MCS-012(S)

MCA (Revised) / BCA (Revised)
Term-End Examination
December, 2018

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MCS-012(S) : COMPUTER ORGANISATION AND ASSEMBLY LANGUAGE PROGRAMMING

Time : 3 hours   *Maximum Marks : 100*

(Weightage 75%)

*Note : Question number 1 is **compulsory** and carries 40 marks. Attempt any **three** questions from the rest.*

1. (a) Using K-map, simplify the following function in Sum of Product form :   5

    $F(A, B, C, D) = \Sigma(2, 4, 5, 7, 11, 12, 15)$

    Also draw the logic circuit for the simplified expression.

    (b) (i) Add (-100) and (-105) in 8-bit registers using signed 2's complement representation for negative numbers.   2

    (ii) Convert decimal number 65·41 to binary.   2

(c) What is a zero address machine ? Write a program to compute the following expression using zero address machine : *4*

$$F = (A/B) + (C * D) - E$$

(d) A digital computer has a memory unit of 64 K × 8. *5*

  (i) How many data input and data output lines does it have ?

  (ii) How many address lines does it have ?

  (iii) What is the memory capacity in bytes ?

(e) Calculate the physical address given the following 8086 register contents : *4*

  (i) SS = 7698h
       SP = 01FFh

  (ii) CS = 5526h
       IP = 8874h

(f) Simplify the boolean expression

$$F = \overline{\overline{A + B} + \overline{(A + \overline{B})}}.$$ *3*

(g) What is the minimum set of registers for von-Neumann machine ? What are the functions of these registers ? *4*

(h) Write micro-operations for the following : 5

    (i) ADD R1, X

       (Add the contents of location X to register R1 and place the result in R1).

    (ii) Interrupt processing

(i) Write 8086 assembly language program that finds the maximum value among a list of 5 byte numbers. The result should be stored in BX register. 6

2. (a) Explain the working of CD-ROM and DVD-ROM with the help of a block diagram. 5

(b) Using Manning code what should be the length of the error detection code that detects error in one bit ? Justify, using suitable example. 5

(c) Explain the set associative cache memory mapping scheme with the help of an example. 7

(d) Explain the following terms : 3

    (i) Seek Time for Hard Disk

    (ii) Latency Time for Hard Disk

    (iii) Hit Ratio for Cache Memory

3. (a) How many RAM chips of 256 × 1 bits are required to build 32 Mbytes of memory ? 5

(b) Draw an internal organization of 32 × 4 RAM and explain the purpose of its associated control signals. 5

(c) How can an interleaved memory mechanism be used to improve the processing speed of a computer system ? 4

(d) Draw a 4-bit right-shift register and explain its operation. 6

4. (a) Discuss the features and principles of RISC processing. 5

(b) Suppose the value of register R1 is 1101 1110. Perform the following micro-operations : 6

(i) Insert 0010 in place of the leftmost 4-bits

(ii) Clear all the bits of R1

(iii) Arithmetic left shift of R1

(c) Discuss the design and operation of the Wilkes control unit with the help of a diagram. 6

(d) What are the assembler directives ? Explain the purpose of the following 8086 assembler directives : 3

(i) Segment

(ii) Assume

5. **(a)** Write a program in 8086 assembly language that accepts a character string of maximum size of 10 characters from the keyboard and converts the string to upper case. **8**

(b) What will be the output of the following 8086 assembly language statements ? **6**

    (i)   SAL BX, 01 if CF = 0

    (ii) ROR BX, 1

    (iii) SHR BX, 01 if CF = 0

    Given : BX = 1001 1101 1011 1011

(c) Draw the logic diagram, characteristic table and excitation table for a T flip-flop. **6**