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:2022
Name of Course:Design and Analysis of Algorithms	Course Code:INT223006B
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 pages.
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 Write an algorithm for "Addition of 2 Matrices". Analyze it to find its time complexity using step count. (6) CO1

Question No. 2

2 Show steps of Max-Min Recursive algorithm using Divide and Conquer approach for given elements as below. Write total comparison required for finding maximum and minimum of these numbers. (6) CO2

30	-5	-60	0	45	2	45	6

Question No. 3

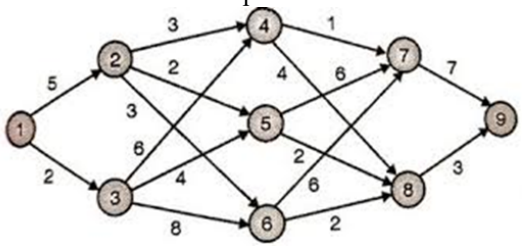
3a) Apply Dynamic programming to find solution for 0/1 Knapsack problem given below with M=5: (10) CO3

Profit	12	10	20	15
Weight	2	1	3	2

3b) Explain Principle of Relaxation with respect to Bellman Ford Algorithm. Comment on time complexity. (6) CO3

Group OR

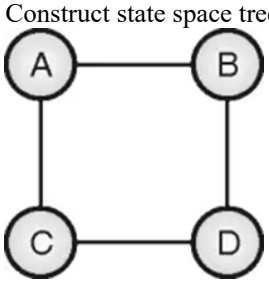
3c) Find the minimum cost path from source 1 to sink 9 of the following multistage graph. (10) CO3



3d) Explain Principle of Optimality. How it gets hold for Knapsack problem? (6) CO3

Question No. 4

4a) Construct state space tree for given graph-coloring with m=3 using Backtracking algorithm. (10) CO4



4b) Explain two categories of constraints required to be satisfied by backtracking solutions.((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) Distinguish between LC and FIFO branch and bound approaches for problem solving. (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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