Sl. No. of Ques. Paper : **2051**   **GC-3**

Unique Paper Code   : **32511305**

Name of Paper   : **Core Paper – III : C Programming and Data Structure**

Name of Course   : **B.Sc. (Hons.) Electronics under CBCS**

Semester   : **III**

Duration :   : **3 hours**

Maximum Marks   : **75**

(Write your Roll No. on the top immediately on receipt of this question paper.)

Attempt *five* questions in all. *Q. No. 1 is compulsory.*
All questions carry equal marks.

Q1 a) What are High Level Language and Low Level Languages in programming ? Give one example of each.   3

     b) Evaluate the following expression :   3
       d*=k++ - i-- + f++
       where **i=4, j=5 , k=3, d=1.5 and f=3.2**

     c) Identify and explain the error(s) in the following code segment   3

```
int arr[ ]={ 13,8,19,12,11,16};
int * p, q, *r, i;
for (i=0 ; i < 5; i++)
{
        printf ("%d ", *arr);
        arr++;
}
p=arr;
q=arr+4;
p=q*2;

q=q/2;
printf ("%d %d", *p, *q);
```

     d) How is a *typedef* name different from a *reference* name?   3

     e) Arrange the following sequence of numbers in a Binary Search Tree (BST)   3
       13, 3, 4, 12, 14, 10, 5, 1, 8, 2

Q2. a) Write one or more C statements that perform the following tasks   5
   i. Define a constant variable SIZE to store size of an array ARR and initialize it to value 10.
   ii. Display address of the first element and value of sixth element of the array ARR.

b) What are bitwise operators? Determine the output of the following code   6

```c
#include <stdio.h>
int main()
{
    int a = 12, b = 25;
    printf("Output = %d %d", a|b, a^b);
    return 0;
}
```

c) Explain the **strcmp()** and **strcpy()** functions in C with suitable examples.   4

Q3. a) Write a C function to calculate factorial of a number using recursion   5

b) Explain with examples the difference between *call by value* and *call by reference* method of function invoking   5

c) Define a **structure** student with following members: student name, student class, student age and marks in 5 different subjects. Extend this definition for 10 students.   5

Q4 a) Write a program that will count down 10 to 1 using while and do-while loop. Make use of switch statement for taking choice.   6

b) Re-write the following code using ternary operator   3

```
if (x == 10)
    p=a;
else
    if (x<10)
        p=b;
    else
        p=c;
```

c) A C program has the following statements   6

```c
char t = 'A';
char *pv = & t;
*pv = t+1;
```

Suppose each character occupies 1 byte of memory. If the value assigned to variable t is stored in address 00XBBA77(hexadecimal),

i.   What will be the output of the statement pv = & t?
ii.   What will be the value of *pv?
iii.   What will be the output of the statement *pv = t+1?

Q5. a) What is OOPs? What are its features?   5

b) How is a **structure** different from a **class** and an **array**?   3

c) Define a **class** to represent bank account of 10 customers with the following data members and member functions :   7

Data Members: Depositor name, account number, type of account, balance amount.

Member Functions: to initialize data members, to deposit money and to display the details

Q6. a) Evaluate the following postfix expression using stacks. Show the contents of stack at each stage   5

30 5 2 $ 12 6 / + - 3

b) Write an algorithm to insert an element ITEM in a circular QUEUE of size 10.   5

c) Write a function in C to delete an element from a given position a Double Linked list.   5

Q7. a) Apply bubble sort on the following data   5

30 15 20 28 36 11 65 29

Show the content after each successive passes.

b) What is a complete binary tree and almost complete binary tree? Explain with suitable example.   5

c) Give the post order and preorder traversal of the following tree   5