Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–IV(New) • EXAMINATION – WINTER 2016

Subject Code:2140706 Date:21/11/2016

Subject Name:Numerical and Statistical Methods for Computer Engineering

Time:02:30 PM to 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.**

			MARKS
Q.1		**Short Questions**	**14**
	1	Define: Relative error and Absolute error.	
	2	What is convergence rate of Bisection method and Newton's Raphson method?	
	3	What are the conditions for system of linear equations to be diagonally dominant?	
	4	Define well condition of system of linear equations.	
	5	Write the normal equations to fit straight line.	
	6	Define interpolation.	
	7	Write the name of methods in interpolation for unequally spaced arguments.	
	8	Write Simpson's-$\frac{1}{3}$ rule to integrate tabulated function.	
	9	Write the formula for second order R-K method to solve ordinary differential equation.	
	10	Define coefficient of correlation.	
	11	Write the name of two methods to determined measurement of trend.	
	12	What is the order of polynomial of the curve $y = f(x)$ passing through the points (1,-3),(3,9),(4,30) and (6,139).	
	13	Find an approximate positive root of an equation $x^3 + x - 1 = 0$ after first iteration by Bisection method.	
	14	Find mean of temperature recorded in degree centigrade during a week in May 2015, where the temperature recorded are 38.2,40.9,39,44,39.6,40.5,39.5.	
Q.2	(a)	Perform three iteration to find real root of $e^{-x} - 10x = 0$ correct to two decimal places by fixed point iteration method.	**03**
	(b)	Discuss the method Bisection to find the root of an equation $f(x) = 0$.	**04**
	(c)	Perform two iteration tosolve $x^4 - 8x^3 + 39x^2 - 62x + 50 = 0$ by Bairstow method. ($p=0$, $q = 0$)	**07**

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OR

(c) State direct and indirect method to solve system of linear equations. Solve the following system by Jacobi method, $2x+y+z=0, 3x+5y+2z=15, 2x+y+4z=8$. **07**

Q.3 (a) Write an algorithm for Simpson's $\frac{3}{8}$ rule to evaluate the tabulated function. **03**

(b) Velocity of a Car running on a straight road at intervals of 2 minutes are given below: **04**

Time	0	2	4	6	8	10	12
Velocity	0	22	30	27	18	7	0

Apply Simpson's rule to find the distance covered by the car.

(c) Obtain Cubic Spline approximation for the function defined by the data given below with M(0)=0 ,M(3)=0 **07**

X	0	1	2	3
F(x)	1	2	33	244

OR

Q.3 (a) Write an algorithm for Lagrange's interpolation. **03**

(b) By using Lagrange's Interpolation method, Find a second degree polynomial passing through points (0,0),(1,1) and (2,20). **04**

(c) By using Least Square Method fit second degree polynomial using the following data: **07**

X	-3	-2	-1	0	1	2	3
Y	12	4	1	2	7	15	30

Q.4 (a) Consturct forward difference table from the following data. (1,1.1),(2,4.2),(3,9.3),(4,16.4). **03**

(b) By using Newton's divided difference formula find f(6) from the following table. **04**

X	1	2	7	8
f(x)	1	5	5	4

(c) By using forth order Runge -Kutta method find (0.2) by taking h=0.1 given that $\frac{dy}{dx} = 2x+y, y(0)=1$. **07**

OR

Q.4 (a) Construct backward difference table from the given data. **03**

X	4	6	8	10
Y	1	3	8	16

(b) Apply Euler's method to solve $y' = x+y, y(0)=0$ by choosing h=0.2. **04**

(c) Solve boundary value problem **07**
$\frac{d^2y}{dx^2} - y = 0, y(0) = 0, y(1) = 1, h = \frac{1}{4}$ by finite difference method.

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Q.5 (a) Find Arithmetic mean from the following table. **03**

X	35	45	55	60	75	80
f	12	18	10	6	3	11

(b) Develop a C program to fitting of straight line. **04**

(c) Find the regression line X on Y from the following table. **07**

X	1	2	3	4	5	6	7	8	9	10
Y	10	12	16	28	25	36	41	49	40	50

OR

Q.5 (a) Find the median by the data 2,8,4,6,10,12,4,8,14,16. **03**

(b) Complete correlation coefficient for the data given below. **04**

X	4	5	9	14	18	22	24
Y	16	22	11	16	7	3	17

$\sum x = 96, \sum y = 92, \sum x^2 = 1702, \sum y^2 = 1464, \sum xy = 1047$

(c) Develop a C program of Runge-Kutta second order method to solve ordinary differential equation. **07**

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