Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – I • EXAMINATION – SUMMER • 2013

Subject code: 711507N **Date: 17-06-2013**

Subject Name: Numerical Methods

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.**

Q.1 **(a)** Define following types of errors (i) Absolute and relative errors (ii) Inherent errors (iii) Round-off errors (iv) Truncation errors **06**

(b) (i) Determine the absolute and relative errors involved if x = 22/7 is represented in normalised decimal form with 6 digits by (a) round-off (b) truncation. **08**

(ii) Determine the true error and true percentage relative error for each case. (a) If the measured length of a track is approximated by 5999 cm and the true value is 6000 cm (b) If the measured length of a track is approximated by 59 cm and the true value is 60 cm.

Q.2 **(a)** Find one root of cos x ï x e^x = 0 correct to two decimal places using suitable method. **07**

(b) Determine the equation to the best fitting exponential curve of the form $y = ax^2+bx+c$ for the data given in Table: **07**

x	10	20	40	50	90
y	55	70	125	160	300

OR

(b) Enlist and compare methods for curve fitting. **07**

Q.3 **(a)** Write a C++ programme for method of group averages of curve fitting. **07**

(b) Construct the divided difference table for data **07**

x	0.5	1.5	3.0	5.0	6.5	8.0
f(x)	1.625	5.875	31.0	131.0	282.125	521.0

Find the value of f(6)

OR

Q.3 **(a)** Derive the trapezium and mid-ordinate rule for numerical integration. **07**

(b) Determine the numerical value of integration of $\log_{10}x$ for limit 1 to 2, using three-point Gauss-Quadrature rule **07**

Q.4 **(a)** Using the finite difference method, compute the deflection at L/4 interval of a simply supported beam subjected to central point load and full span UDL. Take EI constant. **07**

(b) Analyse a simply supported uniform square plate for uniformly distributed load by finite difference method. Take grid step L/4 in both directions. **07**

OR

Q.4 **(a)** Explain the procedure to analayse plate using finite difference method. **07**

Q.4 **(b)** Calculate support reactions for a prismatic fixed beam subjected to two point loads spaced at 1/3 span, using finite difference method. **07**

Q.5 **(a)** Apply the Eulerôs method to the ordinary differential equation , dy/dx= x+y y(0) =1, using increments of size h = 0.1. The exact solution is $y = ï 1 ï x + 2e^{x}$. Determine the error and the percentage error at each step. **07**

(b) Determine the largest eigen value and corresponding eigenvector of the matrix A=[1 1 1 ; 2 1 2; 1 3 2] **07**

OR

Q.5 **(a)** Solve the following equations by Gauss Jordan method: **07**

x + y + z = 1
4x +3y -z = 6
3x + 5y + 3z = 4

(b) Write C++ program for any method for solution of linear simultaneous algebraic equations, except asked above. **07**

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