

(6 pages)

Reg. No. : .....

Code No. : 7057

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M.C.A. (CBCS) DEGREE EXAMINATION,  
NOVEMBER 2022.

First Semester

Computer Application – Core

DESIGN AND ANALYSIS OF ALGORITHMS  
USING C++

(For those who joined in July 2021 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. Which one of the following is an application of queue data structure
  - (a) When a resource is shared among multiple consumers
  - (b) When data is transferred asynchronously
  - (c) Load Balancing
  - (d) All of the above

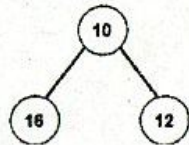
2. Which of the following data structures can be used to implement queues?
  - (a) Stack
  - (b) Arrays
  - (c) Linked List
  - (d) All of the Above
3. Merge sort uses which of the following technique to implement sorting?
  - (a) backtracking
  - (b) greedy algorithm
  - (c) divide and conquer
  - (d) dynamic programming
4. What is the worst case time complexity of a quick sort algorithm?
  - (a)  $O(N)$
  - (b)  $O(N \log N)$
  - (c)  $O(N^2)$
  - (d)  $O(\log N)$
5. Consider a complete graph  $G$  with 4 vertices. The graph  $G$  has \_\_\_\_\_ spanning trees.
  - (a) 15
  - (b) 8
  - (c) 16
  - (d) 13

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6. The following given tree is an example for?



- (a) Binary tree                      (b) Binary search tree  
(c) Fibonacci tree                  (d) AVL tree
7. What is the traversal strategy used in the binary tree?
- (a) Depth-first traversal  
(b) Breadth-first traversal  
(c) Random traversal  
(d) Priority traversal
8. A connected planar graph having 6 vertices, 7 edges contains \_\_\_\_\_ regions.
- (a) 15                                      (b) 3  
(c) 1                                        (d) 11

9. In Hamiltonian Cycle for  $n$  vertices, we \_\_\_\_\_.

- (a) Can visit to same vertex two times  
(b) Can't visit same vertex more than one time  
(c) Can omit one vertex  
(d) None of these
10. The worst-case efficiency of solving a problem in polynomial time is?
- (a)  $O(p(n))$                                       (b)  $O(p(n \log n))$   
(c)  $O(p(n^2))$                                       (d)  $O(p(m \log n))$

PART B — ( $5 \times 5 = 25$  marks)

Answer ALL questions, choosing either (a) or (b).  
Each answer should not exceed 250 words.

11. (a) What is a circular queue? Explain.
- Or
- (b) Define a heap. What are the types of heap?
12. (a) Write the algorithm for finding maximum and minimum using quick sort.
- Or
- (b) Discuss any five applications of divide and conquer problem.





13. (a) What is greedy method? Give one example for greedy method.

Or

- (b) Write the algorithm for all pairs shortest path.

14. (a) What are the traversal method for a graph data structure?

Or

- (b) Write the algorithm for N-queen problem.

15. (a) What is job shop scheduling-explain?

Or

- (b) How will you solve knap sack problem using branch and bound algorithm?

PART C — ( $5 \times 8 = 40$  marks)

Answer ALL questions, choosing either (a) or (b)  
Each answer should not exceed 600 words.

16. (a) Write in detail about the asymptotic notations of algorithms.

Or

- (b) Explain the dictionary data structure with suitable algorithm.

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17. (a) Write the binary search method with algorithmic procedure.

Or

- (b) Explain in detail about the strassen's matrix.

18. (a) Explain the 0/1 knapsack problem with suitable algorithm.

Or

- (b) Give the general concepts of dynamic programming.

19. (a) What are spanning trees and how will you generate spanning trees?

Or

- (b) Explain backtracking with an example.

20. (a) Write the basic Cook's theorem in design of algorithms.

Or

- (b) What is NP- hard problem? Explain.

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