

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

MCA - SEMESTER- 1 EXAMINATION – WINTER 2018

Subject Code: 2620004

Date: 05-01-2019

Subject Name: Computer-Oriented Numerical Methods

Time: 02.30 pm to 5.00 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) 1. List two bracketing and open methods. **02**
2. Use Descartes' rule of signs to the following equation to determine positive and negative roots. **02**
 $F(x) = 2x^4 - 3x^3 - 6x^2 + 6x - 1 = 0$
3. What is inverse interpolation? List methods of inverse interpolation. **02**
4. When Newton's forward difference interpolation method is used? **01**
(b) Define error. Explain the types of errors with example. **07**

- Q.2** (a) Find a root of the equation $x^3 - x - 11 = 0$, using bisection method up to fourth approximation. **07**
(b) Find the root of $x^3 + 2x^2 + 10x - 20 = 0$ correct up to three significant digits using Birge Vieta Method. (Hint: Take $r_0 = 1$) **07**

OR

- (b) What are the similarities and differences between Secant Method & False Position method of finding a root of a given equation $f(x) = 0$? **07**
- Q.3** (a) Apply Lagrange's inverse interpolation formula to obtain the value of x when $y = 6$ from the given table. **07**

X:	168	120	72	63
Y:	3	7	9	10

- (b) For the following data, interpolate at $x = 21$ and $x = 28$ by suitable Newton's interpolation formula. **07**

X:	20	23	26	29
Y:	0.3420	0.3907	0.4384	0.4848

OR

- Q.3** (a) By the method of least squares, find the best fitting straight line to the data given below. **07**

X:	5	10	15	20	25
Y:	16	19	23	26	30

- (b) Express Maclaurin series expansion of $f(x) = e^{-x}$ in terms of chebyshev polynomials. **07**

- Q.4** (a) Given that, **07**

X:	1	1.1	1.2	1.3	1.4	1.5	1.6
Y:	7.989	8.403	8.781	9.129	9.451	9.750	10.031

Find dy/dx and d^2y/d^2x at $x=1.1$

- (b) Dividing the range into 10 equal parts, find the approximate value of $\int_0^\pi \sin x \cdot dx$ by trapezoidal rule. **07**

OR

- Q.4** (a) Find $f''(5)$ from the following table using Newton's Divided Difference formula. **07**

X:	0	2	3	4	7	9
Y:	4	26	58	112	466	922

- (b) Find the value from 07

$$\int_0^1 \frac{x^2}{1+x^3} dx \text{ using Simpson's } 1/3 \text{ rule with } h=0.25$$

- Q.5** (a) Solve the system using gauss elimination method. 07

$$3X + Y - Z = 3$$

$$2X - 8Y + Z = -5$$

$$X - 2Y + 9Z = 8$$

- (b) Find Eigen value, Eigen vector of the matrix 07

$$\begin{bmatrix} -3 & -7 & -5 \\ 2 & 4 & 3 \\ 1 & 2 & 2 \end{bmatrix}$$

OR

- Q.5** (a) Given $dy/dx = y - x$, $y(0) = 2$. Find $y(0.1)$, $y(0.2)$ correct to four decimal places 07
using R.K. 2nd order method.

- (b) Given $y' = 1/(x+y)$, $y(0) = 2$, $y(0.2) = 2.0933$, $y(0.4) = 2.1755$, $y(0.6) = 2.2493$. 07
Find $y(0.8)$ by Milne's Predictor – Corrector method.
