



# THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

## University Examinations 2010

### Faculty of Engineering

#### BACHELOR IN TECHNOLOGY

#### ELECTRONICS ENGINEERING

### MICROPROCESSOR SYSTEMS I

**APRIL/MAY 2010 SERIES.**

**TIME: 2 HOURS**

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#### **INSTRUCTIONS :**

You should have the following for this examination:

- Answer Booklet

This paper consists of **FIVE** questions.

Answer question **ONE** and any other **TWO** questions.

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- Q.1 (a) Draw a block diagram of the microprocessor architecture and explain the function of each part. (10 marks)
- (b) Explain the **THREE** instruction word sizes giving ONE example in each case. (7 marks)
- (c) Explain the functions of each of the following registers:
- (i) Program counter
  - (ii) Accumulator
  - (iii) Index register. (6 marks)
- (d) (i) Write instructions for the 8085 processor to perform the following tasks:

- (I) Load byte 5AH in register B.
- (II) Initialize a memory location
- (III) 2080H in register pair D, E.
- (IV) Copy (B) to accumulator. (7 marks)

(ii) State and explain **TWO** instructions used with the stack.

Q.2 (a) Explain the following addressing modes giving ONE example for each case:

- (i) Direct
- (ii) Immediate (6 marks)

(b) (i) Differentiate between machine cycle and instruction cycle. (6 marks)

(ii) Explain the function of the following instructions.

- (I) INX D
- (II) DAD B (6 marks)

(c) Six bytes of data are stored in memory locations at 8050H to 805FH.

- (i) Write instructions to store the data bytes in the memory locations.
- (ii) Write a program that transfers the entire block of data in (i) to new memory locations starting at AB00H. The data bytes are:

Data (H): 37, A2, F2, 82, 57, 5A, 10, 19 and 98. (8 marks)

Q.3 (a) Explain the following terms:

- (i) Subroutine
- (ii) Stack
- (iii) Parameter passing. (6 marks)

(b) Describe the operations undertaken by the CPU when it executes the instruction RET. (2 marks)

(c) A traffic lights system Green, Amber and Red together with pedestrian signs WALK and DON'T Walk has the following time schedule:

Lights	Data bits	ON time (seconds)
Green	D <sub>0</sub>	15
Amber	D <sub>2</sub>	5
Red	D <sub>4</sub>	20
WALK	D <sub>6</sub>	15
DON'T WALK	D <sub>7</sub>	25

- (i) Draw a sequence table to determine the hex code for switching the lights and Pedestrian signs.
- (ii) Write the assembly language program for the 8085 processor. (The Delay subroutine is not required) (12 marks)
- Q.4 (a) (i) Explain the following concepts as used in assembly language programming:
- (I) Pseudo code  
(II) Operand. (6 marks)
- (ii) State any **THREE** applications of counters in programming. (6 marks)
- (b) A program controls a certain drive for a product labeling system having a cycle equivalent to 256 counts (FFH to 00H) with 1m/s time delay between each count. The system clock has 0.5μs time period. The delay loop has two instructions with a total of 15T-states and all other instructions have a total of 40 T-states.
- (i) Calculate the number of counts for the delay loop  
(ii) Using registers B and C to set up the counter and Delay Count respectively and register D to display the counted hex numbers, write the program. (11 marks)
- Q.5 (a) Define the following terms:
- (i) Machine language  
(ii) Machine code  
(iii) Assembler  
(iv) Compiler. (4 marks)
- (b) (i) State **TWO** advantages of ML over BASIC.  
(ii) Explain the **FOUR** elements of program documentation. (10 marks)
- (c) Given that (A) = 82H and (B) = 35H perform the operations *XRAB* followed by *RRC* illustrating your answer in binary bits. (6 marks)