

**GUJARAT TECHNOLOGICAL UNIVERSITY****M.E Sem-I Regular Examination January / February 2011****Subject code: 711507N****Subject Name: Numerical Methods****Date: 03 /02 /2011****Time: 02.30 pm – 05.00 pm****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Solve the system of non-linear equations:  $x^2 + y = 11$ ,  $y^2 + x = 7$  with initial approximation to the solution are 3.5 and -1.8. **07**
- (b) Find the deflections of cantilever beam subjected to UDL  $w$  KN/m on whole span  $L$ . Find the values at minimum four points by using finite difference method. **07**

- Q.2** (a) Explain in detail with examples, the difference between accuracy and precision. **07**
- (b) Enlist and explain various methods for solution of large set of simultaneous equation. **07**

**OR**

- (b) Derive the various rule and formulas to carry out numerical integration. **07**
- Q.3** (a) Explain the types of error with examples. How to achieve stability in numerical analysis? **07**
- (b) Determine the largest Eigen value and corresponding Eigen vector of the following matrix. **07**

$$A = \begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix}$$

**OR**

- Q.3** (a) Differentiate following (i) Interpolation and Extrapolation, (2) Numerical differentiation and integration **07**
- (b) Solve by Jacobi's method. **07**
- $20x + y - 2z = 17; 3x + 20y - z = -18$  and  $2x - 3y + 20z = 25$

- Q.4** (a) Explain the principles of least squares with minimum two examples. **07**
- (b) Find the root of equation  $f(X) = X^3 - 4X + 1 = 0$  lying between 1 and 2 by using Newton-Raphson method. **07**

**OR**

- Q.4** (a) Describe the various methods for solution of algebraic and banded equations. **07**
- (b) Find the Eigen values and Eigen vectors of the matrix **07**

$$A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$$

- Q.5** (a) Enlist the software used for solution of large linear equations and also for transformation methods. **07**
- (b) Using three point Gaussian formula, evaluate the following **07**

$$\int_0^1 \frac{dx}{1+x}$$

**OR**

- Q.5** (a) Draw and explain a flow chart to generate polynomial coefficients. **07**
- (b) Using Euler's method, find an approximate value of y corresponding to x=1, given that  $dy/dx = x + y$  and  $y = 1$  when  $x = 0$ . **07**

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