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 Langrangian 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**

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

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**

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