Code No: **19CST503/19ITT503** **R19**

III B. TECH I SEMESTER REGULAR EXAMINATIONS, FEB-2022
DESIGN AND ANALYSIS OF ALGORITHMS
(Common to CSE and INF)

Time: 3 Hours **Max. Marks: 60**

Note: Answer **ONE** question from each unit **(5 × 12 = 60 Marks)**

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UNIT-I

1. a) Explain the various asymptotic notations used in algorithm design? [6M]
   b) Write an algorithm to compute the n^{th} Fibonacci number? Provide time complexity analysis using step count method. [6M]

(OR)

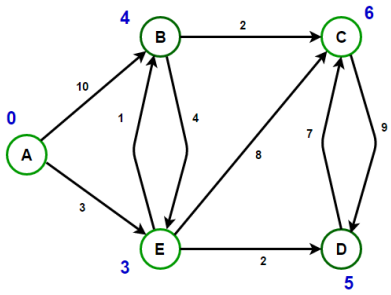
2. a) Describe divide and conquer based binary search technique with an example. [6M]
   b) Discuss the working strategy of quick sort and illustrate the process of quick sort algorithm for the given data: 43, 32, 22, 78, 63, 57, 91 and 13. [6M]

UNIT-II

3. a) Describe Knapsack problem statement? Find all feasible solutions for the following: instance of the knapsack problem: n = 3, m = 20, (p1, p2, p3) = (25, 24, 15), and (w1, w2, w3) = (18, 15, 10). [6M]
   b) Discuss Greedy algorithm to find optimal storage on tapes problem statement? Find an optimal placement for 13 programs on three tapes T_1, T_2, T_3, where the programs are of lengths12,5,8,32,7,5,18, 26,4, 3,11,10, and 6. [6M]

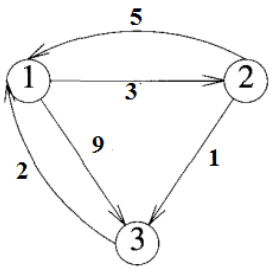
(OR)

4. a) Write greedy algorithm to find the shortest paths. [6M]
   b) Find shortest path in the following graph. [6M]



UNIT-III

5. a) What is meant by principle of optimality? Identify solution to an optimal solution to the knapsack instance *n* = 5, *M* = 15, (*p1*, *p2*... p5) = (10, 5, 15, 7, 6) and (w_1, w_2, ... , w_5) = (2, 3, 5, 7,1) using dynamic programming? [6M]
   b) Illustrate all pair shortest path algorithm to find the length of shortest paths in with the following graph [6M]



(OR)
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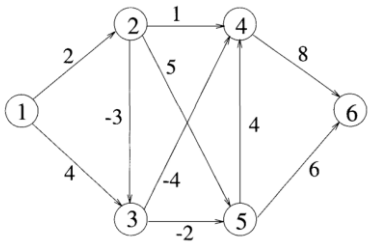
6. a) Illustrate Bellman and Ford algorithm to compute shortest paths in the following graph. [6M]

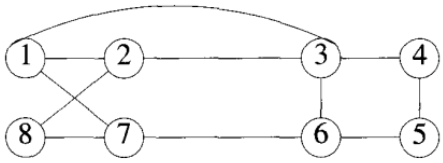


b) Describe string editing problem? Find a minimum-cost edit sequence that transforms X into Y, Let X = a, a, b, a, a, b and Y = b, a, b, a, a. [6M]

UNIT-IV

7. a) Discuss sum of subsets problem? Write recursive backtracking algorithm for sum of subsets of problem? [6M]

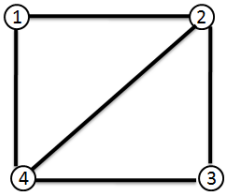
b) Explain Hamilton cycle. Draw the state space generated to identify Hamilton cycles in the following graph? [6M]



(OR)

8. a) Let w = {5, 7, 10, 12, 15, 18, 20} and m = 35.Find all possible subsets of w that sum to m. Draw the portion of the state space tree that is generated? [6M]

b) Draw the state space tree for the following instance of graph coloring problem. Where n = 4, colors k = 3. [6M]



UNIT-V

9. a) Write an algorithm for a FIFO branch-and-bound search. [6M]

b) Define branch and bound problem. Solve the following instance of Knapsack problem by Branch and bound Algorithm. W = 15. [6M]

Item	Weight	Profit
1	5	40
2	7	35
3	2	18
4	4	4
5	5	10
6	1	2

(OR)

10. a) Draw the portion of the state space tree generated by LCBB for the following knapsack instances: n = 5, {p1, p2, p3, p4, p5) = (10,15,6, 8, 4), (w1, w2, w3, w4, w5) = (4, 6, 3, 4, 2), and m = 12 [6M]

b) Define the following [6M]

(i) NP (ii) NP-compete (iii) NP-hard (iv) Cook's Theorem

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