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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, $\triangle$ and ∇. Also obtain relation between E and $\triangle$. **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:

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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. $15 \times 3 = 45$

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.

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

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P.T.O.

11. Evaluate $\displaystyle\int_{-6}^{6} \dfrac{dx}{1 + x^2}$ 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

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