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23/159-C

B.C.A. (Third Semester) Examination, 2023

Paper : 301 (First)

(Computer Based Numerical and Statistical Techniques)

Time : Three Hours] *[Maximum Marks : 70*

Note : Attempt questions from **all** sections as per instructions.

Section-A

(Very Short Answer Type Questions)

Note : Attempt **all** parts of this question. Give answer of each part in about **50** words.

1.5×10=15

1. (i) What do you mean by polynomial equation?

P.T.O.

(ii) How will you find standard deviation?

(iii) What are internal and external sources of data?

(iv) Give any two properties of coefficient of correlation.

(v) Write the difference between Interpolation and Extrapolation.

(vi) Give formula of Newton-Raphson method.

(vii) Describe briefly the floating point representation of numbers.

(viii) What do you mean by refinement of solution in simultaneous equations?

(ix) What is pivoting?

(x) Define the term divided difference.

Section-B

(Short Answer Type Questions)

Note : Attempt **all** questions. Give answer of each question in about **200** words.

$7 \times 5 = 35$

2. For x=.4845 and y=.4800, calculate the value of $\frac{x^2-y^2}{x+y}$ using normalized floating point arithmetic. Compare with the value of (x–y). Indicate the error in the former.

OR

Find the real root of the equation $x \log_{10} x = 1.2$ by Bisection method correct to four decimal places.

3. Find a real root of the equation $3x+\sin x-e^x=0$ by the method of false position correct to four decimal places.

OR

Write a C program for computing the root of $(31)^{1/4}$ using Newton Raphson method.

OR

By mean of Lagrange's formula, prove that

$$y_0 = \frac{1}{2}(y_1 + y_{-1}) - \frac{1}{8}\left|\frac{1}{2}(y_3 - y_1) - \frac{1}{2}(y_{-1} - y_{-3})\right|$$

6. The following table is given :

x	:	0	1	2	5
f(x)	:	2	3	12	147

What is the form of the function?

OR

Find the median for the following data.

Marks	11-15	16-20	21-25	26-30	31-35	36-40
Frequency	7	10	13	26	9	5

Section-C

(Long Answer Type Questions)

Note : Attempt any **two** questions. Give answer of each question in about **500** words.

$10 \times 2 = 20$

7. Calculate linear regression coefficients from the following :

x	→	1	2	3	4	5	6	7	8
y	→	3	7	10	12	14	17	20	24

8. Find a real root of the equation $x=e^{-x}$ using the Newton-Raphson method.

9. Find the missing terms in the following table:

x	1	2	3	4	5	6	7	8
f(x)	1	8	?	64	?	216	343	512

10. Given logx for x=40,45,50,55,60 and 65 according to the following table :

x	logx
40	1.60206
45	1.65321
50	1.69897
55	1.74036
60	1.77815
65	1.81291

Find the value of log 5875.

4. Solve the following system of linear equations using Gaussian elimination method with pivoting :

$$x_2+2x_3=5$$

$$x_1+2x_2+4x_3=11$$

$$-3x_1+x_2-5x_3=-12$$

OR

Evaluate : $\Delta^n[\sin(ax+b)]$.

5. Apply Gauss's backward formula to find sin 45° from the following table :

θ°	sinθ
20	0.34202
30	0.502
40	0.64279
50	0.76604
60	0.86603
70	0.93969
80	0.98481

11. Write a C program to implement Lagrange's method of Interpolation.