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

**College of Engineering and Technology**

**School of Computing**

SRM Nagar, Kattankulathur – 603203, Chengalpattu District, Tamilnadu

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

**Test: CLA-T1** **Date: 05-04-2022**

**Course Code & Title: 18CSC204J Design and Analysis of Algorithms** **Duration:** 1 Hour

**Year & Sem: II Year / IV Sem** **Max. Marks:** 25

**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 |

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| **Part - A**  **(10 x 1 = 10 Marks)**  **Instructions: Answer all** | | | | | | |
| **Q. No** | **Question** | **Marks** | **BL** | **CO** | **PO** | **PI Code** |
| **1** | The best case running time of insertion sort is   1. Factorial 2. Constant 3. **Linear** 4. Exponential | **1** | **L2** | **1** | **2** | **2.5.3** |
| **2** | Determine the correct order with respect to computational time(lowest to largest) for the algorithms mentioned below:   1. O(n) , O(1) , O( log n) , O( 2n) 2. **O(1) , O( log n) , O(n) , O(2n)** 3. O(2n) , O(n) , O( log n ) , O(1) 4. O(log n) , O(1) , O(2n) , O(n) | **1** | **L4** | **1** | **2** | **2.6.5** |
| **3** | Consider is equal to   1. n (n+1)/2 2. **n(n+1)(2n+1)/6** 3. n2(n+1)2/4 4. n/(n+1) | **1** | **L3** | **1** | **2** | **2.8.1** |
| **4** | The worst case time complexity of an algorithm gives \_\_\_\_\_\_\_\_\_\_\_on the running time of an algorithm   1. **An upper bound** 2. A lower bound 3. A middle bound 4. A tight bound | **1** | **L2** | **1** | **2** | **2.5.3** |
| **5** | Which among the following is not a characteristic of an algorithm?   1. Definiteness 2. **Error** 3. Uniqueness 4. Input | **1** | **L1** | **1** | **1** | **1.6.1** |
| **6** | The efficiency of an algorithm is determined by   1. Time Factor 2. **Time and Space Factor** 3. Space Factor 4. Memory | **1** | **L2** | **1** | **1** | **1.6.1** |
| **7** | Which of the following is the notation used for expressing the upper bound of an algorithm?   1. **Big-O** 2. Big-Ω 3. Little ‘o’ 4. Theta | **1** | **L2** | **1** | **2** | **2.5.3** |
| **8** | Identify the recurrence equation for the sequence 100,300,900,2700,…? Given T(0)=100   1. **T(n) = 3 \* T(n-1)** 2. T(n) = T(n-1) + 300 3. T(n) = T(n-1) \* 100 4. T(n)=T(n-1) \* 30 | **1** | **L3** | **1** | **2** | **2.8.1** |
| **9** | Which of the following is not an algorithm design technique?   1. Greedy Approach 2. Dynamic Programming 3. **Forward Method** 4. Backtracking | **1** | **L1** | **1** | **1** | **1.6.1** |
| **10** | sum = 0;  for( i = 0; i < n; i++)  for( j = 0; j < n \* n; j++)  sum++;  The running time of the above code is   1. O(n2) 2. O(n/2) 3. **O(n3)** 4. O(nlogn) | **1** | **L3** | **1** | **2** | **2.5.2** |
| **Part – B**  **( 3 x 5 Marks = 15 Marks)**  **Instructions: Answer any 3 Questions** | | | | | | |
| **11** | Explain the characteristics of a good algorithm  **Brief Input/Output, Definiteness, Uniqueness, Correctness and Finiteness** | **5** | **L2** | **1** | **1** | **1.6.1** |
| **12** | Solve the following recurrence relation using substitution method  T(n) = T(n/2)+ 1, T(1) = 1  **O(log n)** | **5** | **L3** | **1** | **2** | **2.5.3** |
| **13** | Solve the following recurrence relation using recursion tree method.  T(n) = 2T(n-1) + 1, for n>1 and T(1) = 1  O(2n) | **5** | **L3** | **1** | **2** | **2.5.3** |
| **14** | Derive best case analysis of insertion sort using step count.  Pseudocode of insertion sort – 1  Step count – 2  Best case Analysis - 2 | **5** | **L3** | **1** | **2** | **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**