Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V • EXAMINATION – WINTER • 2014

Subject Code: 151601 **Date: 26-11-2014**

Subject Name: Computer Oriented Statistical 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 Truncation error, Round off error, Inherent error. Find the relative error and percentage error if 0.005998 is truncated to three decimal digits. **07**

(b) Show that the Successive approximation method is linearly convergent. **07**

Q.2 **(a)** Find all the roots of the equation $x^3 + x^2 - x + 2 = 0$ using Lin-Bairstow method. Start with the initial factor $x^2 - 0.9x + 0.9$ **07**

(b) Find all the roots of the equation $x^3 - 2x^2 - 5x + 6 = 0$ using Graeffe's method squaring thrice. **07**

OR

(b) Solve the non linear system of equations $xy = 1,\ x^2 + 4y^2 = 5$ using Newton-Raphson method. **07**

Q.3 **(a)** Derive the Recurrence relation for Chebyshev polynomials and using it define $T_2(x)$, $T_3(x)$ and $T_4(x)$ **07**

(b) Derive Lagrange's interpolation formula and using inverse interpolation find the value of x corresponding to $y = 12$ from the following data **07**

x	1.2	2.1	2.8	4.1	4.9	6.2
y	4.2	6.8	9.8	13.4	15.5	19.6

OR

Q.3 **(a)** Obtain the cubic spline for every subinterval from the following data **07**

x	1	2	3	4
f(x)	1	2	5	11

(b) The pressure and volume of a gas are related by the equation $pV^a = c$. Fit this curve to the following data **07**

p	0.5	1.0	1.5	2.0	2.5	3.0
V	1.62	1.00	0.75	0.62	0.52	0.46

Q.4 **(a)** Solve $\frac{dy}{dx} = 2y + 3e^x$ with $y(0) = 0$ for $x = 0.1$, 0.2, 0.3 by Taylor's series method. Extend the solution to $x = 0.4$ by Milne's method. **07**

(b) Solve $\frac{dy}{dx} = xy + y^2$ with $y(0) = 1$ for $x = 0.1$, 0.2, 0.3 by Runge-Kutta method. **07**

OR

Q.4 **(a)** Derive the formula of Simpson's 1/3rd rule and use it to evaluate $\int_0^6 \frac{1}{1+x}\,dx$. Hence obtain the value of $\log_e 7$. **07**

(b) Explain ill conditioned system of equations and solve the following system of equations using Gauss - Jacobi method **07**

$3x + 20y - z = -18, \quad 2x - 3y + 20z = 25, \quad 20x + y - 2z = 17$

Q.5 **(a)** Find the first four moments of the following data about assumed mean 25 and actual mean. **07**

Class limit	0-10	10-20	20-30	30-40
Frequency	1	3	4	2

(b) Find the correlation coefficient from the following data **07**

X	307	259	341	317	274	416	267	320	274	336
Y	80	75	90	74	75	110	70	85	88	78

OR

Q.5 **(a)** Find both Regression lines for the data **07**

	x	y
Mean	60	67.5
Standard Deviation	15	13.5

The correlation coefficient is 0.5

(b) Calculate 7-yearly moving averages for the following data showing the number of students of an engineering college clearing GATE **07**

Year	Number of students	Year	Number of students
1999	23	2007	9
2000	26	2008	13
2001	28	2009	11
2002	32	2010	14
2003	20	2011	12
2004	12	2012	9
2005	12	2013	3
2006	10	2014	1

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