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

Course Title: Real-Time Computer Control System	**Date: 9/6/2007**
Course No: (630581)	**Time Allowed: 2 Hours**
Lecturer: Dr. Mohammed Mahdi	**No. of Pages: 2**

Question 1:   *(15 Marks)*
Objectives:
This question is about the concepts of (RTCCS).

Answer the following briefly: -

1. **What is the main function of the input signal conditioning in RTCCS.**

2. **What were the reasons of using supervisory control?**

3. **What is the main objective in using sequence control?**

4. **What are the main characteristics of DDC?**

5. **Sketch the Decision Making (DM) element.**

6. **State the main functionalities of Man Machine Interface (MMI).**

7. **When one can use PGA in analog input interface?**

8. **Sketch the schematic diagram of the conditional data transfer.**

9. **What does the term kernel mean?**

10. **Compare 'using table' between Multi-tasking and Multi-user real-time operating system.**

Question 2:   *(10 Marks)*
Objectives:
This question is about z-transform.

$$\text{Given } X(s) = 1 \backslash s \, (\, s + 1 \,)$$

It is required to: -

1. **Calculate X(z).**

2. **What is the suitable sampling time? Why?**

3. **Find X(k).**

4. **What conclusions can you make?**

Question 3:   *(10 Marks)*
Objectives:
This question is about RTCCS design.

You have been asked to design a computer-based system to control all possible operations of a gasoline station. Sketch the DDC schematic diagram and the instructions sequence based on the design.

<u>*Question 4:*</u>   *(15 Marks)*
Objectives:
This question is about the z-transform and real-time operating system.

A) Given

$$G(z) = (0.368\ z + 0.264) \setminus (z^2 - 1.368 + 0.368)$$

It is required to: -

1. **Write the difference equation.**

2. **Check absolute stability using jury test.**

3. **Find ess(kT) for unit-step input.**

4. **Draw the representative block-diagram for closed-loop P.T.F.**

B) Sketch the task state transition diagram, showing how states can be transformed from a state to other, giving reasons.