

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 Φ is an operator such that $\Phi f(x) = f(x-h) - f(x)$, find a relation between E and Φ 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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