

FACULTY OF INFORMATICS

**M.C.A. (3 years Course) II-Semester (CBCS) (Backlog) (New) Examination,
October / November 2023**

Subject: Computer Organization

Time: 3 Hours

Max. Marks: 70

**Note: I. Answer one question from each unit. All questions carry equal marks.
II. Missing data, if any, may be suitably assumed.**

Unit - I

1. a) Illustrate floating point representation.
b) Describe the computer components.

(OR)

2. a) Write notes on binary codes.
b) Explain the bus structure.

Unit – II

3. a) Give an overview of register transfer language.
b) Explain the fetch and execute cycle.

(OR)

4. a) Construct the adder subtractor circuit.
b) Enumerate and describe memory reference instruction.

Unit – III

5. a) Draw the flowchart of address sequencing and explain it.
b) Discuss the instruction format.

(OR)

6. a) Explain the program control logic.
b) Illustrate the Booth multiplication algorithm.

Unit – IV

7. a) Explain the memory hierarchy.
b) Discuss the functionality of main memory.

(OR)

8. a) Illustrate the working of cache memory.
b) Write notes on memory management hardware.

Unit – V

9. a) Write about input output interface.
b) Explain interrupt mode of transfer.

(OR)

10. a) Describe the RISC pipeline.
b) Discuss the CPU performance and its factors.

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**M.C.A. (3 Years Course) (CBCS) II-Semester (Backlog) (Old) Examination,
October / November 2023**

Subject: C++ and Data Structures

Time: 3 Hours

Max. Marks: 70

**Note: I. Answer one question from each unit. All questions carry equal marks.
II. Missing data, if any, may be suitably assumed.**

Unit – I

1. a) Illustrate Programming paradigms with examples.
b) Demonstrate Applications of Object Oriented Programming.
(OR)
2. a) Demonstrate Arrays in functions with example.
b) Explain Function Overloading with example.

Unit – II

3. a) With an example program, Illustrate Friend Functions.
b) Explain Pointers with example.
(OR)
4. a) Demonstrate types of Constructors with an example.
b) Write a program to implement String methods.

Unit – III

5. a) Define Inheritance. Explain types of Inheritance with examples.
b) Demonstrate Virtual functions with an example.
(OR)
6. a) Illustrate Exception Handling with examples.
b) Demonstrate Class templates with example.

Unit – IV

7. a) Illustrate operations on Stack with examples.
b) Define Linear List. Explain Linear List with an example.
(OR)
8. a) Demonstrate Hashing with example.
b) Discuss Applications of Queue.

Unit – V

9. a) Define Binary Tree. Discuss Binary Trees Properties in detail.
b) Demonstrate B-Trees with example.
(OR)
10. a) Demonstrate any one Graph Traversing Technique with an example.
b) Describe Graph representation with example.

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**M.C.A. (2-Years Course) II-Semester (CBCS) (Main & Backlog) Examination,
October/November 2023**

Subject: Design and Analysis of Algorithms

Time: 3 Hours

Max. Marks: 70

**Note: I. Answer one question from each unit. All questions carry equal marks.
II. Missing data, if any, may be suitably assumed.**

Unit – I

1. (a) Compare and contrast a priori estimates and a posteriori testing.
(b) Define algorithm. Explain different Asymptotic Notations.

(OR)

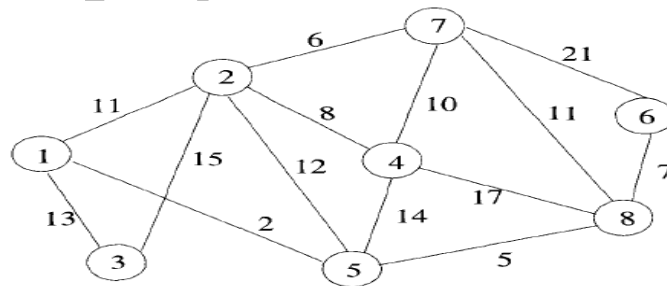
2. (a) Write algorithms for Add Q and Delete Q assuming the queue represented as a linked list.
(b) Define MAX HEAP and MIN HEAP. Explain the Heap sort technique for the sequence: 100, 119, 118, 171, 112, 151 and 132.

Unit – II

3. (a) Write the algorithm for selection sort and analyze its Best, Average and Worst case time complexity.
(b) Explain Strassen's algorithm for matrix multiplication with the help of an example.

(OR)

4. (a) Compute a minimum cost spanning tree for the graph shown in figure below using Prim's algorithm.



- (b) Explain the single source shortest path algorithm with an example.

Unit – III

5. (a) What is Dynamic programming? Write an algorithm to find a minimum cost binary search tree.
(b) Explain about Travelling Salesperson problem.

(OR)

6. (a) Describe Bi-connected components.
(b) Briefly explain about Depth First Search.

Unit – IV

7. (a) Explain Hamiltonian cycles with examples.
(b) Describe in detail 8-queens problem using back tracking.

(OR)

8. (a) Explain the general method of branch and bound.
(b) Consider the travelling salesperson instance defined by the cost matrix

$$\begin{bmatrix} \infty & 7 & 3 & 12 & 8 \\ 3 & \infty & 6 & 14 & 9 \\ 5 & 8 & \infty & 6 & 18 \\ 9 & 3 & 5 & \infty & 11 \\ 18 & 14 & 9 & 8 & \infty \end{bmatrix}$$

Obtain the reduced cost matrix.

Unit – V

9. (a) State and explain cook's theorem.
(b) Explain how are P and NP problems related.

(OR)

10. (a) Briefly explain the classes NP-hard and NP-complete.
(b) Discuss about CNF satisfiability.
