Faculty of Engineering & Technology

Fourth Semester B.E. (Comp. Sci. Engg.) (C.B.S.) Examination

DATA STRUCTURE AND PROGRAMME DESIGN

Time : Three Hours]　　　　　　　　[Maximum Marks : 80

INSTRUCTIONS TO CANDIDATES

(1) All questions carry marks as indicated.

(2) Solve six questions as follows :

Question 1 **OR** Question No. 2

Question 3 **OR** Question No. 4

Question 5 **OR** Question No. 6

Question 7 **OR** Question No. 8

Question 9 **OR** Question No. 10

Question 11 **OR** Question No. 12

(3) Illustrate your answers wherever necessary with the help of neat sketches.

(4) Assume suitable data wherever necessary.

1. (a) Explain in detail binary search method as a recursive process along with example. 　　6

(b) Explain the following terms : 8

    (i) Data structure and its types

    (ii) Time and space complexity

    (iii) Flowchart and its symbols

    (iv) Abstract Data Type.

OR

2. (a) What do you mean by Analysis of algorithm ? Explain different asymptotic notations used for analysis of algorithm. 8

(b) Suppose A array contains 8 elements as follows :

7, 3, 44, 11, 2, 66, 5, 9. Sort array A using selection sort method. Also discuss its time complexity. 6

3. (a) Write 'C' functions to perform following operations on singly linked list : 9

    (i) insert node at begining

    (ii) insert node at end

    (iii) traverse the linked list.

(b) Discuss dynamic memory allocation. State advantages and disadvantages of it. 4

OR

4. (a) What is Doubly Linked List ? Write an algorithm to reverse the links of doubly Linked List. 7

(b) Give suitable representation for polynomials and write an algorithm to add two polynomials. 6

5. (a) Convert given infire expression to postfire expression by using stack : 9

   (i) A + B ↑ C

   (ii) (A + B * C) / (D – E) + F

   (iii) (A – B) / D + (F * A * D).

   (b) Write algorithm for PUSH and POP operation on stack. 4

OR

6. (a) Write short notes on (any **TWO**) :— 6

   (i) Multiple stacks

   (ii) Circular Queue

   (iii) Priority Queue.

   (b) How multiple stack can be implemented using array ? Give PUSH and POP algorithm for multiple stack. 7

7. (a) What is Binary Search Tree ? For the given sequence, create a binary search tree.

   60, 25, 75, 15, 50, 66, 33, 44. 7

   (b) What is Expression tree ? Draw an expression tree for the given expression : A + (B + C * D + E) + F/G

   6

OR

8. (a) Write an algorithm for preorder traversal of Binary Tree (Non-recursive). 7

(b) Write short notes on :—   6

    (i)   AVL trees

    (ii)   Threaded Binary Trees.

9. (a) Define graph. What are different types of graphs and different ways of representation of graphs ? Explain each with suitable example.   7

    (b) Differentiate between DFS and BFS techniques of graph traversal.   3

    (c) Write non-recursive algorithm for Breadth-First Search.   4

<p align="center">OR</p>
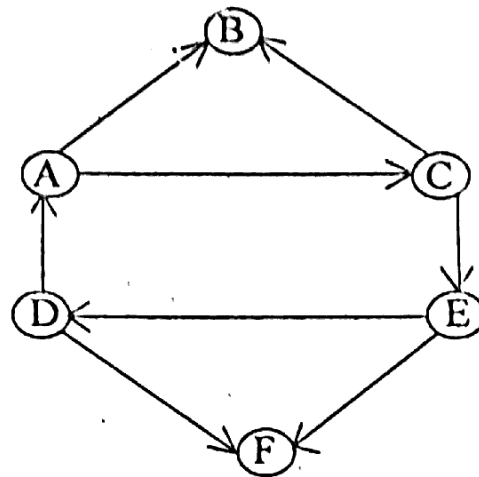
10. (a) Construct the Minimum Cost Spanning Tree (MST) for given graph using Krushkal's algorithm.   6
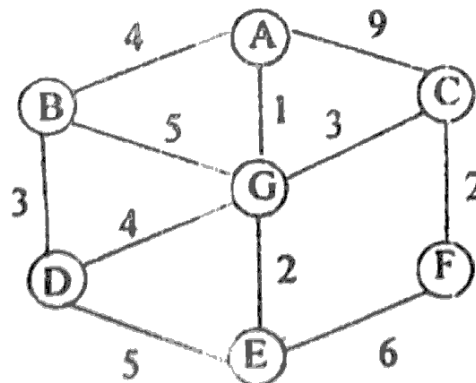
    (b) For the following graph, write :—

        (i)   Indegree and outdegree of each vertex

(ii) Adjacency matrix

(iii) Adjacency list

(iv) Adjacency multilist Representation.

8

11. (a) What is hashing ? Explain division method of hashing to store the following values in hash table.   7

25, 45, 96, 101, 102, 162, 197, 201

Use suitable collision handling mechanism.

(b) What are the different collision handling mechanisms ? Explain each with suitable example.

6

OR

12. (a) Explain difference between static bee tables and dynamic pee tables.   6

(b) Insert the integers 13, 5, 22, 8, 34, 19, 21 into initially empty hash tables using hash function $h(x) = x \bmod y$:

(i) Using linear resolution of collision

(ii) Using linear resolution of collision with slip size 3.   7