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(20221) Roll No.

BCA.-V Sem.

18024

B.C.A. Examination, Dec. 2020

Numerical Methods

(BCA-504)

Time : Three Hours] *[Maximum Marks : 75*

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

Section-A

(Very Short Answer Questions)

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

1. Find the real root of the equation:

   $f(x) = x^3 - x - 1 = 0$

2. Define operators E, Δ and ∇. Also obtain relation between E and Δ.

P.T.O.

3. Given $\frac{dy}{dx} = \frac{y - x}{y + x}$ with $y=1$ for $x=0$. Find $y(0.3)$ by Euler's method taking $h=0.1$.

4. Define Simpson's three-eight rule for Numerical integration.

5. What do you understand by Gauss's eliminations method?

Section-B

(Short Answer Questions)

Note : Attempt any **two** questions out of the following **three** questions. Each question carries **7½** marks. 7½×2=15

6. Use Picard's method to approximate y when $x=0.2$, given that $y=1$ when $x=0$ and $\frac{dy}{dx} = x - y$.

7. Find the value of y when $x=10$ for the following table:

x	5	6	9	11
y	12	13	14	16

8. Using Bessel's formula, find y (25) from the following data:

x	20	24	28	32
y	24	32	35	40

Section-C

(Detailed Answer Questions)

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

9. Apply Gauss-Seidal iteration method to solve the equations.

$20x+y-2z=17$

$3x+20y-z=-18$

$2x-3y+20z=25$

10. Use Runge-Kutta method of fourth order, to find y (0.2) for the equation.

$\frac{dy}{dx} = \frac{y-x}{y+x}$ $y(0)=1$, take $h=0.2$

11. Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by using.

(a) Trapezoidal rule

(b) Simpson's $\frac{1}{3}$ rule.

12. By using Newton-Raphson's method, find the root of $x^4-x-10=0$ which is nearer to $x=2$ correct to three places of decimal. Also obtain the rate of Convergance of Newton-Raphson's method.

13. (a) The following value of the function f(x) for values of x are given:

$f(1)=4$, $f(2)=5$, $f(7)=5$, $f(8)=4$.

Find the value of f(6) and also the value of x for which f(x) is maximum or minimum.

(b) Apply Lagrange's formula to find the cubic polynomial which includes the following values of x and y_x:

x	0	1	4	6
y_x	1	-1	1	-1