Seat No.: _____ Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– IV EXAMINATION – SUMMER 2020

Subject Code: 2140706 **Date:29/10/2020**

Subject Name: NUMERICAL AND STATISTICAL METHODS FOR COMPUTER ENGINEERING

Time: 10:30 AM TO 01:00 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 relative error if the number $X = 0.004997$ is **03**

(i) truncated to three decimal places.

(ii) rounded off to three decimal places.

(b) Find the negative root of $x^3 - 7x + 3 = 0$ by the bisection method correct up to three decimal places. **04**

(c) Using Gauss Jacobi method solve the following system of the equations: **07**

$$8x - y + 2z = 13$$
$$x - 10y + 3z = 17$$
$$3x + 2y + 12z = 25$$

Q.2 **(a)** Using trapezoidal rule to evaluate $\int_0^2 \frac{x}{\sqrt{2+x^2}}dx$, dividing the interval into four equal parts. **03**

(b) By using Lagrange's interpolation formula, find $y(10)$. **04**

x	5	6	9	11
y	12	13	14	16

(c) Using the Runge-Kutta method of fourth order, solve $10\frac{dy}{dx} = x^2 + y^2, y(0) = 1$ at $x = 0.1, x = 0.2$ taking $h = 0.1$ **07**

OR

(c) Using Euler's method find the approximate value of y at $x = 1.5$ taking $h = 0.1$. Given that $\frac{dy}{dx} = \frac{y-x}{\sqrt{xy}}$ and $y(1) = 2$. **07**

Q.3 **(a)** Using Newton Raphson method find the positive root of $x^4 - x - 10 = 0$ correct up to three decimal places. **03**

(b) Fit a least square quadratic curve to the following data: **04**

x	1	2	3	4
y	1.7	1.8	2.3	3.2

Estimate $y(2.4)$.

(c) Find the regression coefficients b_{yx} and b_{yx} hence, find the correlation coefficient between x and y for the following data **07**

x	4	2	3	4	2
y	2	3	2	4	4

OR

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

(b) Using Newton's divided difference formula, compute $f(10.5)$ from the following data: **04**

x	10	11	13	17
f(x)	2.3026	2.3979	2.5649	2.8332

(c) Solve $x^4 - 8x^3 + 39x^2 - 62x + 50$ by using Lin Bairstow method up to third iteration starting with $p_0 = q_0 = 0$. **07**

Q.4 **(a)** Find a real root of the equation $x\log_{10} x = 1.2$ by the regula falsi method. **03**

(b) The first four moments of distribution about $x = 2$ are 1, 2.5, 5.5 and 16. Calculate the four moments about $\bar{x}$ and about zero. **04**

(c) Given that $2\frac{dy}{dx} = y^2 + x^2y^2$, $y(0) = 1$, $y(0.1) = 1.06$, $y(0.2) = 1.12$, $y(0.3) = 1.21$ evaluate $y(0.4)$ by Milne's predictor-corrector method. **07**

OR

Q.4 **(a)** Find the arithmetic mean form the following data: **03**

Marks less than	10	20	30	40	50	60
No. of students	10	30	60	110	150	180

(b) (i) Obtain relation between Δ and E. **04**
(ii) Obtain relation between D and E.

(c) Obtain cubic spline for every subinterval from the following data **07**

x	0	1	2	3
f(x)	1	2	33	244

Q.5 **(a)** Two unbiased coins are tossed. Find expected value of number of heads. **03**

(b) By Simpson's 3/8 rule, evaluate $\int_0^1 \frac{\sin x}{x}\,dx$ taking $h = \frac{1}{6}$. **04**

(c) From the following table, estimate the number of students who obtained marks between 40 and 45. **07**

Marks	30-40	40-50	50-60	60-70	70-80
No. of students	31	42	51	35	31

OR

Q.5 **(a)** Using Budan's theorem find the number of roots of the equation $f(x) = x^4 - 4x^3 + 3x^2 - 10x + 8 = 0$ in the interval $[-1, 0]$. **03**

(b) Find the positive solution of $x - 2\sin x = 0$, correct up to three decimal places starting from $x_0 = 2$ and $x_1 = 1.9$. Using secant method. **04**

(c) Using Gauss Siedel method solve the following system of the equations: **07**

$3x - 0.1y - 0.2z = 7.85$

$0.1x + 7y - 0.3z = -19.3$

$0.3x - 0.2y + 10z = 71.4$

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