3. WAP to generate circle using Mid Point algorithm.
4. WAP to perform translation, rotation scaling on 2-D transformation.
5. WAP to fill polygon using seed fill algorithm.
6. WAP to implement translation of a line and triangle.
7. WAP to implement rotation of a line and triangle.
8. WAP program to implement scaling transformation.
9. WAP to implement 3D rotation about an arbitrary axis.
10. WAP to implement cohen sutherland line clipping.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. **Choose** appropriate line, circle and other curves generation algorithms.

CO2. **Demonstrate** the concept of graphics to create an image using computer.

CO3. **Apply** graphics programming techniques to design, and create computer graphics scenes.

CO4. **Analyze** the importance of viewing and projections.

CO5. **Justify** various colour models, shading, animation and digital image processing in coding.

CO6. **Develop** programs for clipping of images.

Department of Computer Science & Engineering and Information Technology

OBJECT ORIENTED PROGRAMMING AND METHODOLOGY (160304)

LIST OF PROGRAMS

1. WAP to swap two integers without using third variable. The swapping must be done in a different method in a different class.
2. WAP that uses a class where the member functions are defined outside a class.
3. WAP to find the greater of two given numbers in two different classes using friend function.
4. Create an abstract class Shape which has a field PI=3.14 as final and it has an abstract method Volume. Make two subclasses Cone and Sphere from this class and they print their volume.
5. Create a class called LIST with two pure virtual function store() and retrieve().To store a value call store and to retrieve call retrieve function. Derive two classes stack and queue from it and override store and retrieve.
6. WAP to define the function template for calculating the square of given numbers with different data types.
7. Design a class to represent a bank account. Which include contains account number, name of the depositor, type of the account, balance amount in the account. Define Methods, to assign initial values, to Deposit an amount, to Withdraw amount after checking balance, to display name and balance.
8. Create an inheritance hierarchy of Rodent, Mouse, Gerbil, Hamster etc. In the base class provide methods that are common to all Rodents and override these in the derived classes to perform different behaviors, depending on the specific type of Rodent. Create an array of Rodent, fill it with different specific types of Rodents and call your base class methods.
9. WAP to demonstrate the multilevel inheritance.
10. WAP to raise an exception if any attempt is made to refer to an element whose index is beyond the array size.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. **Select** proper arithmetic, logical, relational, and string manipulation expressions to process data.

CO2. **Demonstrate** the use of various OOPs concepts with the help of programs.

CO3. **Apply** validation techniques to build a reliable solution to a given problem.

CO4. **Analyze** and write programs to solve more complicated problems using the concepts of object oriented methodology.

CO5. **Choose** appropriate programming concepts as and when required in the future application development.

CO6. **Construct** a complete class definition with in the class definition, write class and instance methods including the constructor and overloaded methods.

Department of Computer Science & Engineering and Information Technology

HARDWARE LAB
160305 (DLC-1)

COURSE OBJECTIVES

- To understand various number systems, boolean algebra, logic gates.
- To acquire the knowledge of a computer system, motherboard and its processing unit.
- To be aware of different memories, I/O devices, windows installation and SMPS.

Unit -I

Number System, Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Boolean Relations, Digital Logic Gates, De Morgan's Theorem, Karnaugh Maps and simplifications.

Unit-II

Combinational Circuits, Half Adder, Full Adder, Binary Adder-Subtractor, Binary Multiplier, Comparator, Decoders, Encoders, Multiplexers.

Unit -III

Sequential Circuits, Latches, Flip-Flops: Edge-triggered D Flip-flop, Edge-triggered JK Flip-flop, JK Master-slave Flip-flop, Registers. Integrated circuits.

Unit-IV

Introduction of Motherboard, Types of Motherboard, Integrated Motherboards, Non-Integrated Motherboards, Desktop Motherboards, Server Motherboards, Laptop Motherboards, Factors of Motherboard, Components of a Motherboard, Manufacturers of Motherboards, Bus Architecture.

Unit -V

Introduction to Memory, Types of Memory, Installation and Partition of Hard Disk, Working of Hard Disk. Basics of I/O Devices, Introduction to Ports, Identify the Different Ports, Ports Troubleshooting. Windows Installation. SMPS (Switch Mode Power Supply).

RECOMMENDED BOOKS

- Digital Design, Morris Mano M. and Michael D. Ciletti, IV Edition, Pearson Education.
- Digital Electronics: Principles, Devices and Applications, Anil K. Maini, Wiley.
- The Indispensable PC Hardware Book, Hans-Peter Messmer, Third Edition.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. **Illustrate** the concept of number system and Boolean algebra.

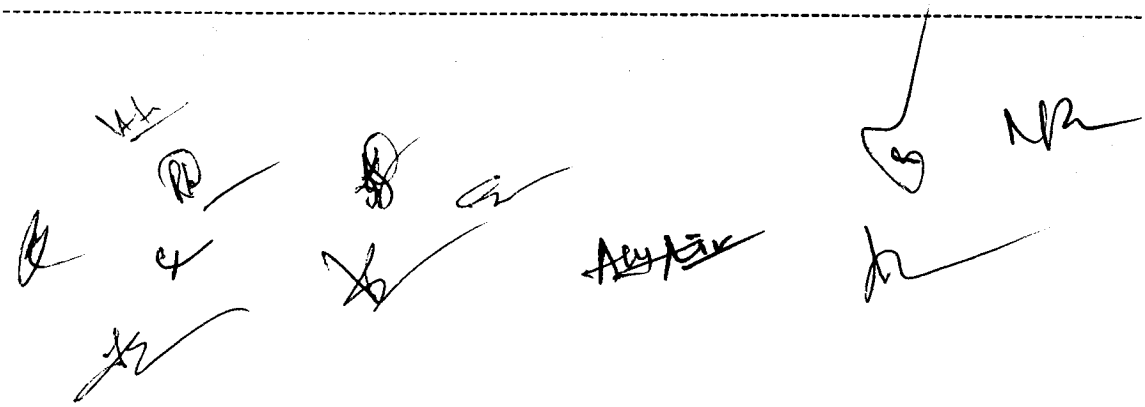
CO2. **Demonstrate** installation of windows and connections through ports at basic level.

CO3. **Build** various circuits and inspect their working.

CO4. **Examine** the ICs specifications and their functioning.

CO5. **Explain** the concept of Memory, Motherboard, Bus, and SMPS.

CO6. **Choose** appropriate logic gates to design combinational & sequential circuits.



Department of Computer Science & Engineering and Information Technology

DESIGN & ANALYSIS OF ALGORITHMS
160401 (DC-5)

COURSE OBJECTIVES

- To introduce the topic of algorithms as a precise mathematical concept.
- To study the techniques like recursion, divide and conquer, dynamic programming, greedy approach, backtracking and branch and bound.
- To practice their skills on many well-known algorithms and data structures designed to solve real-life problems.

Unit-I

Introduction to Computational Model: RAM, Turing machine, Circuit model, PRAM, Bulk synchronous parallel (BSP) Model, Algorithms and its Importance, Recurrences and Asymptotic Notations, Mathematical Analysis of Non-Recursive and Recursive Algorithm, Review of Sorting & Searching Algorithms, **Basic Tree and Graph Concepts:** Binary Search Trees, Height Balanced Trees, B-Trees and Traversal Techniques.

Unit-II

Divide and Conquer Method: Introduction and its Examples such as Finding the Maximum and Minimum, Binary Search, Merge Sort, Quick Sort and Strassen's Matrix Multiplication.

Unit-III

Greedy Method: Introduction, Characteristics, Examples of Greedy Methods such as Single-Source Shortest Paths, **Minimum Cost Spanning Trees :** Prims's and Kruskal's Algorithm, Knapsack Problem, Dijkstra's single source shortest path algorithm, Optimal Storage on Tapes.

Unit-IV

Dynamic Programming: Introduction, The Principle of Optimality, Examples of Dynamic Programming Methods such as – 0/1 Knapsack, Traveling salesman problem, Floyd's All Pairs Shortest Path, Longest Common Subsequence and Reliability Design.

Unit-V

Backtracking: Concept and its Examples like 4-Queen's Problem, Knapsack problem Hamiltonian Circuit Problem, Graph Coloring Problem etc. **Branch & Bound:** Introduction and its Examples like - Traveling Salesperson Problem etc. **NP-Completeness:** Introduction, Class P and NP, Polynomial Reduction, NP-Hard and NP-Complete Problems.

RECOMMENDED BOOKS

- Fundamentals of Computer Algorithms, Horowitz & Sahani, Universities press.
- Introduction to Algorithms, Coremen Thomas, Leiserson CE, Rivest RL, PHI.
- Design & Analysis of Computer Algorithms, Ullmann, Pearson.
- Algorithm Design, Michael T Goodrich, Robarto Tamassia, Wiley India.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. **Tell** the basic features of an algorithm.

CO2. **Demonstrate** a familiarity with major algorithms and data structures.

CO3. **Apply** important algorithmic design paradigms and methods of analysis.

CO4. **Analyze** the asymptotic performance of algorithms.

CO5. **Compare** different design techniques to develop algorithms for computational problems.

CO6. **Design** algorithms using greedy strategy, divide and conquer approach, dynamic programming, backtracking and branch n bound approach.

Department of Computer Science & Engineering and Information Technology

DATABASE MANAGEMENT SYSTEM
160402 (DC-6)

COURSE OBJECTIVES

- To understand the different issues involved in the design and implementation of a database system.
- To study the physical and logical database designs, database modeling, relational, hierarchical and network models.
- To understand and use data manipulation language to query, update and manage a database.

Unit-I

DBMS: Concepts & Architecture, Introduction of File organization Techniques, Database Approach v/s Traditional File Approach, Advantages of Database System, Schemas, Instances, Data Independence, Functions of DBA, Entities & Attributes, Entity types, Value Sets, Key Attributes, Relationships, E-R Diagram.

Data Models: Hierarchical Data Model, Network Data Model & Relational Data Model, Comparison between Models.

Unit-II

Relational Data Models: Domains, Tuples, Attributes, Relations, Characteristics of Relations, Keys, Attributes of Relation, Relational Database, Integrity Constraints.

Query Languages: Relational Algebra & Relational Calculus, Relational Algebra operations like Select, Project, Division, Intersection, Union, Division, Rename, Join etc.

Unit-III

SQL: Data Definition, Data Manipulation in SQL, Update Statements & Views in SQL Query & Subquery, Query by Example Data Storage Definition, Data Retrieval Queries, Set Operations, Aggregate functions, Nested sub queries,Data Manipulation Statements etc . Overview of Tuple Oriented & Domain Oriented Relational Calculus & Operations.

Unit-IV

Database Design: Introduction to Normalization, Various Normal Forms: 1NF, 2NF, 3NF, BCNF, Functional Dependency, Attribute closure, Decomposition, Dependency Preservation, Loss Less & Lossy Join, Problems with Null Valued & Dangling Tuple, Multivalued Dependencies.

Unit-V

Transaction Processing Concepts: Introduction, State Diagram, Properties of Transaction, Types of Transaction, Serializability: Conflict and View Serializability, Concurrency Control: Concepts, Techniques, Concurrent operation of Databases, Recovery: Introduction, Types of Recovery.

Overview of Distributed Databases: Protection, Security & Integrity Constraints. Relational Database Management Systems: Oracle & Microsoft Access Tools. Basic Concepts of Object Oriented Database System & Design.

RECOMMENDED BOOKS

- Database System Concepts,Abraham Silberschatz Henry F. Korth S. Sudarshan, McGraw-Hill 6th Edition.
- Database Management System, Raghu Ramakrishnan Johannes Gehrke, McGraw Hill 3rd Edition.
- Fundamentals of Database System, Elmasri&Navathe, Addison-Wesley Publishing, 5th Edition.
- An Introduction to Database Systems, Date C. J, Addison-Wesley Publishing, 8th Edition.

COURSE OUTCOMES

After successful completion of the course students will be able to:

CO1. **Tell** the terminology, features, classifications, and characteristics embodied in database systems.

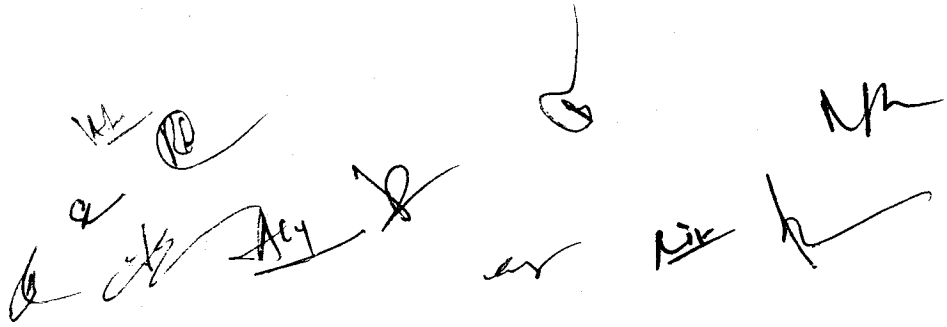
CO2. **Explain** different issues involved in the design and implementation of database system.

CO3. **Apply** transaction processing concepts and recovery methods over real time data.

CO4. **Analyze** database schema for a given problem domain.

CO5. **Justify** principles for logical design of databases, including the E-R method and normalization approach.

CO6. **Formulate**, using relational algebra and SQL, solutions to a broad range of query problems.



Department of Computer Science & Engineering and Information Technology

OPERATING SYSTEM
160403 (DC-7)

COURSE OBJECTIVES

- To provide basic knowledge of computer operating system structures and functioning.
- To compare several different approaches to memory management, file management and process management.
- To understand various problems related to concurrent operations and their solutions.

Unit I

Basics of Operating System: Generations, Types, Structure, Services, System Calls, System Boot, System Programs, Protection and Security.

Unit II

Process Management: Process Concepts, Process States, Process Control Block, Scheduling-Criteria, Scheduling Algorithms and their Evaluation, Threads, Threading Issues.

Unit III

Process Synchronization: Background, Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Classic Problems of Synchronization, Monitors.

Deadlock: System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery form Deadlock.

Unit IV

Memory Management: Main Memory, Swapping, Contiguous Memory Allocation, Paging, Structure of Page Table, Segmentation, Virtual Memory, Demand Paging, Page Replacement Algorithms, Allocation of Frames, Thrashing.

Unit V

Storage Management: Mass-Storage Structure, Overview, Disk Structure, Disk Attachment, Disk Scheduling.

File System Interface: The Concept of a File, Access Methods, Directory Structure, File System Structure, Allocation Methods, Free-Space Management.

RECOMMENDED BOOKS

- Operating System Concepts, Silberschatz, Ninth Edition, Willey Publication.
- Operating Systems, internals and Design Principles, Stallings, Seventh Edition,Pearson Publication.
- Modern Operating Systems,Tanenbaum, Fourth Edition. Pearson Publication.

COURSE OUTCOMES

After the successful completion of this course, the student will be able to:

CO1. **Tell** the basic concept of operating systems.

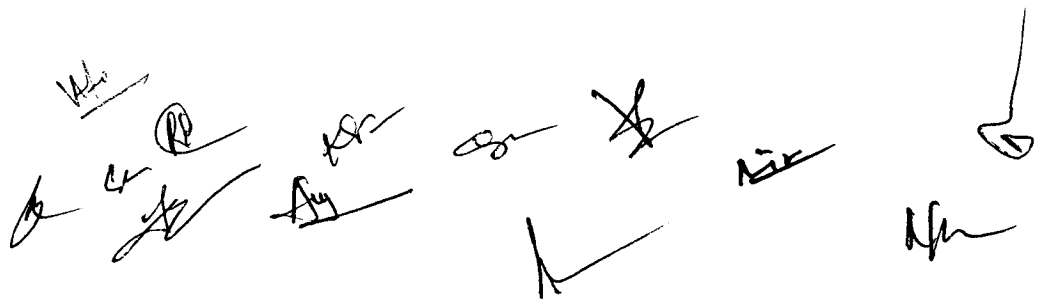
CO2. **Explain** the working of operating system.

CO3. **Develop** the solution of various operating system problems/issues.

CO4. **Analyze** the various operating system problems/issues.

CO5. **Measure** the performance of various scheduling/allocation approaches.

CO6. **Test** the working of various scheduling/allocation approaches.



Department of Computer Science & Engineering and Information Technology

COMPUTER SYSTEM ORGANIZATION
160404 (DC-8)

COURSE OBJECTIVE

- To provide the fundamental knowledge of a computer system and its processing units.
- To provide the details of input & output operations, memory management and performance measurement of the computer system.
- To understand how computer represents and manipulate data.

Unit -I

Introduction: Von Newman Model, Various Subsystems, CPU, Memory, I/O, System Bus, CPU and Memory Registers, Program Counter, Accumulator, Register Transfer and Micro Operations: Register Transfer Language, Register Transfer, Tree-State Bus Buffers, Bus and Memory Transfers, Arithmetic Micro-Operation, Logic Micro-Operation, Shift Micro-Operation Register Transfer Micro Operations, Arithmetic Micro-Operations, Logic Micro-Operations and Shift Micro-Operations.

Unit- II

Computer Arithmetic: Addition and Subtraction with Signed-Magnitude, Multiplication Algorithm, Division Algorithm, Division Algorithms, Floating-Point Arithmetic Operations.

Central Processing Unit (CPU): General Purpose Register Organization, Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer (RISC).Hardwired and Microprogrammed Control.

Unit -III

Microprocessors: Introduction of 8085 Microprocessor: Architecture, Instruction Set, Addressing Modes, Interrupts and Basic Assembly Language Programming.

Unit -IV

Input-Output Organization: Peripheral Devices, I/O Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, DMA (DMA Controller, DMA Transfer),

Input-Output Processor (IOP), Data Transfer- Serial/Parallel, Simplex/ Half Duplex/ Full Duplex.

Unit-V

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory- Organization and Mappings, Memory Management Hardware, Introduction to Pipelining & Multiprocessors.

RECOMMENDED BOOKS

- Computer System Architecture, Morris Mano, PHI.
- Microprocessor Architecture, Programming and Applications with the 8085, Gaonkar, Penram International Publishing (India) Pvt.Ltd.
- Computer Organization, Carl Hamacher, THM.
- Computer Architecture and Organization, J P Hayes, Mc-Graw Hills, New Delhi.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. **Recall** the basic building blocks of computer Architecture.

CO2. **Compare** different memories.

CO3. **Apply** the concept of memory mapping, multiprocessor and pipelining in solving real world problems.

CO4. **Analyze** various modes of Input-Output data transfer.

CO5. **Evaluate** the arithmetic related to the number system.

CO6. **Develop** the skill of writing low level programming.

Department of Computer Science & Engineering and Information Technology

CYBER SECURITY
100004 (MC-2)

COURSE OBJECTIVES

- To provide an understanding of cyber security fundamentals.
- To analyze various cyber attacks and their countermeasures.
- To provide basics of Internet and networking.
- To identify various cyber security threats and vulnerabilities.
- To apply forensic science to investigate a cyber crime.

Unit-I

Introduction- Overview of Cyber Security, Cyber Crime, Cyber Warfare, Cyber Terrorism, Cyber Espionage, Cyber Vandalism (Hacking), Cyber Stalking, Internet Frauds and Software Piracy.

Unit-II

Basics of Internet & Networking- Wired and Wireless Networks, Internetworking Devices, Topologies, Web Browser, Web Server, OSI Model, IP Addressing, Firewall, E-Commerce, DNS, NAT, VPN, HTTP & HTTPS.

Unit-III

Cryptography and Network Security- Security Principles, Attacks, Cryptography, Steganography, Cryptanalysis, Symmetric key and Public key cryptography, Digital Signature, Intrusion Detection System, Secure Socket Layer(SSL) & Secure Electronic Transaction(SET).

Unit-IV

Cyber Security Threats and Vulnerabilities- Hacker, Types of Hacker- White, Gray and black, **Malicious Software's-** Virus, Worm, Trojan Horse, Backdoors and Spywares. Sniffers, Denial of Service Attack and Phishing.

Unit-V

Cyber Crime Investigation and Legal Issues: Intellectual property, privacy issues, IT Act 2000, Basics of Cyber Crime Investigation- Cyber Forensics, Electronic Evidences and its Types.

RECOMMENDED BOOKS

- Cryptography and Network Security, 4/E, William Stallings, 4th edition, Pearson publication.
- Computer Security: Principles and Practice, Stallings William, Pearson publication.
- Investigating Network Intrusions and Cybercrime, EC-Council Press.
- Network Forensics, Tracking Hackers through Cyberspace, Sherri Davidoff, Jonathan Ham, Prentice Hall.
- Cryptography and Network Security, 3e, Atul Kahate, McGraw Hill publication.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. Tell the basic terminologies of Cyber Security.

CO2. Explain the basic concept of networking and Internet.

CO3. Apply various methods used to protect data in the internet environment in real world situations.

CO4. Discover the concept of IP security and architecture.

CO5. Compare various types of cyber security threats/vulnerabilities.

CO6. Develop the understanding of cyber crime investigation and IT ACT 2000.

Department of Computer Science & Engineering and Information Technology

DESIGN AND ANALYSIS OF ALGORITHM
(160401)

LIST OF PROGRAMS

1. WAP to implement the following using array as data structure and analyze its time complexity.
   a. Insertion sort b. Selection sort c. Bubble sort d. Quick sort e. Merge sort
   f. Bucket sort g. Shell sort h. Radix sort i. Heap sort
2. WAP to implement Linear and Binary Search and analyze its time complexity.
3. WAP to implement Matrix Chain Multiplication and analyze its time complexity.
4. WAP to implement Longest Common Subsequence Problem and analyze its time complexity.
5. WAP to implement Optimal Binary Search Tree Problem and analyze its time complexity.
6. WAP to implement Huffman Coding and analyze its time complexity.
7. WAP to implement Dijkstra's Algorithm and analyze its time complexity.
8. WAP to implement Bellman Ford Algorithm and analyze its time complexity.
9. WAP to implement DFS and BFS and analyze their time complexities.
10. WAP to Implement 0/1 knapsack using dynamic programming.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. **Relate** the principles of algorithm design in solving problems.

CO2. **Demonstrate** basic algorithms and different problem solving strategies.

CO3. **Build** creativeness and confidence to solve non-conventional problems.

CO4. **Analyze** running times of algorithms using asymptotic analysis.

CO5. **Compare** various algorithm design approaches for solving real world problems.

CO6. **Design** and implement optimization algorithms in specific applications.

Department of Computer Science & Engineering and Information Technology

DATA BASE MANAGEMENT SYSTEM
(160402)

LIST OF PROGRAMS

1. Implementation of DDL commands of SQL with suitable examples
   - Create table
   - Alter table
   - Drop Table

2. Implementation of DML commands of SQL with suitable examples
   - Insert
   - Update
   - Delete

3. Implementation of different types of function with suitable examples
   - Number function
   - Aggregate Function
   - Character Function
   - Conversion Function
   - Date Function

4. Implementation of different types of operators in SQL
   - Arithmetic Operators
   - Logical Operators
   - Comparison Operator
   - Special Operator
   - Set Operation

5. Implementation of different types of Joins
   - Inner Join
   - Outer Join
   - Natural Join etc.

6. Study and Implementation of
   - Group By & having clause
   - Order by clause
   - Indexing

7. Study & Implementation of
   - Sub queries
   - Views

8. Study & Implementation of different types of constraints.

9. Study & Implementation of Database Backup & Recovery commands. Study & Implementation of Rollback, Commit, Savepoint.

10. Creating Database /Table Space
    - Managing Users: Create User, Delete User
    - Managing roles:-Grant, Revoke.

11. Study & Implementation of PL/SQL.

12. Study & Implementation of SQL Triggers.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. **Choose** database schema for a given problem domain.

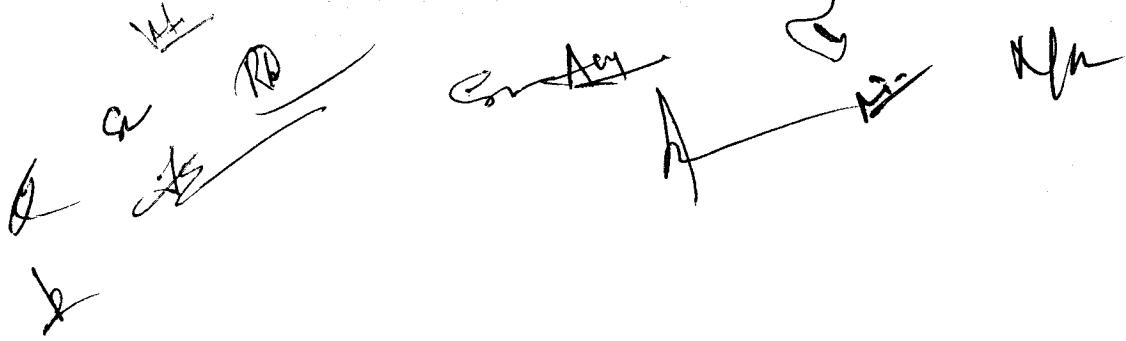
CO2. **Illustrate** relational data model with relational algebra operations.

CO3. **Build** normalized database, query a database using SQL DML/DDL commands.

CO4. **Analyze** integrity constraints on a database using a state-of-the-art RDBMS.

CO5. **Determine** data selection and operators used in queries and restrict data retrieval and control the display order.

CO6. **Create** database using aggregation, group functions and joining tables to summarize data.



Department of Computer Science & Engineering and Information Technology

PROGRAMMING LAB
(JAVA PROGRAMMING)
160405 (DLC-3)

COURSE OBJECTIVES

- To understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.
- To acquire the ability to write a computer program to solve specified problems.
- To be able to use Java SDK environment to create, debug and run simple Java programs.

Unit-I

Introduction to Java programming: Overview and Characteristics of Java, The Java Virtual Machine, Installing Java, Java Program Development, Java Source File Structure, Compilation, Executions. Packages, Package access, Variables and data types, Conditional and looping constructs, Arrays.

Unit-II

Object-oriented programming with Java Classes and Objects: Fields and Methods, Constructors, Overloading methods, Nested classes, Overriding methods, Polymorphism, Making methods and classes final, Wrapper classes.

Unit-III

Extending Classes and Inheritance: Types of Inheritance in Java, Abstract classes and methods, Interfaces, use of 'super', Polymorphism in inheritance. Garbage collection in JAVA.

Exception handling: Try- Catch, Throw, Throws, Finally constructs, The Exception class.

Unit-IV

String Package and Multithreading: Operation on String, Mutable & Immutable String, Tokenizing a String, Creating Strings using String Buffer class.

Understanding Threads: Needs of Multi-Threaded Programming, Thread Life-Cycle, Thread Priorities and Synchronizing Threads.

Unit-V

The I/O Package: Input Stream and Output Stream classes, Reader and Writer classes, Basics of AWT, Swing and Applets: Layout Managers, Event Handling, Classes for various controls, such as label, choice, list, checkbox, etc., Dialogs and frames using menus.

Basic concepts of networking: Working with URLs, Concepts of URLs and Sockets. Basics of database connectivity with JDBC.

RECOMMENDED BOOKS

- Programming with JAVA: A Primer, E. Balagurusamy, Tata McGraw Hill.
- JAVA: The Complete Reference, Herbert Schildt, McGraw Hill Education.
- JAVA-2: The Complete Reference, Patrick Naughton, Herbert Schidt.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. **Tell** the available features in Java programming language.

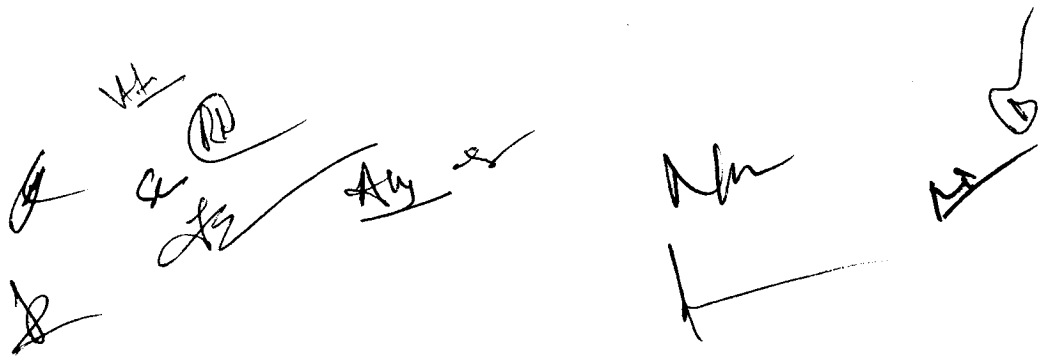
CO2. **Illustrate** Java programming constructs in solving problems.

CO3. **Make use of** Java programming language for creating databases.

CO4. **Test for** bugs in a software application written in Java programming language.

CO5. **Determine** different ways for handling exception, memory management, file handling, I/O management and internet based application development.

CO6. **Build** a project for application development using Java programming language.



Department of Computer Science & Engineering and Information Technology

ARTIFICIAL INTELLIGENCE & EXPERT SYSTEMS
BITL -701

COURSE OBJECTIVES

- To provide an introduction to the Artificial Intelligence and its methods.
- To enhance the capability of analysis for Machine learning and fuzzy logic.
- To apply the mathematical concepts in designing and executing the knowledge representation and problem solving.

Unit-I

Definition, Scope, Task and Objectives of Artificial Intelligence, AI Problems, Applications of AI. The Importance of AI, AI and related fields. Problems, Problem Spaces and Production System. Components of Production System, Characteristics of Production Systems, Types of Production System. Control Strategies, Application of Production Systems, water-jug, 8 – Puzzle and other advance Problems.

Unit-II

Searching : The Blind and Informed Searches, Breadth First Search, Depth First Search and their implementation using Open and Closed list, Heuristic estimation and evaluation, Hill climbing and their Problems, Best First Search, Searching And-Or Graphs, A * search, AO * search.

Unit-III

Knowledge Representation: General Concept, Introduction, Definition and importance Of Knowledge, Approaches to knowledge Representation, Issues in Knowledge Representation, Procedural and Declarative Knowledge, Forward Versus Backward Reasoning, Knowledge Representation Techniques: Logics, Prepositional Logic, Predicate Logic.

Unit-IV

Semantic Nets, Partition Semantic Nets, Frames, Conceptual Dependencies, Scripts, Bay's Theorem, Fuzzy Logic, Game Playing: Min – Max Search Procedure.

Unit-V

Planning, Understanding, Natural Language Processing, Speech Recognition, Computer Vision, Expert System and Expert System Cell.

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RECOMMENDED BOOKS

- Artificial Intelligence, Rich & Knight McGraw Hill.
- Introduction to Artificial Intelligence and Expert Systems –Dan. W. Patterson, PHI.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. **Tell** the basics of concept of artificial intelligence.

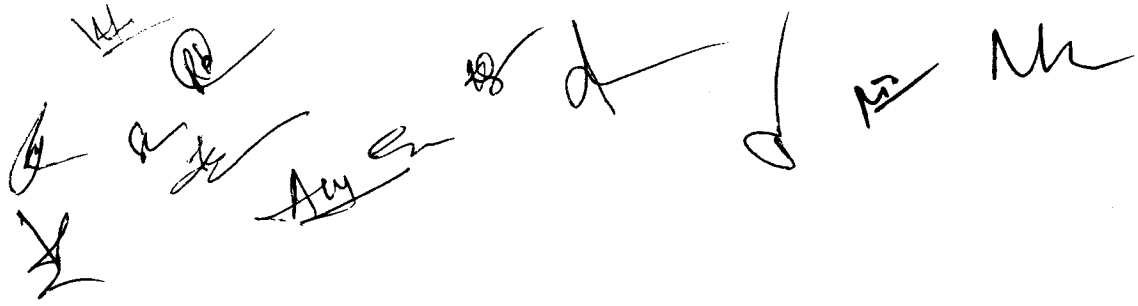
CO2. **Illustrate** various algorithms for efficient formed & informed search.

CO3. **Identify** the appropriate search methods to solve specific problems.

CO4. **Analyze** the performance of knowledge representation methods used in Artificial intelligence.

CO5. **Explain** machine learning methods in robotics & other applications.

CO6. **Design** game playing techniques by applying programming methods of puzzle solving techniques.



Department of Computer Science & Engineering and Information Technology

DISTRIBUTED SYSTEMS
BITL -702 (Elective – III)

COURSE OBJECTIVES

- To provide students contemporary knowledge of distributed systems.
- To equip students with skills to analyze and design distributed applications.
- To gain experience in the design and testing of a large software system, and to be able to communicate that design to others.

Unit - I

Introduction to distributed systems: Architecture for Distributed System, Goals of Distributed system, Hardware and Software concepts, Distributed Computing Model, Advantages & Disadvantage distributed system, Issues in designing Distributed System.

Unit -II

Distributed Share Memory: Basic Concept of Distributed Share Memory (DSM), DSM Architecture & its Types, Design & Implementations issues In DSM System, Structure of Share Memory Space, Consistency Model, and Thrashing.

Unit - III

Distributed File System: Desirable features of good Distributed File System, File Model, File Service Architecture, File Accessing Model, File Sharing Semantics, File Catching Scheme, File Application & Fault tolerance. Naming - Features, System Oriented Names, Object Locating Mechanism, Human Oriented Name.

Unit - IV

Inter Process Communication and Synchronization: API for Internet Protocol, Data Representation & Marshaling, Group Communication, Client Server Communication, RPC- Implementing RPC Mechanism, Stub Generation, RPC Messages. Synchronization: - Clock Synchronization, Mutual Exclusion, Election Algorithms - Bully & Ring Algorithms.

Unit - V

Distributed Scheduling and Deadlock Distributed Scheduling- Issues in Load Distributing, Components for Load Distributing Algorithms, Different Types of Load Distributing Algorithms, Task Migration and its issues. Deadlock- Issues in deadlock detection & Resolutions, Deadlock Handling Strategy, Distributed Deadlock Algorithms. Case Study of Distributed System: Amoeba, Mach, Chorus.

RECOMMENDED BOOKS

- Distributed Operating System Concept & Design, Sinha, PHI .
- Distributed System Concepts and Design, Coulouris & Dollimore, Pearson Pub.
- Distributed Operating System, Andrew S. Tanenbaum, Pearson.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. **Tell** the basic elements and concepts related to distributed system technologies

CO2. **Demonstrate** knowledge of the core architectural aspects of distributed systems.

CO3. **Identify** how the resources in a distributed system are managed by Algorithm.

CO4. **Examine** the concept of distributed file system and distributed shared memory.

CO5. **Compare** various distributed system algorithms for solving real world problems.

CO6. **Discuss** large-scale distributed applications.

Department of Computer Science & Engineering and Information Technology

INFORMATION TECHNOLOGY INFRASTRUCTURE AND ITS MANAGEMENT
BITL – 703 (Elective – IV)

COURSE OBJECTIVES

- To explain current trends in IT infrastructure and their impacts on IT infrastructure management.
- To demonstrate an awareness of current IT governance frameworks and their relevance to the development of IT infrastructure management plans and proposals.
- To analyse current IT infrastructure management plans and practice, and assess their degree of alignment with organizational business and strategic goals.

Unit - I

Infrastructure Management Overview: Definitions, Infrastructure management activities, Evolutions of Systems since 1960s (Mainframes-to-Midrange-to-PCs-to-Client-server computing-to-New age systems) and their management, growth of internet, current business demands and IT systems issues, complexity of today's computing environment, Total cost of complexity issues, Value of Systems management for business.

Unit - II

Preparing for Infrastructure Management: Factors to consider in designing IT organizations and IT infrastructure, Determining customer's Requirements, Identifying System Components to manage, Exist Processes, Data, applications, Tools and their integration, Patterns for IT systems management, Introduction to the design process for information systems, Models, Information Technology Infrastructure Library (ITIL).

Unit - III

Service Delivery Processes: Service-level management, financial management and costing, IT services continuity management, Capacity management, Availability management.

Unit - IV

Service Support Processes: Configuration Management, Service desk. Incident management, Problem management, Change management, Release management.

Unit - V

Storage and Security Management: Introduction Security, Identity management, Single sign-on, Access Management, Basics of network security, LDAP fundamentals, Intrusion detection, firewall, security information management, Introduction to Storage, Backup & Restore, Archive & Retrieve, Space Management, SAN & NAS, Disaster Recovery, Hierarchical space management, Database & Application protection, Bare machine recovery, Data retention.

RECOMMENDED BOOKS

- Jan Van Bon, "Foundations of IT Service Management: based on ITIL" Van Haren Publishing, 2nd edition 2005.
- Harris Kem, Stuart Gaiup, Guy Nemiro, "IT Organization: Building a Worldclass Infrastructure", Prentice Hall, 2000.
- Rich Schiesser, "IT Systems Management: Designing, Implementing, and Managing World-Class Infrastructures", Prentice Hall PTR, 2001.
- Phalguni Gupta, "IT Infrastructure and its Management", Tata McGraw Hill Education Private Limited.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1 **Recall** the concepts and histories of computer platforms and operating systems, network, data storage and applications.

CO2 **Extend** the knowledge scope from Technique to Management.

CO3 **Develop** business continuity with IT services on storage management.

CO4 **Analyze** the relation between different components of IT infrastructure management.

CO5 **Determine** service delivery processes and service support processes for IT infrastructure management.

CO6 **Estimate** storage and security management issues and its counter measures in IT service management.

Department of Computer Science & Engineering and Information Technology

ADHOC NETWORK
BITL - 704

COURSE OBJECTIVES

- To recognize needs of different set of MAC, routing and transport protocols for wireless computer networks.
- To analyze performance of MANET Routing Protocols under different mobility patterns.
- To identify different methods for energy saving in a mobile device.

Unit -I

Introduction: Wireless Networks, Cellular Mobile Network, Wireless LAN, Ad Hoc Networks, Sensor Network, Differences between Cellular and Ad Hoc, Issues in Ad Hoc Wireless Networks, Applications of Ad Hoc Wireless Networks.

Unit -II

MAC Layer: Introduction, Issues and Need for Medium Access Control. Problems in Ad Hoc Channel Access such as Hidden Terminal Problem and Exposed Node Problem. Classification of MAC Protocols – Contention Based MAC Protocols such as ALOHA and CSMA, Contention-Based MAC Protocols with Reservation Mechanisms such as MACA and MACA-BI.

Unit -III

Routing Protocols: Introduction, Classification of Routing Protocols- Proactive routing protocols such as WRP and DSDV, Reactive routing protocol such as AODV, DSR , LAR, Hybrid Routing protocols such as ZRP.

Unit -IV

Transport Protocols and Energy Management Systems: Introduction, Design Issues and Challenges, Power Management, Smart Batteries and Battery Characteristics.

Unit -V

Security: Security in wireless Ad hoc wireless Networks, Network security requirements, Issues & challenges in security provisioning, Security attacks.

RECOMMENDED BOOKS

- Ad Hoc Wireless Networks: Architectures and Protocols, C. Siva Ram Murthy, B. S. Manoj, Pearson Education India.
- Ad Hoc Mobile Wireless Networks: Protocols and Systems, C.-K. Toh Pearson Publication.
- Wireless Networks Principles, Protocols, and Applications: Subir Kumar Sarkar, T G Basavaraju, C Puttamadappa, Auerbach Publications, Taylor & Francis Group
- Security and Quality of Service in Ad Hoc Wireless Networks, Amitabh Mishra, John Wiley & Sons, Cambridge University Press

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COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. **Tell** the basics of wireless networks.

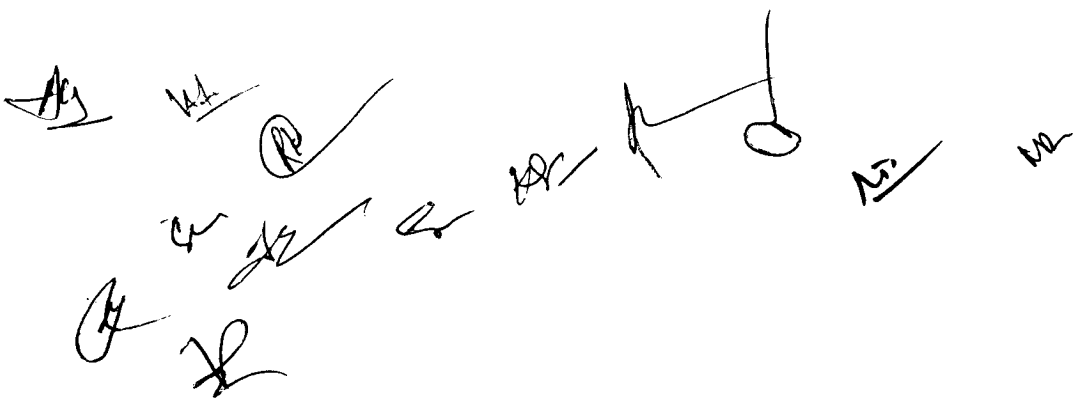
CO2. **Explain** the working of various Ad-hoc network protocols.

CO3. **Identify** various issues/problems associated with Ad-hoc networks and their solutions.

CO4. **Analyze** the performance of various Ad-hoc network protocols.

CO5. **Conclude** the security challenges and issue of Ad-hoc wireless network.

CO6. **Develop** the solutions of various problems/Issues associated with ad-hoc networks.



Department of Computer Science & Engineering and Information Technology

E - COMMERCE
BITL -705

COURSE OBJECTIVES

- To identify the major categories and trends of e-commerce applications.
- To discuss the various marketing strategies for an online business.
- To define various electronic payment types and associated security risks and the ways to protect against them.

Unit -I

Introduction of Building Blocks of Electronic Commerce, Features, Traditional Commerce v/s E-Commerce, E-Commerce Advantages And Disadvantages, E-Commerce : Business Models, E-Services: Category of E-Services, Web-Enabled Services, Information-Selling on the web.

Unit -II

Internet and Networking Technologies, Static and Dynamic Web Pages, Tiers, Plug-Ins Frames, Exposure to Markup Languages HTML, DHTML VRML, SGML, XML, CGI, Applets & Serve-Lets, JSP& Java Beans, ASP Cookies, Creating and Reading Cookies, Comparative Case Study of Microsoft and Java Technologies, Web Application Architectures, Browsers, Search Engines.

Unit -III

Internet Payment System: Characteristics of Payment System, 4C Payment Methods, SET Protocol for Credit Card Payment, E-Cash, E -Check, Micro Payment System, Overview of Smart Card, E- Governance: E- Governance Architecture, Public Private Partnership, EDI, EDI Documents, Steps in an EDI System, Advantages of an EDI System readiness.

Unit -IV

Security Systems, Measures to ensure Security, Security Protocols in internet Secure Socket Layer (SSL), Secure Hypertext Transfer Protocol (HTTP), Secure Electronic Transaction, Cyber Crime Law, IT Act.

Unit -V

Advanced Technologies of E-Commerce, Introduction to Mobile Agents, WAP: the enabling technology, WAP Model, WAP Architecture, Benefits of WAP to E-Commerce, Web Security, Encryption Schemes, Secure Web, Digital Signatures, Firewall.

RECOMMENDED BOOKS

- E-commerce, Gary P. Schneider, Cengage Learning India.
- Essentials of E-Commerce Technology, V. Rajaraman, PHI Learning Private Limited.
- E-commerce study, technology and applications, David Whiteley, TMH.
- E-Commerce An Indian Perspective, P.T. Joseph, PHI Learning Private Limited.
- Web Technologies: TCP/IP to Internet Application Architectures, Achyut S. Godbole and Atul Kahate, TMH.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. **Find** the impact of Information and Communication technologies, especially of the Internet in business operations.

CO2. **Explain** the foundations and importance of E-commerce.

CO3. **Develop** web pages using tools and services of the internet in the development of a virtual e-commerce site.

CO4. **Perceive** legal issues and privacy in E-Commerce, electronic payment systems and other global E-commerce issues.

CO5. **Analyze** policy and regulatory issues in E-commerce.

CO6. **Elaborate** Wireless Application Protocol for internet access and advanced telephony services from the mobile phones.

Department of Computer Science & Engineering and Information Technology

GRID COMPUTING
BITL - 709 (Elective – III)

COURSE OBJECTIVES

- To expose the characteristics of grid computing.
- To explore the design principles of grid computing.
- To illustrate security mechanisms in grid computing applications.

Unit - I

Concepts and Architecture: Introduction, Parallel and Distributed Computing, Cluster Computing, Grid Computing, Anatomy and Physiology of Grid, Review of Web Services, OGSA, WSRF.

Unit - II

Grid Monitoring: Grid Monitoring Architecture (GMA), An Overview of Grid Monitoring Systems, Grid ICE – JAMM, MDS, Network Weather Service, R, GMA, Other Monitoring Systems, Ganglia and GridMon.

Unit - III

Grid Security and Resource Management: Grid Security, A Brief Security Primer, PKI, X.509 Certificates, Grid Security, Grid Scheduling and Resource Management, Scheduling Paradigms, Working principles of Scheduling, A Review of Condor, SGE, PBS and LSF, Grid Scheduling with QoS.

Unit - IV

Data Management and Grid Portals: Data Management, Categories and Origins of Structured Data, Data Management Challenges, Architectural Approaches, Collective, Data Management Services, Federation Services, Grid Portals, First-Generation Grid Portals, Second-Generation Grid Portals.

Unit - V

Grid Middleware: List of globally available Middleware, Case Studies, Recent version of Globus Toolkit and gLite, Architecture, Components and Features.

RECOMMENDED BOOKS

- Grid Computing, Joshy Joseph, Craig Fellenstein, Pearson Education, 2004.
- Grid Computing for Developers, Vladimir Silva, Dreamtech Press, 2006.
- Grid Computing making the global infrastructure a Reality, Fran Berman, Geoffrey C. Fox, Anthony J.G Hey, Wiley.
- Grid Computing -A Practical Guide to Technology and Applications, Ahmar Abbas, Firewall Media, 2006.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. **Relate** grid computing with previous technologies.

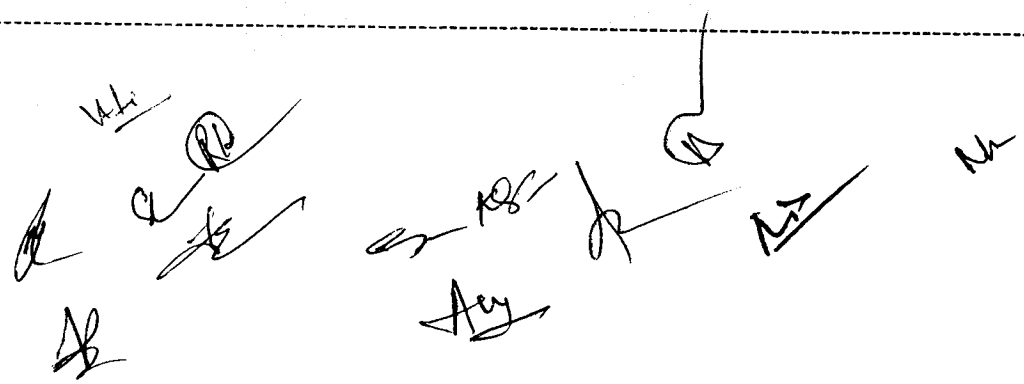
CO2. **Illustrate** security mechanisms in grid computing applications.

CO3. **Identify** the characteristics of grid computing.

CO4. **Classify** various functions of grid computing middleware.

CO5. **Explain** the design principles of grid computing.

CO6. **Discuss** different grid computing applications.



Department of Computer Science & Engineering and Information Technology

NATURAL LANGUAGE PROCESSING
BITL - 710 (Elective – III)

COURSE OBJECTIVES

- To give a exposure related to machine learning and motivate toward its application.
- To enhance the capability of natural language processing.
- To apply the probabilistic approach for solving the problems.

Unit - I

Introduction: Introduction to Natural Language Processing and issue in Natural language Processing, NLP stages, Basic Text Processing, Regular Expression, Word tokenization, Word Normalization, Stemming, sentence segmentation.

Unit - II

Probabilistic Language Model: Conditional Probability, Bayes' theorem, Markov assumptions, N-grams, Estimating N-gram probability, MLE Dealing with zeros, generalization, Back-offs and interpolations.

Unit - III

Word Classes and Part-of-Speech Tagging: Text classification, Naïve Based Learning Parameter Estimation, Laplace (Add one) smoothing Text classification evaluation, Tagging problem , Part-Of-Speech Tagging, Generative models, Trigram Hidden Markov Model for parameter estimation, Dealing with low frequency words, Viterbi Algorithm.

Unit - IV

Parsing: Natural Language Parsing, A simple CFG for English Language, Ambiguity, Probabilistic CFGs, Parsing with PCFGs, CKY parsing algorithm. Example, Issue with PCFGs, Lexicalized PCFGs.

Unit - V

Applications: Word Prediction, Information Extraction, Sentiment analysis, Question Answering and summarization, Machine Translation, Text Categorization, Optical character Recognition.

RECOMMENDED BOOKS

- Speech and Language Processing, Second Edition, Prentice Hall, Jurafsky, Dan and Martin, James, 2008.
- Foundations of Statistical Natural Language Processing , Manning, Christopher and Heinrich, Schutze, MIT Press, 1999.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. **Relate** the natural language processing techniques in applied domain.

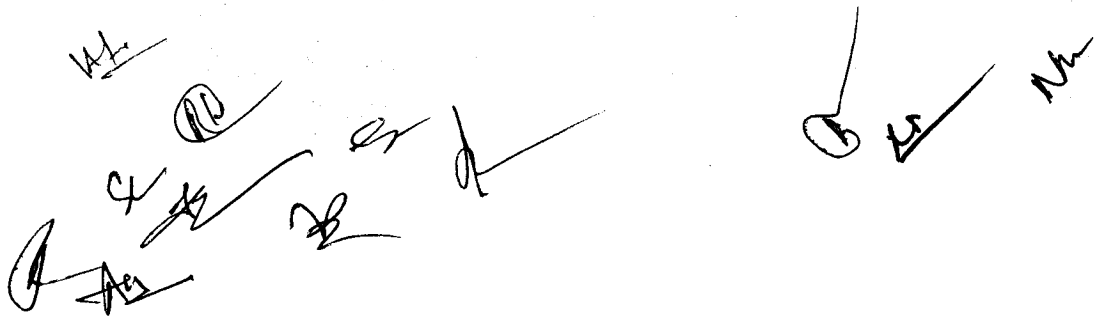
CO2. **Compare** machine learning methods and robotics.

CO3. **Apply** the NLP constructs in solving real world problems.

CO4. **Analyze** knowledge representation methods.

CO5. **Explain** computation modelling of natural language processing.

CO6. **Improve** the new approaches over existing one using probabilistic formulation.



Department of Computer Science & Engineering and Information Technology

SOFTWARE TESTING AND QUALITY ASSURANCE (STQA)
BITL - 711 (Elective – IV)

COURSE OBJECTIVE

- To apply software testing knowledge and engineering methods.
- To design and conduct a software test process for a software project.
- To identify the needs of software test automation, and define and develop a test tool to support test automation.

Unit - I

Quality: Perspectives and Expectations, Correctness and Defects: Definitions, Properties, and Measurements, Software quality factors, **Quality Assurance:** Defect Prevention, Defect Reduction, Defect Containment.

Unit - II

Concepts, Issues, and Techniques of Software Testing: Functional vs. Structural Testing, Test Planning and Preparation, Test Execution, Result Checking, and Measurement, Test Automation, **Coverage and Usage Testing Based on Checklists and Partitions:** Checklist-Based Testing and Its Limitations, Testing for Partition Coverage.

Unit - III

Input Domain Partitioning and Testing- Basic concepts, definitions, and terminology, Simple Domain Analysis and the Extreme Point Combination Strategy, Testing Strategies Based on Boundary Analysis, Other Boundary Test Strategies and Applications, **Control Flow, Data Dependency, and Interaction Testing:** Basic Concept and techniques.

Unit - IV

Defect Prevention and Process improvement: Basic Concepts and Generic Approaches, Focusing on Software Processes, **Software Inspection:** Basic Concepts and Generic Process, Fagan inspection, Other Inspections and Related Activities. **Formal Verification:** Basic Concepts, Axiomatic Approach.

Unit - V

Feedback Loop and Activities for Quantifiable Quality Improvement: QA Monitoring and Measurement, **Quality Models and Measurements:** Models for Quality Assessment, **Risk Identification for Quantifiable Quality Improvement:** New Techniques for Risk Identification.

RECOMMENDED BOOKS

- Software Quality Engineering-Testing, Quality Assurance and Quantifiable Improvement, Jeff Tian, A John Wiley & Sons, Inc., Publication.
- Software Testing and Quality Assurance: Theory and Practice, Kshirasagar Naik, Priyadarshi Tripathy, A John Wiley & Sons, Inc., Publication.
- Software Quality Assurance From theory to implementation, Daniel Galin, Pearson Publication.
- Software Testing: Principles, Techniques and Tools, M G Limaye, TMH Publication.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. **Tell** basic concept of Software Testing and Quality.

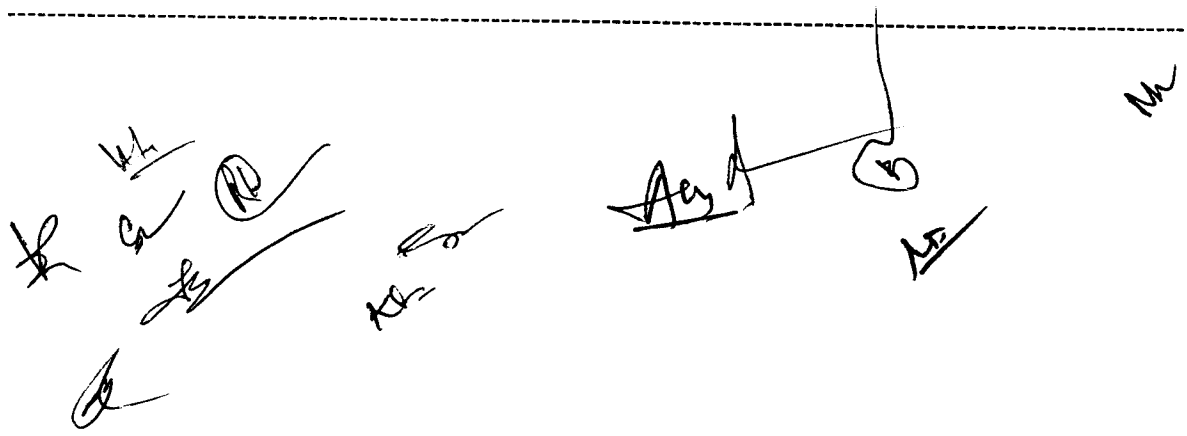
CO2. **Demonstrate** software test automation problems and solutions.

CO3. **Apply** software testing tools and Techniques for improvement of software project.

CO4. **Analyze** various quality parameters for a good software project.

CO5. **Evaluate** a project using test cases and other software testing parameters.

CO6. **Design** software testing documents and quality plan for communicating with engineers in various forms.



Department of Computer Science & Engineering and Information Technology

AGILE METHODOLOGY
BITL - 712 (Elective – IV)

COURSE OBJECTIVES

- To understand the background and driving forces for taking an agile approach to software development.
- To understand the business value of adopting agile approaches.
- To understand the agile development practices.

Unit - I

Fundamentals of Agile: The Genesis of Agile, Introduction and background, Agile Manifesto and Principles, Overview of Scrum, Extreme Programming, Feature Driven development, Lean Software Development, Agile project management, Design and development practices in Agile projects, Test Driven Development, Continuous Integration, Refactoring, Pair Programming, Simple Design, User Stories, Agile Testing, Agile Tools.

Unit - II

Agile Scrum Framework: Introduction to Scrum, Project phases, Agile Estimation, Planning game, Product backlog, Sprint backlog, Iteration planning, User story definition, Characteristics and content of user stories, Acceptance tests and Verifying stories, Project velocity, Burn down chart, Sprint planning and retrospective, Daily scrum, Scrum roles – Product Owner, Scrum Master, Scrum Team, Scrum case study, Tools for Agile project management.

Unit - III

Agile Testing: The Agile lifecycle and its impact on testing, Test-Driven Development (TDD), xUnit framework and tools for TDD, Testing user stories - acceptance tests and scenarios, Planning and managing testing cycle, Exploratory testing, Risk based testing, Regression tests, Test Automation, Tools to support the Agile tester.

Unit - IV

Agile Software Design and Development: Agile design practices, Role of design Principles including Single Responsibility Principle, Open Closed Principle, Liskov Substitution Principle, Interface Segregation Principles, Dependency Inversion Principle in Agile Design, Need and significance of Refactoring, Refactoring Techniques, Continuous Integration, Automated build tools, Version control.

Unit - V

Industry Trends: Market scenario and adoption of Agile, Agile ALM, Roles in an Agile project, Agile applicability, Agile in Distributed teams, Business benefits, Challenges in Agile, Risks and Mitigation, Agile projects on Cloud, Balancing Agility with Discipline, Agile rapid development technologies

RECOMMENDED BOOKS

- Agile Software Development with Scrum, Ken Schawber, Mike Beedle, Pearson.
- Agile Testing: A Practical Guide for Testers and Agile Teams, Lisa Crispin, Janet Gregory, Addison Wesley.
- Agile Software Development, Principles, Patterns and Practices, Robert C. Martin, Prentice Hall.
- Agile Software Development: The Cooperative Game, Alistair Cockburn, Addison Wesley.
- User Stories Applied: For Agile Software, Mike Cohn, Addison Wesley.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. **Explain** Scrum Release Planning, and Scrum Sprint Planning.
CO2. **Classify** a Sprint with Sprint Reviews and Sprint Retrospectives.
CO3. **Apply** user stories into tasks and ideal day estimates.
CO4. **Examine** the Scrum with multiple, or distributed, project teams.
CO5. **Determine** agile methods scale to large and distributed projects.
CO6. **Design** test driven and agile principal based software.

Department of Computer Science & Engineering and Information Technology

IMAGE PROCESSING
BITL - 801

COURSE OBJECTIVES

- To understand the fundamentals of Image acquisition, image processing in spatial and frequency domain.
- To understand image transforms used in digital image processing.
- To know about the image restoration techniques and methods used in image processing.

Unit - I

Introduction and Fundamentals: Introduction to Image Processing Systems, Digital Image Fundamentals: Components of Digital Image Processing system, Image model, Imaging geometry, Sampling and quantization of images, Classification of digital images, Zooming and shrinking, Relationship between pixels.

Unit - II

Image Enhancement in spatial domain: Introduction, Basic gray level function, piecewise linear transformation, Contrast stretching, Histogram specification, Histogram Equalization, Local enhancement using arithmetic and logical operation-Image subtraction, Image averaging Image smoothing: Smoothing Spatial Filters, Smoothing Linear Filters, Image sharpening.

Unit - III

Image Enhancement in Frequency domain: Introduction to Fourier Transform, Filters: low pass and High pass, Gaussian filters, Homomorphic filtering. **Image Restoration:** Model of Image Degradation/Restoration process, Noise models, Noise reduction in spatial domain and frequency domain, Inverse filtering, mean filters, Least Mean Square(Wiener) filtering, FIR Wiener Filter.

Unit - IV

Morphological Image Processing: Logic operation involving binary images, Dilation and Erosion, Opening and Closing, Morphological Algorithms: Boundary extraction,

Region filling, Extraction of connected components, Convex Hull, Thinning, and Thickening.

Unit - V

Image registration: Introduction, Geometric transformation, Plane to plane transformation, mapping. **Image Segmentation:** Introduction, Region extraction, pixel based approach, Multi level thresholding, Local thresholding, Region based approach, Region growing, Splitting and merging, Edge and Line detection, Corner detection, Detection of discontinuities, Edge linking and boundary detection.

RECOMMENDED BOOKS

- Digital Image Processing, Rafael C Gonzalez, Richard E Woods, Pearson Education.
- Fundamentals of Digital Image Processing, K. Jain, Pearson Education.
- Digital Image Processing, S. Esakkirajan, S. Jayaraman,T. Veerakumar, Tata McGraw-Hill Education.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. **Explain** different modalities and current techniques in image acquisition.

CO2. **Classify** spatial and frequency domain techniques used in image processing.

CO3. **Apply** image processing techniques to enhance visual images.

CO4. **Analyze** the constraints in image processing when dealing with real problems.

CO5. **Evaluate** various Enhancement, restoration and retrieval techniques of image processing.

CO6. **Design** a system using the mathematical models and principles of digital image processing for real world problems.

Department of Computer Science & Engineering and Information Technology

DATA WAREHOUSE & DATA MINING
BITL - 802

COURSE OBJECTIVES

- To understand the value of data mining in solving real-world problems.
- To gain understanding of algorithms commonly used in data mining tools.
- To develop ability for applying data mining tools to real-world problems.

Unit - I

Introduction: Motivation, important, Data type for data mining: relational databases, Data ware-houses. Transactional databases, advanced Database system and its Applications, Data Mining Functionalities Concept/Class description, Association Analysis classification & prediction, cluster Analysis, Outliner Analysis classification of data Mining Systems, Major issues in data mining.

Unit - II

Data Warehouse and OLTP Technology for Data Mining: Differences between operational Database Systems, & Data warehouse, A multidimensional Data Model, Data warehouse Architecture, Data warehouse Implementation Data cube technology.

Unit - III

Data Pre-processing: Data cleaning, Data Integration and Transformation, Data reduction Discretization and Concept Hierarchy Generation. Data Mining Primitives Languages and system Architectures, Concept description, Characterization and comparison Analytical characterization.

Unit - IV

Mining Association Rules in Large Databases: Association rule Mining : Market Basket Analysis, Basic Concepts, Mining single Dimensional Boolean Association rules from Transactional databases : The Apriori algorithm, Generating Association rules from frequent items, Improving the efficiency of Apriori, other algorithms & their comparison, Mining multilevel Association Rules, Multidimensional Association rules, constraint Based Association rule Mining.

Unit - V

Classification & Predication and Cluster Analysis: Issues regarding classification & predication, Different classification methods, Predication, cluster Analysis, Major clustering methods. Application & Trends in data mining: Data Mining Applications, Currently available tools, case study, current status.

RECOMMENDED BOOKS

- Data Mining: Concepts and Techniques, Han and Kamber, Morgan Kaufmann Publications.
- Data Mining Techniques, A. K. Pujari, Universities Press Pvt. Ltd.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. **Tell** various methods for storing & retrieving data from different data sources /repository.

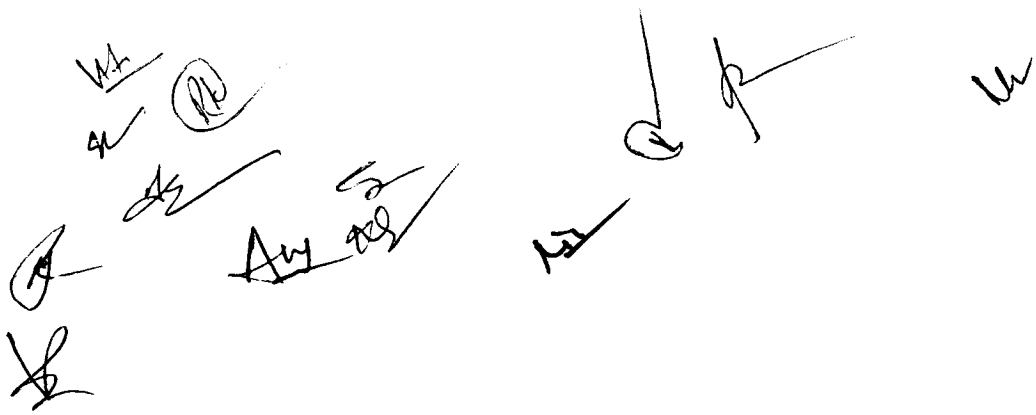
CO2. **Classify** various data bases and data models of data warehouse.

CO3. **Apply** pre-processing techniques for construction of data warehouse

CO4. **Analyze** data mining algorithms for knowledge discovery & prediction.

CO5. **Choose** appropriate data mining method for finding of association rules from transactional databases.

CO6. **Develop** various classification algorithms for data using data mining.



Department of Computer Science & Engineering and Information Technology

NEURAL NETWORKS & FUZZY SYSTEMS
BITL - 803

COURSE OBJECTIVES

- To provide the student with the basic understanding of neural networks and fuzzy logic fundamentals.
- To understand the fundamental theory and concepts of neural networks, neuro-modeling, several neural network paradigms and its applications.
- To understand the concepts of fuzzy sets, knowledge representation using fuzzy rules, approximate reasoning, fuzzy inference systems, and fuzzy logic control and other machine intelligence applications of fuzzy logic.

Unit - I

Introduction and Fundamental concept of ANN: Basic models of Artificial Neural Networks, Terminologies of ANNs McCulloch-Pitts Neurons, Linear Separability, Hebb Network.

Unit - II

Supervised Learning Networks: Introduction, Perceptron Networks, Associative Memory Network, Back Propagation Networks, Delta learning rule, Radial Basis Function Networks, Hopefield networks.

Unit - III

Unsupervised Learning: Fixed weight Competitive Nets, Kohonen Self-Organizing Map, Learning vector quantization, Counter propagation Networks, Adaptive Resonance Theory Network.

Unit - IV

Fuzzy Set Theory: Fuzzy Sets, Fuzzy Membership Functions, Operations on Fuzzy Sets, Fuzzy Relations, Fuzz Extension Principles. **Fuzzy Logic:** Basics, Fuzzy truth in terms of Fuzzy sets, Fuzzy rules, Fuzzy Reasoning.

Unit - V

Defuzzification: Lembda-Cuts for Fuzzy sets (Alpha-Cuts), Lembda-Cuts for Fuzzy Relations.**Fuzzy Inference System:** Introduction, Mamdani Fuzzy Models, Other Variants: Sugeno Fuzzy Models, Tekamoto Fuzzy Models.

RECOMMENDED BOOKS

- Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis and Applications-S. Rajasekaran & G.A. Vijayalakshmi Pai, PHI.
- Principles of Soft Computing, S. N. Sivanandam and S. N. Deepa , Wiley
- Introduction to Soft Computing Neuro-Fuzzy and Genetic Algorithms, Samir Roy and Udit Chakraborty, Pearson.
- Neural Networks and Learning Machines-Simon Haykin (PHI).
- Fuzzy Logic and Engineering Application, Tomthy Ross, TMH.

COURSE OUTCOMES

After successful completion of the course students will be able to:

CO1. **Explain** the concept of Artificial Neural Network and Fuzzy Logic.

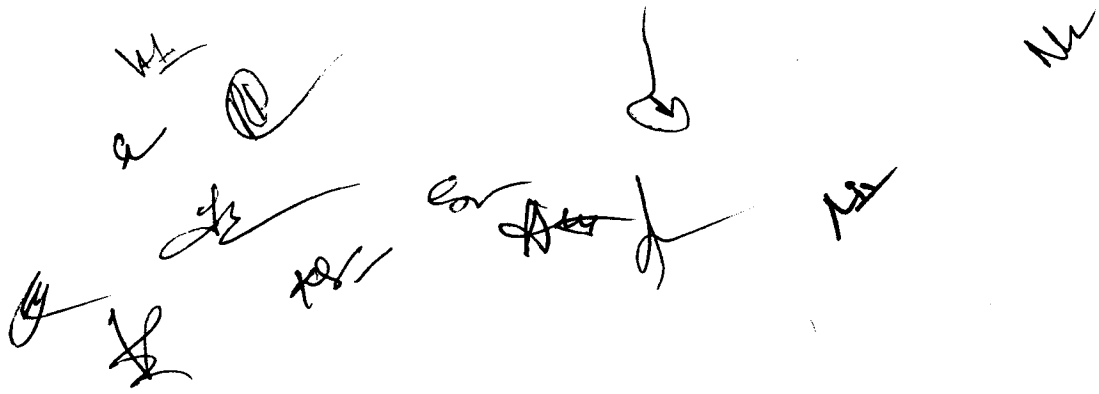
CO2. **Illustrate** various problems to be solved through Fuzzy Systems.

CO3. **Make use of** single and multi-layer feed-forward neural networks.

CO4. **Analyze** various Neural Networks in order to solve problems effectively and efficiently.

CO5. **Determine** the roll of Neural Networks & Fuzzy Systems in problem solving.

CO6. **Develop** and train different supervised and unsupervised networks.



Department of Computer Science & Engineering and Information Technology

INTERNET OF THINGS AND APPLICATIONS
BITL – 804 (Elective – V)

COURSE OBJECTIVES

- To identify the various elements of an IoT System.
- To understand Cloud Computing & its relevance in IoT.
- To make students aware of security concerns and challenges while implementing IoT Solutions.

Unit - 1

Internet of Things: Introduction, Internet of things Definition Evolution, IoT Architectures, Resource Management, IoT Data Management & Analytics, Communication Protocols, Internet of Things Applications, Security, Identity Management and Authentication, Privacy, Standardization and Regulatory Limitations.

Unit -2

Open Source Semantics Web Infrastructures for Managing IoT resources in the cloud: Open IoT Architecture for IoT/Cloud Convergence, Scheduling Process and IoT Services Lifecycle, Scheduling and Resource Management, Validating Applications and use cases, Device/Cloud Collaboration Framework, Application of Device/Cloud Collaboration, Fog Computing: Principles, Architectures and Applications.

. Unit -3

Programming Frameworks for Internet of Things: Introduction, Embedded Device Programming Languages, Message Passing in Devices, Coordination Languages, Polygot Programming, Survey of IoT Programming Frameworks, Virtualization on Embedded Boards as Enabling Technology for the cloud of Things, Micro Virtual Machines (MicroVMs) for cloud- Assisted Cyber- Physical System (CPS), Cloud Computing in IoT.

Unit -4

IoT Data and Knowledge Management: The foundations of Stream Processing in IoT, Continuous Logic Processing System, Framework for Distributed Data Analysis for IoT,

Anomaly detection, Efficient Incremental local modeling, Big Data Analytics - Data Visualization - IoT Platforms.

Unit -5

Security and Privacy in the Internet of Things: Concepts, IoT Security Overview, Security Frameworks for IoT, Privacy in IoT Networks, IoT Robustness and Reliability, Governing Internet of Things: Issues, Approaches and New Paradigms, IoT Applications.

RECOMMENDED BOOKS

- Internet of Things- Principles and Paradigms (M.K), Rajkumar Buyya, Amir Vahid Dastjerdi.
- Marco Schwartz, "Internet of Things with the Arduino Yun", Packt Publishing, 2014.
- Internet of Things (A Hands-on-Approach), Vijay Madisetti and Arshdeep Bahga, 1st Edition, VPT, 2014.
- Rethinking the Internet of Things: A Scalable Approach to Connecting Everything, Francis daCosta, 1st Edition, Apress Publications, 2013.
- Internet of Things and Data Analytics, Wiley Publications.

COURSE OUTCOMES

After completing the course the student must able to do:

CO1. **Explain** Internet of things, Evolution of IoT, Applications of IoT.

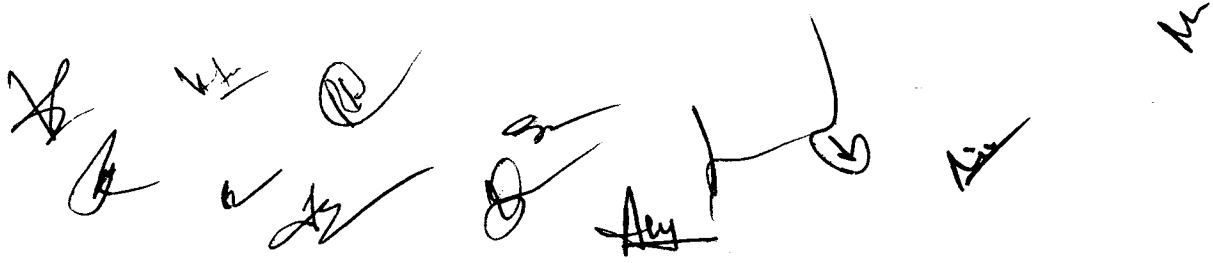
CO2. **Classify** IoT Architectures, IoT services lifecycles & Application of Device/Cloud Collaboration.

CO3. **Apply** the concept of Internet of Things in the real world scenario.

CO4. **Analyze** Security and Privacy in the IoT.

CO5. **Choose appropriate** Framework for Distributed Data Analysis for IoT & Anomaly detection.

CO6. **Develop** small low cost embedded system.



Department of Computer Science & Engineering and Information Technology

BIOMETRICS
BITL – 806 (Elective – V)

COURSE OBJECTIVES

- To understand of essential terminologies of biometric systems.
- To apply biometric matching for identification, authentication and authorization.
- To know about emerging future trends in the biometrics industry.

Unit - I

Introduction: Biometric fundamentals, Biometric technologies, Biometrics Vs traditional techniques, Characteristics of a good biometric system, Benefits of biometrics, Key biometric processes: verification, identification and biometric matching - Performance measures in biometric systems, FAR, FRR, FTE rate, EER and ATV rate, Applications of Biometric Systems, Security and Privacy Issues.

Unit - II

Physiological Biometrics : Leading technologies : Finger-scan, Facial-scan, Iris-scan, Voice-scan, components, working principles, competing technologies, strengths and weaknesses, Other physiological biometrics : Hand-scan, Retina-scan, components, working principles, competing technologies, strengths and weaknesses, Automated fingerprint identification systems.

Unit - III

Behavioral Biometrics: Leading technologies: Signature-scan, Keystroke scan, components, working principles, strengths and weaknesses. Privacy and Standards in Biometrics: Assessing the Privacy Risks of Biometrics, Designing Privacy, Sympathetic Biometric Systems, Need for standards, different biometric standards.

Unit - IV

Fingerprint Biometrics: Fingerprint Patterns, Fingerprint Features, Fingerprint Image, width between two ridges, Fingerprint Image Processing, Minutiae Determination, Fingerprint Matching: Fingerprint Classification, Matching policies.

Unit - V

Iris Biometrics: Iris System Architecture, Definitions and Notations, Iris Recognition: Iris location, Doubly Dimensionless Projection, Iris code, Comparison, Coordinate System: Head Tilting Problem, Basic Eye Model, Searching Algorithm, and Texture Energy Feature.

RECOMMENDED BOOKS

- Biometrics - Identity Verification in a Networked World, Samir Nanavati, Michael Thieme, Raj Nanavati, Wiley-Dreamtech India Pvt Ltd.
- Handbook of Biometrics, Anil K Jain, Patrick Flynn, Arun A Ross, Springer.
- Introduction to Biometrics, Anil K Jain, Arun A Ross, Springer.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. **Explain** various biometric technologies along with their basic features and other parameters.

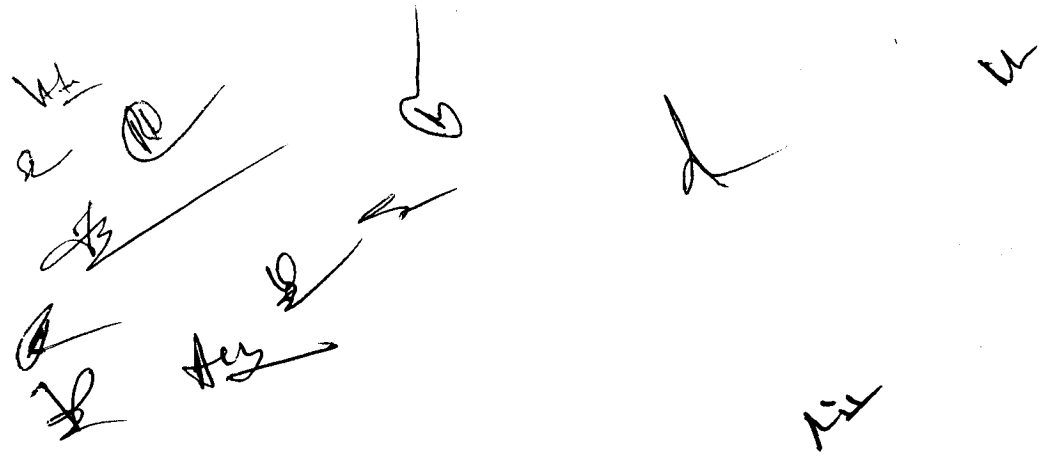
CO2. **Demonstrate** the state-of-the-art in biometric technologies and explore the currently available biometric systems.

CO3. **Identify** the issues related to fingerprint and iris technology and plan a mechanism to solve them.

CO4. **Analyze** the fundamental concepts of behavioral biometrics and their applications in biometric systems.

CO5. **Compare** various physiological and behavioral biometrics approaches.

CO6. **Design** large scale biometric identification systems for real world security systems.



Department of Computer Science & Engineering and Information Technology

HIGH PERFORMANCE COMPUTING
BITL – 807 (Elective – V)

COURSE OBJECTIVES

- To understand the fundamentals of high performance computing.
- To develop and execute parallel programs on high performance computing resources using parallel programming paradigms such as the message passing interface (MPI).
- To provide systematic and comprehensive treatment of the hardware and the software high performance techniques involved in current day computing.

Unit - I

Parallel Processing Concepts: Levels of parallelism (instruction, transaction, task, thread, memory, function), Models (SIMD, MIMD, SIMT, SPMD, Dataflow Models, Demand-driven Computation etc), Architectures: N-wide superscalar architectures, multi-core, multi-threaded.

Unit - II

Parallel Programming with CUDA: Processor Architecture, Interconnect, Communication, Memory Organization, and Programming Models in high performance computing architectures: (Examples: IBM CELL BE, Nvidia Tesla GPU, Intel Larrabee Micro-architecture and Intel Nehalem micro-architecture), Memory hierarchy and transaction specific memory design, Thread Organization.

Unit - III

Fundamental Design Issues in Parallel Computing: Synchronization, Scheduling, Job Allocation, Job Partitioning, Dependency Analysis, Mapping Parallel Algorithms onto Parallel Architectures, Performance Analysis of Parallel Algorithms; Fundamental Limitations Facing Parallel Computing: Bandwidth Limitations, Latency Limitations, Latency Hiding/Tolerating Techniques and their limitations.

Unit - IV

Power-Aware Computing and Communication: Power-aware Processing Techniques, Power-aware Memory Design, Power-aware Interconnect Design, Software Power Management.

Unit - V

Advanced Topics: Petascale Computing, Optics in Parallel Computing, Quantum Computers, Recent developments in Nanotechnology and its impact on HPC.

RECOMMENDED BOOKS

- Highly Parallel Computing, George S. Almasi and Alan Gottlieb.
- Advanced Computer Architecture: Parallelism, Scalability, Programmability, Kai Hwang, McGraw Hill 1993
- Parallel Computer Architecture: A hardware/Software Approach, David Culler Jaswinder Pal Singh, Morgan Kaufmann, 1999.
- Petascale Computing: Algorithms and Applications, David A. Bader (Ed.), Chapman & Hall/CRC Computational Science Series, 2007.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. **Explain** the key components of HPC architectures and how they are put together to form complete system.

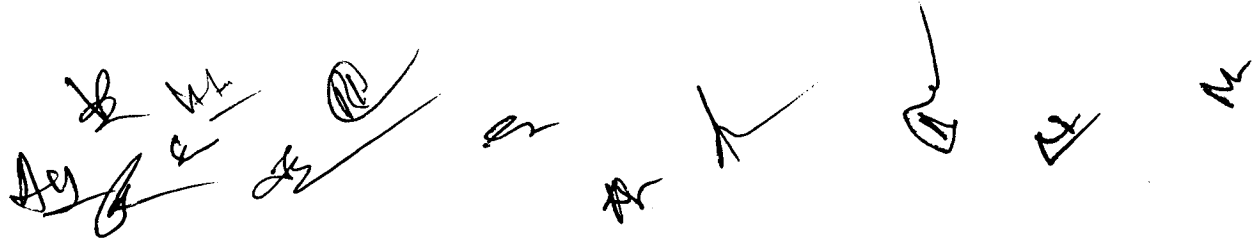
CO2. **Demonstrate** a basic knowledge of numerical computing using an appropriate programming language.

CO3. **Develop** software, which exploits the memory hierarchy of a CPU to obtain a code which is close to optimal performance.

CO4. **Examine** the architectural hardware and software issues for high performance computing systems.

CO5. **Determine** all aspects in the processes of programming, compilation, starting program, running program by OS, executing (parallel) instructions by CPU to writing output to disk.

CO6. **Design** algorithms that yield good performance on high-performance architectures, and to be able to estimate and evaluate their performance.



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Department of Computer Science & Engineering and Information Technology

SOFTWARE ENGINEERING
160502 (DC-9)

L	T	P	C
2	1	2	4

COURSE OBJECTIVES

- To understand the nature of software development and software life cycle process models, agile software development, SCRUM and other agile practices.
- To understand project management and risk management associated with various types of projects.
- To know basics of testing and understanding concept of software quality assurance and software configuration management process.

Unit - I

Introduction to Software Engineering: Definition, software engineering-layered Technology, Software Characteristics and Components, **Software model:** Software Development of Life Cycle Model (SDLC), The Waterfall Model, Iterative Waterfall Model, Prototyping Model, Spiral Model, RAD Model. **Selection criteria of model:** Characteristics of Requirements, Status of Development Team, Users participation, Type of Project and Associated Risk.

Unit - II

Requirement Engineering: Definition, Requirement Engineering Activity , **Types of Requirement-** Functional and Non-functional Requirements, User and System Requirements, Requirement Elicitation Methods, Requirement Analysis Methods, Requirement Documentation (SRS), Requirement Validation, Requirement Management.

Unit - III

Design Concept, Principle and Methods: Design Fundamentals, Design Principles, Effective Modular Design, Design Representations, Architectural design, Procedural design, data Directed design, Real Time Design, Object Oriented Design, Coupling and Cohesion.

Unit - IV

Software Metrics, Project Management and Estimation: Metrics in Process and Project domains, Software Measurement, Software Quality Metrics, **Project Management-** Basics-People, Product, Process, Project, **Estimation-** Software Project Estimation, Decomposition Techniques- Function Point Estimation, Line of Code (LOC) based estimation, Empirical Estimation, COCOMO Model, Project Scheduling Techniques.

Unit - V

Software Testing: Definitions, Software Testing Life Cycle (STLC), , Test Case Design, Strategic Approach to Software Testing- Verification & Validation , Strategic issues, Criteria for completion of Testing, Unit Testing, Integration Testing, Validation Testing, System Testing, Black Box Testing Techniques, White Box Testing Techniques, Acceptance Testing.

RECOMMENDED BOOKS

- Software Engineering, Sommerville, Pearson.
- Software Engineering: A Practitioner's Approach, Roger S. Pressman, McGraw Hill.
- Software Engineering, K.K. Agrawal & Yogesh Singh, New Age Publication.
- Software Engineering, Rajib Mall, PHI.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. explain the various fundamental concepts of software engineering.

CO2. develop the concepts related to software design & analysis.

CO3. compare the techniques for software project management & estimation.

CO4. choose the appropriate model for real life software project.

CO5. design the software using modern tools and technologies.

CO6. test the software through different approaches.

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Department of Computer Science & Engineering and Information Technology

THEORY OF COMPUTATION
160503 (DC-10)

L	T	P	C
2	1	2	4

COURSE OBJECTIVE

- To understand computability, decidability, and complexity through problem solving.
- To analyse and design abstract model of computation & formal languages
- To understand and conduct mathematical proofs for computation and algorithms.

Unit-I

Introduction of Automata Theory: Examples of automata machines, Finite Automata as a language acceptor and translator, Moore machines and mealy machines, composite machine, Conversion from Mealy to Moore and vice versa.

Unit-II

Types of Finite Automata: Non Deterministic Finite Automata (NDFA), Deterministic finite automata machines, conversion of NDFA to DFA, minimization of automata machines, regular expression, Arden's theorem. Meaning of union, intersection, concatenation and closure, 2 way DFA.

Unit-III

Grammars: Types of grammar, context sensitive grammar, and context free grammar, regular grammar. Derivation trees, ambiguity in grammar, simplification of context free grammar, conversion of grammar to automata machine and vice versa, Chomsky hierarchy of grammar, killing null and unit productions. Chomsky normal form and Greibach normal form.

Unit-IV

Push down Automata: example of PDA, deterministic and non-deterministic PDA, conversion of PDA into context free grammar and vice versa, CFG equivalent to PDA, Petrinet model.

Unit-V

Turing Machine: Techniques for construction. Universal Turing machine Multitape, multihead and multidimensional Turing machine, N-P complete problems. Decidability and Recursively Enumerable Languages, decidability, decidable languages, undecidable languages, Halting problem of Turing machine & the post correspondence problem.

RECOMMENDED BOOKS

- Introduction to Automata Theory Language & Computation, Hopcroft & Ullman, Narosa Publication.
- Element of the Theory Computation, Lewis & Christors, Pearson.
- Theory of Computation, Chandrasekhar & Mishra, PHI.
- Theory of Computation, Wood, Harper & Row.
- Introduction to Computing Theory, Daniel I-A Cohen, Wiley.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. explain the basic concepts of switching and finite automata theory & languages.

CO2. relate practical problems to languages, automata, computability and complexity.

CO3. construct abstract models of computing and check their power to recognize the languages.

CO4. analyse the grammar, its types, simplification and normal form.

CO5. interpret rigorously formal mathematical methods to prove properties of languages, grammars and automata.

CO6. develop an overview of how automata theory, languages and computation are applicable in engineering application.

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Department of Computer Science & Engineering and Information Technology

MICROPROCESSOR & INTERFACING
160504 (DC-11)

L	T	P	C
2	1	2	4

COURSE OBJECTIVES

- To understand different processors and basic architecture of 16 bit microprocessors.
- To understand interfacing of 16 bit microprocessor with memory and peripheral chips involving system design.
- To understand 8051 microcontroller.

Unit-I

Microprocessors: Introduction to x86 microprocessors, RISC and CISC processors, 8086 Architecture-Functional Diagram, Register Organization, Memory Segmentation, Programming Model, Memory Address, Physical Memory Organization, Minimum and maximum mode signals, Bus Cycle and Timing Diagrams, Instruction Formats, Addressing Modes, Instruction Set, Interrupts of 8086.

Unit-II

Basic Peripherals and Interfacing: 8212, 8155, 8255, 8755, interfacing with LED's, ADC, DAC, stepper motors and I/O & Memory Interfacing.

Unit-III

Special Purpose Programmable Peripheral Devices and Interfacing: 8253, 8254 programmable interval timer, 8259A programmable interrupt controller and 8257 DMA controllers, Keyboard and Display Interfacing.

Unit-IV

Serial and Parallel Data Transfer: Serial and Parallel data transmission, Types of communication system, Baud rate RS-232C, Modem and various bus standards, USART – 8251A.

Unit-V

Introduction to Microcontrollers: 8051 Microprocessor and its Architectures, Pin Description, Input-Output configurations, Interrupts, Addressing Modes, An overview of 8051 Instruction Set.

RECOMMENDED BOOKS

- The Intel Microprocessors, Architecture, Programming and Interfacing, B.B. Brey, PHI.
- Microprocessor 8086: Architecture, Programming and Interfacing, Sunil Mathur, PHI.
- Advanced Microprocessor and Interfacing, D.V. Hall, Mc-Graw Hill.
- Advanced Microprocessor and Peripherals – Architecture, Programming and Interfacing, A.K. Ray & K.M. Bhurchandi, Tata McGraw Hill.
- Interfacing Techniques in Digital Design with Emphasis on Microprocessors, R.L. Krutz, John Wiley.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. compare the architecture and feature of different 16-bit microprocessor interfacing chips & microcontrollers.

CO2. develop programming skills in assembly language of 8086 microprocessor and 8051 microcontroller.

CO3. demonstrate the concept of interfacing with peripheral devices.

CO4. make use of different interrupts and addressing modes.

CO5. design an interfacing for I/O devices.

CO6. build a system based on 8086 microprocessor and 8051 microcontroller.

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Department of Computer Science & Engineering and Information Technology

COMPILER DESIGN
160601 (DC-12)

L	T	P	C
2	1	2	4

COURSE OBJECTIVES

- To learn finite state machines and context free grammar.
- To learn, various phases of compiler
- To understand process of compiler implementation.

Unit-I

Overview of Translation Process: Introduction to Compiler, Major Data Structures in Compiler, Other Issues in Compiler Structure, BOOT Strapping and Porting, Compiler Structure: Analysis-Synthesis Model of Compilation, Various Phases of a Compiler, Tool Based Approach to Compiler Construction.

Unit-II

Lexical Analysis: Input Buffering, Symbol Table, Token, Recognition of Tokens, Lexeme and Patterns, Difficulties in Lexical Analysis, Error Reporting and Implementation. Regular Grammar & Language Definition, Transition Diagrams, Design of a Typical Scanner using LEX.

Unit-III

Syntax Analysis: Context Free Grammars (CFGs), Ambiguity, Basic Parsing Techniques: Top Down Parsing, Recursive Descent Parsing, Transformation on the Grammars, Predictive Parsing LL(1) Grammar, Bottom-UP Parsing, Operator Precedence Parsing, LR Parsers (SLR, CLR, LALR), Design of a Typical Parser Using YACC.

Unit-IV

Semantic Analysis: Compilation of expression, control, structures, conditional statements, various intermediate code forms, syntax directed translation, Memory allocation and symbol table organizations, static and dynamic array allocation, string allocation, structure allocation etc., error detection indication and recovery, Routines or

printing various lexical, syntax and semantic errors.

Unit-V

Code generation and Code Optimization: Issues, Basic Blocks and Flow Graphs, Register Allocation, Code Generation, DAG Representation of Programs, Code Generation from DAGS, Peep-hole Optimization, Code Generator Generators, Specification of Machine. Code Optimization: Source of Optimizations, Optimization of Basic Blocks, Loops, Global Data Flow Analysis, Solution to Iterative Data Flow Equations, Code Improving Transformations, Dealing with Aliases, Data Flow Analysis of Structured Flow Graphs.

RECOMMENDED BOOKS

- Compilers: Principles, Techniques and Tools, V. Aho, R. Sethi and J. D. Ullman, Pearson Education.
- Compiler Construction: Principles and Practice, K.C. Louden, Cengage Learning.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. define the concepts of finite automata and context free grammar.

CO2. build the concept of working of compiler.

CO3. examine various parsing techniques and their comparison.

CO4. compare various code generation and code optimization techniques.

CO5. analyze different tools and techniques for designing a compiler.

CO6. design various phases of compiler.

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Department of Computer Science & Engineering and Information Technology

COMPUTER NETWORKS
160602 (DC-13)

L	T	P	C
4	-	-	4

COURSE OBJECTIVES

- Familiarize the student with the basic taxonomy and terminology of the computer networking.
- Provide detail knowledge about various layers, protocols and devices that facilitate networking.
- Enable Students to deal with various networking problems such as flow control, error control and congestion control

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Unit-I

Introduction: Computer Network, Types- LAN,MAN & WAN, Data transmission modes- Serial & Parallel, Simplex, Half duplex & full duplex, Synchronous & Asynchronous transmission, Transmission medium- Guided & Unguided, Cables- Twisted pair, Coaxial cable & Optical fiber, Networking devices-Repeaters, Hub, Switch, Bridge, Router, Gateway and Modem, Performance Criteria- Bandwidth, Throughput, Propagation Time & Transmission Time, Network Standardization- OSI Reference Model & TCP/IP Reference Mode.

Unit-II

Physical Layer: Network topologies- Bus, Ring, Star & Mesh, Line coding- Unipolar, Polar and Bipolar, Switching- Circuit switching, Message switching & Packet switching, Multiplexing: FDM – Frequency division multiplexing, WDM – Wavelength division multiplexing & TDM – Time division multiplexing.

Unit-III

Data Link Layer: Introduction, Design issues, Services, Framing, Error control, Flow control, ARQ Strategies. Error Detection and correction, Parity bits, Cyclic Redundant Code (CRC), Hamming codes, MAC Sub Layer- The channel allocation problem, Pure ALOHA ,Slotted ALOHA, CSMA ,CSMA/CD, IEEE 802.3, IEEE 802.4 and IEEE 802.5.

Unit-IV

Network Layer & Transport Layer: Introduction, Design issues, Services, Routing- Distance vector routing. Hierarchical routing & Link state routing, Shortest path algorithm- Dijkstra's Algorithm & Floyd–Warshall's Algorithm, Flooding, Congestion Control- Open Loop & Closed Loop Congestion Control, Leaky Bucket & Token bucket Algorithm. Connection Oriented & Connectionless Service, IP Addressing.

Unit-V

Presentation, Session& Application Layer: Introduction, Design issues, Presentation layer- Translation, Encryption- Substitutions and Transposition ciphers, Compression- lossy and lossless. Session Layer – Dialog Control, Synchronization. Application Layer- Remote login, File transfer & Electronic mail.

RECOMMENDED BOOKS

- Data Communication and Networking, Behrouz A. Forouzan, McGraw Hill.
- Computer Networks, Andrew S. Tanenbaum, Pearson Education India.
- Computer Networks and Internets, Douglas E. Comer, Pearson India.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. explain the fundamental concepts of computer network.

CO2. illustrate the basic taxonomy & terminologies of computer network protocols.

CO3. develop a concept for understanding advance computer network.

CO4. build the skill of IP addressing and routing mechanism.

CO5. predict the performance of computer network in congestion and Internet.

CO6. construct the network environment for implementation of computer networking concept.

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Department of Computer Science & Engineering and Information Technology

Indian Constitution and Traditional Knowledge
100006

100006	Indian Constitution and Traditional Knowledge	Theory	Midterm	Quiz/Assignment	TOTAL	L	T	P	C
		70	20	10	100	3	-	-	-

COURSE OBJECTIVES

- The course aims to provide students with the continuous, comprehensive and cumulative understanding of Indian Knowledge Tradition (Philosophy, Language, Art) and its modern interpretation and analysis.
- It intends to connect the students' modern advanced knowledge system with the roots of Indian Knowledge Tradition for their development and better understanding of the essentials of thought process, intellection and inference.
- To impart the knowledge of the Yogic Science and an insight into Sanskrit Literature which will promote interest among students in discerning the significance of health and wisdom with an Indian perspective.
- The objective of the syllabus is to familiarize students with the essential features and basic principles of the constitution of India.
- It will acquaint them with the concept of government, its organs and various types.
- It will provide students with a comprehensive and clear understanding of the basic fundamental rights and duties.

Unit-I

- Introduction to Basic Structure of Indian Knowledge System
- Homogeneity of modern science and Indian Knowledge Tradition
- Yoga: Promoting positive health and personality
- Case Studies

Unit-II

- Indian Philosophy or Darshanas: Jainism, Buddhism, Yoga, Śaiva and Vedanta
- Indian Linguistic Tradition: Panini's Ashtadhyayi
- Indian Art: Mauryan art, Buddhist art, Gupta art, Muslim Art & Culture Contemporary art

- Case Studies

Unit III:

Introduction to Political Science

- Nature and scope of political science
- Definition, elements and theories of origin of State (Social Contract and Evolutionary)
- Meaning and features of Civil Society
- Indian Political Thought: Raja Ram Mohan Roy, Swami Vivekanand, Gandhi, Ambedkar

Unit IV:

Concept of Government and Its Organs

- Government: Definition and its characteristics
- Types and meaning of Legislature: Composition, Function and Role of the Parliament (Lok Sabha and Rajya Sabha)
- The Powers, Position and Role of the President, Prime Minister and the Cabinet
- The Powers, Position and Role of the Governor and the Chief Minister; Composition and the role of Supreme Court, Judicial Review and Judicial Activism

Unit V:

Salient features of Indian Constitution

- Preamble, Conventions, Sovereignty of the Constitution and the Rule of Law
- Parliamentary Democracy, Federalism, Secularism and Socialism
- Fundamental Rights, Directive Principles of State Policies and Fundamental Duties
- Election Commission and Electoral Reforms

BASIC READINGS:

- O.P. Gauba, Political Theory, Macmillan, (latest edition).
- D.D. Basu, Introduction to the Constitution of India, (Latest Edition).
- N.G. Jayal & Pratap Bhanu Mehta, The Oxford Companion of Politics in India, 2000.
- W.H. Morris-Jones, The Government and Politics of India.
- Swami Jitamanand, Holistic Science and Vedam, Bhartiya Vidyabhawan

- V. Shivramakrishnan (Ed.), Cultural Heritage of India, Bhartiya Vidyabhawan, Mumbai Fifth Edition, 2014.
- Yoga sutra of Patanjali, Ramakrishnan Mission, Kolkata.
- Panini Shiksha, Motilal Banarsidas
- VN Jh, Language, Thought and Reality
- Krishna Chaitanya. Arts of India, Abhinav Publications, 1987.
- SC Chaterjee and DM Datta, An Introduction to Indian Philosophy, university of Calcutta, 1984
- A L Basham, The Wonder That was India

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. know the rich Indian traditions and the Indian constitution.

CO2. Appraise the utility and significance of tradition and its applicability in present times.

CO3. Employ the knowledge of the constitutional norms as laid in the constitution and abide by the practices stated therein.

CO4. Create a better society and living standards for themselves as well as for others.

CO5. Recognize the basic concepts of ethics and morality pertaining to Indian culture and tradition.

CO6. Connect traditional Indian philosophy with their everyday conduct and practices.

Department of Computer Science & Engineering and Information Technology

DISASTER MANAGEMENT
100007

100007	Disaster Management (MC)	Theory	Midterm	Quiz/Assignment	Total	L	T	P	C
		70	20	10	100	3	-	-	03

COURSE OBJECTIVES

- To understand basic concepts in Disaster Management
- To understand Definitions and Terminologies used in Disaster Management
- To understand Types and Categories of Disasters
- To understand the Challenges posed by Disaster
- To understand Impact of Disasters key skills

Unit-I

Introduction to disaster management, concepts and definitions: disaster, vulnerability, risk severity, frequency and details, capacity impact, prevention, mitigation.

Unit-II

Disasters – Disasters classification, demographic aspects (gender, age, special needs); hazard locations; global and national disaster trends, hazard and vulnerability profile of India.

Unit-III

Disaster Impacts – Disaster impact (environmental, physical, social, ecological, economic, political, etc.); health, psycho-social issues, impact of natural disasters (floods, draught, cyclones, volcanoes, earthquakes, tsunami, landslides etc.), impact of manmade disasters (industrial pollution, artificial flooding in urban areas, urban disasters, transportation accidents etc.).

Unit-IV

Disaster Risk Reduction (DRR) - Disaster management cycle- its phases; prevention, mitigation, preparedness, relief and recovery; structural and non- structural measures; risk analysis, vulnerability and capacity assessment; early warning systems, Post disaster environmental response. Roles and responsibilities of government, community,

local institutions, NGOs and other stakeholders: Policies and legislation for disaster management. DRR programmes in India and the activities of National Disaster Management Authority.

Unit-V

Disasters, Environment and Development – Factors affecting vulnerability such as impact of development projects and environmental modifications (including of dams, land use changes, urbanization etc.), sustainable and environmental friendly recovery; reconstruction and development methods.

TEXT BOOKS:

- Pradeep Sahni, 2004, Disaster Risk Reduction in South Asia, Prentice Hall.
- Ghosh G.K., 2006, Disaster Management, APH Publishing Corporation
- Srivastava H.H. & Gupta G.D., Management of Natural Disasters in developing countries, Daya Publishers Delhi, 2006, 201 pages.

REFERENCE BOOKS:

- http://ndma.gov.in (Home page of National Disaster Management Authority)
- http://www.ndmindia.nic.in / (National Disaster Management in India)
- Singh B.K., 2008, Handbook of Disaster Management: Techniques & Guidelines, Rajat Publication.
- National Disaster Management Policy, 2009, GOI.
- Inter Agency Standing Committee (IASC) (Feb. 2007), IASC Guidelines on Mental Health and Psychosocial Support in Emergency Setting. Geneva: IASC

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. Propose disaster prevention and mitigation approaches.

CO2. Classify global and national disasters, their trends and profiles.

CO3. Appreciate the impacts of various disasters.

CO4. Apply Disaster Risk Reduction in management.

CO5. Find the linkage between disasters, environment and development.

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Department of Computer Science & Engineering and Information Technology

NETWORK & WEB SECURITY
160603 A (DE-1)

L	T	P	C
4	-	-	4

COURSE OBJECTIVES

- To provide conceptual understanding of network security principles, issues, challenges and mechanisms.
- To understand how to apply encryption techniques to secure data in transit across data networks.
- To explore the requirements of real-time communication security and issues related to the security of web services.

Unit-I

Security: Principles and Attacks, **Basic Number theory:** Prime number, congruence's, Modular exponentiation, Fundamentals of Cryptography, Steganography, Cryptanalysis, Code Breaking, Block ciphers and Steam ciphers, Substitution ciphers, Transposition ciphers, Caesar cipher, Play-fair Cipher, Hill Cipher, Cipher modes of operation.

Unit-II

Cryptography: Symmetric key cryptography, Public key Cryptography, Principles of Public key Cryptosystem, Classical Cryptographic algorithms: DES, RC4, Blowfish, RSA, Distribution of public keys and key management, Diffie-hellman key exchange.

Unit-III

Hash Functions: Hash functions, one way hash function, SHA (Secure hash algorithm). **Authentication:** Requirements, Functions, Kerberos, Message authentication codes, Message digest: MD5, SSH (Secure Shell), Digital Signatures, Digital Certificates.

Unit -IV

IP & Web security overview: SSL (Secure socket layer), TLS (Transport Layer Security), SET (Secure Electronic Transaction). **IDS (Intrusion detection system):** Statistical Anomaly Detection and Rule-Based Intrusion Detection, Penetration testing, Risk management. **Firewalls:** Types, functionality and Polices.

Unit -V

Phishing: Attacks and its types, Buffer overflow attack, Cross Site Scripting, SQL injection Attacks, Session Hijacking. **Denial of Service Attacks:** Smurf attack, SYN flooding, Distributed Denial of Service. **Hacker:** Hacking and types of hackers, Footprinting, Scanning: types: port, network, vulnerability), Sniffing in shared and switched networks, Sniffing detection & prevention, Spoofing.

RECOMMENDED BOOKS

- Cryptography and Network Security, William Stallings, Pearson Education.
- Cryptography and Network Security, Atul Kahate, McGraw Hill Education India.
- Incident Response and Computer Forensics, Kevin Mandia, Chris Prosise, Tata McGraw Hill.

COURSE OUTCOMES

After completion of the course students would be able to:

CO1. explain cryptographic algorithms, hash algorithms and authentication mechanisms.

CO2. illustrate fundamentals of number theory, attacks and security principles.

CO3. apply number theory and various algorithms to achieve principles of security.

CO4. analyze the cause for various existing network attacks and describe the working of available security controls.

CO5. examine the vulnerabilities in IT infrastructure.

CO6. predict the attacks and controls associated with IP, transport-level, web and e-mail security.

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Department of Computer Science & Engineering and Information Technology

PARALLEL PROCESSING
160603 B (DE-1)

L	T	P	C
4	-	-	4

COURSE OBJECTIVES

- To describe different parallel processing architectures based on relationships between processing elements, instruction sequence, memory and interconnected network.
- To identify design and develop algorithms which require parallelization as part of system design or performance enhancement.
- To evaluate the performance of parallel algorithms designed based on shared and distributed memory models as well as against serial based algorithm designs.

Unit-I

Introduction to Parallel Processing: Multiprogramming and Time Sharing, Parallelism in Uniprocessor system, Parallel computer structure, Architectural classification schemes and Parallel processing applications.

Unit-II

Principles of Pipelining: Pipelining principle of linear pipelining. Performance measures, General Pipelines, reservation tables, Instruction and Arithmetic pipelines, Instruction Prefect, Branch handling, Data Buffering, Internal Forwarding and Register tagging, Hazard detection and resolution, Job Sequencing and Collision prevention.

Unit-III

Vector Processing: Vector processing requirements, Characteristics of vector processing multiple vector task dispatching, pipeline vector processing methods, vector super computers, recent vector processors, Architecture of CRAY, Pipeline chaining and vector loops, Architecture of CYBER, Configurability.

Unit-IV

Array Processing: SIMD organization, Interconnection networks, Parallel algorithm for array processor-Matrix Multiplication Parallel sorting on Array Processor, SIMD Fast Fourier transform, Connection issues for SIMD Processing.

Unit-V

Multiprocessor Architecture, Programming & Control: Loosely and Tightly Coupled Architectures. Functional Structures, Types Interconnection networks, Parallel memory organizations.

Process Synchronization mechanism: Semaphores, Critical Section and monitors, System deadlocks and protection schemes, Multiprocessor scheduling strategies, Parallel algorithms.

RECOMMENDED BOOKS

- Computer Architecture and Parallel Processing, K. Hwang and Briggs, Tata McGraw Hill.
- Advanced Computer Architecture, K. Hwang, Tata McGraw Hill.
- Computer Architecture and Organization, J.P. Hayes, Tata McGraw Hill.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. define the fundamental concepts of parallelism.
CO2. illustrate the performance of different computing structures.
CO3. develop the ability for improving performance in parallel architecture.
CO4. analyze the parallel algorithms for real world problems solving.
CO5. assess the communication and the computing possibilities of parallel system architecture.
CO6. design contemporary parallel algorithms.

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Department of Computer Science & Engineering and Information Technology

AGILE METHODOLOGY
160603 C (DE-1)

L	T	P	C
4	-	-	4

COURSE OBJECTIVES

- To understand the background and driving forces for taking an Agile approach to software development.
- To understand the business value of adopting Agile approaches.
- To understand the Agile development practices.

Unit -I

Fundamentals of Agile: The Genesis of Agile, Introduction and background, Agile Manifesto and Principles, Overview of Scrum, Extreme Programming, Feature Driven development, Lean Software, Development, Agile project management, Design and development practices in Agile projects, Test Driven Development, Continuous Integration, Refactoring, Pair Programming, Simple Design, User Stories, Agile Testing, Agile Tools.

Unit- II

Agile Scrum Framework: Introduction to Scrum, Project phases, Agile Estimation, Planning game, Product backlog, Sprint backlog, Iteration planning, User story definition, Characteristics and content of user stories, Acceptance tests and Verifying stories, Project velocity, Burn down chart, Sprint planning and retrospective, Daily scrum, Scrum roles – Product Owner, Scrum Master, Scrum Team, Scrum case study, Tools for Agile project management.

Unit- III

Agile Testing: The Agile lifecycle and its impact on testing, Test-Driven Development (TDD), xUnit framework and tools for TDD, Testing user stories - acceptance tests and scenarios, Planning and managing testing cycle, Exploratory testing, Risk based testing, Regression tests, Test Automation, Tools to support the Agile tester.

Unit- IV

Agile Software Design and Development: Agile design practices, Role of design Principles including Single Responsibility Principle, Open Closed Principle, Liskov Substitution Principle, Interface Segregation Principles, Dependency Inversion Principle in Agile Design, Need and significance of Refactoring, Refactoring Techniques, Continuous Integration, Automated build tools, Version control.

Unit -V

Industry Trends: Market scenario and adoption of Agile, Agile ALM, Roles in an Agile project, Agile applicability, Agile in Distributed teams, Business benefits, Challenges in Agile, Risks and Mitigation, Agile projects on Cloud, Balancing Agility with Discipline, Agile rapid development technologies.

RECOMMENDED BOOKS

- Agile Software Development with Scrum, Ken Schawber, Mike Beedle, Pearson.
- Agile Testing: A Practical Guide for Testers and Agile Teams, Lisa Crispin, Janet Gregory, Addison Wesley.
- Agile Software Development, Principles, Patterns and Practices, Robert C. Martin, Prentice Hall.
- Agile Software Development: The Cooperative Game, Alistair Cockburn, Addison Wesley.
- User Stories Applied: For Agile Software, Mike Cohn, Addison Wesley.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. demonstrate Scrum Release Planning, and Scrum Sprint Planning.
CO2. apply user stories into tasks and ideal day estimates.
CO3. classify a Sprint with Sprint Reviews and Sprint Retrospectives.
CO4. examine the Scrum with multiple team or distributed project teams.
CO5. design test driven and agile principal based software.
CO6. develop any application using agile methodology.

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Department of Computer Science & Engineering and Information Technology

ETHICAL HACKING
160604 A (DE-2)

L	T	P	C
4	-	-	4

COURSE OBJECTIVES

- To introduce the basic concepts and principles in ethical hacking.
- This includes the major techniques involved and system vulnerabilities issues for testing.
- To demonstrate vulnerabilities related to computer system to develop an understanding of Programming Survival Skills, Basic Linux Exploits and solution for these issues.

Unit-I

Introduction to Ethical Disclosure: Ethics of Hacking, Ethical Hacking and the legal system, Proper and Ethical Disclosure.

Unit-II

Penetration Testing and Tools: Using Metasploit, Using Back Track Live CD Linux Distribution.

Unit-III

Exploits: Programming Survival Skills, Basic Linux Exploits, Advanced Linux Exploits, Shell code Strategies, Writing Linux Shellcode, Basic windows Exploits.

Unit-IV

Vulnerability Analysis: Passive Analysis, Advanced Static Analysis with IDA Pro, Advanced Reverse Engineering, and Client-side browser exploits, Exploiting Windows Access Control Model for Local Elevation Privilege, Intelligent Fuzzing with Sulley, From Vulnerability to Exploit.

Unit-V

Malware Analysis: Collecting Malware and Initial Analysis, Hacking Malware.

Denial-of Service Attacks: Types of Attacks (Smurf Attack, Buffer Overflow Attack, Ping of Death Attack, Teardrop Attack, SYN Attack, SYN Flooding), DDoS Attack

(Distributed DoS Attack.), Session Hijacking, Spoofing v Hijacking, TCP/IP hijacking, CAPTCHA Protection.

RECOMMENDED BOOKS

- Gray Hat Hacking: The Ethical Hackers' Handbook, Shon Harris, Allen Harper, Chris Eagle and Jonathan Ness, Tata McGraw Hill.
- Hacking: The Art of Exploitation, Jon Erickson, No Starch Press.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. demonstrate various penetration testing tools like Metasploit, Backtrack etc.

CO2. explain ethics behind hacking and vulnerability disclosure.

CO3. apply the reverse engineering and client-side browser exploits.

CO4. identify the core concepts related to malware, hardware and software vulnerabilities and their causes.

CO5. analyze the vulnerabilities related to computer system and networks using state of the art tools and technologies.

CO6. develop programming survival skills, basic Linux exploits, advanced Linux exploits, shell code strategies.

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Department of Computer Science & Engineering and Information Technology

DISTRIBUTED SYSTEMS
160604 B (DE-2)

L	T	P	C
4	-	-	4

COURSE OBJECTIVES

- To provide students with contemporary knowledge, analyze and design distributed applications.
- To provide master skills to measure the performance of distributed algorithms
- To gain experience in the design and testing of a large software system, and to be able to communicate that design to others.

Unit-I

Introduction to Distributed Systems: Architecture for Distributed System, Goals of Distributed system, Hardware and Software concepts, Distributed Computing Model, Advantages & Disadvantage distributed system, Issues in designing Distributed System.

Unit-II

Distributed Shared Memory: Basic Concept of Distributed Share Memory (DSM), DSM Architecture & its Types, Design & Implementations issues In DSM System, Structure of Share Memory Space, Consistency Model, and Thrashing.

Unit-III

Distributed File System: Desirable features of good Distributed File System, File Model, File Service Architecture, File Accessing Model, File Sharing Semantics, File Catching Scheme, File Application & Fault tolerance. Naming - Features, System Oriented Names, Object Locating Mechanism, Human Oriented Name.

Unit-IV

Inter Process Communication and Synchronization: API for Internet Protocol, Data Representation & Marshaling, Group Communication, Client Server Communication, RPC- Implementing RPC Mechanism, Stub Generation, RPC Messages.

Synchronization: - Clock Synchronization, Mutual Exclusion, Election Algorithms - Bully & Ring Algorithms.

Unit-V

Distributed Scheduling and Deadlock Distributed Scheduling- Issues in Load Distributing, Components for Load Distributing Algorithms, Different Types of Load Distributing Algorithms, Task Migration and its issues. Deadlock- Issues in deadlock detection & Resolutions, Deadlock Handling Strategy, Distributed Deadlock Algorithms. Case Study of Distributed System: - Amoeba, Mach, Chorus.

RECOMMENDED BOOKS

- Distributed Operating System Concept & Design, Sinha, PHI.
- Distributed System Concepts and Design, Coulouris & Dollimore, Pearson.
- Distributed Operating System, Andrew S. Tanenbaum, Pearson.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. define the basic elements and concepts related to distributed system technologies.
CO2. demonstrate knowledge of the core architectural aspects of distributed systems.
CO3. identify how the resources in a distributed system are managed by Algorithm.
CO4. examine the concept of distributed shared memory, file system and, inter process communication.
CO5. compare various distributed system algorithms for solving real world problems.
CO6. discuss large-scale distributed applications.

Department of Computer Science & Engineering and Information Technology

SOFTWARE TESTING
160604 C (DE-2)

L	T	P	C
4	-	-	4

COURSE OBJECTIVES

- To understand defects and various levels of testing.
- To study about testing plan, management and its types.
- To understand the testing automation and its challenges.

Unit-I

Introduction: Overview, Objectives, Software Structure and Software Testing, Purpose of Testing, Testing vs. Debugging, Model for Testing, Taxonomy of Bugs, Mistakes, Bugs and Failures, Consequences of Bugs.

Unit –II

Testing Tactics: Software Testing Fundamentals, Basic Path Testing, Control Structure Testing, Black-Box Testing: Graph Based testing methods, Equivalence Partitioning, Boundary Value Analysis, Orthogonal Testing, White Box Testing, Test Coverage – Traceability matrix.

Unit -III

Testing & Levels: Overview, Objectives, Testing Levels, Unit Testing, Component Testing, Integration Testing, System Testing, Interoperability Testing, Performance Testing, Regression Testing, Acceptance Testing.

Unit -IV

Special Tests: Introduction, Complexity Testing, Graphical User Interface Testing, Security Testing, Performance Testing, Volume and Stress Testing, Recovery Testing, Installation Testing, Requirement Testing.

Unit -V

Test Planning: Introduction, Test Policy, Test Strategy, Test Planning, Quality Plan and Test Plan, Guidelines for developing the Test Plan, Test Estimation, Test Standards, Building Test Data and Test Cases, Essential Activities in testing, Test

Management Software, Test Log Document, Effective Test Cases, Test File, Building test Data, Rules and Responsibilities in Testing Life Cycle, Test Progress Monitoring.

RECOMMENDED BOOKS

- Software Testing, Techniques and Applications, Arun Khannur, Pearson Education.
- Software Engineering, Roger S Pressman, Tata McGraw Hill.
- Software Testing Principles, Techniques and Tools, M G Limaye, Tata McGraw Hill.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. define different types of defects and testing models.

CO2. demonstrate methods of test generation from requirements.

CO3. explain different types of testing.

CO4. apply software testing techniques in commercial environments.

CO5. examine various test plans and continuous quality improvement.

CO6. choose the various test tools for automation.

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Department of Computer Science & Engineering and Information Technology

R PROGRAMMING
160605 A (OC-1)

L	T	P	C
2	1	-	3

COURSE OBJECTIVES

- To understand the critical programming language concepts.
- To perform data analysis using R commands.
- To make use of R loop functions and debugging tools.

Unit-I

Introduction to R: R Commands, Objects, Functions, Simple Manipulations, Matrices and Arrays, Factors, Lists, Data Frames.

Unit-II

Programming Using R: Introduction, Function Creation, Scripts, Logical Operators, Conditional Statements, Loops in R, Switch Statement, Creating List and Data Frames, List and Data Frame Operations, Recursive List.

Unit-III

Object- Oriented Programming in R: Introduction, S3 Classes, S4 Classes, References Classes, Debugging Principle in R, Import and Export Data from CSV, SAS and ODBC.

Unit-IV

Mathematical and Statistical Concepts, Hypothesis Testing, Different Statistical Distribution, Regression, Time Series Analysis.

Unit-V

Graphics in R: Basic Plots, Labelling and Documenting Plots, Adjusting the Axes, Specifying Colour, Fonts and Sizes, Plotting symbols, Customized Plotting, Packages in R for Windows, Linus and Mac.

RECOMMENDED BOOKS

- "R for Beginners", Sandip Rakshit, Tata Mc Graw Hill Education.
- "R programming for Data Science", Roger D. Peng, Learn publishing.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. define basic programming constructs used in R.

CO2. explain the various commands used in R.

CO3. apply commands in performing operations over data.

CO4. analyze the data set using constructs of R.

CO5. choose appropriate packages for dealing various tasks.

CO6. predict results from the datasets using R commands.

Department of Computer Science & Engineering and Information Technology

SOCIAL NETWORKING
160605 B (OC-1)

L	T	P	C
2	1	-	3

COURSE OBJECTIVES

- To know basic notation and terminology used in network science.
- To be able to visualize, summarize and compare networks.
- To develop practical skills of network analysis and be capable of analyzing real work networks.

Unit- I

Introduction: Introduction to Semantic Web, Limitations of current Web, Development of Semantic Web, Emergence of the Social Web, Social Network analysis: Development of Social Network Analysis, Key concepts and measures in network analysis, Electronic sources for network analysis: Electronic discussion networks, Blogs and Online communities, Web-based networks, Applications of Social Network Analysis.

Unit- II

Modeling, Aggregating and Knowledge Representation: Ontology and their role in the Semantic Web: Ontology, based knowledge Representation, Ontology languages for the Semantic Web: Resource Description Framework, Web Ontology Language, Modeling and aggregating social network data: State of the art in network data representation, Ontological representation of social individuals, Ontological representation of social relationships, aggregating and reasoning with social network data, advanced representations.

Unit- III

Extraction and Mining Communities in Web Social Networks: Extracting evolution of Web Community from a Series of Web Archive, Detecting communities in social networks, Definition of community, Evaluating communities, Methods for community detection and mining, Applications of community mining algorithms, Tools for detecting communities social network infrastructures and communities, Decentralized

online social networks, Multi, Relational characterization of dynamic social network communities.

Unit- IV

Predicting Human Behavior and Privacy Issues: Understanding and predicting human behavior for social communities, User data management, Inference and Distribution, Enabling new human experiences, Reality mining, Context, Awareness, Privacy in online social networks, Trust in online environment, Trust models based on subjective logic, Trust network analysis, Trust transitivity analysis, Combining trust and reputation, Trust derivation based on trust comparisons, Attack spectrum and countermeasures.

Unit- V

Visualization and Applications of Social Networks: Graph theory, Centrality, Clustering, Node, Edge Diagrams, Matrix representation, Visualizing online social networks, Visualizing social networks with matrix based representations, Matrix and Node, Link Diagrams, Hybrid representations, Applications, Cover networks, Community welfare, Collaboration networks, Co-Citation networks.

RECOMMENDED BOOKS

- Networks, Crowds, and Markets: Reasoning about a Highly Connected World, David Easley and John Kleinberg, Cambridge University Press.
- Statistical Analysis of Network Data with R (Use R!), Eric Kolaczyk, Gabor Csardi, Springer.
- Social Network Analysis: Methods and Applications, Stanley Wasserman and Katherine Faust, Cambridge University Press.

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. classify the alternatives for technologies to carry out social network analysis

CO2. demonstrate an understanding of the theory of social networks.

CO3. apply network analysis software to characterize social network structure in different forms.

CO4. analyze the impact of network structure on patterns through network statistics.

CO5. create social network analysis to understand socially meaningful outcomes in political action and online interaction

CO6. develop any application for designing social network.

MADHAV INSTITUTE OF TECHNOLOGY AND SCIENCE, GWALIOR – 474005
(A Govt. Aided UGC Autonomous Institute Affiliated to R.G.P.V. Bhopal, M.P.)

Department of Computer Science & Engineering and Information Technology

SOFT COMPUTING
160605 C (OC-1)

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COURSE OBJECTIVES

- To provide the student with the basic understanding of neural networks and fuzzy logic fundamentals, Program the related algorithms and Design the required and related systems.
- To understand the fundamental theory and concepts of neural networks, neuro-modeling, several neural network paradigms and its applications.
- To understand the basics of an evolutionary computing paradigm known as genetic algorithms and its application to engineering optimization problems.

Unit-I

Introduction and Fundamental Concept of ANN: Basic models of Artificial Neural Networks, Terminologies of ANNs McCulloch-Pitts Neurons, Linear Separability, Hebb Network, **Supervised Learning Networks:** Introduction, Perceptron Networks, Back Propagation Networks, Radial Basis Function Networks, Hopefield networks.

Unit-II

Unsupervised Learning: Fixed weight Competitive Nets, Kohonen Self-Organizing Map, Learning vector quantization. Counterpropagation Networks, Adaptive Resonance Theory Network.

Unit-III

Fuzzy Set Theory: Fuzzy Sets, Fuzzy Membership Functions, Operations onFuzzy Sets, Fuzzy Relations, Fuzzy rules, Fuzzy Reasoning, **Defuzzification:** Lembda-Cuts for Fuzzy sets(Alpha-Cuts), Lembda-Cuts for Fuzzy Relations. Fuzzy Inference System: Introduction, Mamdani Fuzzy Models, **Other Variants:** Sugeno Fuzzy Models, Tekamoto Fuzzy Models.

Unit-IV

Introduction: Biological Background, Traditional optimization and Search Techniques, Basic Terminologies in GA, Operators in Genetic Algorithm, Stopping Condition for Genetic Algorithm Flow, Classification of Genetic Algorithm, Genetic Programming, Comparison with Evolutionary algorithm, Application of Genetic algorithm.

Unit-V

Hybrid Soft Computing Techniques: Introduction, Neuro-fuzzy Hybrid system, Adaptive Neuro fuzzy inference system(ANFIS), Genetic Neuro Hybrid system, Application of Soft Computing Techniques.

RECOMMENDED BOOKS

- Principles of Soft Computing, S. N. Sivanandam and S. N. Deepa , Wiley
- Neural Networks, Fuzzy Logic and Genetic Algorithms: Synthesis and Applications-S. Rajasekaran & G.A. Vijayalakshmi Pai, PHI.
- Introduction to Soft Computing Neuro-Fuzzy and Genetic Algorithms, Samir Roy and Udit Chakraborty, Pearson.
- Neural Networks and Learning Machines-Simon Haykin PHI.
- Fuzzy Logic and Engineering Application, Tomthy Ross, TMH

COURSE OUTCOMES

After completion of this course, the students would be able to:

CO1. define basic concepts of neural network and fuzzy systems.

CO2. compare solutions by applying various soft computing approaches on a given problem.

CO3. develop and train different supervised and unsupervised networks.

CO4. classify various nature inspired algorithms according to their application aspect.

CO5. compare the efficiency of various hybrid systems.

CO6. design a soft computing model for solving real world problems.
