

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-IV (NEW) EXAMINATION – SUMMER 2024****Subject Code:2140706****Date:20-07-2024****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.

- Q.1** (a) Round off the number 865250 to four significant figures and compute absolute error, relative error. **03**
- (b) Find a root of the equation $x^3 - 4x - 9 = 0$, using the bisection method. Carry out computations upto the 6th iteration. **04**
- (c) Define ill-conditioned system. Solve the following system by Gauss sediel method: **07**

$$27x + 6y - z = 85, \quad 6x + 15y + 2z = 72, \quad x + y + 54z = 110$$

- Q.2** (a) Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by trapezoidal rule taking $h = 1$. **03**
- (b) Prove that (1) $E = e^{hD}$ (2) $hD = \log(1 + \Delta)$ **04**
- (c) Using Runge-Kutta method of fourth order, Solve for y at $x = 1.2, 1.4$. Given that $\frac{dy}{dx} = \frac{2xy+e^x}{x^2+xe^x}$ and $y(1) = 0$. **07**

OR

- (c) Using Euler's method, find an approximate value of y at $x = 1$ taking $h = 0.1$. Given that $\frac{dy}{dx} = x + y$ and $y(0) = 1$. **07**
- Q.3** (a) Find the number of roots of the equation $x^3 - 3x^2 - 4x + 13 = 0$ in the interval $[-1,0]$. **03**
- (b) Find a real root of the equation $x \log_{10} x = 1.2$ by regula falsi method correct to three decimal places. **04**
- (c) Find the polynomial $f(x)$ using Lagrange's formula and hence find $f(3)$ for following table: **07**

x	0	1	2	5
f(x)	2	3	12	147

OR

- Q.3** (a) Derive iterative formula for \sqrt{N} . **03**
- (b) Find a root of the equation $x^3 - 2x - 5 = 0$ by secant method correct to three decimal places. **04**
- (c) Find the polynomial using interpolation formula for the following values. Hence evaluate $f(4)$. **07**

x	0	1	2	3
f(x)	1	2	1	10

- Q.4** (a) Find a root of the equation $x^4 - x = 10$ by Newton Raphson method correct to two decimal places. **03**
- (b) Evaluate $\int_0^1 \frac{x^2}{1+x^3} dx$ by Simpson's 1/3rd rule taking $h = 0.25$. **04**
- (c) Fit a straight line to the following data: **07**

x	6	7	8	8	8	9	9	10
y	5	5	4	5	4	3	4	3

OR

- Q.4** (a) Find a root of the equation $x^3 - 2x^2 + x - 2 = 0$ by Bairstow method. Carry first iteration with $p_0 = q_0 = 0$. **03**
- (b) Evaluate $\int_0^3 \frac{1}{1+x} dx$ with $n=6$ by using Simpson's $3/8^{\text{th}}$ rule. **04**
- (c) Fit a second degree parabola to the following data: **07**

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

- Q.5** (a) Calculate the arithmetic mean for the following data: **03**

Class	0-8	8-16	16-24	24-32	32-40	40-48
Frequency	8	7	16	24	15	7

- (b) Find the first four moments for the set of numbers 2,4,6,8. **04**
- (c) Calculate the two regression coefficients from the following data and find correlation coefficient. **07**

x	7	4	8	6	5
y	6	5	9	8	2

OR

- Q.5** (a) A sample of 3 items is selected at random from a box containing 10 items of which 4 are defective. Find the expected number of defective items. **03**
- (b) Calculate the correlation coefficient between x and y using the following data: **04**

x	2	4	5	6	8	11
y	18	12	10	8	7	5

- (c) Obtain the two regression lines from the following data: **07**

x	6	2	10	4	8
y	9	11	5	8	7
