

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION SP/2024)

CLASS: B.TECH
BRANCH: CSE/ECE/EEE

SEMESTER : IV
SESSION : SP/2024

SUBJECT: MA203 NUMERICAL METHODS

TIME: 02 Hours

FULL MARKS: 25

INSTRUCTIONS:

1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates

- Q.1(a) Considering floating point arithmetic, perform the following arithmetic operations [2] CO1 BL
and express the obtained result in 4 digit NFP:

- i) $0.6544 \times 10^{-2} + 0.9412 \times 10^{-4}$
ii) $0.8325 \times 10^5 - 0.8012 \times 10^5$

- Q.1(b) The radius of a circular plate is measured as 12.65 cm instead of the actual length 12.5 cm. find the following in calculating the area of the circular plate: [3] CO1
(i) Absolute error (ii) Relative error (iii) Percentage error

- Q.2(a) Find the approximate roots of the equation $x^3 - 2x - 5 = 0$ between (2, 3) by using bisection method correct up to two decimal place. [2] CO1

- Q.2(b) Find the root of the equation $2x = \cos x + 3$ correct to three decimal places using fixed-point iteration method over the interval $[0, \pi/2]$, take $x_0 = \pi/2$. [3] CO1

- Q.3(a) Use Gauss-Jordan method to find the inverse of the following matrix [5] CO2

$$\begin{bmatrix} 1 & -3 & 4 \\ 2 & -5 & 6 \\ -3 & 3 & 4 \end{bmatrix}$$

- Q.4(a) Find the LU decomposition of the matrix [2] CO2

$$\begin{bmatrix} 2 & 3 & 1 \\ 1 & 2 & 3 \\ 3 & 1 & 2 \end{bmatrix}$$

- Q.4(b) Using Gauss Seidel Method with initial approximation $(x_0, y_0, z_0) = (0, 0, 0)$, find the 4-th iteration for the following linear system of equations [3] CO2

$$\begin{aligned} 27x + 6y - z &= 85 \\ 6x + 15y + 2z &= 72 \\ x + y + 54z &= 110 \end{aligned}$$

Take all values upto 4 decimal places.

- Q.5(a) Find the polynomial $f(x)$ by using Lagrange's formula and hence find $f(3)$ for the below points: [5] CO3

x	:	0	1	2	5
$f(x)$:	2	3	12	147