Program: TE(Information Technology)

Curriculum Scheme: CBCGS

Examination: Third Year Semester V December 2020

Course Code: ITC305 **Course Name: ADS&AOA**

Time: 2 hour **Max. Marks: 80**

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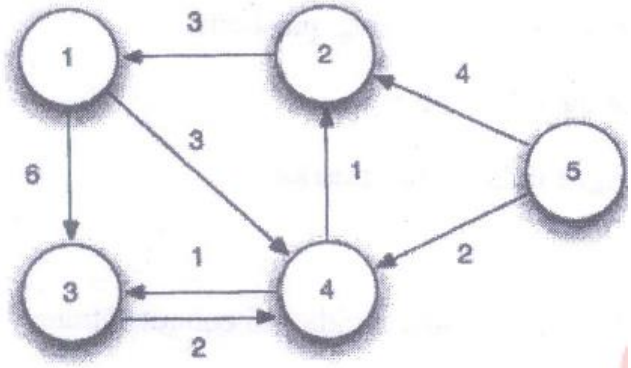
Q1	**MCQs** **2 Marks each**
1.	What is the running time of Strassen's algorithm for matrix multiplication?
Option A:	O(n^2.81)
Option B:	O(n^3)
Option C:	O(n^1.8)
Option D:	O(n^2)
2.	Give asymptotic upper bound for T(n) if the recurrence can be solved with the Master Theorem T (n) = 4T (n/2) + log n
Option A:	T (n) = Θ(n^2)
Option B:	T (n) = Θ(n log n)
Option C:	T (n) = Θ(n)
Option D:	Does not apply
3.	Which notation bounds a function from above and below and defines exact asymptotic behavior
Option A:	Theta
Option B:	Big O
Option C:	Omega
Option D:	All of the above
4.	What is an AVL tree?
Option A:	a tree which is balanced and is a height balanced tree
Option B:	a tree which is unbalanced and is a height balanced tree
Option C:	a tree with three children
Option D:	a tree with atmost 3 children
5.	2-3 tree is a specific form of _____
Option A:	B tree
Option B:	B+ tree
Option C:	AVL tree
Option D:	Heap
6.	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
7.	What is the running time of naïve matrix multiplication algorithm?
Option A:	O(n^2.81)
Option B:	O(n^4)
Option C:	O(n)
Option D:	O(n^3)
8.	Fractional knapsack problem is solved most efficiently by which of the following algorithm?
Option A:	Divide and conquer
Option B:	Dynamic programming
Option C:	Greedy algorithm
Option D:	Backtracking
9.	Given items as {value,weight} pairs {{60,20},{50,25},{20,5}}. The capacity of knapsack=40. Find the maximum value output assuming items to be divisible.
Option A:	100
Option B:	110
Option C:	130
Option D:	120
10.	Longest common subsequence is an example of _____
Option A:	Greedy algorithm
Option B:	DP
Option C:	Divide and conquer
Option D:	Branch & Bound
11.	What is a Rabin and Karp Algorithm?
Option A:	String Matching Algorithm
Option B:	Shortest Path Algorithm
Option C:	Minimum spanning tree Algorithm
Option D:	Approximation Algorithm
12.	Floyd Warshall's Algorithm is used for solving _____
Option A:	All pair shortest path problems
Option B:	Single Source shortest path problems
Option C:	Network flow problems
Option D:	Sorting problems
13.	What is the maximum height of an AVL tree with p nodes?
Option A:	P
Option B:	log(p)
Option C:	log(p)/2

Option D:	p⁄2
14.	Which is not feasible solution in case of job sequence problem item: 1 2 3 4, profit: 100, 10,15,27, deadline: 2 1 2 1
Option A:	(1,4)
Option B:	(4,3)
Option C:	(2,4)
Option D:	(1,2)
15.	Consider the strings “PQRSTPQRS” and “PRATPBRQRPS”. What is the length of the longest common subsequence?
Option A:	9
Option B:	8
Option C:	7
Option D:	6
16.	You are given a knapsack that can carry a maximum weight of 60. There are 4 items with weights {20, 30, 40, 70} and values {70, 80, 90, 200}. What is the maximum value of the items you can carry using the knapsack(0/1)?
Option A:	160
Option B:	200
Option C:	170
Option D:	90
17.	What is the basic principle in Rabin Karp algorithm?
Option A:	Hashing
Option B:	Sorting
Option C:	Augmenting
Option D:	Dynamic Programming
18.	You are given infinite coins of denominations 3, 5, 7. Which of the following sum CANNOT be achieved using these coins?
Option A:	15
Option B:	16
Option C:	17
Option D:	4
19.	In dynamic programming, the technique of storing the previously calculated values is called _____
Option A:	Saving value property
Option B:	Storing value property
Option C:	Memoization
Option D:	Mapping
20.	Which of the following problems should be solved using dynamic programming?
Option A:	Mergesort

Option B:	Binary search
Option C:	Longest common subsequence
Option D:	Quicksort

Q2	**Solve any 2 out of 3** **(10 marks each)**
A	Define AVL tree.Construct AVL tree for following data: 21,26,30,9,4,14,28,18,15,10,2,3,7
B	What is optimal binary search tree? Explain with the help of example.
C	Construct B-Tree for following data: 8, 9, 10, 11, 15, 16, 17, 18, 20, 23.

Q3	**Solve any 2 out of 3** **(10 marks each)**
A	Solve the following numbers using quicksort. Also derive time complexity of quick sort. 27 10 36 18 25 45
B	Apply All pairs shortest path on following graph 
C	What is Longest common sub sequence problem? Find LCS for following string X= ACBAED Y=ABCABE