

Roll No. ....

**Y-2091**

**B. C. A. (Part II) EXAMINATION, 2015**

Paper First

NUMERICAL ANALYSIS

*Time : Three Hours ]*

*[ Maximum Marks : 50*

**Note :** Attempt any *two* parts from each question. All questions carry equal marks. Non-programmable calculators are allowed.

**Unit—I**

1. (a) Find a real root of the equation  $f(x) \equiv x^3 - 4x - 9 = 0$ , using bisection method in four stages.

(b) Apply Newton-Raphson method to solve :

$$3x - \cos x - 1 = 0$$

(c) Solve the equation :

$$2x^4 - 4x^3 + 11x^2 - 9x - 26 = 0$$

one root being  $\frac{1}{2} + \frac{5}{2}i$ .

**Unit—II**

2. (a) Apply Gauss-Jordan method to solve :

$$2x - 6y + 8z = 24$$

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

$$3x + y + 2z = 16$$

- (b) Solve the system of linear equations :

$$4x_1 - x_2 = 1$$

$$-x_1 + 4x_2 - x_3 = 0$$

$$-x_2 + 4x_3 - x_4 = 0$$

$$-x_3 + 4x_4 = 0$$

using the Cholesky method.

- (c) Use Power method to find the largest eigen value of the matrix :

$$A = \begin{bmatrix} 4 & 2 \\ 1 & 3 \end{bmatrix}$$

**Unit—III**

3. (a) Estimate the missing term in the following :

x	y
1	2
2	4
3	8
4	?
5	32
6	64
7	128

[ 3 ]

Y-2091

- (b) Find a polynomial satisfied by  $(-4, 1245), (-1, 33), (0, 5), (2, 9)$  and  $(5, 1335)$ , by the use of Newton's interpolation formula with divided differences.
- (c) From the following data compute  $x$  corresponding to  $y = 7$  using Lagrange's formula :

$x$	$y$
1	4
3	12
4	19

**Unit—IV**

4. (a) Show that :

$$\sum_{k=0}^n C_k^n = 1$$

where  $C_k^n$  is Cote's number.

- (b) A curve is drawn to pass through the points given by the following table :

$x$	$y$
1	2
1.5	2.4
2	2.7
2.5	2.8
3	3
3.5	2.6
4	2.1

Estimate the area bounded by the curve, the  $x$ -axis and the lines  $x = 1$  to  $x = 4$ .

- (c) Find the value of  $\int_0^6 y \, dx$ , using the following table :

$x$	$y$
0	0.146
1	0.161
2	0.176
3	0.190
4	0.204
5	0.217
6	0.230

#### Unit—V

5. (a) Use Picard's method to approximate  $y$  when  $x = 0.2$  given that  $y = 1$  when  $x = 0$  and  $\frac{dy}{dx} = x - y$ .
- (b) Use Euler's method to find  $y(0.4)$  from the differential equation  $\frac{dy}{dx} = xy$ ,  $y(0) = 1$ . Take for each step  $h = 0.1$ .
- (c) Apply Runge's method to approximate  $y$  when  $x = 1.6$  given that  $y = 0.4$  at  $x = 1$  and  $\frac{dy}{dx} = x - y$ .