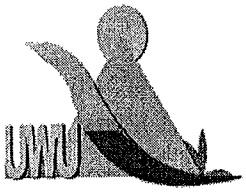
Uva Wellassa University, Sri Lanka

End Semester Examination – September 2011

SCT 363-2 Advanced Electronics



Time: Two (02) hours

Total **04** Questions

Answer **All** questions.

1) a. What are the two main memory types of a microprocessor? Briefly discuss the function of each category.

   b. Compare and contrast the followings.

      i. SRAM and DRAM.

      ii. EPROM and EEPROM.

   c. Draw a schematic representation for a single bit memory. Briefly explain the 'Read' and 'Write' operations using the above representation.

   d. Draw a circuit diagram to show how you would construct a 4kB (2048×16 bit) memory using four 1kB (1024×8 bit) RAM.

(25 Marks)

2) a. Define the three types of input/output methods of a microprocessor based system.

   b. What is an "Address Decoder" circuit?

   c. Suppose you are expected to design a microprocessor based system using an 8 bit microprocessor having 16 address lines and other necessary control lines. You are also provided with the following devices together with a switch and a seven segment display to interface with the microprocessor.

Device	Size	Starting Address
EPROM chip	2kB (2048×8 bit)	0000H
RAM chip	4kB (4096×8 bit)	3000H

The switch and the seven segment display should be interfaced using the memory mapped method and their addresses would be 7301H and 7400H respectively.

   i. Draw the memory map of the system.

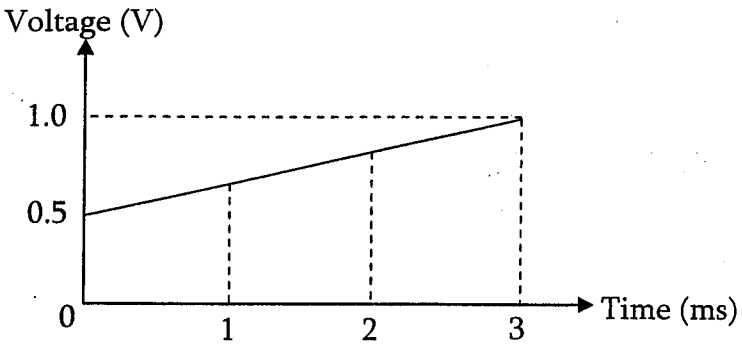
   ii. Draw a circuit diagram of the system showing all the address decoding circuits. (You may use additional gates if necessary)

(25 Marks)

3) a. Briefly explain how information is lost during the process of analog to digital conversion (ADC). What is the importance of the sampling theorem in this respect?

b. Describe the principle of operation of a dual slope ADC. How does it avoid the problems associated with single slope ADC?

c. An 8-bit dual slope ADC with *0.1 ms* charging time is used to digitize the signal shown below. Calculate the conversion time in each case if the ADC is started at *t = 0, 1* and *2 ms*.



d. Discuss the nature of the error introduced into the measurements due to the variation of the input signal during the charging period. Suggest a method to solve this problem (without changing the ADC speed).

(25 Marks)

4) a. What is a first order active filter?

b. Plot a graph of gain, $\{|e_o / e_i|\}$, against frequency for a simple first order passive low- pass CR filter and use this graph to show that,

i. at f_c the gain is *3 dB* less than its DC value.

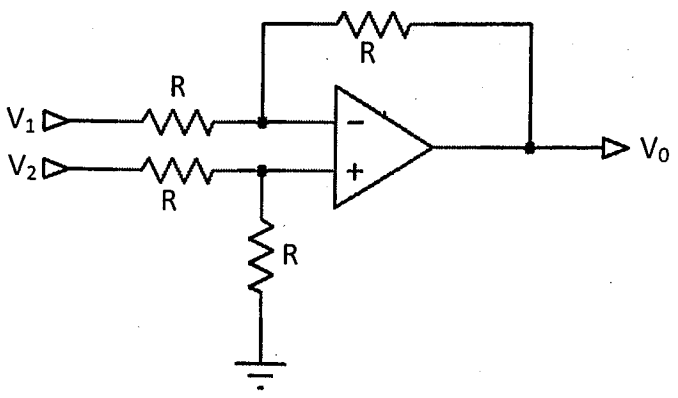
ii. at frequencies higher than $2f_c$ the output declines at *20 dB/decade*.

c. Using response curves, relevant equations and circuit model explain

i. first order band- pass passive CR filter circuit.

ii. first order high pass OPAMP filter circuit.

d. For the following OPAMP circuit, find the expression for V_o.



(25 Marks)