

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-IV (NEW) EXAMINATION – WINTER 2023****Subject Code:2140706****Date:19-01-2024****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.

		MARKS
Q.1	(a) Find mean of the following data x: 1 3 5 7 9 f : 4 2 3 1 5	03
	(b) The following table gives the marks obtained by 50 students in statistics. Find the median. Marks : 0-10 10-20 20-30 30-40 40-50 No. of students: 16 12 18 3 1	04
	(c) Calculate the first four moments about the mean for the following data. X : 0-10 10-20 20-30 30-40 40-50 50-60 60-70 F : 8 12 20 30 15 10 5	07
Q.2	(a) Find the square root of 8 correct upto two decimal places.	03
	(b) Find positive root of the equation $x - \cos x = 0$	04
	(c) Find the positive solution of $f(x) = x - 2\sin x = 0$ by secant method starting from $x_0=2, x_1=1.9$	07
	OR	
	(c) Use secant method to estimate the root of $f(x) = e^{-x} - x$. Start with initial condition of $x_0 = 0$ and $x_1 = 1$.	07
Q.3	(a) Prove that $E^{1/2} = \mu + \frac{1}{2}\delta$	03
	(b) Find approximate value of $f(1.6)$ using Newton's forward formula x : 1 1.4 1.8 2.2 f(x) : 3.49 4.82 5.96 6.5	04
	(c) Employ Stirling's formula to compute $y(35)$ from the following data. x : 20 30 40 50 y: 512 439 346 243	07
	OR	
Q.3	(a) Prove that $\mu\delta = \frac{1}{2}\Delta E^{-1} + \frac{1}{2}\Delta$	03
	(b) Compute $f(9.2)$ by using quadratic Lagranges interpolation method from the following data. X : 9 9.5 11 F(x): 2.1972 2.2513 2.3979	04
	(c) Express the function $F(x) = \frac{3x^2 - 12x + 11}{(x-1)(x-2)(x-3)}$	07

- Q.4 (a)** Compute $\int_0^2 (1+x)dx$ by Gauss two point quadrature. **03**
- (b)** Evaluate $\int_0^6 \frac{1}{1+x} dx$ by taking $h=1$ using Simpson's 1/3 rule. **04**
- (c)** Use trapezoidal rule to estimate $\int_{0.5}^{1.3} e^{x^2} dx$ using strip of width 0.1. **07**
- OR**
- Q.4 (a)** Compute $\int_0^1 \frac{1}{1+x} dx$ by Gauss three point quadrature formula. **03**
- (b)** $\int_0^{1.2} \ln(1+x^2) dx$ using Simpson's 3/8 rule., Taking $h=0.2$ **04**
- (c)** Evaluate the integral $\int_0^1 (4x - 3x^2) dx$ by taking $n=10$ by Simpson's 1/3 rule. **07**
- Q.5 (a)** Using method of least squares, find the best fitting straight line to the given following data. **03**
- X: 1 2 3 4 5
Y: 1 3 5 6 5
- (b)** Using Euler's method, find $y(0.2)$ given that **04**
- $\frac{dy}{dx} = y - \frac{2x}{y}, y(0) = 1, h = 0.1.$
- (c)** Apply Runge-Kutta method of forth order to calculate $y(0.2)$ given that **07**
- $y' = x + y, y(0) = 1$ taking $h=0.1$
- OR**
- Q.5 (a)** Using method of least squares, find the best fitting second degree curve to the given following data. **03**
- X: 1 2 3 4
Y: 6 11 18 27
- (b)** Using Euler's method , find $y(0.04)$ for the following initial value problem, **04**
- $y' = y, y(0) = 1$, take $h = 0.01$
- (c)** Apply Runge-Kutta method to solve initial value problem $y' = x + y$ with **07**
- $y(0)=0$ choosing $h=0.2$ and compute y_1, y_2, y_3, y_4, y_5 . Compare your results with the exact solution.
