Reg. No. ☐☐☐☐☐☐☐☐☐

BCACACN 202

Second Semester B.C.A. Degree Examination, September 2022
(NEP – 2020) (2021 – 22 Batch Onwards)
DATA STRUCTURE USING C (DSCC)

Time : 2 Hours   Max. Marks : 60

Note : *Answer **any six** questions from Part – **A** and **one full** question from **each** Unit in Part – **B**.*

PART – A

1. a) Define linear data structure and non linear data structure.   **(2×6=12)**

   b) What is sparse matrix ? Give example.

   c) What is a Circular Linked List ? Give diagrammatic representation of a circular linked list.

   d) Differentiate linear search and binary search.

   e) Define Dequeue. What are its types ?

   f) Write prefix and postfix of :

   $(X + Y/Z * W \wedge P)$.

   g) What is binary search tree ? Give an example.

   h) Define the following :
      i) Leaf node
      ii) Directed graph.

PART – B
Unit – I

2. a) Given a two dimensional array A[10] [20], base address of A being 1000 and width of each element is 4 bytes, find the location of A[8] [10] when the array is stored in (i) row wise (ii) column wise.

   b) List the properties of recursive function. Write a recursive algorithm to find the factorial of a number.

   c) Write bubble sort algorithm. Explain with an example.   **(4+4+4)**

3. a) Explain the memory representation of one dimensional array.

   b) Explain algorithmic notations for selection control structure.

   c) Trace the following numbers using insertion sort :

   70, 11, 33, 77, 88, 22.   **(4+4+4)**

Unit – II

4. a) Write and explain an algorithm to search for an element in a given list of N numbers using linear search method.

   b) Explain with a neat diagram to delete a node following a given node in a singly linked list.

   c) Explain memory representation of linked list in memory with a neat diagram.   **(4+4+4)**

5. a) Write a note on singly linked list.

   b) Write binary search algorithm to search for an element in a given list of N numbers.

   c) Write an algorithm to insert a node at the beginning of a singly linked list.
                                              (4+4+4)

Unit – III

6. a) What is a Queue ? Write algorithms to insert and delete an item into/from a linear queue.

   b) Evaluate the following postfix expression using STACK :

   3, 1, +, 2, ^, 7, 4, –, 2, *, +, 5. –   **(6+6)**

7. a) What is a Stack ? Write algorithms to implement STACK operations using array.

   b) Write and explain an algorithm to convert given infix expression to postfix expression using STACK with an example.   **(6+6)**

Unit – IV

8. a) Write recursive algorithms to perform preorder and postorder traversal of a binary tree.

   b) Given the following traversals of a binary tree, write the corresponding binary search tree. Also write post order traversal.

   PRE ORDER : A B C D E F G H I

   IN ORDER : D C E B A F H I G

   c) Write an algorithm for breadth first search for a graph.   **(4+4+4)**

9. a) Draw a binary search tree for the following list of numbers and traverse it in Preorder, Inorder and Postorder :

   40, 50, 33, 99, 22, 77, 60, 11, 55

   b) What is adjacency matrix and path matrix ? Give an example for each.

   c) Write an algorithm for a depth first search for a graph.   **(5+3+4)**

_____