SE-SEM-III NEP-2020 DATE:- 09/06/2026 **COMP** Pr. CODE 1211161

Duration: 02 Hours **Max Marks: 60**

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Note: 1) Question No. 1 is **Compulsory**.
2) Attempt any **THREE** questions out of the remaining FIVE.
3) All questions carry equal marks.
4) Figures to the right indicate full marks.

Q1) Answer the following (Any Five) **Marks**

a) Solve the following recurrence relation using recursion tree method: 03
$T(n) = 3T(n/3) + n^2$

b) Explain Divide and Conquer strategy with diagram. 03

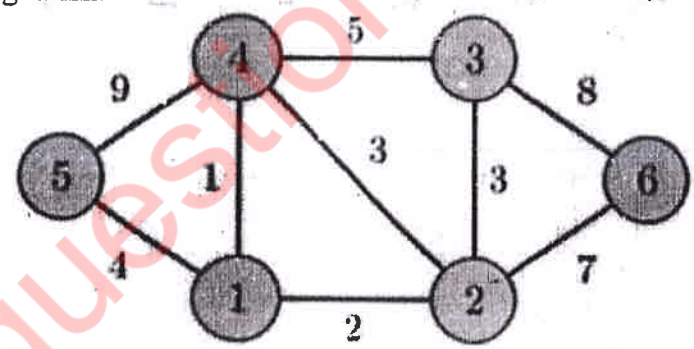
c) Differentiate between fractional and 0/1 knapsack problem (give minimum 5 relevant points). 03

d) Find the LCS for the following sequences: 03
X = ABCDE Y = ACE

e) Explain the concept of Branch and Bound. 03

f) Explain the advantage of KMP algorithm over Naïve string matching algorithm. 03

Q2) a) Find the Minimum spanning tree for the following graph using Prim's algorithm: 05



b) Sort the following elements using Merge Sort and hence derive the complexity of Merge Sort: 34, 9, 56, 10, 78, 61, 98, 23, 38. 10

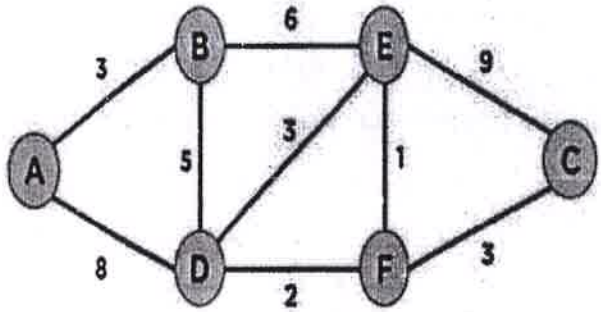
Q3) a) Sort the following elements using insertion sort: 05
90, 1, 4, 2, 78, 45, 39, 58, 79
Show output after each pass. Also, derive complexity of insertion sort.

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b) Find the shortest path for the following graph using Dijkstra's algorithm: (Source vertex is A) **10**



Q4) a) Explain backtracking and how it is used to solve the graph coloring problem. **05**

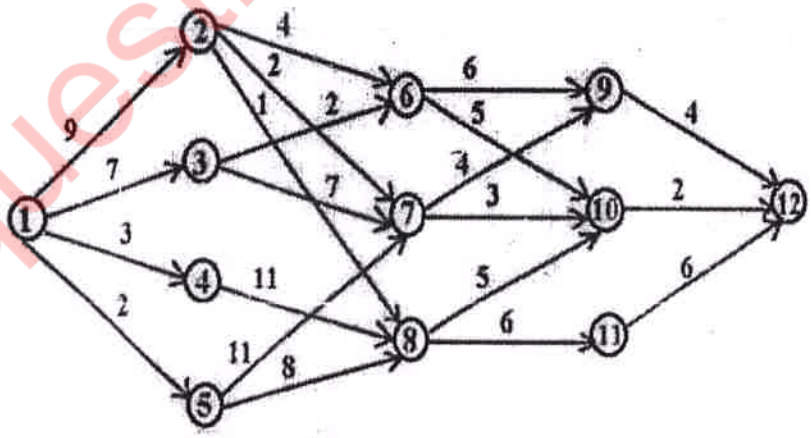
b) Solve the following knapsack problem using dynamic programming: (Capacity = 7) **10**

Item	Weight	Profit
I1	1	50
I2	2	40
I3	4	70
I4	5	80
I5	1	10

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Q5) a) Draw the partial state space tree for 15-puzzle problem. Specify the complexity of 15 puzzle problem. **05**

b) Find the shortest distance form vertex 1 to vertex 12 for the following graph: **10**



COMP SEM III

Q6) a) Explain the different asymptotic notations with graphs. **05**

b) Explain KMP String matching algorithm with example. **05**

c) Solve the following sum of subset Problem: **05**
S = {3, 4, 5, 6} and sum = 9

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