(101CP24)

M.Sc. DEGREE EXAMINATION, JUNE/JULY 2025.

First Semester

Computer Science

DATA STRUCTURES IN C

Time : Three hours Maximum : 70 marks

Answer ONE question from each unit.

(5 × 14 = 70)

UNIT – I

1. (a) Explain how stacks and queues can be implemented using dynamic arrays with examples.

   (b) Describe the algorithm for evaluating postfix expressions using stacks.

Or

2. (a) Discuss the representation of arrays and dynamically allocated arrays in C.

   (b) Write a C program to represent a polynomial using a structure.

UNIT – II

3. (a) What is a singly linked list? Write and explain C functions to insert and delete nodes.

   (b) Describe how polynomials are represented using linked lists and how they can be added.

Or

4. (a) Explain the concept of circular linked lists.

   (b) Discuss sparse matrix representation using arrays and linked lists.

UNIT – III

5. (a) Define a binary tree and Illustrate binary tree representations in C.

   (b) Write algorithms for inorder, preorder, and postorder traversal of a binary tree.

Or

6. (a) What is a binary search tree (BST)? Explain how to insert and delete a node in a BST.

(b) Describe threaded binary trees and how inorder traversal is performed on them

UNIT – IV

7. (a) Write and explain the algorithm for Quick Sort with an example.

(b) Describe the process of building a heap and sorting elements.

Or

8. (a) Explain various hash functions with suitable examples.

(b) Describe collision resolution techniques in hashing.

UNIT – V

9. (a) Explain the representation of graphs using adjacency matrix and adjacency list.

(b) Write and explain the algorithm for Depth First Search (DFS).

Or

10. (a) Discuss Prim's algorithm for finding the minimum cost spanning tree with an example.

(b) Explain Dijkstra's algorithm for solving the single-source shortest path problem.

(102CP24)

M.Sc. DEGREE EXAMINATION, JUNE/JULY 2025.

First Semester

Computer Science

OBJECT ORIENTED PROGRAMMING WITH JAVA

Time : Three hours Maximum : 70 marks

Answer ONE question from each unit

(5 × 14 = 70 marks)

UNIT – I

1. Explain the key features of Java. Write a Java program to demonstrate usage of classes, constructors, and method overloading.

Or

2. Discuss control flow statements in Java. Write a program to read an integer array and print all prime numbers in it.

UNIT – II

3. Differentiate between interfaces and abstract classes with examples. Write a Java program to demonstrate multiple inheritance using interfaces.

Or

4. Explain the steps to create, compile and use a user-defined package in Java. Write a program to illustrate its usage.

UNIT – III

5. What are the different types of streams in Java? Write a program to copy content from one file to another using FileReader and FileWriter.

Or

6. What is exception handling? Explain try-catch-finally with an example. Also explain how to define and use a custom exception.

UNIT – IV

7. What is multithreading? Explain the life cycle of a thread with a diagram. Write a program to create two threads using Runnable interface.

Or

8. What are events and event listeners? Write a Java program to handle button click events using Action Listener.

UNIT – V

9. What is an Applet? Explain the life cycle methods of an applet. Write a simple applet to display your name and roll number.

Or

10. Discuss the features of Swing components. Write a Java Swing application that uses JFrame, JLabel, JTextField, and JButton to accept and display user input.

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(103CP24)

M.Sc. DEGREE EXAMINATION, JUNE/JULY 2025.

First Semester

Computer Science

OPERATING SYSTEMS

Time : Three hours Maximum : 70 marks

Answer ONE question From Each Unit.

(5 × 14 = 70)

UNIT I

1. Explain the different types of variables in Java with examples. Also discuss the concept of scope and lifetime of variables.

Or

2. Describe the concept of inheritance in Java. What are the benefits of using inheritance? Write a program to illustrate the concept.

UNIT II

3. Differentiate between abstract classes and interfaces with examples. When should we prefer an interface over an abstract class?

Or

4. What are packages in Java? Explain how to create and access a user-defined package with suitable code.

UNIT III

5. Discuss the types of exceptions in Java. Explain how exception handling is done using try-catch-finally blocks with a program.

Or

6. What is the role of the File class in Java? Illustrate file handling using byte streams and character streams with examples.

UNIT IV

7. Explain the life cycle of a thread in Java. Describe thread creation using both Thread class and Runnable interface with examples.

Or

8. What is the Delegation Event Model in Java? Explain how mouse and keyboard events can be handled in Java with suitable code.

UNIT V

9. Explain the life cycle of an applet and illustrate each phase using an example. Also, list the differences between applets and applications.

Or

10. Describe the Swing architecture Develop a Swing application to demonstrate the usage of JTextField, JButton and JLabel.

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M.Sc. DEGREE EXAMINATION, JUNE/JULY 2025.

First Semester

Computer Science (CS)

PROBABILITY AND STATISTICS

Time : Three hours Maximum : 70 marks

Answer ONE question From Each Unit.

(5 × 14 = 70)

UNIT I

1. (a) State and explain the axioms of probability with suitable examples.

   (b) A bag contains 3 red, 4 blue, and 5 green balls. Two balls are drawn at random without replacement. Find the probability that both are of the same color.

Or

2. (a) Define conditional probability. Derive the multiplication rule for independent events.

   (b) Define and derive the mean and variance of the Poisson distribution.

UNIT II

3. (a) Define a continuous random variable and its probability density function. Give an example.

   (b) Explain the Central Limit Theorem with a real-life application.

Or

4. (a) Explain the properties of the normal distribution. Find the area under the standard normal curve between $z = -1$ and $z = 2$.

   (b) Discuss point estimation and interval estimation with examples.

UNIT III

5. (a) Define null and alternative hypothesis. Explain the procedure of hypothesis testing.

(b) A coin is tossed 100 times, and heads appeared 56 times. Test whether the coin is fair.

Or

6. (a) Define and distinguish between Type I and Type II errors in hypothesis testing.

(b) A company claims that 40% of its employees are women. In a random sample of 200 employees, 70 are women. Test the claim at a 5% significance level.

UNIT IV

7. (a) Compare two means using independent samples assuming equal variances.

(b) Explain ANOVA one-way classification and its applications.

Or

8. (a) Define randomized complete block design and discuss its importance.

(b) A factory has 3 machines producing parts. Analyze whether the mean production differs using ANOVA.

UNIT V

9. (a) Define simple linear regression. Derive the least square estimators for slope and intercept.

(b) Discuss the significance of the coefficient of determination.

Or

10. (a) Explain the multiple linear regression model and its assumptions.

(b) Construct a confidence interval for the regression slope in a given data set.

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(105CP24)

M.Sc. DEGREE EXAMINATION, JUNE/JULY 2025.

First Semester

Computer Science

COMPUTER ORGANIZATION

Time : Three hours Maximum : 70 marks

Answer ONE question from each unit

(5 × 14 = 70)

UNIT I

1. Simplify the Boolean expression:

   $F(A,B,C,D)=\Sigma(0,1,2,5,8,9,10,14)$

   using Karnaugh Map. Design the corresponding logic circuit.

Or

2. Explain the different types of flip-flops with logic diagrams and characteristic tables.

UNIT II

3. What is Register Transfer Language (RTL)? Explain register transfer, memory transfer, and bus transfer operations with examples.

Or

4. Explain the instruction cycle and memory reference instructions in a basic computer. Illustrate with a flowchart.

UNIT III

5. Describe the structure and working of a micro-programmed control unit. Also, explain address sequencing.

Or

6. Discuss various addressing modes used in CPU with suitable examples.

UNIT IV

7. Explain Booth's multiplication algorithm with an example.

Or

8. Discuss floating-point arithmetic operations. Show how addition and subtraction are handled.

UNIT V

9. Describe the different modes of data transfer in I/O organization.

Or

10. Explain cache memory and its mapping techniques. Compare cache with associative memory.

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