Set A

SRM

SRM Institute of Science and Technology
Delhi- NCR Campus, Modinagar
Department of Computer Science and Engineering

Mode of Exam
OFFLINE

Academic Year: 2022-2023 **(ODD)**

Test: Theory CLA-1
Course Code &Title: 18CSE201J & Data Structures & Algorithms
Year & SEM: 2nd & 3rd

Date: 22-09-2022
Duration: 1hr
Max. Marks: 30

Course Articulation Matrix:

Part – A(MCQ)
(10*1 =10 Marks)
Instructions: Answer all

Q.No	Question	Marks	CO	PO	BL/KC*	PI Code

1	Consider the following function
	`int unknown(int n) {`
	`int i, j, k = 0;`
	`for (i = n/2; i <= n; i++)`
	`for (j = 2; j <= n; j = j * 2)`
	`k = k + n/2;`
	`return k;`
	`}`
	(A) Θ(n2)
	(B) Θ(n^2 log n)
	(C) Θ(n^3)
	(D) Θ(n^3 logn)
		1	1	2	1/C	2.2.3

2	The operation of processing each element in the list is known as (A) Sorting (B) Merging (C) Traversing (D) None of them	1	1	1	1/F	1.3.1
3	Representation of data structure in memory is known as (A) Recursion (B) Storage Structure (C) ADT (D) File Structure	1	1	1	1/F	1.3.1
4	Which of the given option provide increasing order of asymptotic complexity of function A1,A2,A3, A4 ? A1(n) = 2^n , A2(n) = $n^{3/2}$, A3(n) = nlogn , A4(n) = $n^{\log n}$ (A) A3, A2, A1, A4 (B) A2, A3, a4, A1 (C) A3, A2, A4, A1 (D) A2, A3, A1, A4	1	1	2	1/C	2.4.1
5	Which of the following shows relationship between $n^3\log_2 n$ and $3n\log_8 n$? (A) $n^3\log_2 n$ is $O(3n\log_8 n)$ (B) $n^3\log_2 n$ is $\Omega(3n\log_8 n)$ (C) $n^3\log_2 n$ is $\Theta(3n\log_8 n)$ (D) None of them	1	1	2	1/C	2.4.1
	Three algorithms do the same task. Algorithm One	1	1	2	1/C	2.4.1

6	is O(N) and Algorithm Two is O(logN) and Algorithm Three is O(N1/2). Which algorithm should execute the fastest for large values of N (A) O(N1/2) (B) O(N) (C) O(logN) (D) Both A & B	1	1	2	1/C	2.2.3
7	What is the "c" and "n0" value of finding the upper bound for f(n) = 3n+8 (A) 4, 8 (B) 8, 3 (C) 3, 6 (D) 4,7	1	1	1	1/F	1.1.2
8	Two main measures of the efficiency of an algorithm are (A) complexity and capacity (B) Processor and memory (C) Time and space (D) Data and space	1	1	1	1/F	1.3.1
9	Which of the following is non-liner data structure? (A) Stacks (B) Linked List (C) Arrays (D) Trees	1	1	1	1/C	1.3.1
10	An algorithm is made up of two independent time complexities f(n) and g(n). Then the complexities of the algorithm is in the order of (A) f(n) ×g(n) (B) Max(f(n), g(n)) (C) Min(f(n), g(n)) (D) Max(f(n), g(n))	1	1	1	1/C	1.3.1
	Part – B(Short Answer) **(5*4 = 20 Marks)**					
Instructions: Attempt all the questions						
11	A. Explain Big-O notation, Θ notation, Ω notations and find all three for following equation: $10n^2 + 4n + 2$ OR B. Compare and contrast linear search and binary search with respect to their time and space complexity.	5	1	3	2 ,2/ C	2.1.3 & 2.2.2
12	A. Write an optimized algorithm for bubble sort with Best, worst and Average case time complexity. **OR** B. Write an algorithm for insertion sort with best, worst and average case time complexity	5	1	2	2 ,2/ P	2.2.2
13	A. Differentiate between linear and non-linear data structures? **OR** B. Two algorithms A1 and A2 run on same machine. The running time of A1 is $100n^2$ and running time of A2 is 2^n. For what values of n, A1 runs faster than A2? Create a graph for growth of function of A1 and A2.	5	1	1	2,3 /C	2.2.2 & 3.1.6
14	A. The designer of an algorithm needs to balance between space complexity and time complexity. Comment and justify the statement. **OR** B. Explain in details about the operations that can be performed on data structures?	5	1	1	2,1/F	2.2.2 & 1.3.1