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

**College of Engineering and Technology**

**School of Computing**

SRM Nagar, Kattankulathur – 603203, Chengalpattu District, Tamil Nadu

**Academic Year: 2022-23 (Even)**

**Test: CLA-T1** **Date: 13-02-2023**

**Course Code & Title: 18CSC204J Design and Analysis of Algorithms** **Duration:**60 mins

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

**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**  **(5x 1 = 5 Marks)**  **Instructions: Answer all** | | | | | | |
| **Q. No** | **Question** | **Marks** | **BL** | **CO** | **PO** | **PI Code** |
| 1 | \_\_\_\_\_\_\_\_criteria denote that, each step in an algorithm must be such that it can, at least in principle, be done by a person using pencil and paper in a finite amount of time.   1. Finiteness 2. Definiteness 3. **Effectiveness** 4. Ambiguous | 1 | 1 | 1 | 2 | 2.1.1 |
| 2 | The running time of the recursive algorithm can be determined by \_\_\_\_   1. Operation count 2. Iterative method 3. **Recurrence relation** 4. Tabular method | 1 | 2 | 1 | 2 | 2.3.1 |
| 3 | If f(n)=O(g(n)) then g(n)=O(h(n)), then \_\_\_\_\_.   1. f(n)=θ(h(n)) 2. f(n)=Ω(h(n)) 3. **f(n)=O(h(n))** 4. either b or c | 1 | 1 | 1 | 2 | 2.1.1 |
| 4 | There are four algorithms A1, A2, A3, A4 to solve the given problem with the order n, n2, n2 logn and 2n respectively. Which is the worst algorithm?  a) A1  b) A2  c) A3  d) **A4** | 1 | 2 | 1 | 2 | 2.3.1 |
| 5 | Which of the following uses divide and conquer approach?   1. Factorial 2. Fibonacci 3. **Merge sort** 4. Sequential search | 1 | 2 | 1 | 2 | 2.3.1 |
| Part – B  (2 x 10 Marks = 20 Marks)  Instructions: Answer any 2 Questions | | | | | | |
| 6 | You are playing a game where your task is to arrange the cards in ascending order. You have an option to exchange the one card **at a time** from your neighbor. The given cards are 6,4,1,2,5. Find the suitable algorithm to arrange cards in order and analyze the time complexities of the given scenario.  **Ans:**  Insertion Sort pseudocode (5)  insertion sort.JPG  Sorted: 1, 2, 4, 5,6  Dry run: (3)  Time Complexity Analysis: (2)  Best case - O(n)  Worst case - O(n^2) | 10 | 3 | 1 | 2 | 2.2.3 |
| 7 | Deduce the time complexity of a given relation using Recursion Tree approach.  T(n) = T(n/3) + T(2n/3) + n; n>1  1 ; n=1 | 10 | 3 | 1 | 2 | 2.3.2 |
| 8  B) | 1. Given g(n)=2n3 + 3n2+4 and f(n)=n2log n. Show that f(n)=O(g(n)) and g(n)= Ω(f(n)).      1. Examine the following pseudocode and calculate the time complexity using operation count method.   Begin  sum=0;  for (i=4;i<n;i++)  for (j=0;j<=i;j++)  sum++;  end for  end for  end   |  |  |  | | --- | --- | --- | | **i** | **J** | **Cost** | | 4 | 0,1,2,3,4 | 5 | | 5 | 0,1,2,3,4,5 | 6 | | 6 | 0,1,2,3,4,5.6 | 7 | | 7 | 0,1,2,3,4,5,6,7 | 8 |   TC=5+6+7+8…+n=n(n+1)/2=O(n^2) | 5  5 | 3  3 | 1  1 | 2  2 | 2.2.2  2.3.2 |

**\*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**

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