

**2021**

**STATISTICS — HONOURS**

**Paper : CC-7**

**(Statistical Computing and Numerical Analysis using C Programming)**

**Full Marks : 50**

*The figures in the margin indicate full marks.*

*Candidates are required to give their answers in their own words  
as far as practicable.*

**Group - A**

Answer **any five** from question nos. **1-8**.

2×5

1. If  $\Phi$  is an operator such that  $\Phi f(x) = f(x-h) - f(x)$ , find a relation between  $E$  and  $\Phi$  operators,  $h$  being the interval of differencing.
2. If 29.8756 is rounded to 29.876 find the relative error.
3. Give the structure of a binary operator in C.
4. Which of the following are valid identifiers : (i) &stat (ii) st@at ?
5. If a number  $x$  is rounded to four decimal points giving percentage error of .002%, what is the absolute error?
6. Distinguish between C relational and logical operators.
7. What operation is performed by the C statement  $+a=a;?$
8. Give an example of an exit-controlled loop and give the structure.

**Group - B**

Answer **any two** from question nos. **9-11**.

5×2

9. If  $x^{(k)} = x(x-1)(x-2)\dots(x - \overline{\{k-1\}})$ , find  $\Delta^2 x^{(k)}$ .
10. Approximate  $\int_0^2 f(x)dx$  by Simpson's 1/3 rd rule with 6 equispaced subdivisions. Give an example and compute the related absolute error.
11. Write a program in C to find the mean of real number inputs lying between -1/2 and 0, both inclusive.

**Please Turn Over**

## Group - C

Answer *any three* from question nos. 12-16.

10×3

12. (a) Write a C function to calculate the sum of squares of 1000 numbers using do-while looping structure.  
(b) Prove that the second order difference of a polynomial of degree 7 is itself a polynomial of degree 5. 6+4
13. (a) Write a C program to sort any given set of 5 numbers using a function with array as argument.  
(b) If the values of  $f(x)$  for  $x = 1, 2, 3, 4$  are respectively, 14, 23, 23.7, 16.7, construct a backward diagonal difference table. 7+3
14. (a) Write a program in C to find the roll number of the candidate getting the highest marks when roll numbers (from 1 to 10) and the corresponding marks are provided.  
(b) Write down the Lagrange's interpolation formula for  $n+1$  arguments  $x_i, i=0, 1, \dots, n$ , in the form  $\sum_{i=0}^n L_i(x)f(x_i)$  for some  $L_i(x)$ . Show that  $\sum L_i(x)=1$ . 6+4
15. (a) Write a program in C to find the proportion of the students with marks in the interval [70, 75], when the marks of 10 students in a class are provided.  
(b) Describe how Lagrange's interpolation formula can be used to find the approximate root of a given equation with single unknown. 5+5
16. (a) Find the iterative methods based on the Newton-Raphson method for finding  $\log_5 N$ , where  $N$  is a positive real number.  
(b) Write a program in C that will return the values of  $f(x)=x/(1+x)^3, 0 < x < 1$  when referenced in the main function. Now, within the main function calculate 50 values of  $f(x)$  corresponding to 50 equally spaced values of  $x$  and hence find the approximate area of the region enclosed by  $y=f(x)$ ,  $x=0$  and  $x=1$ . 4+6
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