BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: MSc. / IMSc. **SEMESTER : I/VII**
BRANCH: PHYSICS **SESSION : MO/2024**

SUBJECT: PH405 MODERN COMPUTATIONAL TECHNIQUES & PROGRAMMING

TIME: 3 Hours **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

			CO	BL
Q.1(a)	State the three major sources of error in numerical solutions to a problem, with examples.	[5]	1	2
Q.1(b)	Describe the bisection method for finding the roots of an equation.	[5]	1	2
Q.2(a)	Describe the LU method of solving a set of linear algebraic equations.	[5]	2	2
Q.2(b)	Solve using Gauss Elimination: $x-y+z = 8$ $2x+3y-z = -2$ $3x-2y-9z = 9$	[5]	2	3
Q.3(a)	Explain how a round-off error can propagate across a forward difference table.	[5]	3	2
Q.3(b)	Derive the Lagrange interpolation formula.	[5]	3	2
Q.4(a)	Derive the Newton's forward difference formulae for first and second order derivatives at $x=x_0$.	[5]	4	2
Q.4(b)	Describe the trapezoidal rule of integration.	[5]	4	2
Q.5(a)	Explain the modified Euler method for solving a first-order ordinary differential equation.	[5]	5	2
Q.5(b)	What do you mean by elliptic, hyperbolic, and parabolic partial differential equations? Provide an example for each.	[5]	5	3

::::::26/11/2024::::::E