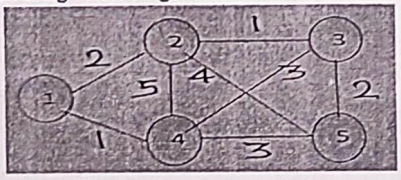
Priyadarshini College of Engineering, Nagpur
Sessional Examination (2022-23) Odd Semester
B. Tech. Fifth Semester (Computer Technology) (C. B. C. S.)
Design and Analysis of Algorithms

P. Pages: 2 **PCE/KW/22/BECT501T**
Time: Three Hours **Max. Marks: 70**

Notes:
1) All questions carry marks as indicated.
2) Solve Question 1 or Question 2
3) Solve Question 3 or Question 4
4) Solve Question 5 or Question 6
5) Solve Question 7 or Question 8
6) Solve Question 9 or Question 10
7) Due credit will be given to neatness and adequate dimensions.
8) Assume suitable data wherever necessary.
9) Illustrate your answers whenever necessary with the help of neat sketches.

Q. No.		Questions	CO	BL	Marks
1	a)	State and explain Asymptotic notations used for analyzing the algorithms	CO1	II	6
	b)	Solve the following recurrence relation, t(n) = 2 if n=0 = $2t_{n-1} + 2^n + 3$, otherwise		III	8
		OR			
2	a)	Find best case and worst case complexity of Insertion sort.	CO1	III	7
	b)	Solve the given Recurrences using Master Theorem: 1) T(n) = 4T(n/2) + n 2) $T(n) = 4T(n/2) + n^2$ 3) $T(n) = 4T(n/2) + n^3$		III	7
3	a)	Use Stressen's algorithm to compute the matrix product and Find the Recurrence relation and its time complexity. $A=\begin{pmatrix}1 & 3\\ 6 & 7\end{pmatrix}$ $B=\begin{pmatrix}5 & 4\\ 6 & 2\end{pmatrix}$	CO2	III	7
	b)	Write an algorithm for Binary search using divide and conquer strategy. Also give its stepwise execution for searching element X = 45 in the following Input array. A = <9,12,7,24,36,45,70>		I	7
		OR			
4	a)	What is Minimum Cost Spanning Tree? Obtain MST with its cost for given undirected graph using PRIM's algorithm.	CO2	I	8

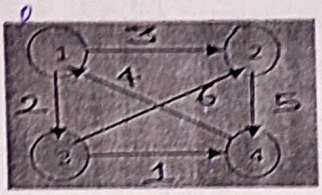


	b)	Write the algorithm of Optimal Huffman Code. Find Optimal Huffman codes for following set of frequencies and discuss its complexity. a:25, b:50, c:10, d:75, e:35		I	6

5	a)	Determine LCS of X=(A,B,C,B,D,A,B) and Y=(B,D,C,A,B,A)	CO3	III	7
	b)	Find optimal solution using 0/1 Knapsack problem for given data: M=6, n=3, (w_1,w_2,w_3)= (2,2,3), (p_1,p_2,p_3)=(1,3,4)		III	7

OR

6	a)	Find All pair shortest Paths using Floyd Warshall algorithm for given graph:	CO3	III	8



	b)	Differentiate between Greedy approach and Dynamic programming		IV	6
7	a)	Implement travelling salesman problem for the given matrix.	CO4	III	8

$$\begin{pmatrix} 0 & 8 & 16 & 15 \\ 14 & 0 & 9 & 12 \\ 9 & 10 & 0 & 6 \\ 11 & 13 & 10 & 0 \end{pmatrix}$$

	b)	Explain Graph coloring method with example. Give algorithm for it.		II	6

OR

8	a)	Discuss 4-Queen problem and give its algorithm using backtracking method	CO4	II	7
	b)	Discuss Hamiltonian cycle. Also write an algorithm for finding Hamiltonian cycle for a graph.		II	7
9	a)	Explain Decision and Optimization problems.	CO5	II	7
	b)	Give the definitions of NP hard and NP-complete class of problems.		I	7

OR

10	a)	Explain Non deterministic algorithm. Give non deterministic algorithm for searching and sorting problem.	CO5	II	7
	b)	Explain the concept of Polynomial Reduction and how it can be used for showing NP completeness of problem.		II	7

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