B.Tech- 1st

C and Data Structures

Full Marks : 50

Time : $2\frac{1}{2}$ hours

Answer **all** questions

The figures in the right-hand margin indicate marks

Symbols carry usual meaning

1. Answer *all* questions : 2 × 5

(*a*) What is the output of the following program ? Justify your answer.

```
#include<stdio.h>
#include<conio.h>
void main()
{
int x;
for(x=97; x<=122; x++)
printf("%c", x);
getchar();}
```

(*b*) What is the output of the following program ? Justify your answer.

```
#include<stdio.h>
#include<conio.h>
    enum directions{North=1, East, West,
                                South};
    int main()
    {
    enum directions d;
    d=2;
    switch(d)
    {
       case North:
         printf{"We are headed towards
                                North.");
          break;
       case East:
         printf{"We are headed towards
                                East.");
       case West:
         printf{"We are headed towards
                                West.");
          break;
```



```
       case South:
         printf{"We are headed towards
                                South.");
          break;
    }
    getch();
}
```

(*c*) Differentiate between structure and union with suitable example.

(*d*) State the differences between a stack and a queue with suitable examples.

(*e*) What is a Binary Search Tree (BST) ? Give a suitable example.

2. (*a*) Write a short note on basic data types that the C language supports. 4

(*b*) Write a program for finding largest among three numbers using ternary operator. 4

Or

(*a*) Write an algorithm and draw flowchart for finding largest among three numbers. 4

(*b*) Write a C program to test whether an input character is vowel or not using switch-case. 4

3. (*a*) Differentiate between call by value and call by reference for a user-defined function with suitable example programs. 4

(*b*) Write a C Program to find the sum and average of 10 positive integers using array. 4

Or

(*a*) Write a C program along with sample output to compute the sum of the diagonal elements of a given 4 × 4 input matrix. 4

(*b*) Write a C program to create a structure named *student* that has *name*, *rollno*, *dob* and *marks* as members. Write a program to read the data from user for *n* number of students (*n* has to be entered by the user) and display the student details. 4

4. (*a*) Write a C program to illustrate the use of pointers in the following arithmetic operations : (*i*) Increment a Pointer (*ii*) Decrement a Pointer. 4

(*b*) What is dynamic memory allocation ? Name the functions that are used for dynamic memory allocation along with their purpose ? 4

Or

(*a*) Write a C Program to compute the sum of squares of all elements stored in an array using pointers. 4

(*b*) Write a C program to test whether the input string is Palindrome or not. 4

5. (*a*) Write an algorithm to insert a node after a given node in a single linked list with a suitable diagram. 4

(*b*) Convert the following infix expression to postfix **((A-(B+C))*D) ^ (E+F)** 4

Or

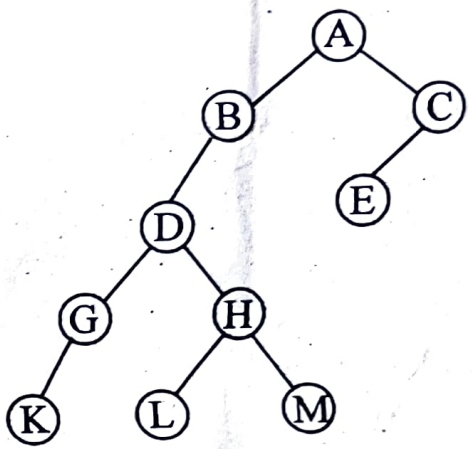
(*a*) Evaluate the following postfix expression
6 2 3 + - 3 8 2 / + * 2 ^ 3 + 4

(*b*) Write algorithms to insert and delete elements into a circular queue. 4

6. (*a*) Write an algorithm for Binary Search and illustrate with a suitable example. 4

(*b*) Traverse the following binary tree in preorder, inorder and postorder. 4

(*Continued*)



Or

(*a*) Construct a Binary Search Tree(BST) for the following data
50, 26, 72, 33, 15, 60, 90, 12, 55, 65
Show the new BST after deletion of node 72. 4

(*b*) Explain the Bubble Sort with a suitable example. 4

Pre-> A B D G K H L M C E