Seat No.: _____ Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– IV (New) EXAMINATION – WINTER 2019

Subject Code: 2140706 **Date: 12/12/2019**

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)** If X = 3.1416, find the absolute and relative errors if : **03**

(a) X is truncated to three decimal places.

(b) X is rounded off to three decimal places.

(b) Construct an Interpolating polynomial which takes the following values : **04**

x	0	1	2	3	4	5
y	-10	-8	-8	-4	10	40

(c) By using Method of least squares , fit a second degree parabola $y=a+bx+cx^2$ to the following data: **07**

x	0	1	2	3	4
y	1	1.8	1.3	2.5	2.3

Q.2 **(a)** Write an algorithm for Bisection Method. **03**

(b) If P is the pull required to lift a load W by means of pulley block, find a linear law of the form P = m W + c connecting P and W using following data: **04**

P	12	15	21	25
W	50	70	100	120

(c) Obtain Cubic spline for any of given subinterval from the following data: **07**

x	1	2	3	4
$f(x)$	1	2	5	11

OR

(c) Using Lagrange's interpolating polynomial, find Interpolating polynomial from the given data: **07**

x	2	3	5	7
$f(x)$	0.1506	0.3001	0.4517	0.6259

Q.3 **(a)** Use Secant method to find the real root of equation $x^3-5x-7=0$. **03**

(b) Find a real root of $x^3-x-1=0$, correct to three decimal places using Newton-Raphson method. **04**

(c) Use Gauss-Seidel method to obtain the solution of the system **07**
$83x+11y-4z=95,\ 7x+52y+13z=104,\ 3x+8y+29z=71$

OR

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) Solve the given System of Linear equations by using Gauss Elimination method: **04**
$x+y+z=7,\ 3x+3y+4z=24,\ 2x+y+3z=16$

(c) Given that $2\frac{dy}{dx}=y^2+x^2y^2$, $y(0)=1,\ y(0.1)=1.06,\ y(0.2)=1.12,\ y(0.3)=1.21$ **07**

Evaluate $y(0.4)$ by Milne's Predictor-Corrector method.

Q.4 **(a)** Considering following tabular values, Determine the area bounded by the given curve and X-axis between $x=10$ to $x=16$ by Trapezoidal rule. **03**

x	10	11	12	13	14	15	16
y	1.02	0.94	0.89	0.79	0.71	0.62	0.55

(b) Using Simpson's 1/3 rule, evaluate $\int_0^1 \frac{1}{(1+x^2)}\,dx$ by taking 4 sub intervals. **04**

(c) Use Fourth order Runge-Kutta method to find $y(0.2)$ with $h=0.1$, given that $\frac{dy}{dx}=2x+y, y(0)=1$ **07**

OR

Q.4 **(a)** Use Euler's Method to find $y(0.10)$ in five steps from the differential equation $\frac{dy}{dx}=x+y+xy \quad , y(0)=1$ **03**

(b) Use Modified Euler's method to solve $\frac{dy}{dx}=x+3y$, $y(0)=1$. Hence find $y(0.5)$ with $h=0.1$. **04**

(c) (i) Write an algorithm for Newton's Forward Interpolation Formula **07**
(ii) Using Newton's devided difference formula, calculate the value of $f(6)$

x	1	2	7	8
$f(x)$	1	5	5	4

Q.5 **(a)** Compute the Median from the data: **03**

Class	0-30	30-60	60-90	90-120	120-150	150-180
Frequency	8	13	22	27	18	7

(b) Find the correlation coefficient between the sales and expenses of the following 10 firms: **04**

Firms	1	2	3	4	5	6	7	8	9	10
Sales	50	50	55	60	65	65	65	60	60	50
Expenses	11	13	14	16	16	15	15	14	13	13

(c) In a state, data shows the demand of towers for the sufficient network for each of the last 7 weeks. **07**

Week	1	2	3	4	5	6	7
Demand	23	29	33	40	41	43	49

(a) Calculate a two week moving average for weeks two to seven
(b) Calculate mean square error (M. S. E)

OR

Q.5 **(a)** Find the standard deviation of a group of data points: **03**
101.8 , 103.2, 104.0, 102.5, 103.5

(b) 10 Participants in a musical test were ranked by the three judges in the following order. Using Spearman's Rank Correlation Co-efficient method, determine which pair of judges has the nearest approach to common liking music. **04**

1st Judge	1	6	5	10	3	2	4	9	7	8
2nd Judge	3	5	8	4	7	10	2	1	6	9
3rd Judge	6	4	9	8	1	2	3	10	5	7

(c) Obtain the two lines of regression for the following data : **07**

X	190	240	250	300	310	335	300
Y	5	10	15	20	20	30	30

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