

GUJARAT TECHNOLOGICAL UNIVERSITY
ME - SEMESTER-I(New course)• EXAMINATION – WINTER- 2015

Subject Code: 2710210**Date: 31/12/2015****Subject Name: Numerical Method for Computer Engineering****Time: 2:30 pm to 5:00 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) Explain in brief the method of least square for fitting straight line $y=a+bx$ **07**
- (b) Define the relative error, absolute error and percentage errors. Evaluate the sum $S = \sqrt{3} + \sqrt{5} + \sqrt{7}$ to 4 significant digits and find its relative and absolute error. **07**
- Q.2** (a) Apply bisection method to solve $x^3 - x - 1 = 0$ correct upto 3 decimal places. **07**
- (b) Implement Newton Raphson method to solve $f(x) = e^{-x} - x$ with $x_0 = 0$ **07**
- OR**
- (b) Apply the method of false position to solve $x^3 - 2x - 5 = 0$ between (2,3) **07**
- Q.3** (a) Explain ill conditioning in a linear system of equation, also give an example for such a system. **07**
- (b) Apply Gauss elimination method to solve the system **07**
- $$\begin{aligned} 2x+y+z &= 10 \\ 3x+2y+3z &= 18 \\ x+4y+9z &= 16 \end{aligned}$$
- OR**
- Q.3** (a) Perform Bairstows method to extract a quadratic factor $x^2 + px + q$ from the polynomial $x^3 + x^2 - x + 2 = 0$ with $p = -0.9$ and $q = 0.9$. **07**
- (b) Evaluate using Simpsons 1/3rd rule $\int_0^1 \frac{1}{1+x} dx$ with $h=0.5$ and $h=0.25$. **07**
- Q.4** (a) Use Modified Euler method to solve $\frac{dy}{dx} = x^2 + y$ $y(0) = 1$ obtain $y(0.1)$ using $h=0.05$. **07**
- (b) Apply Runge Kutta 4th order method to solve $\frac{dy}{dx} = y^2 + 1$ $y(0) = 0$. find $y(0.2)$ and $y(0.4)$. **07**
- OR**
- Q.4** (a) Solve the boundary valued problem $y'' + y + 1 = 0$ with $y=0$ when $x=0$. And $y=0$ when $x=1$, using finite difference method for $h=0.5$ and $h=0.25$. **07**
- (b) Solve using shooting method, **07**
- $$y''(x) = y(x) \quad \text{with} \quad y(0) = 0 \quad \text{and} \quad y(1) = 1.1752$$
- Q.5** (a) Use lagranges interpolation to find the polynomial and compute $f(2)$ given $f(1)=0$, $f(4)=1.38629$, $f(6)=1.791760$. **07**

- (b) Fit a curve $y = ae^{bx}$ to the experimental data given, 07

x	2	4	6	8	10
y	4.077	11.084	30.128	81.897	222.62

OR

- Q.5** (a) Find the arithmetic mean for the data 07

Class	0-10	10-20	20-30	30-40	40-50
Frequency	7	8	20	10	5

- (b) Briefly explain the concept of trend analysis and seasonal effects. 07
