

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE SEM-V Examination-Nov/Dec.-2011

Subject code: 151601

Date: 22/11/2011

Subject Name: Computer Oriented Statistical Methods

Time: 2.30 pm -5.00 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) Find all roots of the equation $x^3 - 2x^2 - 5x + 6 = 0$ by Graeffe's method, squaring thrice. 07

- (b) (i) Use the secant method to estimate the root of $f(x) = e^{-x} - x$ correct to two significant digits with initial estimate of $x_{-1}=0$ and $x_0=1.0$ 04
- (ii) Discuss briefly the different types of errors encountered in performing numerical calculations. 03

Q-2 (a) Fit cubic splines for first two subintervals from the following data. Utilize the result to estimate the value at $x=5$. 07

x:	3	4.5	7	9
f(x):	2.5	1	2.5	0.5

- (b) (i) Fit a curve of the type $y = Ce^{Ax}$ for the five data points: (0, 1.5), (1, 2.5), (2, 3.5), (3, 5.0) and (4, 7.5). 04

(ii) Prove that Newton-Raphson procedure is second order convergent. 03

OR

- (b) (i) Consider $y = f(x) = \cos(x)$ over $[0.0, 1.2]$. Use the three nodes $x_0 = 0.0$, $x_1 = 0.6$ and $x_2 = 1.2$ to construct a quadratic approximation polynomial $p_2(x)$ using Lagrange's Interpolation method. 04
- (ii) Write an algorithm for the false position method to find root of the equation $f(x) = 0$ 03

Q-3 (a) Use Taylor series to find approximate value of $\cos(-8)$ to 5 significant digits. 07

- (b) (i) A train is moving at the speed of 30 m/sec. suddenly brakes are applied. The speed of the train per second after t seconds is given by the following table. 04

Time(t):	0	5	10	15	20	25	30
Speed(v):	30	24	19	16	13	11	10

Apply Simpson's three-eighth rule to determine the distance moved by the train in 30 seconds.

- (ii) Write an algorithm for Trapezoidal Rule to integrate a tabulated function. 03

OR

- Q-3 (a) A slider in a machine moves along a fixed straight rod. Its distance x cm. along the rod is given below for various values of the time t seconds. Find the velocity of the slider when $t=0.1$ second. 07

t:	0	0.1	0.2	0.3	0.4	0.5	0.6
x:	30.13	31.62	32.87	33.64	33.95	33.81	33.24

- (b) (i) The table gives the distance in nautical miles of the visible horizon for the given heights in feet above the earth's surface. Find the values of y when $x=390$ ft. 04

height(x):	100	150	200	250	300	350	400
Distance(y):	10.63	13.03	15.04	16.81	18.42	19.90	21.27

- (ii) Write an algorithm to fit a straight line from given data using the method of least squares regression. 03

- Q-4 (a) Use three iterations of Gauss-Seidel iteration method to solve the system: 07
 $8x - 3y + 2z = 20$; $4x + 11y - z = 33$; $6x + 3y + 12z = 35$.

- (b) (i) Given that $\frac{dy}{dx} = x + y$ with initial condition $y(0)=1$. Use Runge-Kutta fourth order method to find $y(0.1)$. 04

- (ii) Explain pitfalls of Gauss elimination method. 03

OR

- Q-4 (a) Use Heun's predictor-corrector method to integrate $\frac{dy}{dx} = 4e^{0.8x} - 0.5y$ from $x=0$ to $x=3$ with a step size of 1. The initial condition at $x=0$ is $y=2$. (Perform only one iteration in corrector step) 07

- (b) (i) Use Gauss elimination method to solve the equations: 04

$$3x + y - z = 3; \quad 2x - 8y + z = -5; \quad x - 2y + 9z = 8$$

- (ii) Write a pseudo code for Gauss-Jacobi method to solve linear system of equations 03

- Q-5 (a) From the following data obtain the two regression lines and Correlation coefficient: 07

Sales(x):	100	98	78	85	110	93	80
Purchase(y)	85	90	70	72	95	81	74

- (b) The quantities of milk (in litres) produced by a dairy farm on ten consecutive days are shown below: 07

218.2, 199.7, 207.3, 185.4, 213.7, 184.7, 179.5, 194.4, 224.3, 203.5
Evaluate the mean and the first four central moments of the milk yield data (in litres) of the dairy farm.

OR

- Q-5 (a) A factory produces two types of electric bulbs A and B. In an experiment relating to their life, the following results were obtained. 07

- (a) Which type of bulb has more average life.
(b) Which type of bulb is less variable in length of life.

Length of life (in hrs)		500-700	700-900	900-1100	1100-1300	1300-1500
No. of bulbs	A	5	11	26	10	8
	B	4	30	12	8	6

- (b) Calculate seasonal indices by the 'ratio to moving average method' from the following data: 07

Year	I Quarter	II Quarter	III Quarter	IV Quarter
1991	68	62	61	63
1992	65	58	66	61
1993	68	63	63	67
