

S.E. CMPN SEM III NEP 2020 June 2026

Duration: 02 Hours

Max Marks: 60

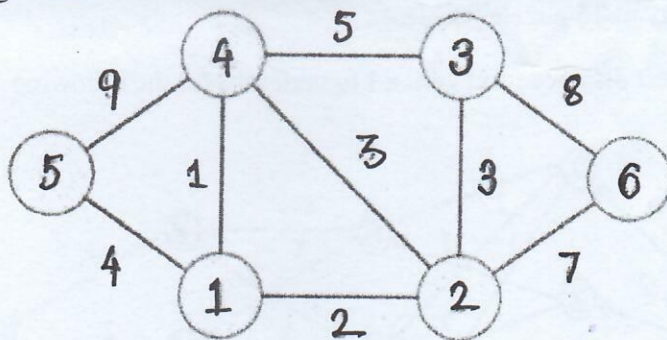
- Note: 1) Question No. 1 is **Compulsory**.
 2) Attempt any **THREE** questions out of the remaining FIVE.
 3) All questions carry equal marks.
 4) Figures to the right indicate full marks.

09/06/2026

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:
 $X = ABCDE$ $Y = ACE$ 03
- 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



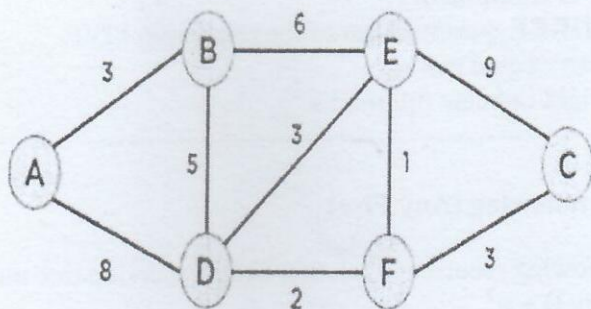
- b) Sort the following elements using Merge Sort and hence derive the complexity of Merge Sort: 34, 9, 56, 10, 78, 61, 98, 23, 38. 10

- 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.

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



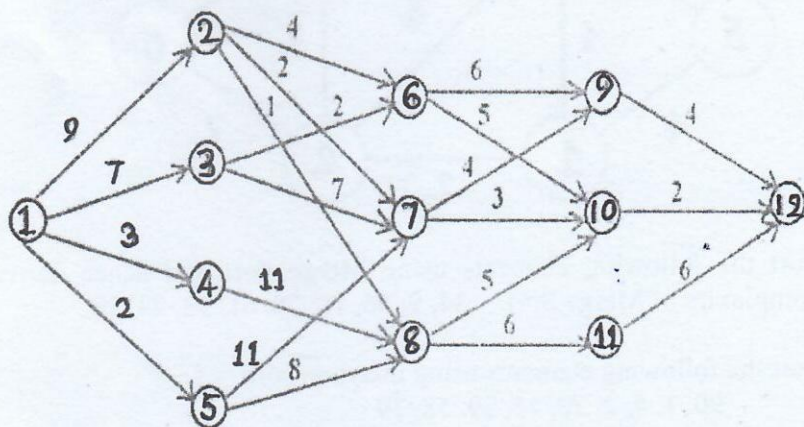
- Q4) a) Explain backtracking and how it is used to solve the graph coloring problem. 05

- 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 from 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
