

17636

21718

3 Hours / 100 Marks

Seat No.

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- Instructions :**
- (1) All Questions are *compulsory*.
 - (2) Answer each Section on same answer sheet.
 - (3) Answer each next main Question on a new page.
 - (4) Illustrate your answers with neat sketches wherever necessary.
 - (5) Figures to the right indicate full marks.
 - (6) Assume suitable data, if necessary.
 - (7) Use of Non-programmable Electronic Pocket Calculator is permissible.
 - (8) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. Attempt any FIVE from following :

5 × 4 = 20

- (a) Elaborate Asymptotic Notations with example.
- (b) Compare binary search and linear search.
- (c) Explain how time complexity is calculated, give example.
- (d) Give comparison between merge sort and quick sort.
- (e) What is heap ? Give use of heaps.
- (f) Explain dynamic programming with its advantages.
- (g) Explain different terms related to graph with figure :
 - (i) In degree
 - (ii) Weighted graph
 - (iii) Edges & nodes
 - (iv) Out degree

2. Attempt any TWO from following :

 $2 \times 8 = 16$

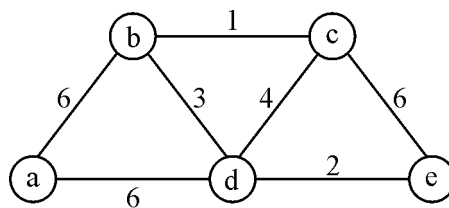
- (a) Write a linear search algorithm and analyse for its best, worst & average case complexity. Give suitable example.
- (b) Explain merge sort problem using divide and conquer technique. Give an example.
- (c) Solve the following instance of 0/1, Knapsack problem given the knapsack capacity is $w = 5$.

Items	Weight	Value
1	2	12
2	1	10
3	3	20
4	2	15

3. Attempt any TWO from following :

 $2 \times 8 = 16$

- (a) Write Kruskal's algorithm, apply it to find a minimum spanning tree for the graph : shown in fig. 1.

**Fig. 1**

- (b) Explain job scheduling a dynamic programming problem in detail.
- (c) Solve using Radix sort for following elements

66, 177, 156, 178, 299, 359, 04

4. Attempt any TWO from following :

2 × 8 = 16

- (a) Solve using quick sort for the following elements :
70, 50, 30, 10, 90, 80, 20, 40
- (b) Explain process scheduling and also give comparison between its types in detail.
- (c) Write Prim's algorithm apply it to find a minimum spanning tree for the following graph : Shown in fig. 2

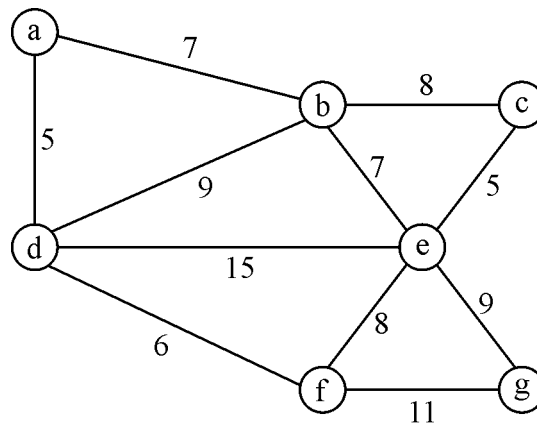


Fig. 2

5. Attempt any TWO from following :

2 × 8 = 16

- (a) Explain Recursion in detail also write a program to calculate factorial to show the use of recursion in (C or C++ or Java).
- (b) Given an array of 6 element :
15, 19, 10, 7, 17, 16; sort it in ascending order using heap sort.
- (c) Perform depth first and breadth first search on the graph shown in fig. 3 and find all its nodes reachable from 'a'.

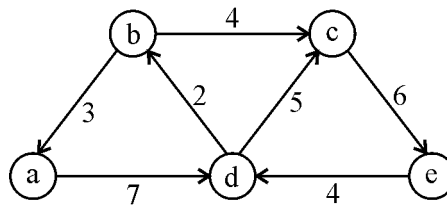


Fig. 3

6. Attempt any TWO from following :

$2 \times 8 = 16$

- (a) Find optimal solution for matrix chain multiplication.

$\langle 30, 35, 10, 20 \rangle$

- (b) (i) What is topological sorting, explain it.

(ii) What is algorithm ? Enlist advantages of greedy methods.

- (c) Find shortest path using Dijkstra's algorithm for following graph as shown in fig. 4.

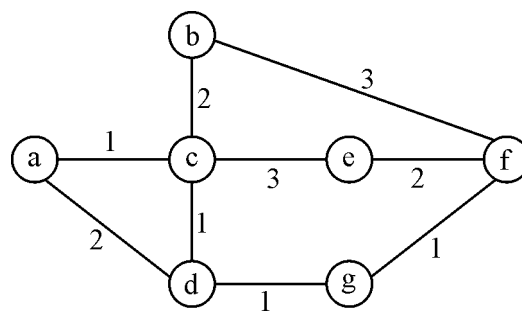


Fig. 4
