



MACHAKOS UNIVERSITY COLLEGE

(A Constituent College of Kenyatta University)
University Examinations for 2014/2015 Academic Year

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

SECOND SEMESTER EXAMINATION FOR BACHELOR OF SCIENCE IN COMPUTER
SCIENCE

SCO 290: ASSEMBLY LANGUAGE PROGRAMMING AND MICROPROCESORS

Date: 9/4/2015

Time: 8:30 – 10:30 AM

INSTRUCTIONS:

1. Attempt question **ONE** and any other **TWO** questions
2. Question one carries **30 marks** while the rest carry **20 marks each**

QUESTION ONE (30 MARKS)

a) Distinguish between the following terms:

- (i) Operation and micro operation (2 marks)
- (ii) Fetch cycle, indirect cycle and execute cycle (3 marks)
- (iii) Memory – reference, register – reference and input – output reference Instructions. (3 marks)
- (iv) Instructions and Pseudo-instructions (2 marks)
- (v) Source programs and Object programs (2 marks)

b) (i) List the four Pseudo-instructions that can be recognized by the Assembler. (2 marks)

(ii) Briefly give a definition of each (2 marks)

(iii) Software systems can be subdivided into six categories. Name them and indicate their applications (6 marks)

- c) (i) The organization of a digital computer is best defined by specifying three parameters.
Name them. (2 marks)
- (ii) On the basis of one of the parameters named in c (i), classify digital systems (2 marks)
- (iii) In basic computers, what do you understand by term 'stored program concept' (1 mark)
- (iv) A line of code in an assembly language program is as follows
DEC -35
Show that four memory words are required to store the line of code and give their
binary content. (3 marks)

QUESTION TWO (20 MARKS)

An instruction in address $(021)_{16}$ in the basic computer has a mode bit $I = 0$, an operation code of the AND instruction, and an address part equal to $(083)_{16}$. The memory word at address $(083)_{16}$ contains the operand $(B8F2)_{16}$ and the content of the AC is $(A937)_{16}$. Go over the fetch and execute cycles and determine the content of the following registers at the end of the execute cycle: *PC*, *MAR*, *MBR*, *AC*, and *OPR*.

QUESTION THREE (20 MARKS)

- (a) What is a control flow chart? (2 marks)
- (b) Name two types of blocks used in a flow chart, clearly explaining the function of each of them. (8 marks)
- (c) Use a control flow chart to summarize the paths taken by the control during an execute cycle. (10 marks)

QUESTION FOUR (20 MARKS)

- (a) Write a program in assembly language to add two operands A and B (8 marks)
- (b) Show that the line of code
PL3, LDA SUB I
Can be stored in seven consecutive memory locations (12 marks)

QUESTION FIVE (20 MARKS)

A memory unit has a capacity of 65,535 words of 25 bits each. It is used in conjunction with a general purpose computer. The instruction code is divided into four parts. An indirect mode bit, operation code, two bits that specify a processor register and an address part.

- (a) What is the maximum number of operations that can be incorporated in the computer if the instruction is stored in one memory word. (5 marks)
- (b) Draw the instruction word format indicating the number of bits and the function of each part. (6 marks)
- (c) How many bits are there in MBR, MAR and PC for the said memory capacity. (9 marks)