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: 04
   $(0, 1.5)$, $(1, 2.5)$, $(2, 3.5)$, $(3, 5.0)$ and $(4, 7.5)$.

   (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 $x_0 = 0.0$,   04
   $x_1 = 0.6$ and $x_2 = 1.2$ to construct a quadratic approximation polynomial $p_2(x)$ using Lagrange's Interpolation method.
   (ii) Write an algorithm for the false position method to find root of the   03
   equation $f(x) = 0$

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

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(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=390ft. **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 $\dfrac{dy}{dx} = x + y$ 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 $\dfrac{dy}{dx} = 4e^{0.8x} - 0.5y$ 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**

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

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

(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

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