PAPER ID-410081

Subject Code: KOE096

Roll No: | | | | | | | | | | | | | |

BTECH

(SEM VIII) THEORY EXAMINATION 2023-24

MODELLING AND SIMULATION OF DYNAMIC SYSTEMS

TIME: 3 HRS **M.MARKS: 100**

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

SECTION A

1. Attempt *all* questions in brief. **2 x 10 = 20**

Q no.	Question	Marks	CO
a.	What do you mean by simulation?	02	1
b.	State one advantage of using MATLAB as a simulation tool.	02	1
c.	What is causality in bond graph modeling?	02	2
d.	What is the purpose of generating system equations from a bond graph model?	02	2
e.	Briefly discuss one challenge associated with modelling a combined rotary and translational system.	02	3
f.	What type of system combines electrical and mechanical components?	02	3
g.	What does the natural frequency of a second-order system represent?	02	4
h.	Discuss the advantages of using block diagrams and signal flow graphs to represent system dynamics	02	4
i.	What is the purpose of system identification in modelling and simulation?	02	5
j.	Briefly discuss the importance of validation in simulation models.	02	5

SECTION B

2. Attempt any *three* of the following: **3 x 10 = 30**

a.	Briefly explain the advantages and disadvantages of using MATLAB as a simulation tool.	10	1
b.	Describe the methods for drawing bond graph models for both mechanical and electrical systems.	10	2
c.	Analyze the behavior of a combined system and discuss how the individual components influence its overall performance.	10	3
d.	Explain the transient and steady-state behavior of a first-order system with a step input.	10	4
e.	Explain the basic steps involved in simulating a system using SIMULINK.	10	5

SECTION C

3. Attempt any *one* part of the following: **1 x 10 = 10**

a.	What is the difference between a static and dynamic system. Also explain the modeling of dynamic system.	10	1
b.	Define the term "modeling" and provide three examples of models used in different fields.	10	1

4. Attempt any *one* part of the following: **1 x 10 = 10**

a.	Briefly explain the key differences between modeling hydraulic and pneumatic systems using bond graphs models.	10	2
b.	Explain the different types of basic mechanical system models.	10	2

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5. Attempt any *one* part of the following: 1 x 10 = 10

a.	Explain the difference between linear and non-linear systems. Provide examples of each in the context of combined systems.	10	3
b.	Explain the concept of a hydro-mechanical system with example.	10	3

6. Attempt any *one* part of the following: 1 x 10 = 10

a.	Describe the key performance measures parameters used to analyze the dynamic response of a second-order system.	10	4
b.	Explain the frequency response analysis of system and also describe bode plot model.	10	4

7. Attempt any *one* part of the following: 1 x 10 = 10

a.	Discuss the importance of validation and verification in simulation models. How do you ensure the accuracy and reliability of your simulations?	10	5
b.	Briefly introduce the concept of optimization in the context of modeling and simulation. How can optimization techniques be applied to improve system performance?	10	5