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

CLASS: MTECH **SEMESTER : I**
BRANCH: MECHANICAL ENGINEERING **SESSION : MO/2025**

SUBJECT: ME549 ENERGY SIMULATION AND MODELING

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)	Explain the need for energy modeling in the context of national energy policy and sustainable development.	[5]	1	2
Q.1(b)	Differentiate between national and rural energy planning with suitable examples.	[5]	1	3
Q.2(a)	Describe the main components and uses of an Input–Output (I–O) model in energy planning.	[5]	2	2
Q.2(b)	Explain how regression analysis can be used to estimate energy demand in econometric models.	[5]	2	3
Q.3(a)	What is the difference between linear and non-linear optimization models? Mention one example of each.	[5]	3	2
Q.3(b)	Apply the concept of linear optimization to design a simple model for minimizing energy cost in a small industry.	[5]	3	3
Q.4(a)	Explain the concept of an end-use model and its role in energy conservation planning.	[5]	4	2
Q.4(b)	Discuss how process analysis can be applied to identify energy-saving opportunities in the transport sector.	[5]	4	3
Q.5(a)	Describe the purpose of a causal loop diagram in system dynamics modeling.	[5]	5	2
Q.5(b)	Explain how a system dynamics model can be used to study the long-term behavior of an energy supply system.	[5]	5	3

::::::24/11/2025::::::E