

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY
MCA – SEMESTER – II • EXAMINATION – WINTER - 2016

Subject Code: 620005

Date: 05/01/ 2017

Subject Name: COMPUTER ORIENTED NUMERICAL METHODS

Time: 02.30 PM TO 05.00

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) Explain the following with examples: **07**

- (1) Absolute Errors
- (2) Relative Errors
- (3) Percentage Errors
- (4) Round-off Errors

(b) Show that the equation $x^3 - x - 1 = 0$ has a root in (1,2). Find the first 3 approximations to this root by the bisection method. **07**

Q.2 (a) Using Regula falsi method solve $x^2 + x - 3 = 0$. **07**

(b) Using Newton's forward difference formula; calculate value of y at x = 1.5 from the following table: **07**

X	6	4	2	0
Y	218	66	10	2

OR

(b) Use Birge-Vieta method to find real root correct to three decimals for the equation. $x^3 - 5x^2 - 17x + 20 = 0$ **07**

Q.3 (a) Given a function in the form of a table as **07**

X	5	6	9
Y	12	13	14

Interpolate the value of y(x) using Lagrangian polynomial at X = 8.

(b) Use least square regression to fit a straight line to the data given below: **07**

X	1	2	3	4	5	6	8
Y	0.5	2.5	2	4	3.5	6	5.5

OR

Q.3 (a) Fit a curve $Y = ax^b$ using the following data: **07**

X	2000	3000	4000	5000	6000
Y	15	15.5	16	17	18

(b) Economize the power series. **07**

$$\sin x = x - \frac{x^3}{6} + \frac{x^5}{120} - \frac{x^7}{5040} + \dots$$

Q.4 (a) Find $y'(0)$ using Newton's forward difference method from the following data : **07**

X	0	1	2	3	4
Y	1	3	15	43	93

(b) Find the integration of $\frac{1}{1+x^2}$ in the limits 0 to 1 by Trapezoidal rule using four strips. **07**

OR

- Q.4 (a)** Evaluate $\int_0^4 e^x dx$ using Simpson's 1/3 Rule using four strips. **07**
- (b)** Find $f'(6)$ from the following table using Newton's Divided difference formula. **07**

x	2	4	9	10
F(x)	4	56	711	980

- Q.5 (a)** Explain the following types of matrices with examples. **07**
- (1) Row Matrix
 - (2) Square Matrix
 - (3) Unit Matrix
 - (4) Diagonal Matrix

- (b)** Find Eigen values and eigen vectors for $A = \begin{bmatrix} 2 & 1 & 1 \\ 2 & 3 & 2 \\ 3 & 3 & 4 \end{bmatrix}$ **07**

OR

- Q.5 (a)** Solve the system using Gauss elimination method. **07**
- $$x + y + z = 6$$
- $$2x + y + 3z = 13$$
- $$3x + 3y + 4z = 20$$
- (b)** $\frac{dy}{dx} = x + y$ given $y(0) = 1$, $h = 0.1$ find $y(0.2)$ using Runge-Kutta 2nd order method. **07**
