Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V • EXAMINATION – SUMMER • 2015

Subject Code: 151601 **Date: 02/05/2015**

Subject Name: Computer Oriented Statistical Methods

Time: 02.30pm-05.00pm **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) Discuss the types of errors in performing numerical calculations. **04**

(b) Does bisection method always converge? **05**
Discuss the comparison of iterative methods .

(c) Discuss the merits and demerits of the moving average method **05**

Q.2 (a) (1) Discuss the consequences of normalized floating point representation of numbers with a suitable example. **04**

(2) Evaluate $\left(\frac{\Delta^2}{E}\right)x^3$. **03**

(b) Write an algorithm for cubic spline interpolation. **07**

OR

(b) Find the first, second and third derivative of the function, tabulated below, at x = 1.5: **07**

x	1.5	2.0	2.5	3.0	3.5	4.0
f(x)	3.375	7.000	13.625	24.000	38.875	59.000

Q.3 (a) (1) Obtain the function whose first difference is $9x^2+11x+5$. Show that its third difference is 18. **04**

(2) Find the first term of the series whose second and subsequent terms are $8, 3, 0, -1, 0$. **03**

(b) State Budan's theorem. Solve $x^3-8x^2+17x-10=0$ by Graffe's method, squaring three times. **07**

OR

Q.3 (a) (1) Find the value of $\log 3$ from $\int_0^1 \frac{x^2}{1+x^3}dx$ using Simpson's rule by dividing the range into four equal parts. **04**

(2) Write an algorithm to solve a differential equation by Runge-Kutta method. **03**

(b) Using Taylor series method, solve $\frac{dy}{dx}=x+y$. Starting from $x=1,\ y=0$ and carry to $x=1.2$ with $h=0.1$. Compute the final result with the value of the explicit solution. **07**

Q.4 (a) (1)Find the value of x corresponding to $y=12$ using inverse interpolation: **04**

x	1.2	2.1	2.8	4.1	4.9	6.2
y	4.2	6.8	9.8	13.4	15.5	19.6

(2) Solve by Jacobi's iterative method: **04**

$2x-3y+20z=25,\ 3x+20y-z=-18,\ 20x+y-2z=17$.

(b) By the method of least squares, fit a parabola to the following data; also estimate y at $x=6$: **06**

X	1	2	3	4	5
Y	5	12	26	60	97

Q.4 (a) Define Chebyshev polynomial. Obtain Taylor series expansion of e^{-x} in terms of x. Approximate it in terms of Chebyshev polynomials. **07**

Q.4 (b) Determine the value of $y(0.4)$ usuing predictor corrector method given $\frac{dy}{dx}=xy+y^2;\ y(0)=1;$ use Taylor series to get the values of $y(0.1),\ y(0.2),\ y(0.3)$ Take $h=0.1$. **07**

Q.5 (a) (1) The coefficient of correlation between two variables X and Y is 0.48. The covariance is 36. The variance of X is 16. Find the standard deviation of Y. **03**

(2) From the following table calculate the coefficient of correlation by Karl Pearson's method: **05**

x	39	65	62	90	82	75	25	98	36	78
y	47	53	58	86	62	68	60	91	51	84

(b) The sales of a company in million of rupees for the years 1994-2001 are given below: **06**

Year	1994	1995	1996	1997	1998	1999	2000	2001
Sales	550	560	555	585	540	525	545	585

Find the linear trend equation. Estimate the sales for the year 1993. Find the slope of the straight line trend.

OR

Q.5 (a) (1) If the relation between two random variables x and y is 2x+3y=4 , find the correlation coefficient between them. **03**

(2) Compute the seasonal index for the following data assuming that there is no need to adjust the data for the trend: **06**

Quarter	1990	1991	1992	1993	1994	1995
I	3.5	3.5	3.5	4.0	4.1	4.2
II	3.9	4.1	3.9	4.6	4.4	4.6
III	3.4	3.7	3.7	3.8	4.2	4.3
IV	3.6	4.8	4.0	4.5	4.5	4.7

(b) If the two lines of regression are **05**

4x-5y+30=0 and 20x-9y-107=0, which of these line of regression of x on y, and y on x. Find r_{xy} and σ_y when $\sigma_x=3$.

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