Faculty of Engineering & Technology
Fourth Semester B.E. (Computer Science Engineering)
(C.B.S.) Examination
DATA STRUCTURE AND PROGRAM DESIGN
Paper–II

Time—Three Hours] [Maximum Marks—80

INSTRUCTIONS TO CANDIDATES

(1) All questions carry marks as indicated.

(2) Due credit will be given to neatness and adequate dimensions.

(3) All questions are compulsory.

1. (a) What do you mean by complexity of an algorithm ? Explain time and space complexity with respect to best case, average case and worst case. Also find the complexity of following code segment :

(i)
```
for ( i = 1; i <= n; i++)
{
    for ( j = 1; j <= i; j++)
    {
        for (k = 1; k <= j; k++)
        {
        x = x + 1;
        }
    }
}
```

(ii)
```
i = n;
while (i >= 1)
{
    x = x + 1;
    i = i/2;
}
```
1+3+2+2=8

(b) What is asymptotic notations ? Explain, different type of asymptotic notations with example. 6

OR

2. (a) Suppose a value is to be searched in a collection of size N which is present in the memory. Write a recursive binary search function to search value in the collection. 6

(b) Write algorithm to perform shell sort. Explain this algorithm by applying it on following data collection :

18 32 12 5 38 33 16 2 8

3. (a) Suppose two single variable polynomials present in the memory by using link–list. Write a function for addition of these two polynomials and generate resultant third polynomial. 7

(b) A binary number is stored in link–list, with each node used to store one bit of a number. Write a program to find decimal equivalent of the binary number. 6

OR

(b) Explain following data structures by giving suitable examples :

(i) Priority Queue

(ii) Double Ended Queue. 6

7. (a) Suppose a binary tree is in memory. Write a function to create mirror image of a tree. 5

(b) For the following expression create binary tree :

(i) A + B * C – D * F ↑ G + E/L

(ii) B – C * D – E * F/K/L – F 4

(c) A binary tree T has 9 nodes, the inorder and preorder traversal of T yields following sequences :

INORDER : E A C K F H D B G

PREORDER : F A E K C D H G B

Draw the tree T. 4

OR

8. (a) What is threaded binary tree ? Give the data structure to represent node of threaded binary tree. Write a function for inorder traversal of threaded binary tree. 8

(b) With reference to AVL tree, explain following terms :

(i) Single rotation

(ii) Double rotation. 5

9. (a) Define and explain following terminology of a graph as a data structure with example :

(i) Complete graph

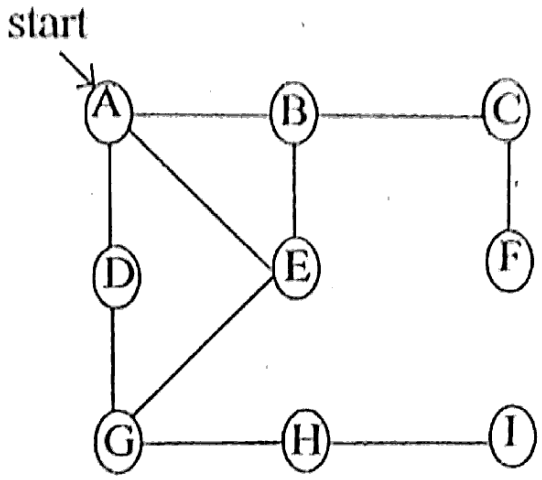
(ii) Connected component

(iii) Path and cycle

(iv) Multigraph

(v) Degree of a graph. 5

(b) Suppose graph is stored in memory. Write a non–recursive procedure for breadth first search traversal of a graph and write BFs spanning tree for following graph.

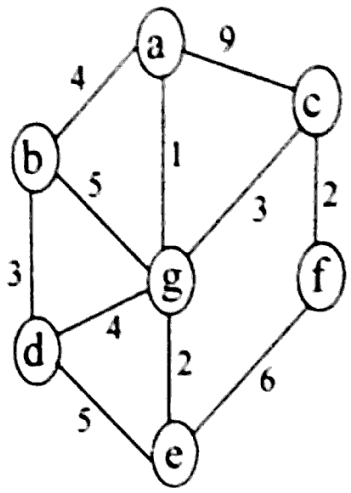


8

OR

10. (a) A graph is given, draw a minimum cost spanning tree using PRIMS algorithm, also find total minimum

cost of spanning tree.



7

(b) Suppose a graph of n vertices is stored in a memory by using adjacency matrix, write a function to compute indegree and outdegree of a vertex of a graph. 6

11. (a) What is symbol table ? Which are different data structures used for symbol table ? Discuss. 6

(b) Explain following collision handling techniques :

(i) Linear probing

(ii) Quadratic probing

(iii) Double hashing. 7

OR

12. (a) Using division method of hashing store the following values in hash table :

35, 47, 89, 103, 104, 152, 197, 203

Use suitable method for handling collision. 7

(b) Explain following collision handling techniques :

(i) Bucket and chaining

(ii) Coalesnd chaining. 6