**SRM Institute of Science and Technology Set D**

**College of Engineering and Technology**

**School of Computing**

SRM Nagar, Kattankulathur – 603203, Chengalpattu District, Tamilnadu

**Academic Year: 2021-22 (Even)**

**Test: CLA-T3**  **Date: 29-06-2022**

**Course Code & Title: 18CSC204J Design and Analysis of Algorithms** **Duration:** 2 Hour

**Year & Sem: II Year / IV Sem** **Max. Marks:** 50

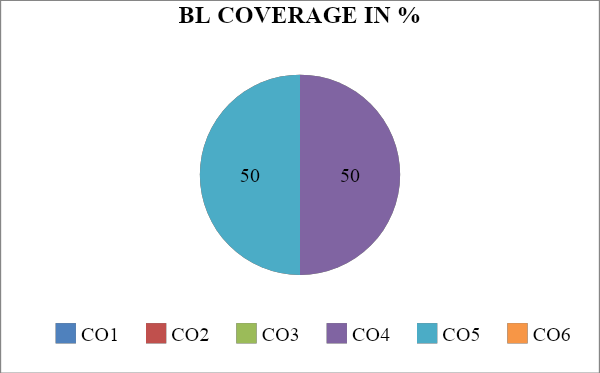
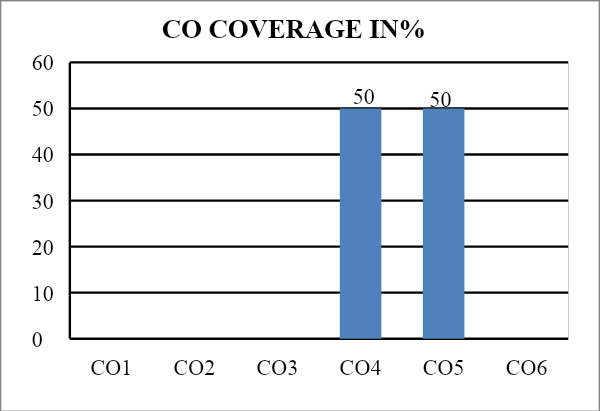
**Course Articulation Matrix:**

| **Course Outcome** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO1** | L | H |  | H | L |  |  |  | L | L |  | H |
| **CO2** | M | H | L | M | L |  |  |  | M | L |  | H |
| **CO3** | M | H | M | H | L |  |  |  | M | L |  | H |
| **CO4** | M | H | M | H | L |  |  |  | M | L |  | H |
| **CO5** | H | H | M | H | L |  |  |  | M | L |  | H |
| **CO6**. | L | H | M | H | L |  |  |  | L | L |  | H |

| **Part - A**  **(10 x 1 = 10 Marks)**  **Instructions: Answer all** | | | | | | |
| --- | --- | --- | --- | --- | --- | --- |
| **Q. No** | **Question** | **Marks** | **BL** | **CO** | **PO** | **PI Code** |
| 1 | Choose the searching method which is helpful in a backtracking algorithm for state-space tree construction.   1. Depth-first search 2. Breadth-first search 3. FIFO search 4. LIFO search | 1 | 3 | 4 | 3 | 2.1.1 |
| 2 | Consider the sum-of-subset problem, n=4, sum=35, and weights={5,7,10,12,15,18,20}. How many total number of solutions for the given problem?  a) 4 b) 3 c) 2 d) 1 | 1 | 4 | 4 | 3 | 2.2.2 |
| 3 | A node is said to be \_\_\_\_\_\_\_\_\_\_\_\_ if it has a possibility of reaching a complete solution. a) Non-promising b) Promising c) Succeeding d) Preceding | 1 | 2 | 4 | 2 | 2.1.1 |
| 4 | Identify the correct choice from the following for branch and bound strategy:   1. converting the minimization problem into a maximization problem 2. converting the maximization problem into a minimization problem 3. changing the upper bound to lower bound 4. changing the lower bound to upper bound | 1 | 3 | 4 | 2 | 2.1.1 |
| 5 | In the Floyd Warshall Algorithm, the value of k is 0 in the following formula: A[i,j]=min{A[i,j],A[i,k],A[k,j]}. Give the correct meaning for the above statement. a) 1 intermediate vertex b) 0 intermediate vertex c) N intermediate vertices d) N-1 intermediate vertices | 1 | 4 | 4 | 3 | 2.1.1 |
| 6 | Randomized quick sort is identified by   1. Quick sort with random partitions 2. Quick sort with random output 3. Quick sort with random choice of pivot 4. Quick sort with random input | 1 | 3 | 5 | 3 | 2.1.2 |
| 7 | Find the matching time of Rabin Karp Algorithm, If the expected number of valid shifts is small and prime is larger than the length of pattern.  a Theta(m)  b. Big-Oh(n+m) c. Theta(n-m) d. Big-Oh(n) | 1 | 3 | 5 | 3 | 2.1.2 |
| 8 | A\_\_\_\_\_\_\_  of a [graph](https://en.wikipedia.org/wiki/Graph_(discrete_mathematics)) is a set of [vertices](https://en.wikipedia.org/wiki/Vertex_(graph_theory)) that includes at least one endpoint of every [edge](https://en.wikipedia.org/wiki/Edge_(graph_theory)) of the [graph](https://en.wikipedia.org/wiki/Graph_(discrete_mathematics)).  a. Vertex Traversal  b. Preorder Traversal  c. Vertex cover  d. In order cover | 1 | 2 | 5 | PO3 | 2.1.1 |
| 9 | Let X be a problem that belongs to the class NP. Then which one of the following is TRUE?.  a) There is no polynomial time algorithm for X  b) If X can be solved deterministically in polynomial time, then P=NP  c) If X is NP-hard, then it is NP-complete  d) X can be solved deterministically with decision | 1 | 2 | 5 | 1 | 2.2.2 |
| 10 | Let us assume the problem of 3-SAT and 2-SAT belongs to the complexity classes. Choose the correct statement from the following:  a) both in P b) NP-complete and P respectively c) both NP-complete d)None of the Above | 1 | 3 | 5 | 1 | 3.1.1 |
| Part – B  ( 4 x 10 Marks = 40 Marks)  Instructions: Answer any 4 Questions | | | | | | |
| **11** | **Write the algorithm to solve the n-queen problem and Give the solution for the 4-queen problem with its state space tree.** | 10 | 2 | 4 | 3 | 1.6.1 |
| **12** | **Consider the following graph G containing the Hamiltonian cycle of n vertices.**    **Draw the adjacency matrix of the graph G. Use a Backtracking algorithm to find the solution cycle. Compare its time complexity analysis with brute force method.** | 10 | 3 | 4 | 4 | 2.5.3 |
| **13** | **Solve the Traveling Salesman Problem using Branch and Bound Algorithm in the following graph. Draw the graph G, the state space tree and find the optimal tour.**   |  | **A** | **B** | **C** | **D** | **E** | | --- | --- | --- | --- | --- | --- | | **A** | ∞ | 3 | 4 | 2 | 7 | | **B** | 3 | ∞ | 4 | 6 | 3 | | **C** | 4 | 4 | ∞ | 5 | 8 | | **D** | 2 | 6 | 5 | ∞ | 6 | | **E** | 7 | 3 | 8 | 6 | ∞ | | 10 | 3 | 4 | 4 | 2.5.3 |
| **14** | **Explain in detail and compare the deterministic quicksort problem and randomized algorithms with the suitable array elements.** | 10 | 3 | 5 | 5 | 2.6.3 |
| **15** | **Write short note on the following:**   * + - 1. **Non-deterministic Polynomial class problems with NP-hard and NP-complete**       2. **Satisfiability problems with example** | 10 | 3 | 5 | 3 | 2.6.3 |

**\*Program Indicators are available separately for Computer Science and Engineering in AICTE examination reforms policy.**

**Course Outcome (CO) and Bloom’s level (BL) Coverage in Questions**



**Approved by the Audit Professor/Course Coordinator**