Philadelphia University
Faculty of Engineering

Student Name:
Student Number:

Dept. of Computer Engineering
Final Exam, First Semester: 2006/2007

Course Title: Modeling & Simulation	Date: 29/1/2007
Course No: (630573)	Time Allowed: 2 Hours
Lecturer: Dr. Mohammed Mahdi	No. of Pages: 2

Question 1: (15 Marks)
Objectives:
This question is about the basic concepts of Modeling and Simulation techniques.

Answer the following briefly: -

1. What do we mean by identification? What are its aims?

2. In one of the identification procedures there are many errors. Put your suggestions to minimize the measured and the quantization errors.

3. Explain why simulation results may be difficult to apply.

4. What is the benefit of time compression or expansion through simulation?

5. Write down four reasons for state-space model to be better than conventional method.

6. Show how can one use the op-amp as an integrator, and differentiator.

7. What is the importance of using magnitude scale in analog simulation?

8. What are the main purposes that simulation is used for?

9. In Matlab how can one change from continuous transfer function model into its equivalent discrete form?

10. Write the Matlab format for the following key words: rlocus, bode, and nyquist.

Question 2: (15 Marks)
Objectives:
This question is about analog computer simulation.

A) For the D.E: $\quad\quad y + 5\,y + 4\,y = 0$
   1. Show the minimum analog computer simulation set up.
   2. How do you think that this system operates?

B) For the transfer function model: $y(s)/u(s) = (2\,s^2 + 6\,s + 5) / (s^3 + 4\,s^2 + 5\,s + 2)$
   1. Extract the canonical state-space model.
   2. Draw the related analog computer simulation set up.
   3. What conclusion can you make for the matrices C, and D?

Question 3: (10 Marks)
Objectives:
This question is about software computer simulation.

Write a complete software simulation program that solves the following nonlinear equation $f(x) = x^2 + \sin(x)$ with $x_o = 0.1$. Take accuracy of 10^{-4} or less.

Objectives:

        This question is about identification and Matlab.

Given the following experimental response for a first order system subjected to a unit step input.

It is required to: -
1. **Identify the system model and parameters.**
2. **Write a Matlab code to re-plot the extracted model with different symbol and color.**