

**GUJARAT TECHNOLOGICAL UNIVERSITY****B.E. Sem-V<sup>th</sup> Examination December 2010****Subject code: 151601****Subject Name: Computer Oriented Statistical Methods****Date: 13 /12 /2010****Time: 03.00 pm - 05.30 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) Use three iterations of Newton Raphson Method to solve the non-linear equations,  $x^2 - y^2 + 7 = 0, x - xy + 9 = 0$ . Take  $(x_0, y_0) = (3.5, 4.5)$  as the initial approximation. **06**
- (b) (i) Discuss the pitfalls in computing using normalized floating – point numbers. **03**  
(ii) Find all roots of the equation  $x^3 - 2x^2 - 5x + 6 = 0$  using Graeffe's method squaring thrice. **05**
- Q-2** (a) Obtain cubic spline for every subinterval from the following data **06**  
 $x :$  0 1 2 3  
 $f(x) :$  1 2 33 244  
Hence an estimate  $f(2.5)$
- (b) (i) The population of the town in decennial census was as given below estimate the population for the year 1895 **06**  
Year : 1891 1901 1911 1921 1931  
Population: 46 66 81 93 101  
(In thousand)  
(ii) Write an algorithm for the successive approximation method to find root of non-linear equation. **02**
- OR**
- (b) (i) If  $P$  is the pull required to lift a load  $W$  by means of pulley block, find a linear law of the form  $P = mW + c$  connecting  $P$  and  $W$  using following data: **06**  
 $P :$  12 15 21 2  
 $W :$  50 70 100 120  
Where  $P$  and  $W$  are taken in kg-wt. compute  $P$  when  $W = 150$  kg.  
(ii) Write an algorithm for Lagrange's interpolation method to interpolate a value of dependent variable for given value of independent variable. **02**
- Q-3** (a) The distance (s) covered by a car in a given time (t) is given below **06**  
Time(Minutes) : 10 12 16 17 22  
Distance(Km.) : 12 15 20 22 32  
Find the speed of car at time  $t = 14$  minutes.
- (b) (i) Evaluate :  $\int_1^5 \log_{10} x dx$ , taking 8 subintervals, correct to four decimal places by Trapezoidal rule. **06**  
(ii) Write an algorithm for Simpson's three-eighth rule to integrate a tabulated function. **02**
- OR**
- Q-3** (a) The following data gives pressure and volume of superheated steam **06**  
 $V :$  2 4 6 8 10  
 $P :$  105 42.7 25.3 16.7 13  
Find the rate of change of pressure w.r.t. volume when  $V = 8$

- (b) (i) Following table shows speed in m/s and time in second of a car 06  
 t : 0 12 24 36 48 60 72 84 96 108 120  
 v : 0 3.60 10.08 18.90 21.60 18.54 10.26 5.40 4.50 5.40 9.00  
 Using Simpson's one-third rule find the distance travelled by the car in 120 second 02  
 (ii) Evaluate  $\int_2^4 (x^2 + 2x) dx$  using Gauss's quadrature formula with  $n=3$ .
- Q-4** (a) Use three iterations of Jacobi's method to solve the system of equations 06  
 $20x + y - 2z - 17 = 0, 2x - 3y + 20z - 25 = 0, 3x + 20y - z + 18 = 0$   
 (b) (i) Given that  $\frac{dy}{dx} = x + y^2, y(0) = 1$ . Using Runge-kutta method find approximate 06  
 value of  $y(0.2)$ , take step size 0.1  
 (ii) Write an algorithm for Euler's method to solve ODE  $\frac{dy}{dx} = f(x, y)$  02
- OR**
- Q-4** (a) Use Gauss elimination method to solve the equations: 06  
 $2x + y + z = 10, 3x + 2y + 3z = 18, x + 4y + 9z = 16$ . also write pseudo code for this method.  
 (b) (i) Given that  $2\frac{dy}{dx} = y^2 + x^2 y^2, y(0) = 1, y(0.1) = 1.06, y(0.2) = 1.12, y(0.3) = 1.21$  06  
 evaluate  $y(0.4)$  by Milnes predictor-corrector method.  
 (ii) Write a pseudo code for Gauss-seidel method to solve linear system 02  
 of equations
- Q-5** (a) The following table gives the profits(in thousand Rs.) of two companies X and Y for 07  
 last 10 years. Which of two companies has greater consistency in profits:  
 Year : 1979 1980 1981 1982 1983 1984 1985 1986 1987 1988  
 Profits(X): 700 625 725 625 650 700 650 700 600 650  
 Profits(Y): 550 600 575 550 650 600 550 525 625 600.
- (b) Find the first four central moments of the following distribution and comment on 07  
 the nature of the distribution:  
 Class-limits: 100-104.9 105-109.9 110-114.9 115-119.9 120-124.9  
 Frequency : 7 13 25 25 30
- OR**
- Q-5** (a) Calculate coefficient of correlation by spearman's method from the following data: 07  
 Sales(Lakhs): 45 56 39 54 45 40 56 60 30 36  
 Advert.Cost : 40 36 30 44 36 32 45 42 20 36  
 ('000Rs.)  
 Comment on the result.
- (b) Obtain Seasonal fluctuations from the following data using moving average method: 07  
 Quarterly output ('000Tons) of Commodity  
 Year I II III IV  
 1984 65 58 56 61  
 1985 68 63 63 67  
 1986 70 59 56 52  
 1987 60 55 51 58  
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