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(21223) Roll No. ....

B.C.A.-V Sem.

18024

B.C.A. Examination, Dec.-2023

Numerical Methods

(BCA-504)

Time : Three Hours] [Maximum Marks : 75

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

Section-A

Note : Attempt all the **five** questions. Each question carries **3** marks. 3×5=15

1. Using Newton-Raphson method, find an iterative formula to compute $\sqrt[3]{N}$, where N is a positive number.

2. Prove that $E\nabla = \nabla E = \Delta$, where E is shift operator , ∇ is backward difference operator & Δ is forward difference operator.

3. Find the first derivative of the function given below at the point x = 1.2

x	1	2	3	4	5
f(x)	0	1	5	6	8

4. Solve the following equations by using Gauss-elimination method :

$$x - y + z = 1$$
$$-3x + 2y - 3z = -6$$
$$2x - 5y + 4z = 5$$

5. Perform two iterations of Picard's method to find an approximate solution of the initial value problem

$$y' = x+y^2;\ y(0) = 1.$$

Section-B

Note : Attempt any **two** questions out of the following three questions. Each question carries 7.5 marks. 2×7.5=15

6. Using method of False position, find a positive root of the equation

$$x^3 - 4x+1 = 0.$$

7. Using Newton's forward interpolation formula, find the cubic polynomial which takes on the following values

x	0	1	2	3	4
y	-1	0	13	50	123

8. Using Simpson's $\left(\frac{1}{3}\right)^{rd}$ rule, find the value of $\int_{1}^{5} f(x)dx$ given that :

x	1	2	3	4	5
f(x)	10	50	70	80	100

Section-C

Note : Attempt any **three** questions out of the following five questions. Each question carries 15 marks. 3×15=45

9. Find a positive root of the equation $2x=3+\cos x$ by Bisection method.

10. Using Lagrange's interpolation formula, find the value of y corresponding to x=2 from the following table :

x	0	1	3	4
y	5	6	50	105

P.T.O.

11. Evaluate $\int_{0}^{1} \frac{dx}{1+x^2}$ by using Simpson's $\left(\frac{3}{8}\right)^{th}$ rule.

12. Solve by Gauss-Seidel method

$$3x+y+z=1$$
$$x+3y-z=11$$
$$x-2y+4z=21.$$

13. Apply Runge-Kutta method fourth order to find an approximate value of y when x=0.2, given that

$\frac{dy}{dx}=x+y^2$ & y= 1 when x = 0

(take h= 0.1) 6.5181