



MACHAKOS UNIVERSITY

University Examinations for 2018/2019

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

SECOND YEAR SPECIAL/SUPPLEMENTARY EXAMINATION FOR

BACHELOR OF SCIENCE (COMPUTER SCIENCE)

SCO 209: MICROPROCESSOR AND ASSEMBLY LANGUAGE

DATE: 25/9/2019

TIME: 11:00 – 1:00 PM

INSTRUCTIONS:

Answer Question One and Any Other Two Questions

QUESTION ONE (COMPULSORY) (30 MARKS)

- a) Explain the significance of Assembly Language programming. (3 marks)
- b) Describe three sections that assembly program can be divided into. (3 marks)
- c) Explain three statements used in assembly language programming. (3 marks)
- d) Write assembly language program to display the “Welcome to Machakos University”. (2 marks)
- e) Explain REP MOVSB instruction with example. (2 marks)
- f) Explain three memory segments as used in assembly language programming. (3 marks)
- g) Discuss the three categories of 32-bit and 16-bit processor registers in IA-32 architecture. (3 marks)
- h) Explain three basic modes of addressing in assembly language programming. (3 marks)
- i) Write assembly language program to prints the number 1 to 9 on the screen. (3 marks)

- j) Write 8086 assembly instruction which will perform the following operations: (5 marks)
- i) Multiply AL times BL.
 - ii) Load the number F3H into AL register.
 - iii) Copy BP registers contents to SP register.
 - iv) Divide the AL register contents by 2 bu using a shift instruction.
 - v) Multiply the AL register contents by 4 using shift instruction.

QUESTION TWO [20 MARKS]

- a) With a neat diagram, explain the architecture of 8086 microprocessor along with functions of each block and registers. (8 marks)
- b) Explain five forms of directive in assembly language programming language. (5 marks)
- c) Explain the following: (3 marks)
- i. EQU
 - ii. %assign
 - iii. %define
- d) Write assembly language program in simple procedure named *sum* that adds the variables stored in the ECX and EDX register and returns the sum in the EAX register. (4 marks)

QUESTION THREE [20 MARKS]

- a) Explain the addressing modes used in 8086 with an example for each. (8 marks)
- b) Write assembly language program to create and opens a file named *myfile.txt*, and writes a text 'Welcome to Machakos University ' in this file. Next, the program reads from the file and stores the data into a buffer named *info*. Lastly, it displays the text as stored in *info*. (4 marks)
- c) Describe the difference between the instructions MOV AX, 2347H and MOV AX, [2347H]. (3 marks)
- d) At any given time the 8086 works with 4 segments in this address space. How many bytes are contained in each segment? (4 marks)

QUESTION FOUR [20 MARKS]

- a) Explain the flags of 8086 processor using suitable examples. (6 marks)
- b) Write assembly language program to shows how factorial n is implemented in assembly language. (4 marks)
- c) What is flag register? Explain the flag register format, in detail. (6 marks)
- d) Write and explain instruction template for MOV instruction. Also generate opcode for following instructions: the opcode for MOV is. (4 marks)

1	0	0	0	1	0
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- i. MOV CL,[BX]
- ii. MOV CS,[BX],DL
- iii. MOV 43H[SI],DH
- iv. MOV CX,[437A]H

QUESTION FIVE [20 MARKS]

- a) What is an assembler directive? Explain the following assembler directive with example: (4 marks)
- i. PUBLIC
 - ii. PROC
 - iii. MACRO
 - iv. DB
- b) Discuss the following addressing modes with examples: (5 marks)
- i. Direct
 - ii. Register indirect
 - iii. Base plus index
 - iv. Immediate
 - v. Scaled indexed.

c) Describe the following instruction with suitable examples: (4 marks)

- i. PUSH
- ii. MUL
- iii. IN
- iv. AAA.

d) explain the following instructions with an example: (5 marks)

- i. DAA
- ii. AAM
- iii. LOOP
- iv. SUB
- v. XLAT

e) Explain the types of program execution transfer instruction (branch instructions) with examples. (2 marks)