University of Mumbai

Program: Information Technology
Curriculum Scheme: Rev2019
Examination: TE Semester V
Course Code: ITDLO5011 and Course Name: Advanced Data Structures & Analysis of Algorithms
Time: 2 hour 30 mins Max. Marks: 80

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Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	Which one of the following is Substitution method
Option A:	Forward
Option B:	Linked list
Option C:	Master's
Option D:	Stack
2.	Recursion is a method in which the solution of a problem depends on
Option A:	Smaller instances of the same problem
Option B:	Larger instances of the same problem
Option C:	Larger instances of different problems
Option D:	Smaller instances of different problems
3.	Which of the following is NOT recurrence method
Option A:	Substitution Method
Option B:	Master's Theorem
Option C:	Array
Option D:	Tree Method
4.	What is probabilistic analysis for hire assistant example?
Option A:	T(n)=O(n/2)
Option B:	T(n)=O(n)
Option C:	T(n)=O(logn)
Option D:	T(n)=O(1)
5.	A _____ is a special Tree-based data structure in which the tree is a complete binary tree.
Option A:	Graph
Option B:	Heap
Option C:	List
Option D:	Stack
6.	Which is not an application of Topological Sorting
Option A:	Ordered Statistics
Option B:	Finding prerequisite of a task
Option C:	Finding Deadlock in an Operating System
Option D:	Finding Cycle in a graph

7.	In which of the following graph Topological Sort can be implemented?
Option A:	Directed Acyclic Graphs
Option B:	Undirected Cyclic Graphs
Option C:	Directed Cyclic Graphs
Option D:	Undirected Acyclic Graphs
8.	In most of the cases, topological sort starts from a node which has
Option A:	Maximum Degree
Option B:	Minimum Degree
Option C:	Any degree
Option D:	Zero Degree
9.	Matrix A is of order 3*4 and Matrix B is of order 4*5. How many elements will be there in a matrix A*B multiplied recursively.
Option A:	12
Option B:	15
Option C:	16
Option D:	20
10.	What is the worst case time complexity of merge sort?
Option A:	O(n log n)
Option B:	O(n^2)
Option C:	O(n^2 log n)
Option D:	O(n log n2)
11.	Given an array arr = {45, 77, 89, 90, 94, 99,100} and key = 100; What are the mid values (corresponding array elements) generated in the first and second iterations?
Option A:	90 and 99
Option B:	90 and 100
Option C:	89 and 94
Option D:	94 and 99
12.	Kruskal's algorithm is used to find
Option A:	Single Source Shortest Path
Option B:	Graph Traversal
Option C:	Minimum Spanning Tree
Option D:	All pair shortest Path
13.	Which of the following is not greedy problem?
Option A:	Container loading
Option B:	Fractional Knapsack
Option C:	Flow Shop Scheduling
Option D:	Job Sequencing with deadlines
14.	What is the optimal storage on tapes value when n=3, (l1, l2, l3) = (5, 10, 3)?
Option A:	29

Option B:	31
Option C:	34
Option D:	43
15.	Which is not correct solution method of Flow shop scheduling problem?
Option A:	Branch and Bound
Option B:	Dynamic Programming
Option C:	Greedy algorithm
Option D:	Heuristic algorithm
16.	Which of the following are the characteristics of dynamic programming approach?
Option A:	Overlapping sub problems
Option B:	Greedy approach
Option C:	Optimal substructure
Option D:	Both optimal substructure and overlapping sub problems
17.	When a problem can be solved by combining optimal solutions to non-overlapping problems, the strategy is called
Option A:	Recursion
Option B:	Divide and Conquer
Option C:	Memorization
Option D:	Greedy
18.	What is the time complexity of the above dynamic programming implementation of the longest common subsequence problem where length of one string is “m” and the length of the other string is “n”?
Option A:	O(n)
Option B:	O(m)
Option C:	O(m+n)
Option D:	O(mn)
19.	What is the worst case running time of Rabin Karp Algorithm?
Option A:	Theta(n)
Option B:	Theta(n-m)
Option C:	Theta((n-m+1)*m)
Option D:	Theta(n* logm)
20.	Which of the following is a substring of “engineering”
Option A:	Engg
Option B:	Gineer
Option C:	Ning
Option D:	Eiee

Q2. **(20 Marks Each)**	**Solve any Two Questions out of Three 10 marks each**
A	Explain Probabilistic Analysis with the help of example.
B	Sort the following numbers using Heap Sort.[25,67,56,32,12,96,82,44].Show the contents of the array after every iteration. Also Derive time complexity for the same.
C	Explain Strassen's matrix multiplication rules. Solve the following example with the help of Strassen's matrix multiplication.

Q3. **(20 Marks Each)**	**Solve any Two Questions out of Three 10 marks each**
A	Explain Minimum Spanning Tree. Find Minimum spanning tree of the following graph using prims and kruskals algorithm.
B	Explain 0/1 knapsack problem using dynamic programming approach.
C	Explain Rabin Karp Algorithm with a suitable example.

Q4. **(20 Marks Each)**	**Solve any Two Questions out of Three 10 marks each**
A	Explain vertex cover problem.
B	Explain genetic algorithm.
C	What are the Parallel Computing algorithms.