

2018**MCA 2nd Semester Examination****COMPUTER ORIENTED NUMERICAL METHODS****PAPER—MCA-205****Subject Code—32***Full Marks : 100**Time : 3 Hours**The figures in the margin indicate full marks.**Candidates are required to give their answers in their own words as far as practicable.**Illustrate the answers wherever necessary.***Answer any five questions.**

1. (a) Apply Newton's Divided difference formula to find the polynomial of the lowest possible degree which satisfies the conditions $f(3) = 3$, $f(2) = 12$, $f(1) = 15$ and $f(-1) = -21$.
- (b) Find the real root of the equation $3x - \cos x - 1 = 0$ correct to four significant figures by using Newton-Raphson method.

(Turn Over)

- (c) Consider the equation $x_{n+1} = \frac{1}{2}(a_n + b_n)$ to explain the

Bisection method for numerical solutions of Algebraic and Transcendental equations. 5+5+4

2. (a) Find $f(31.5)$ from the following table by using Newton's Backward interpolation formula :

x	20	24	28	32
f(x)	0.01427	0.01581	0.01772	0.01996

- (b) Solve the equation $x^3 - 9x + 1 = 0$ for the root lying between 2 and 3 correct to 3 significant figures using Regula-Falsi method.
- (c) What is interpolation and extrapolation ? 6+6+2
3. (a) Solve the following system of equations by Gauss-elimination method

$$5x_1 - x_2 = 9$$

$$-x_1 + 5x_2 - x_3 = 4$$

$$-x_1 + 5x_3 = -6$$

- (b) Find a real root of the transcendental equation $x^x + 2x - 2 = 0$ correct upto two decimal places using Bisection method. 7+7

4. (a) Establish Simpson's $\frac{1}{3}$ Rule for numerical integrations.

(b) Evaluate $\int_0^1 \frac{dx}{1+x^2}$ using Weddle's rule, taking $n = 6$.

Hence compute an approximate value of π . 9+5

5. (a) What do you mean by Numerical Analysis ?

(b) Discuss different Errors in Numerical Analysis.

(c) Write the algorithm of Lagrange's interpolation method.

2+7+5

6. (a) Evaluate by Trapezoidal rule $\int_0^1 (4x - 3x^2) dx$, by taking

$n = 10$. Also find absolute and relative errors.

(b) Solve by Gauss-Jordan method :

$$20x_1 + 5x_2 - 2x_3 = 14$$

$$3x_1 + 10x_2 + x_3 = 17$$

$$x_1 - 4x_2 + 10x_3 = 23 \quad \text{7+7}$$

7. (a) Find the root of the equation $100x = 21 \sin(x + 0.5)$ lying between 0 and 1, correct to four places of decimals using the Fixed Point iterations Method.
- (b) Define : Algebraic Equation, Transcendental Equation.
- (c) For any numerical integration, if the number of intervals = 12 then, which rule you would prefer to apply and why ?
- (d) Which rule you would like to use when the values of x are not equi-spaced for any numerical interpolation problem ?

7+4+2+1

[Internal Assessment : 30 Marks]
