SE-Sem III / NEP / MAY 2026 / AIDS / CS(IoT) / Computer / Date-09/06/2026

QP-14659 (V2)

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

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: $T(n) = 3T(n/3) + n^2$ **03**

b) Explain Divide and Conquer strategy with diagram. **03**

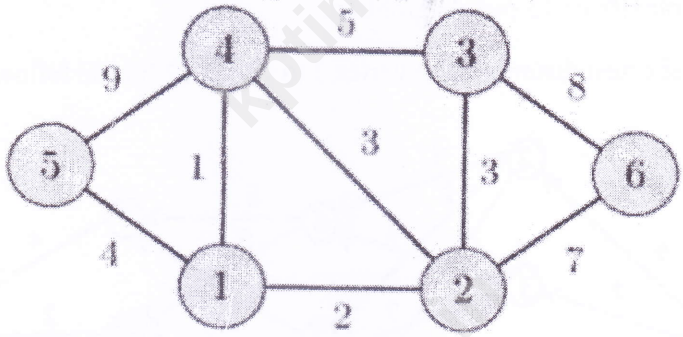
c) Differentiate between fractional and 0/1 knapsack problem (give minimum 5 relevant points). **03**

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**



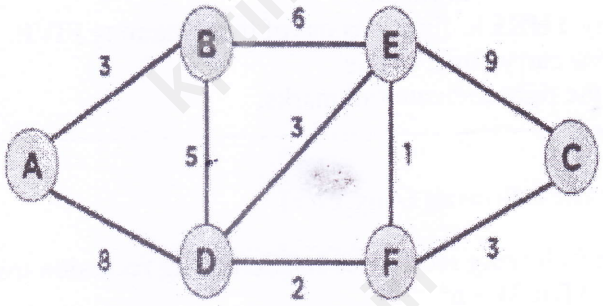
b) Sort the following elements using Merge Sort and hence derive the complexity of Merge Sort: 34, 9, 56, 10, 78, 61, 98, 23, 38. **10**

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**



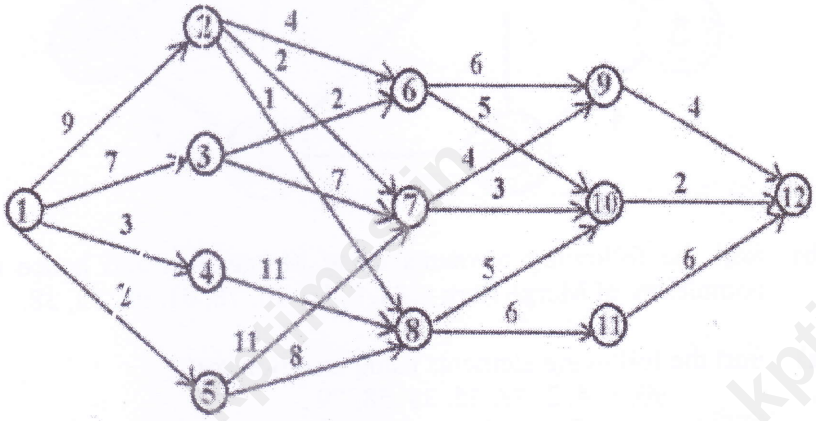
Q4) a) Explain backtracking and how it is used to solve the graph coloring problem. **05**

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

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**



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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