

5. Solve $x^3 - 9x + 1 = 0$ for the root lying between 2 and 4 by Regula-Falsi method.

Section-C

(Long Answer Type Questions)

Note : Attempt **any one** question. Each question carries **15** marks. [15×1=15]

6. Given $\frac{dy}{dx} = \frac{y-x}{y+x}$ with $y=1$ for $x=0$. Find y approximately for $x=-1$ by Euler's method (five steps).
7. Solve the following system by Gauss-Seidel method :
- $$\begin{aligned} 10x + 2y + z &= 9 \\ 2x + 20y - 2z &= -44 \\ -2x + 3y + 10z &= 22 \end{aligned}$$
8. Use Runge-Kutta method to solve $\frac{dy}{dx} = xy$ for $x=1.4$ initially $x=1$, $y=2$ (take $h=.2$).
9. Use Picard's method up to second approximation, solve $\frac{dy}{dx} = 1 + xy$ with $x_0 = 2$, $y_0 = 0$.

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BCA-5004/4240

(4)

Roll No. :

Total No. of Questions : 9] [Total No. of Printed Pages : 4

BCA-5004

BCA (Semester-V) (NEP) Examination, 2024-25

(Major)

NUMERICAL METHODS

Time : 2 Hours]

[Maximum Marks : 75

- Note :1.** This paper consists of **three** sections - A, B and C. Attempt questions from **all** sections as directed.
2. The candidates are required to answer in serial order only. If there are many parts of a question, answer them in continuation.
3. "B" Copy will not be provided.

Section-A

(Short Answer Type Questions)

Note : All questions of this section are **compulsory**. Each question carries **5** marks. [9×5=45]

BCA-5004/4240

(1)

Turn Over

1. (a) Obtain the function whose first forward difference is $9x^2 + 11x + 5$.

- (b) Using Lagrange's interpolation formula, find $f(u)$ from the following table :

x	0	1	2	5
$f(x)$	2	5	7	8

- (c) Obtain the estimate of the missing figure in the following table :

x	0	1	2	3	4	5	6
$f(x)$	1	2	-	8	16	-	64

- (d) Find the third divided difference $f(3,4,5,6)$ where $f(x) = x^3 - x$.

- (e) Find the relation between D and E.

- (f) Find the value of the integral by Simpson's $\frac{1}{3}$ rd rule.

$$\int_{-3}^3 x^4 dx$$

- (g) Write the steps for Gauss Elimination method.

- (h) Explain in brief about bisection method.

- (i) Solve it by using trapezoidal rule $\int_0^1 \frac{dx}{1+x}$.

Section-B

(Long Answer Type Questions)

Note : Attempt **any one** question. Each question carries **15** marks. [15×1=15]

2. Derive equation for Newton-Raphson method and discuss its convergence.

3. In an examination the number of students who scored marks between certain limits are as follows :

Marks	No. of Students
0-19	41
20-39	62
40-59	65
60-79	50
80-99	17

Estimate the number of candidates getting marks less than 70.

4. Find the first and second derivatives of the function tabulated below at the point $x = 1.1$:

x	1	1.2	1.4	1.6	1.8	2.0
$f(x)$	0	0.128	0.544	1.296	2.432	4.00