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

CLASS: IMSC **SEMESTER : V**
BRANCH: Maths & Computing SESSION : MO25

SUBJECT: MA311R1 NUMERICAL METHODS

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**

			CO	BL
Q.1 a	Find a positive real root of $x - Cosx = 0$ by bisection method correct upto 3 decimal place.	[2]	1	1
Q.1 b	α and β are roots of $x^2 + ax + b = 0$. Show that the iterative scheme $x_{n+1} = -\left(\frac{ax_n + b}{x_n}\right)$ will converge near $x = \alpha$ if $\lvert\alpha\rvert > \lvert\beta\rvert$	[3]	1	2
Q.2a	Derive an iterative formula to find kth root of a positive number using Newton Raphson method and hence find cube root of 22. (upto two iteration)	[2]	1	2
Q.2b	Find the root of $xe^{-x/2} = 1$ between 0 and 2 by secant method correct upto three decimal places.	[3]	2	2
Q.3a	Find LU decomposition (where $l_{ii} = 1$) of $\begin{bmatrix} 2 & 3 & 1 \\ 1 & 2 & 3 \\ 3 & 1 & 2 \end{bmatrix}$	[2]	2	2
Q.3 b	Find dominat wigen value by power method for $\begin{bmatrix} 1 & 3 & -1 \\ 3 & 2 & 4 \\ -1 & 4 & 10 \end{bmatrix}$ correct upto two decimal place. Consider initial vector as $[0\ 0\ 1]^T$	[3]	3	2
Q4 a.	Solve the following equations by Gauss Elimination method x + y + z = 3, 2x + 3y + z = 6 and x –y –z = -3	[2]	2	2
Q4 b.	Solve the following equations by Gauss Seidel iterative method correct upto one decimal place. 27x + 6y – z = 54, 6x + 15y + 2z = 72 and x + y + 54z = 110	[3]	2	2
Q5.	From the given data find polynomial by Lagrange method and Newton divided difference method and write in simplest form and also find y(5)	[5]	2	2

x	1	2	4	6
y	14	15	5	9

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