



DEPARTMENT OF INFORMATION TECHNOLOGY

COMPUTER NETWORKS  
3160321

L	T	P	Total Credits
2	1	-	3

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.

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, X.25.

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.

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

**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.

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**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.

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**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.
- CO3. identify various parameter for affecting the performance of computer network.
- CO4. analyze the concepts of communication using various layer of OSI model.
- CO5. evaluate the performance of computer network in congestion and Internet.
- CO6. design the network environment and applications for implementation of computer networking concept.

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DEPARTMENT OF INFORMATION TECHNOLOGY

## DESIGN & ANALYSIS OF ALGORITHMS

3160322

L	T	P	Total Credits
2	1	2	4

### 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:** 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:** B-Trees and Traversal Techniques, Topological sort.

#### 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 and Additional Real World Problems on Divide and Conquer.

#### Unit-III

**Greedy Method:** Introduction, Characteristics, Examples of Greedy Methods such as Single-Source Shortest Paths, **Minimum Cost Spanning Trees :** Prim'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, Matrix Chain Multiplication.

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**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, Cormen Thomas, Leiserson CE, Rivest RL, PHI.
- Design & Analysis of Computer Algorithms, Ullmann, Pearson.
- Algorithm Design, Michael T Goodrich, Roberto Tamassia, Wiley India.

**COURSE OUTCOMES**

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

- CO1. demonstrate a familiarity with major algorithms and data structures.
- CO2. identify important algorithmic design paradigms and methods of analysis.
- CO3. analyze the performance of algorithms.
- CO4. compare various algorithm design techniques.
- CO5. select the design technique to solve any real world problem.
- CO6. design efficient algorithm using various design techniques.

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DEPARTMENT OF INFORMATION TECHNOLOGY  
COMPUTER GRAPHICS & MULTIMEDIA  
3160323

L	T	P	Total Credits
2	1	2	4

COURSE OBJECTIVES

- To become familiar with computer graphics techniques and display devices.
- To enhance the proficiency in image representations, 2D and 3D graphics transformations.
- To develop awareness with various illumination, color models and multimedia system.

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: 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.

Unit-IV

**Clipping:** Point clipping, Line Clipping, Simple Visibility Line Clipping Algorithm, Polygon Clipping, Hidden Surface Elimination: Z- Buffer algorithm and Painter's Algorithm, Area Filling, **Basic Illumination Models:** Diffuse Reflection, Specular Reflection, Phong Shading, Gouraud Shading, Color Models: RGB, YIQ, CMY, HSV.

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**DEPARTMENT OF INFORMATION TECHNOLOGY**

**Unit-V**

**Multimedia System:** An Introduction, Multimedia hardware and software, Multimedia System Architecture, Multimedia Applications and evolving technologies, Multimedia Authoring. Data & File Format standards, Sampling, Compression standards, Compression through spatial and temporal redundancy.

**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
- Prabhat K. Andleigh, Kiran Thakrar : Multimedia Systems Design, Prentice Hall PTR

**COURSE OUTCOMES**

After completion of the course students will be able to:

- CO1. explore various display devices and applications of computer graphics.
- CO2. illustrate various scan conversion techniques like line, circle, curve and shape drawing algorithms.
- CO3. apply 2-dimensional, 3-dimensional transformations and projections on images.
- CO4. classify methods of image clipping and various algorithms for line and polygon clipping.
- CO5. apply appropriate filling algorithms, hidden surface elimination algorithm on images.
- CO6. summarize various color models, shading methods and multimedia system.

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DEPARTMENT OF INFORMATION TECHNOLOGY

OPERATING SYSTEM  
3160324

L	T	P	Total Credits
2	1	-	3

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 from 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.

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**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 procedure of the operating system.
- CO3. analyze the various operating system problems and issues.
- CO4. develop the solutions for various operating system problems and issues.
- CO5. measure the performance of various scheduling and allocation techniques.
- CO6. test the working of various scheduling and allocation techniques.

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DEPARTMENT OF INFORMATION TECHNOLOGY

JAVA PROGRAMMING LAB  
3160325

L	T	P	Total Credits
-	1	2	2

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.

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**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.

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**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.

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**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 concepts for solving problems.
- CO3. make use of the Java programming methods for connecting the various databases.
- CO4. test for bugs in a software application written in the Java programming language.
- CO5. determine different ways for handling exceptions, memory management, file handling, i/o management and internet based application development.
- CO6. build a project for application development using Java programming language.

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**DEPARTMENT OF INFORMATION TECHNOLOGY**  
**DESIGN & ANALYSIS OF ALGORITHMS**  
**3160322**

**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. Heap sort
2. WAP to implement Linear and Binary Search and analyze its time complexity.
3. WAP to implement Strassen's Matrix Multiplication.
4. WAP to implement Binomial coefficient computation and analyze its time complexity.
5. WAP to implement minimum spanning tree using Prim's algorithm and analyze its time complexity.
6. WAP to implement Dijkstra's Algorithm and analyze its time complexity.
7. WAP to implement Bellman Ford Algorithm and analyze its time complexity.
8. WAP to implement DFS and BFS and analyze their time complexities.
9. WAP to implement Bucket Sort Algorithm for integer elements.
10. WAP to implement Topological sort algorithm and analyze their time complexities.

**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.

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DESIGN & ANALYSIS OF ALGORITHMS  
3160322  
LIST OF SKILL BASED MINI PROJECT

**List of Micro Projects:**

1. Implement the greedy approach for single source shortest path.
2. Design a program for finding minimum cost tree for traversing all nodes of a graph.
3. Implement tree traversal techniques like pre-order, post-order and in-order.
4. Implement the Task Scheduling problem.
5. Implement the Longest Common Subsequence problem.
6. Find the shortest cycle in a graph.

**List of Macro Projects:**

1. Implement the movement of knight in chess game.
2. Implementation of a guessing game of the terminal on screen.
3. Print all the nodes reachable from a given starting node in a digraph using BFS method.
4. Check whether a given graph is connected or not using DFS method.
5. Find a subset of a given set  $S = \{s_1, s_2, \dots, s_n\}$  of  $n$  positive integers whose sum is equal to a given positive integer  $d$ . For example, if  $S = \{1, 2, 5, 6, 8\}$  and  $d = 9$  there are two solutions  $\{1, 2, 6\}$  and  $\{1, 8\}$ . A suitable message is to be displayed if the given problem instance doesn't have a solution.
6. Write a program to solve the job scheduling problem using the greedy algorithm.
7. Calculate the maximum weighted vertex pair in the weighted graph.

**List of Mini Projects:**

1. Implement a program for matrix layer rotation.
2. Implementation of vertex cover algorithm.
3. Implementation of the knapsack problem.
4. Implement N Queen's problem using Back Tracking.
5. Write a program to calculate the shortest path using travelling salesman problem.
6. Implement a phone directory application using doubly-linked lists.
7. Find the maximum clique in a graph.
8. WAP to implement the spanning tree using kruskal algorithms.

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COMPUTER GRAPHICS & MULTIMEDIA  
3160323

LIST OF PROGRAMS

1. WAP to implement line generation using DDA algorithm.
2. WAP to implement line generation using Bresenham's line generation algorithm.
3. WAP to generate a circle using mid-point algorithm.
4. WAP to implement Bresenham's circle generation algorithm.
5. WAP to perform translation, rotation, scaling on 2D transformation.
6. WAP to perform scaling and shearing on 2D transformation.
7. WAP to implement translation of a line and triangle.
8. WAP to implement rotation of a line and triangle.
9. WAP to implement scaling transformation.
10. WAP to fill polygon using seed filling algorithm.
11. WAP to implement 3D rotation about an arbitrary axis.
12. WAP to implement Cohen Sutherland line clipping.

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COURSE OUTCOMES

After completion of the course students will be able to:

- CO1. understand the basic concepts of computer graphics.
  - CO2. demonstrate scan conversion problems using programming language.
  - CO3. implement the concepts of geometric transformation of 2D and 3D objects.
  - CO4. apply clipping and filling techniques for modifying an object.
  - CO5. understand the practical implementation of modelling and rendering.
  - CO6. demonstrate the concept of viewing of 2D objects.
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COMPUTER GRAPHICS & MULTIMEDIA  
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LIST OF SKILL BASED MINI PROJECT

List of Micro Projects:

1. Draw the three parallel lines with different colors.
2. Draw the three lines, first should be line horizontal, second line on 45 degree and third line vertical.
3. Draw a triangle with different colors.
4. Draw a circle with multiple colors.
5. Draw two triangles with different size.
6. Draw a rectangle with 45 degree on screen.
7. Draw an ellipse on 45 degree on screen.
8. Case study on the hardware level components available in computer graphics.
9. Case study on the software level components available in computer graphics.
10. Case study on functions available in graphics.h header file.

List of Macro Projects:

1. Design an Indian Flag on screen.
2. Design a Pyramid.
3. Design a House front face.
4. Design a Balloon.
5. Design a Smile face.
6. Design a Rain.
7. Design a Football.
8. Design a Moving a wheel project.
9. Design a Moving a Cycle project.
10. Design a Analog Clock.

List of Mini Projects:

1. Write the code to draw a hut and color it using graphics.
2. Write the code to draw concentric circle on screen using graphics.

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DEPARTMENT OF INFORMATION TECHNOLOGY

JAVA PROGRAMMING LAB  
3160325

LIST OF PROGRAMS

1. Write a program to accept two numbers (int) as command line arguments and print their Sum.
2. Write a program to find the average and sum of the N Numbers Using Command line argument.
3. Write a program to Demonstrate Type Casting.
4. Write a program to find the number of arguments provide at runtime.
5. Write a program to print Fibonacci series without using recursion and using recursion.
6. Write a program to check prime numbers and palindrome numbers.
7. Write a program to sort an array of elements using bubble sort algorithm.
8. Write a program to sort an array of elements using insertion sort algorithm.
9. Write a non-static function in java that prints the sum of two numbers.
10. 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.
11. WAP to handle the Exception using try and multiple catch block.
12. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -, \*, % operations. Add a text field to display the result. Handle any possible exceptions like divide by zero.
13. Develop an Applet that receives an integer in one text field & compute its factorial value & returns it in another text field when the button "Compute" is clicked
14. Write a Java program that implements a multi-thread application that has three threads. First thread generates a random integer every first second and if the value is even, the second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of the cube of the number.

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COURSE OUTCOMES

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

CO1. tell the available features in Java programming language.

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- CO2. illustrate Java programming concepts for solving problems.
- CO3. make use of the Java programming methods for connecting the various databases.
- CO4. test for bugs in a software application written in the Java programming language.
- CO5. determine different ways for handling exceptions, memory management, file handling,  
i/o management and internet based application development.
- CO6. build a project for application development using Java programming language.
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LIST OF SKILL BASED MINI PROJECT

**List of Micro Projects:**

1. To build an Authentication System for user login.
2. Design a Random number generator using function.
3. Calculate the CGPA of students using java application.
4. Implementation of Word Counter using java programming language.
5. Convert the temperature in different slandered using java.
6. To manage the data of alumni using Online Alumni Database System.
7. Design a Ceaser Cipher for encryption and decryption of text.

**List of Macro Projects:**

1. Implementation of Online shopping bill generation system using java programming language.
2. Design a Scientific Calculator using event delegation model of java.
3. To manage Online Quiz using java application.
4. Build an application for designing CV/ Resume
5. Calculate the Electricity Bill using java programming language.
6. Design an Online Voting System using multithreading concept of java.
7. To implement the Play fair Cipher concept using java programming language.

**List of Mini Projects:**

1. Develop a java application for implementation of Online Shopping Cart.
2. Apply the basic concept of java applet for designing Tic-Tac-Toe Game.
3. Create a Java application for implement basic transaction in any Bank.
4. To manage the attendance of students using Java database Management System
5. To implement a Java application for conduction of Online Survey System
6. Design a Java application for designing Search Engine
7. Create a Java application for development of Snake Game.

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