



Dept. of Computer Engineering
Second Exam, First Semester: 2009/2010

Course Title: Modeling & Simulation	Date: 30/12/2009
Course No: (630573)	Time Allowed: 1 Hour
Lecturer: Dr. Mohammed Mahdi	No. of Pages: 1

Question 1: (10 Marks)

Objectives:

This question is about the principles of system modeling and analysis.

A) Sketch the model building scheme. Does the extracted model fully represent the real system? Why? (5 Marks)

B) Derive the general solution of first order system subjected to unit impulse using two methods. (5 Marks)

Question 2: (10 Marks)

Objectives:

This question is about MATLAB and analysis of second order systems.

A) Show with examples the restrictions on naming variables in the MATLAB workspace. (3 Marks)

B) A simple model for the hard – disk read \ write head controller is represented by the following differential equation: - (7 Marks)

$$j \frac{d^2 \theta}{dt^2} + c \frac{d \theta}{dt} + k \theta = k_i i$$

Where j is the inertia of the head assembly, c is the viscous damping coefficient of bearings, k is the return spring constant, k_i is the motor torque constant, θ is the angular position of the head, and i is the input current.

It is required to: -

- Show the possibilities of its time response.
- Analysis the system behavior if:

$$j = 0.01 \text{kgm}^2, c = 0.004 \text{Nm}/(\text{rad} / \text{sec}), k = 10 \text{Nm} / \text{rad}, \text{and } k_i = 0.05 \text{Nm} / \text{rad}$$

- What conclusion can you make?