



Course Title: Modeling & Simulation	Date: 23/11/2009
Course No: (630573)	Time Allowed: 1 Hour
Lecturer: Dr. Mohammed Mahdi	No. of Pages: 1

**Question 1:** (8 Marks)

Objectives:

This question is about the principles of modeling and simulation.

A) What do we mean by simulation? Then state three of main simulation advantages and disadvantages. (4 Marks)

B) Given the mathematical model:  $\tau \dot{Y} + Y = kU$ . It is required to:-

1. Extract its characteristics "showing reasons". (2 Marks)

2. Sketch the conventional analog simulation circuit diagram. (2 Marks)

**Question 2:** (12 Marks)

Objectives:

This question is about extracting and analysis of a mathematical model.

Given the following RLC electrical circuit with  $G(s) = \frac{sR/L}{s^2 + sR/L + 1/LC}$  and system parameters of R, L, C

respectively along with Bode diagram and step response. It is required to:-

1. Confirm the Bode diagram. (2 Marks)

2. Confirm the Step response. (2 Marks)

3. Extract the canonical state space representation. (2 Marks)

4. Sketch the state space representation analog circuit diagram. (2 Marks)

5. Identify G(s) using physical laws. (4Marks)

