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

**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:** 100 min

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

**Course Articulation Matrix:**

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| **Course Outcome** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** |
| **CO1** | ***2*** | ***3*** | ***-*** | ***-*** | ***-*** | ***-*** | ***-*** | ***-*** | ***-*** | ***-*** | ***-*** | ***-*** |
| **CO2** | ***-*** | ***3*** | ***2*** | ***-*** | ***-*** | ***-*** | ***-*** | ***-*** | ***-*** | ***-*** | ***-*** | ***-*** |
| **CO3** | ***-*** | ***3*** | ***3*** | ***-*** | ***-*** | ***-*** | ***-*** | ***-*** | ***-*** | ***-*** | ***-*** | ***-*** |
| **CO4** | ***3*** | ***2*** | ***3*** | ***-*** | ***-*** | ***-*** | ***-*** | ***-*** | ***-*** | ***-*** | ***-*** | ***-*** |
| **CO5** | ***2*** | ***3*** | ***-*** | ***-*** | ***-*** | ***-*** | ***-*** | ***-*** | ***-*** | ***-*** | ***-*** | ***-*** |
| **CO6** | ***-*** | ***2*** | ***3*** | ***-*** | ***-*** | ***-*** | ***-*** | ***-*** | ***-*** | ***-*** | ***-*** | ***-*** |

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| **Part – A**  **(10 x 1 = 10 Marks)**  **Instructions: Answer all** | | | | | | |
| **Q. No** | **Question** | **Marks** | **BL** | **CO** | **PO** | **PI Code** |
| **1** | **Backtracking algorithm is implemented by constructing a tree of choices called as?**  **a. State-space tree**  **b. State-chart tree**  **c. Node tree**  **d. Backtracking tree**  **Ans: a. State Space tree** | **1** | **1** | **CO4** | **PO2** | **2.1.1** |
| **2** | **In what manner is a state-space tree for a backtracking algorithm constructed?**  **a. Depth-first search**  **b. Breadth-first search**  **c. Nearest neighbor first**  **d. twice around the tree**  **Ans: a. Depth First Search** | **1** | **4** | **CO4** | **PO3** | **3.1.1** |
| **3** | **Which data structure is used for implementing a LIFO branch and bound strategy?**  **a. stack**  **b. queue**  **c. array**  **d. linked list**  Ans: a. Stack | **1** | **4** | **CO4** | **PO2** | **2.3.1** |
| **4** | **What happens when the backtracking algorithm reaches a complete solution?**   1. **It backtracks to the root** 2. **It continues searching for other possible solutions** 3. **It traverses from a different route** 4. **Recursively traverses through the same route**   **Ans: b. It continues searching for other possible solutions** | **1** | **2** | **CO4** | **PO2** | **2.3.1** |
| **5** | **Which algorithm technique is used to find a solution for the n- Queen problem?**  **a. Branch and Bound**  **b. Backtracking**  **c. Brute force**  **d. Dynamic Programming**  **Ans: b. Backtracking** | **1** | **2** | **CO4** | **PO2** | **2.3.1** |
| **6** | **What does NP stand for?**  **a. Non Polynomial**  **b. Non Positive**  **c. Nondeterministic Polynomial**  **d. Non Perfect**  **Ans: c. Nondeterministic Polynomial** | **1** | **1** | **CO5** | **PO3** | **3.1.1** |
| **7** | **Which of the following running time will make the problem qualified to be in P?**  **a. nlog n b. 2^n c. n! d. 3^n** | **1** | **1** | **CO5** | **PO3** | **3.2.2** |
| **8** | **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**  **Ans: b. Promising** | **1** | **1** | **CO5** | **PO3** | **3.2.2** |
| **9** | **Let S be an NP-complete problem and Q and R be two other problems not known to be in NP. Q is polynomial time reducible to S and S is polynomial-time reducible to R. Which one of the following statements is true?**  **a. R is NP-Complete**  **b. R is NP-Hard**  **c. Q is NP Complete**  **d. Q is NP Hard**  **Ans: a. R is NP-Complete** | **1** | **4** | **CO5** | **PO3** | **3.3.1** |
| **10** | **A random algorithm uses random bits as input in order to achieve a ………………… good performance overall possible choice of random bits.**  **a. worst case**  **b. best case**  **c. average case**  **d. none of the above**  **Ans: c. Average case** | **1** | **2** | **CO5** | **PO2** | **2.1.2** |
| **Part – B**  **( 4 x 10 Marks = 40 Marks)**  **Instructions: Answer any 4 Questions** | | | | | | |
| **11** | **Consider the sum-of-subset problem, n=4, Sum=13 and w1=3, w2=4, w3=5 and w4=6. Find a solution to the problem using backtracking. Show the state-space tree leading to the solution. Also, the number of nodes in the tree in the order of recursion calls.** | **10** | **4** | **CO4** | **PO3** | **3.3.1** |
| **12** | **Write the algorithm for Backtracking. Print all the Hamiltonian Cycles present in the below graph with a complete state space tree.** | **10** | **3** | **CO4** | **PO3** | **3.4.1** |
| **13** | **Explain Branch and Bound. Find the optimal cost tour for the below streets using branch and bound.**    Minimum cost : 80  Path Taken : 0 1 3 2 0 | **10** | **3** | **CO4** | **PO3** | **3.2.1** |
| **14** | **Construct a graph with atleast 5 vertices and 10 edges, and give the vertex cover for the graph and explain.** | **10** | **4** | **CO5** | **PO2** | **2.3.2** |
| **15** | **Write Rabin-Karp Algorithm and Perform Pattern matching for the following using Rabin Karp Algorithm.**  **String: abccddaefg**  **Pattern: cdd**  **Pattern found** | **10** | **4** | **CO5** | **PO2** | **2.3.2** |

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**\*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**