# GUJARAT TECHNOLOGICAL  UNIVERSITY
### MCA. Sem-II Remedial Examination December  2010

### Subject code: 620005
### Subject Name: Computer Oriented Numerical Methods
Date:  20 /12 /2010                                              Time: 10.30 am – 01.00 pm

**Total Marks: 70**

## Instructions:
1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Assume data where ever necessary.**

**Q.1** **(a)** Describe the Newton-Raphson method and derive its formula analytically.One of   **07**
the root of the equation sin x - x – 2 =0 lies near x=2.5.Find the root with tolerance
0.001.

**(b)** Solve the following system of equations using Guass elimination method         **07**
   2x + y + z =10
   3x +2y+3z=18
   x + 4y +9z=16

**Q.2** **(a)** Discuss different type of difference table in detail with an assumed suitable   **07**
example.

**(b)** Derive the formula to find the root using Bisection method also write algorithm for   **07**
it.

**OR**

**(b)** Write a well commented program for Secant method. Also explain it in detail.      **07**

**Q.3** **(a)** Given a function in the form of a table as                                  **07**

| x | 2.0 | 3.0 | 4.0 |
|---|-----|-----|-----|
| Y(x) | 6.6 | 9.2 | 8.6 |

Interpolate the value if y(x) using Langrangian polynomial at
   a.  x = 2.8
   b.  x = 3.1

**(b)** Give the table of values for function as                                         **07**

| x: | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 3.5 |
|----|-----|-----|-----|-----|-----|-----|
| y: | 6.2 | 7.5 | 9.0 | 10.00 | 11.5 | 12.0 |

Determine both the regression lines and also prove that the intersect at $(\sum x/n, \sum y/n)$

**OR**

**Q.3** **(a)** Given the following data find the cubic spline equations for the 4 intervals   **07**

| x | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| F(x) | 6 | -3 | 6 | 2 | -6 |

Find the value of f(x) at x = 3.8

**(b)** From the Taylor series for y(x) ,find y(0.1) correct to four decimal places if y(x) satisfies :   **07**
$y^{|}$=x-$y^{2}$ and y(0)=1

**Q.4** **(a)** Evaluate $\int_{-2}^{2} \frac{3x}{(4+x)^2} \, dx$ using Trapezoidal and Simpson's 1/3$^{rd}$  rule with six   **07**
intervals.

**(b)** Find the solution of the following differential equation $\frac{dy}{dx} = x^2 + y$ using Runge –   **07**
Kutta second order method for x=0.1 and 0.2 .Given that y = 1 when x = 0.

**Q.4** **(a)** Find the eigen value of the matrix                                                                                       **07**

$$A=\begin{matrix} 1 & 2 & 3 \\ 2 & 3 & 1 \\ 5 & 1 & 6 \end{matrix}$$

**(b)** Give $\frac{dy}{dx}$ =1/(x+y) ,y(0)=2,y(0.2)=2.0933,y(0.4)=2.1755,y(0.6)=2.2493.Find  y(0.8)   **07**
using Milne's Predictor Corrector formula.

**Q.5** **(a)** Write a well commented program for Gauss – elimination method.                            **07**
**(b)** Solve by Gauss-Seidal method, the following system of Equations.                          **07**
$$28x + 4y - z = 32$$
$$x + 3y + 10z = 24$$
$$2x + 17y + 4z = 35$$

**OR**

**Q.5** **(a)** Discuss different types of errors and error propagation in detai; with example        **07**
**(b)** Write an algorithm for false position method and explain the method in detail.        **07**

************