Seat No.: _____ Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

MCA – SEMESTER – II • EXAMINATION – SUMMER 2018

Subject Code: 2620004 Date: 23-May-2018

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)** Explain the concept of successive approximation method used to find root of equation. Discuss the convergence of the method using graphical techniques. **07**

(b) Find the root of the polynomial, g(x) = x3 - 5 + 3x using bisection method. Where m = 1 and n = 2? **07**

Q.2 **(a)** Solve $2x^3$-2.5x-5=0 for the root in [1,2] by Newton Raphson method. **07**

(b) Consider finding the root of $f(x) = x^2 - 3$. Let εstep = 0.01, εabs = 0.01 and start with the interval [1, 2]. **07**

OR

(b) Find the root of $x^4 - 3x^3 + 3x^2 - 3x + 2 = 0$ Using Birge- vieta Method. **07**

Q.3 **(a)** Given the following data, estimate F(1.83) using Newton-Gregory forward difference interpolation. **07**

i	0	1	2	3	4
xi	1	3	5	7	9
fi	0	1.0986	1.6094	1.9459	2.1972

(b) Derive an expression for Newton's backward difference interpolation formula. **07**

OR

Q.3 **(a)** Find f(0.25) for Using langrage interpolation. **07**

x	0.1	0.2	0.3	0.4	0.5
f	9.9833	4.9667	3.2836	2.4339	1.9177

(b) Evaluate f (15), given the following table of values: **07**

x	10	20	30	40	50
f(x)	46	66	81	93	101

Q.4 **(a)** Derive Newton cotes' general quadrature formula. Using it obtain Trapazodial formula for numerical integration. **07**

(b) Solve the following system of equations using Gaussian elimination. **07**

$$-3x + 2y - 6z = 6$$
$$5x + 7y - 5z = 6$$
$$x + 4y - 2z = 8$$

OR

Q.4 **(a)** Derive Newton's Backward Difference interpolation formula of first order differentiation **07**

(b) Solve the linear system by Gauss elimination method. **07**

$$y + z = 2$$
$$2x + 3z = 5$$
$$x + y + z=3$$

Q.5 **(a)** Find the solution to the following system of equations using the Gauss-Seidel method. **07**

$12x_1 + 3x_2 - 5x_3 = 1$

$x_1 + 5x_2 + 3x_3 = 28$

$3x_1 + 7x_2 + 13x_3 = 76$

Use x_1 1

X_2 0

X_3 1

as the initial guess and conduct two iterations.

(b) Use Runge-Kutta Method of Order 4 to solve the following, using a **07**

$du/dx = -2u+x+4$, $u(0) = 1$,

to obtain $u(0.2)$ using $\Delta x = 0.2$

OR

Q.5 **(a)** Define the following terms: Absolute Error, Relative Error, and Blunders. **07**

(b) Derive Newton Raphson method formula. **07**

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