TECHNICAL UNIVERSITY OF MOMBASA

FACULTY OF ENGINEERING AND TECHOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

DIPLOMA IN ELECTRICAL POWER ENGINEERING

EEE2303 MICROCONTROLLER SYSTEMS

SERIES: MAY, 2016

INSTRUCTIONS TO CANDIDATES:

1. You should have the following for this examination:
   - Answer booklet
   - Electronic calculator
   - PIC16F84A Instruction set
2. This paper consists of FIVE questions.
3. Answer ANY THREE Questions
4. All questions carry equal marks

QUESTION ONE

(a) Using FOUR factors distinguish between microcontrollers and microprocessors (8 marks)

(b) Explain the functions of the following registers:
  i. TMRO
  ii. W
  iii. OPTION
  iv. PLCLATH
  v. STATUS   (9 marks)

(c) Draw the block diagram of the microcontroller architecture and explain the functions of each block.   (8 marks)

(d) State any THREE specifications of microcontrollers   (3 marks)

QUESTION TWO

(a) Explain any FOUR types of microcontroller   (8 marks)

(b) (I)Three sensors are connected to pins RB0, RB2 and RB3 while two indicator LEDs are connected to RA0 and RA1 of the PIC16F84A microcontroller. Write instructions to initialize the ports.

  (ii) Draw a table to show the possible configurations of the prescaler.

                                                                                (12 marks)

QUESTION YHREE

(a) An LED is connected to pin RA1 of the PIC16F84A microcontroller. A program is required to cause the LED to flash ON and OFF continuously.
  i. Draw the circuit
  ii. Write the program   (14 marks)

(b) Explain any THREE reasons why interfacing is necessary between the microcontroller and external circuits   (6 marks)

QUESTION FOUR

(a) Explain any FOUR categories of microcontrollers   (8 marks)

(b) Explain the process of writing a program into a microcontroller   (8 marks)

(c) Explain the process of etching and state ONE safety precaution to be observed.   (4marks)

QUESTION FIVE

(a) EIGHT LEDs are connected to PORTB of the PIC16F84A microcontroller. A program is required to simulate a running light running back and forth.
  i. Draw the circuit
  ii. Write the program   (14 marks)

(b)(i) State any TWO applications of microcontrollers

  (ii) Distinguish the instructions **BTFSC PORTB, 0** and **ANDWF PORTA.**   (6 marks)