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 preprocessor directive in C? Explain any two preprocessor directive? Also explain why do we recommend the use of parentheses for formal arguments used in macro definition? Give an example.

(ii) Develop functions to carry out the matrix multiplication and addition of two matrices A of order m × m and B of order m × m ($m \leq 5$). Hence, write a C program to compute Y=(A+B)*(A+B). Print the results in file.

2.

(i) What is a pointer variable? How ~~it~~ is it declared? How is a value ~~is~~ accessed by pointer? What are the arithmetic operators that are permitted on pointers? How ~~they~~ are they useful in dynamic memory allocation? Explain two functions of dynamic memory allocation.

(ii) Write a C recursion function to find the value of $n!$. Using this function write a C program to compute $\binom{n}{r}$ for n= 8 and r = 0,1,2…n. Print the results in file.

3.

(i) What is a structure? How is a structure declared and how are its members ~~are~~ accessed? Can you define an array inside a structure? Define a structure called *tag* containing the following three members:

(a) A 28 element character array called *design*

(b) An integer quantity called *get*

(c) A double quantity called *know*

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(ii) Develop a function to sort an array of n numbers into ascending order. Hence, write a C-program using pointers to generate 25 random numbers from gamma distribution with parameters k and theta. Also compute the sample median using the function developed above.

4.

(i) Explain the output of the following program:

```
#include <stdio.h>
int fun (int*, int, int*);
int main (void)
{
        int a = 3, b=10;
```

```
        int c[5] = {9,14,3,15,6};
        a=fun(&a,b,c);
        printf("2. %d %d %d %d %d %d %d\n", a, b,
        c[0],c[1],c[2],c[3],c[4]);
        return 0;
}

int fun (int* px, int y, int* pz)
{
        int a=15;
        int* p;
        printf("1. %d  %d  %d\n",*px,y,*pz);
        for (p=pz; p<pz+5; ++p)
            *p=a+*p;
        return(*px + *pz + y);
}
```

(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, 3, ……n ≤25}. Write a C program to fit a line Y = a + bX using the function developed above. Also compute the fitted Y_i's. Print the results in file.

5.

(i) Explain the output of the following program:

```
#include<stdio.h>
void main( )
{
    int a[20],i,ele,j;
    ele= 145;
    i=0;
    while(ele > 0)
    {
        a[i]=ele%2;
        i++;
        ele=ele/2;
    }
    for(j=i-1;j>=0;j++)
        printf("%1d",a[j]);
}
```

(ii) Given two independent samples (x_i, i=1,2….n_1) and (y_i, i=1,2…n_2) drawn from the Normal populations N(μ_1 , σ^2) and N(μ_2 , σ^2) respectively, write a C-program to test for the equality of two means using t test. (Use of dynamic memory allocation is must.)

6.

(i) Given the following definitions:

int num[26] = {23, 3, 5, 7, 4,-1, 6};
*int * n = num, i=2, j=4;*
Evaluate of the following:

(a) n
(b) *n
(c) *n+1
(d) *(n+1)
(e) *n + j
(f) *&i
(g) *(n + i) +j
(h) *(n+i+j)
(i) *(num + i) + * (num+j)
(j) *(num + *(num+1))

(ii) Write a C-code to generate the 100 random numbers following ~~N(μ=20,σ=2)~~ N(20, 4) using central limit theorem. 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.