BACHELOR OF TECHNOLOGY (CBCS) (2021-COURSE)
B. Tech. Sem - V CS&BS : SUMMER : 2025
SUBJECT: DESIGN & ANALYSIS OF ALGORITHMS

Day : Tuesday
Date : 13/05/2025

S-24166-2025

Time : 10:00 AM-01:00 PM
Max. Marks : 60

N.B.

1) All questions are **COMPULSORY.**
2) Figures to the **RIGHT** indicate **FULL** marks.
3) Assume suitable data **WHEREVER** necessary.
4) Draw neat diagrams **WHEREVER** necessary.

Q.1 Explain with a neat diagram: **(10)**

I. Theta Notation (Θ).
II. Big-Oh Notation (O).
III. Big-Omega Notation (Ω).

OR

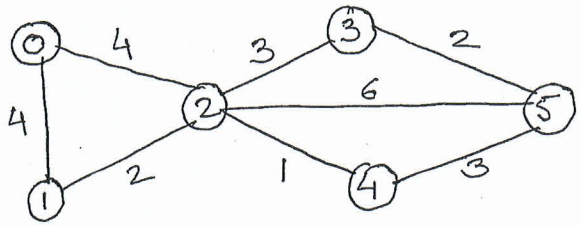
Q.1 Write a short note on: **(10)**

I. Time and Space Trade-Offs.
II. Performance measurements of an algorithm.

Q.2 Describe in detail Greedy Strategy to solve a problem. Compare Greedy Strategy with Dynamic Programming. **(10)**

OR

Q.2 Write an algorithm to find shortest path using Dijkstra's algorithm. Explain the running time of algorithm. Find shortest path in the graph with 0 as source node. **(10)**



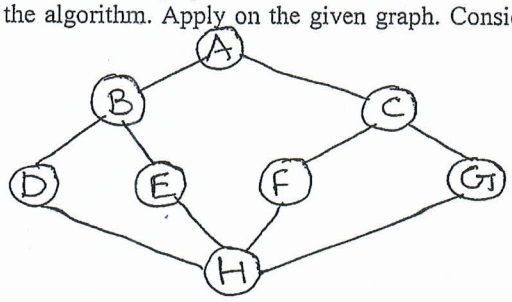
Q.3 Write an algorithm to find 0/1 Knapsack problem. Also compute the efficiency of the algorithm by analyzing its time complexity. Solve the numerical where the capacity of the knapsack W/M is 15. **(10)**

Item	1	2	3	4	5	6	7
Profit	5	10	15	7	8	9	4
Weight	1	3	5	4	1	3	2

OR

Q.3 Explain Backtracking Strategy to solve a problem. Explain it with respect to 15 Puzzle Problem. **(10)**

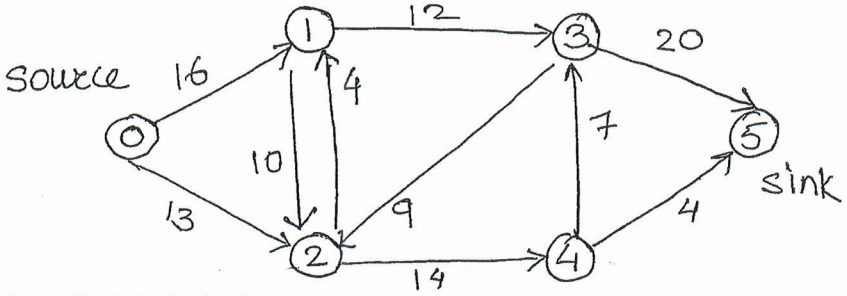
Q.4 Write algorithm to traverse a graph in Breadth First Search. Also explain the time complexity of the algorithm. Apply on the given graph. Consider node D as the source node. **(10)**



P.T.O

OR

Q.4 Write an algorithm to calculate Maximum Flow in the graph. Explain the time complexity of the algorithm. Apply on the given graph. **(10)**



Q.5 Explain Cook's Theorem. Prove that SAT problem is NP-Complete. **(10)**

OR

Q.5 Explain Polynomial Time Reduction and Verification with a neat diagram. **(10)**

Q.6 Discuss Randomized algorithms with examples. **(10)**

OR

Q.6 Discuss Quantum algorithms with examples. **(10)**

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