# University of Mumbai

## Examination First Half (Summer-2022)

Program: MCA (2 Year Course)

Curriculum Scheme:(R-2021-22)

Examination: 1T00162 / MCA (Sem-II) (R-2021-22) (2 Year Course)

Course Code:70661 / Elective 2: Design & Analysis of Algorithm

Time: 2 hours 30 minutes Max. Marks: 80

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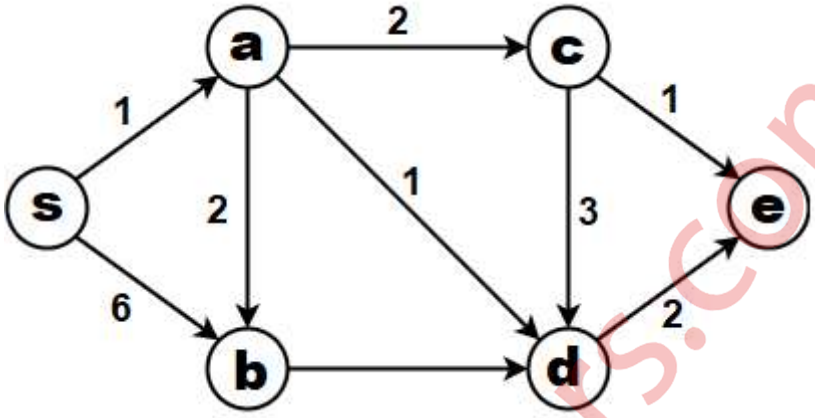
| Q1. | **Choose the correct option for following questions. All the Questions are compulsory and carry equal marks** |
|---|---|
| 1. | Dijkstra's algorithm is used to solve _____ problems? |
| Option A: | Network lock |
| Option B: | Single pair shortest path |
| Option C: | All pair shortest path |
| Option D: | Sorting |
| | |
| 2. | Which of the following is used for solving the N Queens Problem? |
| Option A: | Greedy Algorithm |
| Option B: | Dynamic Programming |
| Option C: | Backtracking |
| Option D: | Sorting |
| | |
| 3. | Hamiltonian path problem is _____? |
| Option A: | NP Problem |
| Option B: | P class Problem |
| Option C: | NP Complete Problem |
| Option D: | N class problem |
| | |
| 4. | What is the time complexity of the binary search algorithm? |
| Option A: | O(n) |
| Option B: | O(1) |
| Option C: | O(log2n) |
| Option D: | O(n2) |
| | |
| 5. | ___ of an algorithm is the amount of time required for it to execute. |
| Option A: | Time complexity |
| Option B: | Space complexity |
| Option C: | Compiling time |
| Option D: | Best case |
| | |

| | |
|---|---|
| 6. | The recursive versions of binary search use a ___ structure. |
| Option A: | Branch and bound |
| Option B: | Dynamic programming |
| Option C: | Divide and conquer |
| Option D: | Simple recursive |
| | |
| 7. | If a problem can be broken into subproblems which are reused several times, the problem possesses _____ property. |
| Option A: | Overlapping subproblems |
| Option B: | Optimal substructure |
| Option C: | Memoization |
| Option D: | Greedy |
| | |
| 8. | Which of the following problems should be solved using dynamic programming? |
| Option A: | Mergesort |
| Option B: | Binary search |
| Option C: | Longest common subsequence |
| Option D: | Quicksort |
| | |
| 9. | Which of the following branch and bound strategy leads to breadth first search? |
| Option A: | LIFO branch and bound |
| Option B: | FIFO branch and bound |
| Option C: | Lowest cost branch and bound |
| Option D: | Highest cost branch and bound |
| | |
| 10. | What is a Rabin and Karp Algorithm? |
| Option A: | String Matching Algorithm |
| Option B: | Shortest Path Algorithm |
| Option C: | Minimum spanning tree Algorithm |
| Option D: | Approximation Algorithm |

| **Q2** | **Solve any Two Questions out of Three** **10 marks each** |
|---|---|
| A | Explain MERGE sort using divide and conquer Methodology. |
| B | What do you mean by efficiency of a program? Calculate the efficiency of non recursive algorithms. |
| C | Solve given 0/1 Knapsack problem using dynamic programming approach. The maximum weight the knapsack can hold is W is 11. There are five items to choose from. Their weights and values are presented in the following table:<br>W1=1 V1=1<br>W2=2 V2=6<br>W3=5 V3=18<br>W4=6 V4=22<br>W5=7 V5=28 |

| Q3 | **Solve any Two Questions out of Three** **10 marks each** |
|---|---|
| A | Explain Naïve string-matching algorithm with an example. |
| B | Find Single source shortest path/s from the source vertex 'S' using Dijkstra's algorithm by applying greedy approach.<br>  <br> |
| C | Define backtracking, explain 4 queen problems using backtracking technique and draw the state diagram. |

| Q4. | **Solve any Two Questions out of Three** **10 marks each** |
|---|---|
| A | Define NP Hard and NP –complete problem in detail. |
| B | What do you mean by Branch and Bound technique? Explain LIFO Search, FIFO search and least cost search with examples. |
| C | Solve given 15-puzzle problem using branch and bound technique.<br>1 2 3 4<br>5 6 8<br>9 10 7 11<br>13 14 15 12<br>Given arrangement<br>1 2 3 4<br>5 6 7 8<br>9 10 11 12<br>13 14 15<br>Goal arrangement |