K. K. Wagh Institute of Engineering Education & Research, Nashik

(An Autonomous Institute From A.Y. 2022-23)

WINTER-2025	
Exam Seat No.:	
Academic Year:2025-2026	Semester:V
Class:TY IT	Program:B.Tech
Branch Code:INT	Pattern:2023
Name of Course:Design and Analysis of Algorithms	Course Code:2308306B
Max. Marks:60	Duration:2.30 Hrs.

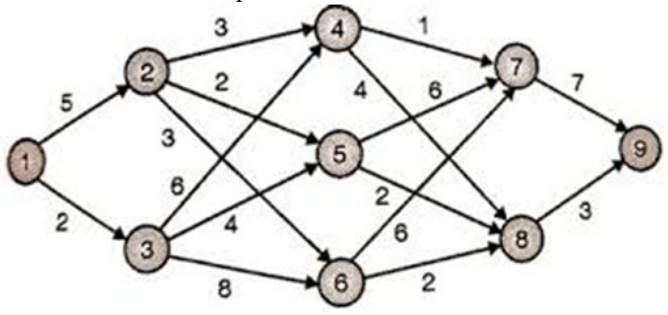
Instructions: Candidates should read carefully the instructions printed on the Question Paper and on the cover page of the Answer Book, which is provided for their use.

1. This question paper contains TWO ages.
2. Answer to each new question is to be started on a new page.
3. Assume suitable data wherever required, but justify it.
4. Draw the neat labelled diagrams, wherever necessary.
5. The last columns indicates the Course Outcome and level of Blooms Taxonomy of the Question/sub-question.

		Marks	CO
Question No. 1			
1	Construct recursive algorithm for "Tower of Hanoi" problem. Analyze it to find time complexity. Show moves for 3 disks with 3 towers.	(6)	CO1
Question No. 2			
2	Find the job sequence and total profit earned for the following jobs using greedy approach.	(6)	CO2

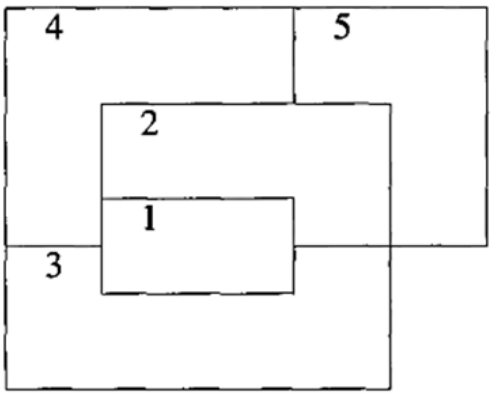
Profit	60	50	40	10	30
Deadline	2	1	1	2	3

Question No. 3					
3a)	Explain Principle of Optimality. Find number of solutions for coin-change making problem using Dynamic Programming to get an amount = 5 with coins = {1,2,5} denominations.	(10)	CO3		
3b)	Explain Principle of Relaxation with respect to Bellman Ford Algorithm. Comment on time complexity.	(6)	CO3		
	Group OR				
3c)	Find the minimum cost path from source 1 to sink 9 of the following multistage graph.	(10)	CO3		



3d)	Explain Principle of Optimality. How it gets hold for Knapsack problem?	(6)	CO3
Question No. 4			

4a) Construct planar graph for following map. Explain how to find m - colouring of this planar graph by using m-colouring Backtracking algorithm. (10) CO4



4b) With respect to backtracking explain: Solution states, Answer states, Sate space tree. (6) CO4

Group OR

4c) Solve the 0/1 knapsack problem using backtracking method with M=8. (10) CO4

Profit	3	5	6	10
Weight	2	3	4	5

4d) State the principle of backtracking and Write backtracking algorithm for N-Queen problem. Comment on it's Time complexity. (6) CO4

Question No. 5

5a) Consider travelling sales-person problem whose cost matrix is as follows.: (12) CO5

∞	**7**	**3**	**12**	**8**
3	∞	**6**	**14**	**9**
5	**8**	∞	**6**	**18**
9	**3**	**5**	∞	**11**
18	**14**	**9**	**8**	∞

i) Find reduced cost matrix and its cost.

ii) Using state space tree formulation obtain portion of state space tree for FIFO Branch and Bound solution approach.

5b) Explain LC branch and bound method of problem solving. Explain its advantages and limitations. (4) CO5

Group OR

5c) Solve 0/1 Knapsack Problem using FIFO Branch-and-Bound technique Example: Consider the instance M=10, n=4, (p1, p2, p3, p4) = (40, 42, 25, 12) and (w1, w2, w3, w4)=(4, 7, 5, 3). (12) CO5

5d) Explain FIFO branch and bound method of problem solving. Explain its advantages and limitations. (4) CO5

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