Unique Paper Code: 32371502
Name of Paper: Statistical Computing using C/C++ Programming
Name of Course: B.Sc. (H) Statistics (CBCS)
Semester: V
Duration: 3 Hours
Maximum Marks: 75 Marks

Instruction for Candidates:
   (i)   All questions carry equal marks. Attempt any FOUR questions
   (ii)   5 marks are reserved for explaining the steps involved in obtaining the output

1.   (i) What do you mean by macros with arguments? Define a macro to find the larger of two numbers and use it in the program to find largest of three numbers?
(ii) Develop a function "read()" and "print()" to read and print a 2-dim matrix using files. Write a C program that reads the matrices A and B using the developed function "read()", calculate C=A*B by doing matrix multiplication and print the matrices A,B and C in files using developed function "print()".

2.   (i) What do you mean by call by value and call by reference while calling a user defined function in C? What is the advantage of latter over former? Explain by giving suitable example.
(ii) Write a recursive function program "fact()" to calculate the factorial of a number. Develop a C-program to fit a Poisson distribution using developed function and perform a chi-square goodness fit test for the data x_i, f_i ($i = 1, 2\ldots n \leq 20$).

3.   (i) Define a "structure" in C? Explain the use of period (.) operator and arrow(->) operator to access a member of the structure with the help of an example?
(ii) Write a C-function program "ranks()" to obtain the ranks of an array using pointers. Develop a C-program that calculates the Spearman's rank correlation between the marks obtained by a group of students in class 12 and JEE after calculating ranks using developed function "ranks()".

4.   (i)   Explain the output of the following program:
#include <stdio.h>
void main()
{ int i;
  for(i = 0; i< 35000; i++)
      printf("\n i = %d", i);
 }
(ii) Develop a C function to find the correlation coefficient for the given discrete data in the form { (x_i, y_i) $i = 1, 2\ldots n \leq 25$}. Write a C program to fit a line $Y = a + bX$ using the function developed above. Also compute the fitted $Yi's$. Print the results in file.

5.   (i) Explain the output of the following program:
    #include<stdio.h>

```
int functl(int n);
main ( )
{
        int n = 10;
        printf("%d", functl(n));
}
int functl(int n)
{
  if (n > 0) return(n + functl(n - 2);}
```

(ii) Given two independent samples (x_i, i=1,2….n_1) and (y_i, i=1,2…n_2) drawn from the Normal population $N(\mu_1, \sigma^2)$ and $N(\mu_2, \sigma^2)$ respectively, write a C-program to test for the equality of two means using t test. Use appropriate functions to read/print the data/result using files.

6.   (i) Explain the output of the following program:

```
#include<stdio.h>
int fun (int n, int m)
{
        int r ;
        r = m % n;
        while(r! = 0)
        {
        m = n;
        n = r;
        r = m%n;
        }
return(n);
}
void main()
{
        int a=47, b=41;
        if(a < b)
        printf("%d %d %d", a, b, fun(a,b));
        else
        printf("%d %d %d", a, b, fun(a,b));
}
```

(ii) Write a C-code to generate the 100 random numbers following $\chi^2_{(10)}$. Calculate the sample mean and variance and compare with the statistics based on the population parameters. Read the parameters from the user and print the result in a file.