## **GUJARAT TECHNOLOGICAL UNIVERSITY** BE - SEMESTER-IV (New) EXAMINATION – WINTER 2015

# Subject Code:2140706Date:28/12/2015Subject Name: Numerical & Statistical Method for Computer Engineering<br/>Time: 2:30pm to 5:00pmTotal Marks: 70

Instructions:

- 1. Attempt all questions.
- 2. Make suitable assumptions wherever necessary.
- 3. Figures to the right indicate full marks.
- Q.1 (a) (1) Using method of successive approximation solve the equation 03  $2x \log_{10} x = 7$  correct to four decimal places.
  - (2) Using method of False-position, compute the real root of the equation  $04 x \log_{10} x 1.2 = 0$  correct to four decimals.
  - (b) (1) Discuss briefly the different types of errors encountered in performing 03 numerical calculations.
    - (2) Use Newton-Raphson method to find smallest positive root of 04 $f(x) = x^3 - 5x + 1 = 0$  correct to four decimals.
- Q.2 (a) Solve this system of linear equations using Jacobi's method in three iterations 07 first check the co-efficient matrix of the following systems is diagonally dominant or not?

$$20x + y - 2z = 17$$
  

$$2x - 3y + 20z = 25$$
  

$$3x + 20y - z = -18$$

- (b) (1) State Budan's theorem and hence show that 03  $p(x) = x^5 - x^4 - 3x^3 + 2x + 5$  has one root in [-2, -1].
  - (2) Apply Budan's theorem to find the no. of roots of the equation  $x^5 + x^4 4x^3 3x^2 + 3x + 1$  in the interval [-2, -1], [0,1] & [1,2].

### OR

- (b) Perform two iterations of the Bairstow method to extract a quadratic factor from 07 the polynomial  $p(x) = x^3 + x^2 x + 2 = 0$ .
- Q.3 (a) State the Direct & iterative methods to solve system of linear equations. Using 07 Gauss-Seidel method, solve

$$2x_1 - x_2 = 7$$
  
-x\_1 + 2x\_2 - x\_3 = 1  
-x\_2 + 2x\_3 = 1

(1) Define ill-conditional linear systems of equations. Determine the **(b)** 03 4 9 condition number of the matrix A =4 9 16 9 16 25

(2) From the following data find the value of x when y = f(x) = 0.390. 04

20	25	
0.342	0.423	
OR		

100

Q.3 (a) Obtain the cubic Spline approximation for the function defined by the data.

20

	x	0	1	2	3
	f(x)	1	2	33	244
т	T C'1	1: 1 C C (O 5	`\		

Hence find an estimate of f(2.5).

х

х

y = f(x)

(1)	Fit a straight l	ine for the data	a.	
	У	12	15	21

50

03

03

07

30

0.500

25

120

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

70

Height (x)	100	150	200	250	300	350	400
Distance $(y)$	10.63	13.03	15.04	16.81	18.42	19.90	21.47

0.4 (a)

**(b)** 

(1) Use Euler's method to find an approximation value of y at 
$$x = 0.1$$
 for the initial value problem  $\frac{dy}{dx} = x - y^2$ ;  $y(0) = 1$ .

04 (2) Find the least squares approximations of second degree for the following data

x	-2	-1	0	1	2
y = f(x)	15	1	1	3	19
		1			

(b) Solve the initial value problem 
$$\frac{dy}{dx} = -2xy^2$$
;  $y(0) = 1$  with  $h = 0.2$  for 07

y(0.2) using Runge-Kutta fourth order method.

#### OR

**Q.4 (a)** (1) Evaluate  $\int \log_{10} x \, dx$  taking 8 subintervals by Trapezoidal rule. 03 (2) Evaluate  $\int_{-\infty}^{1} \frac{dx}{1+x}$  using Simpson's  $\frac{3}{8}$  rule. 04

State different predictor-corrector method. For the initial value problem **(b)** 07  $\frac{dy}{dx} = y + x^2$ ; y(0) = 1, use Milne's prediction-corrector method to find y(0.8) by taking h = 0.2 from following data

		0		
x	0	0.2	0.4	0.6
У	1	1.2242	1.5155	1.9063

From the following data calculate moments about (i) Assumed mean 25 07 Q.5 (a) (ii) Actual mean (iii) zero.

Variable	0-10	10 - 20	20-30	30 - 40
Frequency	1	3	4	2

(b) Explain co-relation, co-relation Types, co-relation co-efficient. Also state the 07 methods to find correlation between two variables. Find the correlation co-efficient between the serum diastolic blood pressure & serum cholesterol levels of 10 randomly selected persons.

Persons	1	2	3	4	5	6	7	8	9	10
Cholesterol	307	259	341	317	274	416	267	320	274	336
Diastolic	80	75	90	74	75	110	70	85	88	78
B.P.										

### OR

- Q.5 (a) The quantities of water (in liters) supplied by municipal corporation on ten 07 consecutive days in certain area are shown below: 218.2, 199.7, 207.3, 185.4, 213.7, 184.7, 179.5, 194.4, 224.3, 203.5. Evaluate the mean & the first four central moments of the water (in liters) of that area.
  - (b) State the formula for two regression equations. Also give algorithm for the 07 following data find the line of regression of y on x.

x	1.53	1.78	2.60	2.95	3.42
У	33.5	36.3	40.0	45.8	53.5

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