Roll No. ....

E–3904

B. C. A. (Part II) EXAMINATION, 2021

(Old Course)

Paper First

NUMERICAL ANALYSIS

(201)

Time : Three Hours] [*Maximum Marks : 50*

Note : All questions are compulsory. Attempt any *two* parts from each question. All questions carry equal marks. Simple/Scientific calculator is allowed.

Unit—I

1. (a) Using bisection method, find real roots of $x^3 - x - 1 = 0$.

   (b) Find the root of $x^2 - 5x + 2 = 0$ correct to five decimal places, by Newton-Raphson method.

   (c) Solve the equation $2x^3 + x^2 - 7x - 6 = 0$ when the difference of two roots is 3.

Unit—II

2. (a) Apply Gauss-Jardon method to find the inverse of the matrix :

$$A = \begin{bmatrix} 2 & 6 & 6 \\ 2 & 8 & 6 \\ 2 & 6 & 8 \end{bmatrix}.$$

(b) Find Choleski's method, the inverse of matrix :

$$A = \begin{bmatrix} 1 & 2 & 6 \\ 2 & 5 & 15 \\ 6 & 15 & 46 \end{bmatrix}$$

(c) Find the characteristic equation and eigen value of the matrix :

$$A = \begin{bmatrix} 2 & -1 & 1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$$

Unit—III

3. (a) The values of x and y are given as below :

x	y
5	12
6	13
9	14
11	16

Find the value of y when $x = 10$.

(b) Estimate the sale for 1966 using the following table :

Year	Sale (in thousands)
1931	12
1941	15
1951	20
1961	27
1971	39
1981	52

(c) Given $\log_{10} 654 = 2.8156$, $\log_{10} 658 = 2.8182$, $\log_{10} 659 = 2.8189$, $\log_{10} 661 = 2.8202$. Find $\log_{10} 656$ using Newton divided difference interpolation formula.

Unit—IV

4. (a) Calculate the approximate value of $\int_0^{\frac{\pi}{2}} \sin x \, dx$ by Simpson's 1/3 rule, using 11 ordinates.

(b) Explain Newton-Cote's formula.

(c) Explain Weddle's rule taking 12th interval with suitable example.

Unit—V

5. (a) Given $\frac{dy}{dx} = 1 + xy$ with the initial condition that $y = 1$ when $x = 0$. Compute $y\ 0.1$ correct to four decimal places by using Taylor's series method.

(b) Solve the equation $\frac{dy}{dx} = x + y$, with initial condition $y\ 0 = 1$ by Runge-Kutta's rule, from $x = 0$ to $x = 0.4$ with $h = 0.1$.

(c) Use modified Euler's method to compute y for $x = 0.05$. Give that $\frac{dy}{dx} = x + y$ with initial conditions $x_0 = 0; y_0 = 1$ result correct upto three decimal places.