Seat No.: _____   Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER– IV(NEW) EXAMINATION – SUMMER 2023
Subject Code:2140706   **Date:13-07-2023**
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.**
4. **Simple and non-programmable scientific calculators are allowed.**

                                                                                    MARKS

Q.1 **(a)** Derive iterative formula for q^{th} root using Newton-Raphson method.   **03**

(b) Using bisection method, find a positive root of the equation $f(x)=x – \cos x= 0$ **04**

(c) Compute the appropriate value of f(7.5) by using suitable interpolation formula using the following data,   **07**

x	3	4	5	6	7	8
f(x)	28	65	126	217	344	513

Q.2 **(a)** Evaluate $\int_0^6 \frac{1}{1+x} dx$ by taking h=1 using Simpson's 1/3 rule.   **04**

(b) Write at least two differences between secant method and false method.   **03**

(c) Using method of least squares, find the best fitting straight line to the given following data.   **07**

x	1	2	3	4	5
f(x)	1	3	5	6	5

OR

(c) Obtain cubic splines approximation for the following data for the following data and hence compute f(1.5)   **07**

X	1	2	3
f(x)	-8	-1	18

Q.3 **(a)** Apply Budan's theorem to the equation $x^4 - 7x^2 + 6x - 1 = 0$ to draw the inference about the roots in the interval (-2,-1).   **03**

(b) Find square root and reciprocal of 8 correct up to four decimal places using Newton-Raphson's Method.   **04**

(c) Using Gauss Seidel method solve the following equations. Use (x, y, z) = (1,0,1) as the initial guess value.   **07**
12x+3y-5z=1
x+5y+3z=28
3x+7y+13z=76

OR

Q.3 **(a)** Prove the following   **03**
(1)$E^{1/2}$= μ+0.5 δ   (2) μδ =0.5ΔE^{-1} +0.5 Δ

(b) Employ Stirling's formula to compute y(35) from the following table.   **04**

x	20	30	40	50
f(x)	512	439	346	243

(c) Find the roots of the $x^3 - 2x^2 + x - 2 = 0$ using Lin-Bairstow's method up to second iteration with $p_0=q_0=0$ — **07**

Q.4 **(a)** Evalute $\int_0^3 \frac{1}{1+x}\,dx$ with n=6 by using Simpson's 3/8 rule — **03**

(b) The following table gives the marks obtained by 50 students in mathematics. Find the median. — **04**

Marks	0-10	10-20	20-30	30-40	40-50
No.of Students	16	12	18	3	1

(c) Using Euler's method, find y (0.04) for the following initial value problem. $y'=y$, y (0) = 1. Take step size as h= 0.01. — **07**

OR

Q.4 **(a)** Write the formula for Runge-Kutta second order method. — **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) Using improved Euler's method, solve $y' + 2xy^2 = 0$ with the initial condition y(0) = 1 and compute y(1) taking h= 0.2. Compare with exact solution. — **07**

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

(b) A discrete random variable X has the following probability distribution. — **04**

X	0	1	2	3	4	5
F(X=x)	0	k	0.2	2k	0.3	2k

(1) Find k (2) Compute $P(X<3)$, $P(X\geq3)$, $P(2<X<5)$, $P(X\leq4)$

(c) Find the correlation coefficient from the following data. — **07**

X	1	2	3	4	5	6	7
Y	6	8	11	9	12	10	14

OR

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

(b) The score of 12 students in their mathematics (X) and Statistics (Y) are as follows. Find the regression line of Y on X. — **04**

X	2	3	4	4	5	6	6	7	7	8	10	10
Y	1	3	2	4	4	4	6	4	6	7	9	10

(c) Using Milne's method, solve $y'=1+y^2$ with y(0)=0, y(0.2)=0.2027, y(0.4)=0.4228, y(0.6)=0.6841.Compute y(0.8) and y(1). — **07**

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