Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY
MCA– SEMESTER –II EXAMINATION –SUMMER-2019

Subject Code: 2620004 **Date: 20-05-2019**

Subject Name: Computer-Oriented Numerical Methods

Time:10.30 am to 1.00 pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** **Answer the following** **07**

1. Differentiate between Accuracy & Precision
2. Explain the following terms :
   Blunders, Formulation, Errors, Data Uncertainty
3. Consider the Following equation
   $f(x)= x^9-8x^3+7x-9=0$, find positive root using Discarte's rule of sign
4. Find Relative error if 2/3 is Approximate to 0.667
5. Give name of iterative method.
6. Round-off following numbers to three significant digits.
   (a) 48.3668 (b) 9.3265 (c) 8.4155
7. Explain Significant figures with Examples.

(b) Determine the root of the equation $x^3-4x+9=0$ correct upto three decimal places using Bisection method using root between 2 & 3 **07**

Q.2 **(a)** Determine the root of the equation $x^4-x-10=0$ correct upto three decimal places using Bisection method **07**

(b) Find the root of the equation $x^3+2x^2+10x-20=0$ correct upto three decimal places using Birge-Vieta method(Hint: Take $r_0=1$) **07**

OR

(b) Determine the root of the equation $x^4-4x+1=0$ correct upto three decimal places using False Position method **07**

Q.3 **(a)** Use appropriate Newton's interpolation formula to find the value of y at x = 51.5,from the following tabular values : **07**

X	41	45	49	53	57
Y	3.4482	3.5569	3.3593	3.7563	3.8485

(b) The results of measurement of electric resistance R of a copper bar at various temperatures t°C are given below : **07**

t	19	25	30	36	40	45	50
R	76	77	79	80	82	83	85

Fit a straight line R = a + bt.

OR

Q.3 **(a)** Explain Bisection method with suitable graph **07**

(b) Using Langrange's interpolation , find f(0)when the data are given in the following Table **07**

X	-1	-2	2	4
Y	-1	-9	11	69

Q.4 **(a)** Find the Eigen values and corresponding Eigen Vector of the **07**

$$\text{Matrix A} = \begin{bmatrix} 1 & 1 & 1 \\ -1 & -3 & -3 \\ 2 & 4 & 4 \end{bmatrix}$$

(b) Explain the pitfalls of Gauss-Elimination method for solving a system of simultaneous linear equations. Hence, solve the following system of equations, using Gauss-Elimination method. **07**

$$2x + y + z = 10$$
$$3x + 2y + 3z = 18$$
$$x + 4y + 9z = 16$$

OR

Q.4 **(a)** Using graph explain false position Method **07**

(b) The velocity V of a particle at distances from a point on its linear path is given below **07**

S(m)	0	2.5	5.0	7.5	10.0	12.5	15.0	17.5	20.0
V(m/s)	16	19	21	22	20	17	13	11	9

Estimate the time taken by the particle to traverse the distance of 20 meters, using Simpson's 1/3 Rule

Q.5 **(a)** Apply Runge-Kutta method to find approximate value of y for x=0.2,in steps of 0.1,if $dy/dx=x+y^2$, given that y=1 where x=0 **07**

(b) **07**

$$\text{if A} = \begin{bmatrix} 1 & 1 & -1 \\ 3 & 0 & 2 \\ 4 & 5 & 0 \end{bmatrix} \quad \text{and} \quad \text{B} = \begin{bmatrix} 1 & 0 & 0 \\ 2 & 1 & 0 \\ 0 & 1 & 3 \end{bmatrix}$$

Verify that $(AB)^T = B^T A^T$ where $(^T)$ indicates Transpose

OR

Q.5 **(a)** Define any six type of matrix with example. **07**

(b) Use Euler's method to solve the following differential equation **07**

$\frac{dy}{dx} = \frac{4x}{y} - xy$ with y(0)=3, in the interval [0,1] taking step size h=0.2

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