

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE – SEMESTER V • EXAMINATION – WINTER - 2012

Subject code: 151601

Date: 11-01-2013

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) Define error, relative error and percentage error. **07**

If the approximate solution of a problem is $x_0 = 35.25$ with relative error of at the most 2 % .Find the range of values correct upto four decimal digits in which the exact value of the solution lie.

(b) Evaluate $\int_2^3 \frac{\cos 2x}{1 + \sin x} dx$ using Gaussian two point and three point formulae. **07**

Q.2 (a) Explain Descarte's rule of signs. **07**

Solve $x^3 - 8x^2 + 17x - 10 = 0$ using Graeffe's method by squaring the roots thrice.

(b) State Budan's theorem and apply it to find the number of roots of the equation $x^5 + x^4 - 4x^3 - 3x^2 + 3x + 1$ in the interval $[-2, -1]$, $[0, 1]$ and $[1, 2]$. **07**

OR

(b) Solve $x^3 - 5x^2 - 2x + 24 = 0$ using Bairstow method. **07**

Q.3 (a) Derive the formula of False Position Method and using it solve **07**

$x \log x - 1.2 = 0$ correct to four decimal places.

(b) Show that the rate of convergence of Newton Raphson method is 2. **07**

OR

Q.3 (a) Solve the non linear equations $x^2 - y^2 + 7 = 0$ and $x - xy + 9 = 0$ using Newton Raphson method. Take $x_0 = 3.5$ and $y_0 = 4.5$ **07**

(b) Describe the method of successive approximation and using it solve **07**

$2x - \log x = 7$ correct to four decimal places.

Q.4 (a) Using Taylor's series method compute the approximate values of y at **07**

$x = 0.2, 0.4$ and 0.6 for the differential equation $\frac{dy}{dx} = x - y^2$ with the initial condition $y(0) = 0$. Now apply Milne's Predictor Corrector method to find y at $x = 0.8$.

(b) Solve the following system of equations by Gauss– Jacobi method correct to five decimal places **07**

$$27x + 6y - z = 85, 6x + 5y + 2z = 72, x + y + 54z = 110$$

OR

Q.4 (a) Obtain Cubic splines for every subinterval of the data **07**

x : 1 2 3 4
y : 1 2 5 11

(b) Fit a curve of the form $y = ab^x$ to the following data by the method of least squares **07**

x : 1 2 3 4 5 6 7
y : 87 97 113 129 202 195 193

Q.5 (a) Compute the correlation coefficient between X and Y **07**

X	2	4	5	6	8	11
Y	18	12	10	8	7	5

(b) Calculate 5-yearly moving averages of the number of students passing from a college **07**

Year	Number of students	Year	Number of students
2003	332	2008	405
2004	317	2009	410
2005	357	2010	427
2006	392	2011	405
2007	402	2012	438

OR

Q.5 (a) Show that $1 + \Delta = E = e^{hD}$ **07**

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