

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER-IV(NEW) – EXAMINATION – SUMMER 2019
Subject Code:2140706
Date:15/05/2019
Subject Name: Numerical and Statistical Methods for Computer
Engineering
Time:02:30 PM TO 05:00 PM
Total Marks: 70
Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

MARKS

- Q.1** (a) Find the percentage error in the area of an ellipse when errors of 2% and 3 % are made in measuring its major and minor axes respectively. **03**

- (b) Using the bisection method, find a root of $f(x) = 2x - 3 \sin x - 5 = 0$ correct up to three decimal places. **04**

- (c) Interpolate the function $y = f(x)$ at point $x = 1.5$ using the following tabulated data. **07**

x	1	2	3	4	5	6	7	8
y	1	8	27	64	125	216	343	512

- Q.2** (a) Using trapezoidal rule find the value of the integral $\int_0^5 \frac{dx}{1+x}$ with $h = 1$. **04**

- (b) Discuss false position method. **03**

- (c) Fit a second-degree parabola to the following data using method of least squares. **07**

x	0	1	2	3	4
y	1	1.8	1.3	2.5	6.3

OR

- (c) Find the cubic spline in the interval $[0, 2]$ for the following data: **07**

x	0	2	4	6
y	1	9	41	41

- Q.3** (a) Apply Budan's theorem to find the number of roots of the equation $x^3 - 3x^2 - 4x + 13$ in the interval $[-3, -2]$ and $[-2, -1]$ **03**

- (b) Find an iterative formula for $\sqrt{N}$, where N is a positive number and hence, find $\sqrt{12}$ correct up to four decimal places. **04**

- (c) Using Gauss Seidel method solve the following equations: **07**

$$5x + y - z = 10$$

$$2x + 4y + z = 14$$

$$x + y + 8z = 20$$

OR

- Q.3** (a) Prove that (i) $(1 + \Delta)(1 - \nabla) = 1$ (ii) $\Delta \nabla = (\Delta - \nabla)$ **03**

- (b) Find $y(32)$ from the following table: **04**

x	25	30	35	40
y	0.2707	0.3027	0.3386	0.3794

(c) Solve $x^3 - 8x^2 + 39x^2 - 62x + 50 = 0$ by using Lin-Baird's method. Find the third iteration $p_0 = q_0 = 0$ 07

Q.4 (a) Using Simpson's 1/3 rule, find $\int_0^{0.6} e^{-x^2} dx$, by taking $n = 6$ 03

(b) Find the median of the following data: 04

Age greater than (in years)	0	10	20	30	40	50	60	70
No. of persons	230	218	200	165	123	73	28	8

(c) Solve $\frac{dy}{dx} = y - \frac{2x}{y}$, $y(0) = 1$ in the range $0 \leq x \leq 0.2$ using modified Euler's method taking $h = 0.1$. 07

OR

Q.4 (a) Write the formula for Runge-Kutta second order method. 03

(b) Use Lagrange's interpolation formula to find the value of $y(10)$ for given data: 04

x	5	6	9	11
y	12	13	14	16

(c) Using Runge-Kutta method of fourth order, solve for $y(0.1)$, $y(0.2)$ and $y(0.3)$ given that $y' = xy + y^2$, $y(0) = 1$. 07

Q.5 (a) Develop a C program for bisection method. 03

(b) Two unbiased dice are thrown at random. Find the probability distribution of the sum of the numbers on them. Also find the mean and variance. 04

(c) Calculate the coefficient of correlation for the following pairs of x and y : 07

x	17	19	21	26	20	28	26	27
y	23	27	25	26	27	25	30	33

OR

Q.5 (a) Discuss type of Regression. 03

(b) Find the regression coefficient of y on x for the following data: 04

x	1	2	3	4	5
y	160	180	140	180	200

(c) Given $\frac{dy}{dx} = \frac{1}{x+y}$, $y(0) = 2$, $y(0.2) = 2.0933$, $y(0.4) = 2.1755$, $y(0.6) = 2.2493$, find $y(0.8)$ using Milne's Predictor Corrector method. 07
