Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – II • EXAMINATION – WINTER 2012

Subject code: 1722309 **Date: 03-01-2013**

Subject Name: Numerical Methods

Time: 10.30 am – 01.00 pm **Total Marks: 70**

Instructions:

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

Q:1 **(a)** What is error? Explain various types of errors in numerical computation with proper examples. **07**

(b) Using geometrical interpretation derive equation of Regula-Falsi method. Discuss its pros and cons. **07**

Q:2 **(a)** Obtain the roots of following equation correct to three decimal places using bisection method. **07**

$f(x) = x^3 + 2x^2 + 3x + 4 = 0$

(b) Use secant method to find roots of following equation up to three decimal places. **07**

$f(x) = \cos x - xe^x$

OR

(b) Using newton raphson method find root of following equation. Use 6 iterations. **07**

$f(x) = x^3 - 2x^2 - 6x + 10$

Q:3 **(a)** The growth rate of bacteria (n) in a culture after t seconds is given below. **07**

t:	0	1	2	3	4	5
n:	32	45	65	93	125	185

Fit the curve of the form $n = ab^t$ and estimate n when t = 2.5 seconds

(b) Compare iterative numerical methods **07**

OR

Q:3 **(a)** Solve the following system of equations using matrix inversion method. **07**

$x_1 + 2x_2 - x_3 = 2$

$3x_1 + 6x_2 + x_3 = 1$

$3x_1 + 3x_2 + 2x_3 = 2$

(b) Solve $\frac{dy}{dx} = x + y$ when $y = 1$ at $x = 0$. Find solution for $x = 0.1, 0.2$ using Runge-Kutta method. **07**

Q:4 **(a)** Explain and write algorithm of Gauss Elimination Method. **07**

(b) Solve the following system of equations using Gauss elimination method. **07**

$$2x + y + 4z = 16$$
$$3x + 2y + z = 10$$
$$x + 3y + 3z = 16$$

OR

Q:4 **(a)** Explain and write algorithm of Gauss Jordan Method. **07**

(b) Solve the following system of equations using Gauss Jordan method. **07**

$$3x_1 - 0.1x_2 - 0.2x_3 = 7.85$$
$$0.1x_1 - 7x_2 - 0.3x_3 = -19.3$$
$$0.3x_1 - 0.2x_2 + 10x_3 = 71.4$$

Q:5 **(a)** Find solution to 3 decimal of following system using gauss seidel method **07**

$$7x_1 + 52x_2 + 13x_3 = 104$$
$$83x_1 + 11x_2 - 4x_3 = 95$$
$$3x_1 + 8x_2 + 29x_3 = 71$$

(b) Using geometrical interpretation derive equation of Trapezoidal Rule and 1/3 Simpson's rule. **07**

OR

Q:5 **(a)** Derive formula for Simposn's 3/8 rule and compute value of definite integral for following data using 3/8 Simpson's rule **07**

x	0	0.5	1	1.5	2	2.5	3
F(x)	1	0.66667	0.5	0.4	0.33333	0.2857	0.25

(b) Explain and write algorithm for Euler's method and modified Euler's method. **07**

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