

GUJARAT TECHNOLOGICAL UNIVERSITY**ME Semester –II Examination Dec. - 2011****Subject code: 1722309****Date: 19/12/2011****Subject Name: Numerical methods****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)** **07**
- (i) Explain different types of error with suitable examples. **04**
- (ii) Explain the term pivoting. **03**
- (b)** Discuss method of least square for regression of line. **07**
- Q.2 (a)** Given an equation **07**
- $f(R) = e^{-0.005R} \cos[\sqrt{2000 - 0.01R^2} (0.05)] - 0.01$
- Find out values of R by bisection method taking initial value as 300 Ω .
Perform 3 iterations.
- (b)** Discuss algorithm for Gauss elimination method. **07**
- OR**
- (b)** Explain algorithm for matrix inversion. **07**
- Q.3 (a)** Discuss in detail problem of falling parachulist. **07**
- (b)** Solve the following equations by Gauss-Siedel method upto three iterations **07**
- $4x - 2y - z = 40, \quad x - 6y + 2z = -28, \quad x - 2y + 12z = -86$
- OR**
- Q.3 (a)** Write a detail program for Gauss-Seidel method. **07**
- (b)** Solve the following by Gauss Elimination method. **07**
- $15x + y + z = 17, \quad 2x + 15y + z = 18, \quad x + 2y + 15z = 18$
- Q.4 (a)** An oscillating current in an electric circuit is described by $i = 9e^{-t} \cos(2\pi t)$, **07**
- where t is in seconds. Determine all values of t such that $i = 3$.
- (b)** Determine the real root of **07**
- $f(x) = 2x^3 - 11.7x^2 + 17.7x - 5$
- by Newton-Raphson method(three iterations, $x_0 = 3$).
- OR**
- Q.4 (a)** An oscillating current in an electric circuit is described by $i = 9e^{-t} \sin(2\pi t)$, **07**
- where t is in seconds. Determine all values of t such that $i = 3$.
- Q.4 (b)** Determine the real root of **07**
- $f(x) = 0.95x^3 - 5.9x^2 + 10.9x - 6$
- by Newton-Raphson method(three iterations, $x_i = 3.5$).

- Q.5 (a)** Evaluate the integral of the following tabular data with the trapezoidal rule. **07**

x	0	0.1	0.2	0.3	0.4	0.5
f(x)	1	8	4	3.5	5	1

- (b)** Explain the algorithm for modified Euler method. **07**

OR

- Q.5 (a)** Evaluate the integral of the following tabular data with the Simpson's rule. **07**

x	0	0.1	0.2	0.3	0.4	0.5
f(x)	1	8	4	3.5	5	1

- (b)** Explain algorithm for Euler method. **07**
