

**BACHELOR OF COMPUTER APPLICATIONS
(BCA) (Revised)****Term-End Examination****BCS-042 : INTRODUCTION TO ALGORITHM
DESIGN***Time : 2 Hours]**[Maximum Marks : 50*

Note: Question number 1 is compulsory. Answer any three questions from the rest.

1. (a) For function defined by: 4

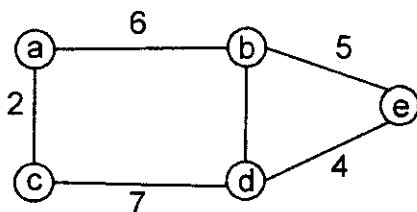
$$f(n) = 5n^3 + 6n^2 + 7n + 8; \text{ show that:}$$

(i) $f(n) = O(n^3)$

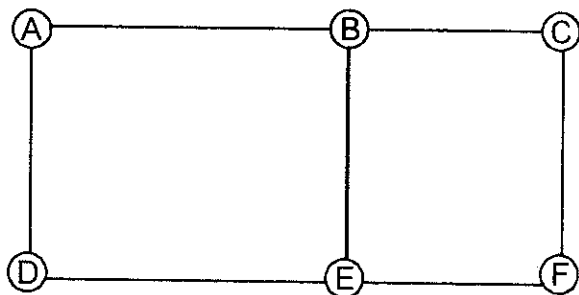
(ii) $f(n) \neq O(n)$

- (b) Write an algorithm to search the smallest number in a given array. Also calculate its time complexity. 6

- (c) Draw all the spanning trees for the following weighted graph: 5



- (d) For the given graph, write DFS traversal sequence from the node A: 5



2. (a) Sort the following list of elements using Quick sort. Also show intermediate steps of the operation. 6

29, 6, 27, 8, 6, 2, 45, 90

- (b) Define optimization problem. Give any two examples of optimization problem with explanation. 4

3. (a) Find the optimal solution to the following fractional Knapsack problem using Greedy Technique: 7

- (i) No. of object $n = 6$
(ii) Max. weight = 25
(iii) Value of each item =

$(P_1, P_2, P_3, P_4, P_5, P_6) = (10, 20, 30, 35, 45, 55)$

(iv) Weight of each item =

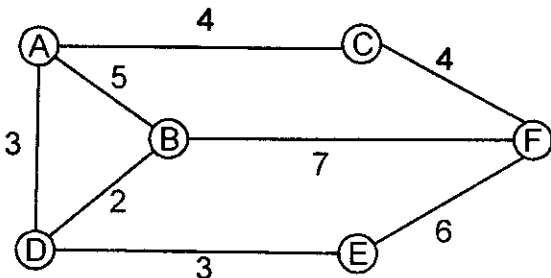
$(W_1, W_2, W_3, W_4, W_5, W_6) = (5, 10, 12, 13, 15, 20)$

(b) Write recurrence relation for binary search algorithm. 3

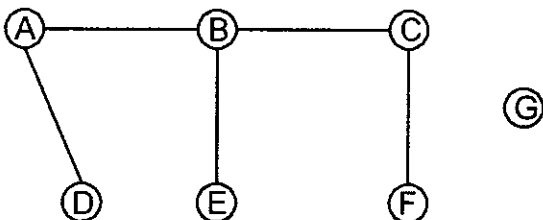
4. (a) Solve the following recurrence relation: 3

$$T(n) = 3T(n/2) + n$$

(b) Find minimum cost spanning tree for the following graph using Kruskal's algorithm: 7



5. (a) Find Adjacency Matrix for the following graph: 3



(b) Find the complexity of following code:

```
int P = 100;
while (P)
```

```
{ For (i = 1; i < n; i++)
  SUM [i] = P - 1;
3- P = P - 1;
```

Make necessary assumptions required. 4

- (c) Describe any two methods to solve recurrence relations.

—x—