



MASENO UNIVERSITY
UNIVERSITY EXAMINATIONS 2013/2014

**FIRST YEAR SECOND SEMESTER EXAMINATIONS FOR THE
DEGREE OF BACHELOR OF SCIENCE IN COMPUTER SCIENCE &
TECHNOLOGY**

(MAIN CAMPUS)

SCS 109: ASSEMBLY LANGUAGE PROGRAMMING

Date: 14th July 2014

Time: 2.30 - 4.30 pm

INSTRUCTIONS:

- Answer ALL questions in SECTION A and any other TWO from SECTION B.
- Write your registration number on all sheets of the answer book used.
- Use a NEW PAGE FOR EVERY QUESTION attempted, and indicate number on the space provided on the page of the answer sheet.
- Fasten together all loose answer sheet.
- No mobile phones and PDAs in the examination room.



SECTION A (ANSWER ALL QUESTIONS)

30 MARKS

QUESTION 1

- a. What is assembly language? (2 marks)
- b. Differentiate between a microcontroller and a microprocessor (4 marks)
- c. Define the following with suitable examples:
 - i. Assembly language pseudo-code (4marks)
 - ii. Assembler directives (4marks)
- d. Write an assembly language program for 8051 microcontroller to add two binary numbers 1011b and 0010b and complement the result then store the final result in register R0. (6marks)
- e. Illustrate the structure of assembly language instruction with suitable example (5marks)
- f. What are the merits of assembly language over high level languages (5marks)

SECTION B (ATTEMPT ANY TWO QUESTIONS)

40 MARKS

QUESTION 2

- a) Explain the following addressing modes with suitable examples. (6marks)
 - i. Register addressing mode
 - ii. Immediate addressing mode
 - iii. Absolute addressing mode
- b) Explain the significance of the following assembler directives in atypical assembly language program with suitable examples. (4marks)
 - i. ORG
 - ii. END
- c) An LED is connected to P1.0 of the microcontroller and a switch to P2.0. Write an assembly language program to monitor the status of the switch and whenever it is pressed a high to low pulse is sent to P1.0 to blink the LED. (10marks)

QUESTION 3

- a) Draw a well labeled diagram of the architecture of 8051 microcontroller (6marks)
- b) Write an assembly language program to perform the logical operation of ANDing three input signals on P1.1, P1.2 and P1.4 and display an inverted result on port pin P2.7 of 8051 microcontroller. (10marks)
- c) Illustrate the differences between microcontrollers and microprocessors (4 marks)

QUESTION 4

- a) Explain the following types of instructions: (6 marks)
 - i. Arithmetic instructions
 - ii. Branch instructions
 - iii. Logical instructions
- b) Write an assembly language program to blink an LED connected to P0.4 infinitely with a delay of 5 machine cycles in between the blink sequence (10marks)
- c) What are mnemonics? Give example (4 marks)

QUESTION 5

- a) Explain the functions of the following special function registers in 8051 microcontroller. (6 marks)
 - i. Accumulator register
 - ii. The program counter register
 - iii. The stack pointer
- b) Write an assembly language program to perform the following tasks
 - i. Subtract two hexadecimal numbers 2F and 0F (4marks)
 - ii. Multiply two binary numbers 0111b and 1010b and find the 1's compliment of the result and store the final result in register R4. (6 marks)
- c) Distinguish between an assembler and a compiler (4 marks)