

D 42503

(Pages : 2)

Name:

Reg. No:

**SEVENTH SEMESTER B.TECH. (ENGINEERING) DEGREE
EXAMINATION, DECEMBER 2007**

IC/AI/EC04 705 (F)—NUMERICAL ANALYSIS

Time : Three Hours

Maximum : 100 Marks

Answer all questions.

1. (a) Find the positive root of $x^3 - 2x - 5 = 0$ by False position method.
(b) Find a positive root of $3x - \sqrt{1 + \sin x} = 0$ by iteration method.
(c) Solve by Gauss-elimination method the following system :—

$$\begin{aligned} 6x - y + z &= 13 \\ x + y + z &= 9 \\ 10x + y - z &= 19. \end{aligned}$$

- (d) Solve the Gauss-Jordan method the following system of equations :

$$\begin{aligned} x - y + z &= 1 \\ -3x + 2y - 3z &= -6 \\ 2x - 5y + 4z &= 5. \end{aligned}$$

- (e) Prove that $\Delta = E - 1 = \frac{1}{2} \partial^2 + \partial \sqrt{1 + \frac{\partial^2}{4}}$.

- (f) Evaluate $\int_0^1 \frac{dx}{1+x^2}$ by Simpson's $\frac{1}{3}$ rule with $h = 0.2$.

- (g) Solve $\frac{dy}{dx} = x + y$ given $y(1) = 0$ and get $y(1.1)$ and $y(1.2)$ by Taylor series method.

- (h) Using Euler's method, solve numerically the equation

$$y' = x + y \quad y(0) = 1, \text{ for } x = 0, 1.0 \text{ and } 1.2, 1.4, 1.6, 1.8 \text{ and } 2.0.$$

(8 × 5 = 40 marks)

2. (a) Find all the roots of $x^3 - 6x^2 + 11x - 6 = 0$ by Graeffe's root squaring method.

Or

- (b) Discuss the order of convergence of Newton's method. Also find a positive root of $3x - \cos x - 1 = 0$ by Newton's method correct to five decimal places.

Turn over

3. (a) Solve by Gauss-Jacobi method, the following system :

$$\begin{aligned} x + y + 54z &= 110 \\ 27x + 6y - z &= 85 \\ 6x + 15y + 2z &= 72. \end{aligned}$$

Or

- (b) Find the dominant eigenvalues for $A = \begin{bmatrix} 25 & 1 & 2 \\ 1 & 3 & 0 \\ 2 & 0 & -4 \end{bmatrix}$ by Power method.

4. (a) (i) Using Lagrange's interpolation formula find y (9.5) given :

$$\begin{array}{cccc} x : & 7 & 8 & 9 & 10 \\ y : & 3 & 1 & 1 & 2 \end{array}$$

- (ii) Find x when $y = 13.5$, the data given below using inverse Lagrange interpolation formula :

$$\begin{array}{cccccc} x : & 93 & 96.2 & 100 & 104.2 & 108.7 \\ y : & 11.38 & 12.8 & 14.7 & 17.07 & 19.91 \end{array}$$

Or

- (b) Estimate the population increase during the period 1946 to 1976 :

$$\begin{array}{cccccc} x : & 1941 & 1951 & 1961 & 1971 & 1981 & 1991 \\ y : & 20 & 24 & 29 & 36 & 46 & 51 \end{array}$$

5. (a) Find y (0.1) y (0.2) y (0.3) from $\frac{dy}{dx} = xy + y^2$, $y(0) = 1$ by using RK-method and hence obtain y (0.4) using Adam's method.

Or

- (b) Find u upto 5 seconds by taking $h = 1$ given $\frac{\partial^2 u}{\partial x^2} = \frac{\partial u}{\partial t}$, $u(0, t) = u(5, t) = 0$ and $u(x, 0) = x^2(25 - x^2)$ using Bender-Schmidt formula.

(4 × 15 = 60 marks)