Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER– V • EXAMINATION – WINTER 2016

Subject Code: 151601 **Date: 02/12/2016**
Subject Name: Computer Oriented Statistical Methods
Time: 10:30AM – 01:00PM **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)** (i) Explain the difference between Truncation error and Round-off error with suitable example. **03**

(ii) If the approximate solution of a problem is 20.14 with relative error of at the most 5% . Find the range of values correct upto four decimal digits in which the exact value of the solution lie. **04**

(b) Show that the Newton-Raphson method is 2nd order convergent. **07**

Q.2 **(a)** Find all the roots of the equation $x^3 + 3x^2 + 3x + 2 = 0$ using Lin- Bairstow method. Start with the initial factor $x^2 + 0.9x + 1.1$ **07**

(b) Find all the roots of the equation $x^3 - 6x^2 + 5x + 12 = 0$ using Graeffe's method squaring thrice. **07**

OR

(b) Solve the non linear system of equations $8xy = 1,\ 2x^2 + 8y^2 = 1$ using Newton Raphson method. Starting with $x_0 = 0.4$ and $y_0 = 0.3$. **07**

Q.3 **(a)** Express $f(x) = x^4 - 12x^3 + 24x^2 - 30x + 9$ and its successive differences in factorial notation and hence show that $\Delta^5 f(x) = 0$ **07**

(b) Obtain the cubic spline for every subinterval from the following data **07**

x	1	2	3	4
y	1	2	5	11

OR

Q.3 **(a)** Fit a relation of the type $R = a + bV^2$ using least squares method to the following data. **07**

V	10	20	30	40	50
R	8	10	15	21	30

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

Q.4 **(a)** Use Taylor's series method to obtain approximate value of y at $x = 0.2$ for the differential equation $\frac{dy}{dx} = 2y + 3e^x$, $y(0) = 0$. Compare the numerical solution with exact solution. **07**

(b) Derive the formula of Euler's method to solve a first order ordinary differential equation numerically and use it to solve $\frac{dy}{dx} = \frac{y-x}{y+x}$, $y(0) = 1$ at $x = 0.1$ **07**

OR

Q.4 **(a)** Evaluate (i) $\frac{dy}{dx}$ at $x = 0.75$ and (ii) $\frac{d^2y}{dx^2}$ at $x = 1.50$ for the data **07**

x	0.50	0.75	1.00	1.25	1.50
y	0.13	0.42	1.00	1.95	2.35

(b) Evaluate $\int_0^1 e^{x^2} dx$ using Gaussian Integral four points formula. **07**

Q.5 a) Calculate the first four moments of the following data about assumed mean 35 and about the mean **07**

Marks	0 - 10	10 - 20	20 – 30	30 - 40	40 – 50	50 – 60	60 - 70
No. of students	8	12	20	30	15	10	5

(b) Ten contestants in a singing contest are ranked by three judges in the following order **07**

Contestant No	1	2	3	4	5	6	7	8	9	10
Judge 1	1	6	5	10	3	2	4	9	7	8
Judge 2	3	5	8	4	7	10	2	1	6	9
Judge 3	6	4	9	8	1	2	3	10	5	7

Using rank correlation find out that which pair of judges have common approach to singing.

OR

Q.5 (a) In a partially destroyed laboratory record of an analysis of correlation data the following results only are legible: **07**

Variance of X = 9

Regression equations $8X - 10Y + 66 = 0$

$40X - 18Y = 214$

Find (i) The mean values of X and Y

(ii) Coefficient of correlation between X and Y

(iii) Standard deviation of Y

(b) Calculate 4-yearly moving averages for the following data **07**

Year	Production	Year	Production
2005	464	2010	540
2006	515	2011	557
2007	518	2012	571
2008	467	2013	586
2009	502	2014	612

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