UNIVERSITY OF CAPE TOWN

DEPARTMENT OF ELECTRICAL ENGINEERING

EEE2039W Mod D & E
EEE2026S Mod D & E
EEE3070S Mod D

FINAL EXAMINATION: NOVEMBER 2011

TIME: 3 HOURS

TOTAL MARKS: 120

DO NOT TURN OVER UNTIL TOLD TO DO SO

Instructions

1. This is a closed-book examination: course notes, hand outs and sample solutions are not allowed.
2. **Please answer Module D and Module E in separate Booklets.**
3. All numerical answers must be given to the appropriate number of significant figures and units and **the base of the number system must be indicated if it is not base 10.**
4. If you require additional booklets, put the booklets of the same Module together before submitting.
5. Candidates will be supplied with the Instruction Set for the 68HCS908GT16 and an ASCII table.
6. Answer all questions. There are 50 marks for Module D and 50 marks for Module E.

INTERNAL EXAMINERS:	**PROF S.P. CHOWDHURY (Module D) and**
	DR A. MISHRA (Module E)
EXTERNAL EXAMINER:	**PROF JOHANN E.W. HOLM**

FINAL EXAMINATION: NOVEMBER 2011

EEE2039S Module D
Introduction to Microprocessors: November 2011

TIME: 1½ HOURS

TOTAL MARKS: 50

INTERNAL EXAMINER: PROF S.P. CHOWDHURY

**Question 1 – Answer these Objective Type Questions very briefly [30 Marks]**

a) What is a **Stack** in the memory space? What does the **Stack Pointer** point at? What is the difference between Stack Pointer and Index Register?   [1+1+2]

b) Draw a simple circuit diagram showing how **LEDs** are connected to **Port A** of the GT16 micro-processor.   [4]

c) State and explain with examples any **three** types of **Addressing modes for GT16**.   [6]

d) What happens when you press Reset Button? Explain.   [4]

e) What is an **Interrupt**? What is the difference between an **Interrupt** and a **Sub-routine Call?**   [4]

f) What is a **delay**? Explain the use of **de-bouncing** technique.   [4]

g) List any **four** properties of ADCs that you must consider before purchasing it. Elaborate on any one of those properties   [2]

h) Briefly explain the differences between asynchronous and synchronous communication systems.   [2]

Question 2 – [10 Marks]

Write an assembly program to write ten bytes of data in the RAM starting at $80 and then determine the maximum and minimum of these ten bytes and store the maximum at $90 and the minimum at $91 respectively. Write comments where necessary.   [10]

Question 3 – [10 Marks]

Write an assembly program that lights up the LED's as follows: [10]

Half second delay

Two second delay

One second delay
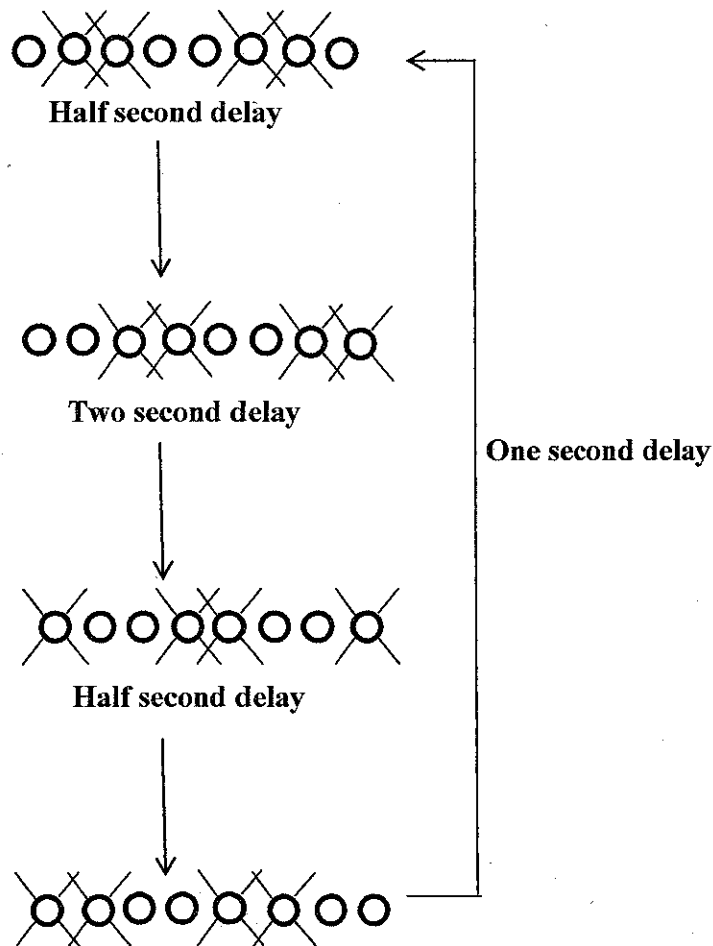
Half second delay

No initialisations are required. Write the **main routine code** only. Do not write the delay subroutines. Call the following:

delay_half ; Half second delay

delay_one ; One second delay

delay_two ; Two second delay

Write comments where necessary.