

BCA [Honours]

[CBCS]

B.Sc. Fifth Semester End Examination-2023

(Regular & Supplementary Paper)

PAPER-DSE2T

Full Marks: 40

Time: 02 Hrs

The figures in the right hand margin indicate marks

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

Illustrate the answers wherever necessary

Group A

1. Answer any FIVE questions of the following: 5x2= 10

- i) Write down the criteria for the convergence is Newton Raphson method.
- ii) State two difference between truncation error and round off error.
- iii) Prove that $(1 + \Delta)(1 - \nabla) = 1$
- iv) Obtain second order divided difference of $f(x) = \frac{1}{x}$ based on points x_0, x_1, x_2
- v) Define the terms significant error and Truncation error.
- vi) When does the is Newton Raphson method fail?

(2)

vii) Calculate $\Delta^n(e^{ax})$.

viii) Comment on accuracy of Euler's method in solving a differential equation.

Group B

2. Answer any FOUR questions of the following: **4x5 = 20**

- i) Establish Newton's Backward interpolation formula.
- ii) Find the positive roots of the equation $x^3 - 3x + 1.06 = 0$, by method of bisection. Correct to three decimal places.
- iii) Find by Euler's method, the value of y for x=0.3 from the differential equation

$$\frac{dy}{dx} = \frac{y-x}{y+x} \text{ given } y=1 \text{ when } x=0, \text{ taking step length } 0.1.$$

iv) Solve the following system of linear equation by Gauss elimination method.

$$x_1 - x_2 - x_3 = 1, 2x_1 - 3x_2 + x_3 = 1, 3x_1 + x_2 - x_3 = 2,$$

v) Calculate the value of y for x=1.4 from the following table, use Newton's forward formula

x	1.0	1.5	2.0	2.5	3.0
y	0.4711	0.5441	0.6020	0.6532	0.6990

vi) Find the percentage error in $f(x)$ for $f(x) = 2x^3 - 4x$ at $x=1$, When the error in x is 0.04.

(3)

Group C

3. Answer any ONE question of the following: **1x10 = 10**

i) a) Obtain the Lagrange's interpolation polynomial for (n+1) distinct and finite interpolating points $x_i, i=0, 1, 2, \dots, n$ (error is not required).

b) Find the value of $\int_0^1 \frac{dx}{1+x^2}$ taking 5 subintervals by Trapezoidal rule, correct to five significant figures.

ii) a) Find the root of $x^3 - 8x - 4 = 0$ which between 3 and 4, by Newton Raphson method, correct to four decimal places.

b) Evaluate $\int_1^2 \frac{dx}{x}$ taking 4 sub-intervals correct upto five decimal places by simpson's one-third Rule.
