

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY**B.E. Sem-5th examination December 2010****Subject code: 151601****Subject Name: Computer Oriented Statistical Method****Date: 20/06/2011****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 Attempt all the questions.

- (a) If $u = 2v^6 - 5v$, find the percentage error in u at $v = 1$ if error in v is 0.05. 03
- (b) Find the solution of the following equation using floating point arithmetic with 4-digit mantissa $x^2 - 1000x + 25 = 0$. 03
- (c) Find the real root of the equation $x^3 - 9x + 1 = 0$ by method of Newton Raphson. 03
- (d) Explain and three diagrams of graphical representation of frequency distribution. 03
- (e) Two unbiased coins are tossed; find expected value of number of head. 02

Q-2 (a) (i) Compute the skewness based on the third moment for the following data 04

Class	3-7	8-12	13-17	18-22	23-27	28-32	33-37	38-42
Frequency	2	108	580	175	80	32	18	5

(ii) Find the co-efficient of the correlation for the following data 03

X	10	14	18	22	26	30
Y	18	12	24	6	30	36

(b) (i) Ten competitors in a musical test were ranked by the three judges X, Y and Z in the following order 04

Ranks by X	1	6	5	10	3	2	4	9	7	8
Ranks by Y	3	5	8	4	7	10	2	1	6	9
Ranks by Z	6	4	9	8	1	2	3	10	5	7

using rank co-relation method, discuss which pair of judges has the nearest approach two common linking in music.

(ii) From the following data calculate two lines of regression 03

X	16	20	17	21	15
Y	50	60	58	60	55

- (a) Estimate value of Y when X = 25
- (b) Estimate value of X when Y = 50.

OR

- (b) (i) Find the co-relation co-efficient and the equation of regression lines for the following values of X and Y 04

X	1	2	3	4	5
Y	2	5	3	8	7

- (ii) Compute the 4 yearly moving averages from the following data 03

Year	1991	1992	1993	1994	1995	1996	1997	1998
Annual sales Rs. In crores	36	43	43	34	44	54	34	24

- Q-3 (a) (i) Find the root of the equation $x^3 - 2x^2 + x - 2 = 0$ using Lin-Bairstow's Method 04

- (ii) Find the root of the equation $2x - \log_{10} x - 7 = 0$ correct to three decimal places using iteration method. 03

- (b) (i) Evaluate 04

$$I = \int_0^6 \frac{dx}{1+x^2}$$

by (i) Trapezoidal rule (ii) Simpson's 1/3 rule

- (ii) Compute $f'(0.75)$, from the following table 03

x	0.50	0.75	1.00	1.25	1.50
f(x)	0.13	0.42	1.00	1.95	2.35

OR

- Q-3 (a) (i) State Budan's theorem. Apply it to find the number of roots of the equation $x^4 - 4x^3 + 3x^2 - 10x + 8 = 0$ in the interval $[-1,0]$ and $[0,1]$. 04

- (ii) Find the root of the equation $4\sin x + x^2 = 0$ by Secant method. 03

- (b) (i) The distance, s (in km) covered by a car in a given time, t (minutes) is given in the following table 04

Time(t)	0	1	2	3	4	5	6
Distance(s)	0	2.5	8.5	15.5	24.5	36.5	50

Estimate the speed and acceleration of the car at $t = 5$ minutes.

- (ii) Using Gauss's quadrature formula, evaluate $I = \int_2^4 (x^2 + 2x)dx$. 03

- Q-4 (a) Estimate the value of $f(22)$ and $f(42)$ from the following data 05

x	20	25	30	35	40	45
f(x)	354	332	291	260	231	204

- (b) Represent the function $f(x) = 3x^3 + x^2 + x + 1$ in factorial notation and hence show that $\Delta^3 f(x) = 18$. 05

- (c) Fit a straight line for the data given below 04

x	100	120	140	160	180	200
y	0.45	0.55	0.60	0.70	0.80	0.85

OR

- Q-4 (a) Use Lagrange's formula to find third degree polynomial which fits into the data below 05

x	0	1	3	4
y	-12	0	12	24

Evaluate the polynomial for $x = 4$.

- (b) Estimate the function value $f(7)$ using cubic splines from the following data ;given $p_0 = p_2 = 0$ 05

i	0	1	2
x_i	4	9	16
f_i	2	3	4

- (c) Prove the following 04

(i) $\Delta \nabla = \nabla \Delta = \Delta - \nabla$

(ii) $\delta = \nabla E^{1/2}$

- Q-5 (a) Solve the following system of equations using Gauss elimination method with pivoting 05

$$2x_1 + 3x_2 + 4x_3 = 20$$

$$4x_1 + 2x_2 + 3x_3 = 17$$

$$x_1 + 4x_2 + 2x_3 = 17$$

- (b) Given $\frac{dy}{dx} = 1 + y^2$, where $y = 0$ when $x = 0$ find $y(0.2)$ and $y(0.4)$ using Runge Kutta method. 05

- (c) Solve the differential equation $\frac{dy}{dx} = x + y$ with $y(0) = 1, x \in [0, 1]$ by Taylor's series expansion to obtain y for $x = 0.1$ 04

OR

- Q-5 (a) Using Gauss Seidel Method solve the following system of equations 05

$$10x + y + z = 12$$

$$2x + 2y + 10z = 14$$

$$2x + 10y + z = 13$$

- (b) Given $\frac{dy}{dx} = xy$ with $y(1) = 5$ 05

Find the solution in the $[1, 1.3]$ using step size $h = 0.1$ by Predictor Corrector Method.

- (c) Using Euler's method, compute $y(0.5)$ for differential equation 04

$$\frac{dy}{dx} = y^2 - x^2 \text{ with } y = 1 \text{ when } x = 0 \text{ (taking } h = 0.1).$$
