



Roll No:

BTECH

(SEM. VIII) THEORY EXAMINATION 2025-26

MODELLING AND SIMULATION OF DYNAMICAL SYSTEMS

TIME: 3 HRS

M.MARKS: 70

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt all questions in brief.**2x7 = 14**

(a)	What is causality in system modeling?	CO-1	K2
(b)	State one advantage of using MATLAB as a simulation tool.	CO-1	K2
(c)	What is the purpose of generating system equations from a bond graph model?	CO-2	K2
(d)	Briefly discuss one challenge associated with modelling a combined rotary and translational system.	CO-3	K2
(e)	What is a transfer function?	CO-4	K2
(f)	Define optimization.	CO-5	K2
(g)	Explain planner mechanisms in Simulation in brief.	CO-5	K2

SECTION B

2. Attempt any three of the following:**7 x 3 = 21**

(a)	Describe different types of models used in engineering systems.	CO-1	K2
(b)	Describe the methods for drawing bond graph models for both mechanical and electrical systems.	CO-2	K2
(c)	Discuss the system models of electro mechanical systems.	CO-3	K2
(d)	Explain the frequency response analysis of system and also describe bode plot model.	CO-4	K2
(e)	Describe parameter estimation and system identification methods.	CO-5	K2

SECTION C

3. Attempt any one part of the following:**7 x 1 = 7**

(a)	Define the term "modeling" and provide three examples of models used in different fields.	CO-1	K2
(b)	Briefly explain the advantages and disadvantages of using MATLAB as a simulation tool.	CO-1	K2

4. Attempt any one part of the following:**7 x 1 = 7**

(a)	Discuss the basic models of hydraulic systems in detail.	CO-2	K2
(b)	Explain the basic models of thermal systems in detail.	CO-2	K2

5. Attempt any one part of the following:**7 x 1 = 7**

(a)	Explain linearity and non-linearity in systems.	CO-3	K2
(b)	Describe hydro-mechanical system modeling.	CO-3	K2

6. Attempt any one part of the following:**7 x 1 = 7**

(a)	Describe the key performance measures parameters used to analyze the dynamic response of a second-order system.	CO-4	K2
(b)	A second-order system is given by $G(s) = \frac{9}{s^2 + 6s + 9}$ Determine:(a) Natural frequency (b) Damping ratio (c) Type of response (d) Overshoot in percentage.	CO-4	K3

7. Attempt any one part of the following:**7 x 1 = 7**

(a)	Discuss simulation of simple and compound pendulum.	CO-5	K2
(b)	Explain validation and verification of simulation models.	CO-5	K2