



# MACHAKOS UNIVERSITY

University Examinations for 2023/2024 Academic Year

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

FOURTH YEAR FIRST SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE (ELECTRICAL AND ELECTRONICS ENGINEERING)

EEE406: MICROPROCESSOR SYSTEMS & APPLICATIONS

DATE:

TIME:

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## INSTRUCTIONS

Attempt question ONE (Compulsory) and any other TWO questions.

### QUESTION ONE (COMPULSORY) (30 MARKS)

- a) Explain briefly the function of a microprocessor in a system. (3 marks)
- b) Define masking and hence explain why it is required in microprocessors. (4 marks)
- c) Compare the memory-mapped IO with the standard IO-mapped IO. (6 marks)
- d) List the various registers of 8085, their sizes and explain their function. (9 marks)
- e) Write an assembly language program to subtract two numbers of 8-bit data stored in memory locations  $4200_H$  and  $4201_H$ . Store the magnitude of the result in  $4202_H$ . If the result is positive store 00 in  $4203_H$  or if the result is negative store 01 in  $4203_H$ . (Hint: show both the flow chart and the program codes). (9 marks)

### QUESTION TWO (20 MARKS)

- a) State the different buses of the 8085 microprocessor indicating size for each bus and hence calculate the memory size of the microprocessor. (3 marks)
- b) With the aid of a suitable diagram illustrate the memory read operation of a microprocessor. (4 marks)

- c) Draw and explain the schematic diagram to generate Read/Write control signals ( $\overline{MEMR}$ ,  $\overline{MEMW}$ ,  $\overline{IOR}$ ,  $\overline{IOW}$ ) for memory and I/O devices in the 8085 microprocessor. (6 marks)
- d) Discuss the function of the ALU of 8085 with functional diagram. (7 marks)

### QUESTION THREE (20 MARKS)

- a) An 8085 program adds the hex number  $CE_H$  from  $9B_H$  and places the result in its accumulator. Determine the status of different flags after result is stored in the accumulator. (7 marks)
- b) Compare static RAM and dynamic RAM. (6 marks)
- c) Describe the process of 8085 maskable/vectored interrupt. (7 marks)

### QUESTION FOUR (20 MARKS)

- a) Explain why interfacing is needed for I/O devices. (2 marks)
- b) Design  $2K \times 8$  bits from two  $1K \times 8$  bits explaining all the steps. (7 marks)
- c) Differentiate between vectored and non-vectored interrupt. (4 marks)
- d) Assume that the 8085 microprocessor returns to the main program after servicing RST 6.5. (Remember that while servicing an interrupt all other interrupts are disabled.) Write a program segment to check whether RST 5.5 interrupt is pending. If it is pending then the program has to enable RST 5.5 without affecting any other interrupts. Otherwise the program has to enable all interrupts and return to main program. (7 marks)

### QUESTION FIVE (20 MARKS)

- a) Differentiate between register addressing and register indirect addressing giving examples in each case. (6 marks)
- b) Explain the following instruction set groupings of 8085 :  
     i. Arithmetic instructions  
     ii. Logical instructions (4 marks)
- c) With the aid of timing diagrams discuss the memory write machine cycle of 8085 microprocessor. (10 marks)