Philadelphia University
Faculty of Engineering

Student Name:
Student Number:

First Exam, First Semester 2011/2012

Course Title:	Embedded Systems Design	**Date:**	16/11/2011
Course No:	0630470	**Time Allowed:**	60 Minutes
Instructor:	Dr. Kasim Al-Aubidy	**No. of Pages:**	2

Instructions:
- Write your name and number on each page of the exam.
- Use the free space after each assignment for your answer.
- Write your answer readable in English.

Question 1: [40%]

Objectives: Basic concepts of Embedded Systems.

[A]. Answer by True or False, then rewrite wrong statements:

1. No value can be moved directly into general-purpose RAM.

2. The RISC architecture executes the vast majority of instructions in 2,3, or more clock cycles, while CISC executes them in one clock.

3. In most microcontrollers, instructions fetching and execution are done at the same time.

4. The BNZ instruction will always take TWO instruction cycles.

5. All PIC ports have EIGHT pins.

[B]. Choose the correct answer for the following:

1. The 16F84 Microcontroller instruction cycle takes ---------- (*1, 2, 4*) clock periods.
2. An embedded system incorporates ---------- *(hard disc, flash memory, computing element)* to perform control functions.
3. Harvard architecture uses ---------- *(the same, multiplexed, different)* address and data busses to fetch both code and data.
4. The ---------- *(reset, sleep, wdt)* resets the microcontroller if it is ever allowed to overflow.
5. The PIC 16F84 microcontroller has a stack memory with ------- *(2, 4, 8)* stack level.

Question 2: **[60%]**

Objectives: Microcontroller Architecture.

[A]. What is a microcontroller? What are the major differences between microprocessors and microcontrollers?

[B]. The PIC16F84 microcontroller has four interrupt sources, these are;

1.
2.
3.
4.

Now, give a simplified outline to demonstrate the microcontroller interrupt mechanism?

[C]. Two microcontrollers (A & B) have maximum clock speeds 8MHz and 24MHz respectively. Microcontroller A divides its clock by 4 to give one machine cycle, and microcontroller B by 8. Microcontrollers A takes 2 machine cycles to perform an instruction, while microcontroller B takes one machine cycle.

1. For each microcontroller calculate;

a). machine cycle period?

b). instruction execution time.

2. Place the microcontrollers in order of the speed in which they can perform that instruction?