

17636

15162

3 Hours / 100 Marks

Seat No.

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**Instructions :** (1) All Questions are *compulsory*.

(2) Figures to the right indicate full marks.

(3) Assume suitable data, if necessary.

(4) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

**Marks**

**1. Attempt any FIVE :**

**(5 × 4) = 20**

- (a) Define algorithm and write the algorithm to find sum and average of three numbers.
- (b) Write the algorithm of merge sort.
- (c) Give the concept of knapsack programming.
- (d) Explain the term node, edge, cycle and path for the graph.
- (e) Explain recursion and give the recursive procedure for Fibonacci series.
- (f) Write the algorithm for Kruskal algorithm.
- (g) Explain how is graph represented in different ways.

**2. Attempt any TWO :**

**(8 × 2) = 16**

- (a) Write a program for quick sort and explain with example.
- (b) Explain process scheduling.
- (c) Explain the algorithm for breadth first search.

**3. Attempt any FOUR :****(4 × 4) = 16**

- (a) Give fundamentals and properties of algorithm.
- (b) Explain divide and conquer strategy with suitable example.
- (c) Sort the following list in ascending order using merge sort. Show intermediate passes.

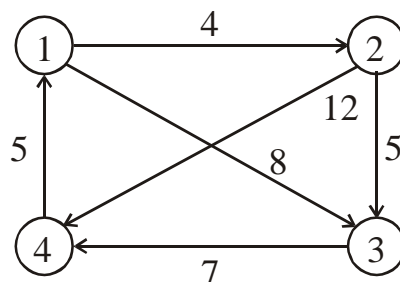
90, 20, 80, 89, 70, 65, 85, 74

- (d) Give general characteristics of greedy method.
- (e) Consider three items :

i	$W_i$	$P_i$
1	18	30
2	15	21
3	10	18

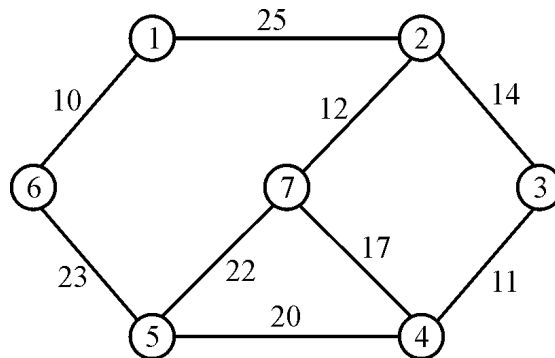
Also  $W = 20$ , obtain the solution for the above given knapsack problem.

- (f) Obtain all pair shortest paths for the following graph :

**4. Attempt any FOUR :****(4 × 4) = 16**

- (a) Explain time complexity and space complexity. Give example.
- (b) Explain the term pivot element with example in quick sort.

- (c) Prove that for quick sort, the quick sort efficiency is  $T(N) = O(N^2)$ .
- (d) Give the difference between divide and conquer and greedy algorithm.
- (e) Write the algorithm for Prim's algorithm.
- (f) Find the minimum spanning tree using Kruskal's algorithm :



**5. Attempt any TWO :**

**(8 × 2) = 16**

- (a) Explain big – oh, omega and theta notation with the help of an example.
- (b) Write a program to sort the series of numbers using radix sort.
- (c) Explain the concept of depth first search.

**6. Attempt any FOUR :**

**(4 × 4) = 16**

- (a) Compare any three sorting algorithms given their time complexity.
- (b) Give the best case, worst case and average case analysis of merge sort.
- (c) Sort the following numbers using heap sort :  
96, 15, 12, 02, 25, 46, 72, 48, 85
- (d) Explain the concept of counting sort with suitable example.

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- (e) Explain job sequencing for the instance  $n = 5$ ,  $(P_1, P_2, P_3, P_4, P_5) = (20, 15, 10, 5, 1)$ .
- (f) Solve using Dijkstra by giving the distance between vertices and path :

