Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V (OLD) - EXAMINATION – SUMMER 2017

Subject Code: 151601 **Date: 08/05/2017**

Subject Name: Computer Oriented Statistical Methods

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.**

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 $x^3 + x^2 - x + 2 = 0$ 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. Starting with $x_0 = 0.9$ and $y_0 = 0.6$. **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 second degree polynomial to the following data using least squares method. **07**

x	0.78	1.56	2.34	3.12	3.81
y	2.50	1.20	1.12	2.25	4.25

(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 $x = 0.1$, 0.2, 0.3 for the differential equation $\frac{dy}{dx} = x^2y - 1\ , y(0) = 1$. Extend the solution to $x = 0.4$ using Milne's method. **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 $\int_{1}^{3} \sin x \, dx$ using Gauss Quadrature formula with five points. Compare the result with analytic value. **07**

Q.5 **(a)** Calculate the first four moments of the following data about **07**
(i) assumed mean 25 (ii) actual mean (iii) zero

x	0 - 10	10 - 20	20 - 30	30 - 40
f	1	3	4	2

(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 seasonal indices by the ratio to moving averages method for the following data. **07**

Year	1st quarter	2nd quarter	3rd quarter	4th quarter
2012	68	62	61	63
2013	65	58	66	61
2014	68	63	63	67

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