

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

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

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- 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 $\frac{dy}{dx} = x + y + xy, y(0) = 1$ **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 divided 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: 101.8, 103.2, 104.0, 102.5, 103.5 **03**

- (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**

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