MERU UNIVERSITY OF SCIENCE AND TECHNOLOGY

P.O. Box 972-60200 – Meru-Kenya.
Tel: 020-2069349, 061-2309217. 064-30320 Cell phone: +254 712524293, +254 789151411
Fax: 064-30321
Website: www.must.ac.ke Email: info@must.ac.ke

University Examinations 2013/2014

THIRD YEAR, SECOND SEMESTER EXAMINATION FOR DIPLOMA IN ELECTRICAL ENGINEERING

EEE 0248: MICROPROCESSORS

DATE: APRIL 2014   **TIME: 1 ½ HOURS**

INSTRUCTIONS: *Answer question **one** and any other **two** questions*

QUESTION ONE – (30 MARKS)

(a) What is the size of memory address space for the following microprocessors

Microprocessor	Data bus width	Address bus width	
8080A	8 – bit	16 – bit	
6800	8 – bit	16 – bit	
8086	16 – bit	20 – bit	
9900	16 – bit	16 – bit	
Z8000	16 – bit	23 – bit	(5 Marks)

(b) It is desired to clear the accumulator of 8085. Explain the possible instructions for this purpose. (5 Marks)

(c) Define the following terms
   (i)   Data bus   (1 Mark)
   (ii)   Address bus   (1 Mark)

(d) Draw a block diagram of a simple microprocessor system indicating the I/O ports, data bus, address bus, control bus and memory. (5 Marks)

(e) Describe two basic operations of a microprocessor. (4 Marks)

(f) Explain the function of the following microprocessor sub-systems
   (i)   Arithmetic logic unit (ALU)   (1 Mark)
   (ii)   Registers   (1 Mark)
   (iii) Program counter   (1 Mark)
   (iv)   Flags   (1 Mark)

(g) Explain the difference between a microcontroller and a microprocessor.   (2 Marks)

(h) Write a simple Arduino program that blinks a LED attached at its digital pin 13
repeatedly at a rate of one second.   (3 Marks)

QUESTION TWO – (15 MARKS)

(a) List two Arduino features that make its move attractive than other microntrollers.
                                                                        (2 Marks)

(b) Name the parts labelled 1 – 10 in the arduino uno diagram in figure 1.1 below.
                                                                        (10 Marks)

(c) What does the following arduino statements accomplish.   (3 Marks)
        digitalWrite (13, HIGH);
        delay(1000);
        digitalWrite (13, LOW);

QUESTION THREE – (15 MARKS)

(a) The figure below is an arduino circuit that turns ON a LED when a button is pressed and
turns OFF the LED when the button is released. Write on arduino program that
accomplishes this task.   (10 Marks)

(b) The following program is used to program an Arduino board. The board is then
connected to a circuit as shown below. Explain the task of the system.   (5 Marks)

```
int  LED = 9;
void set up ( ) {
        pinMode (LED, OUTPUT);
}
void loop ( )
{
        for (int i = 0; i < 256; i ++){
                analogWrite (led, i);
                delay (10);
        }
        for (int i = 256; i >=0; i--){
                analogWrite (led, i);
                delay (10);
        }
   }
```

QUESTION FOUR – (15 MARKS)

(a) Draw a schematic diagram showing how a 12V DC motor can be connected to be microcontroller board for regulating the speed of the motor. (5 Marks)

(b) Write Arduino program drive the motor described in question 4(a) above at speeds determined by a potentiometer attached at one of its analog input ports. (5 Marks)

(c) Draw a H-bridge circuit for controlling the direction at which a DC Motor runs. (5 Marks)