

**MASTER OF COMPUTER  
APPLICATIONS/BACHELOR OF  
COMPUTER APPLICATIONS  
(REVISED) (MCA/BCA)  
Term-End Examination**

**December, 2019**

**MCS-012 : COMPUTER ORGANIZATION AND  
ASSEMBLY LANGUAGE PROGRAMMING**

*Time : 3 Hours*

*Maximum Marks : 100*

*Weightage : 75%*

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*Note : Question No. 1 is compulsory and carries  
40 marks. Attempt any three questions from  
the rest.*

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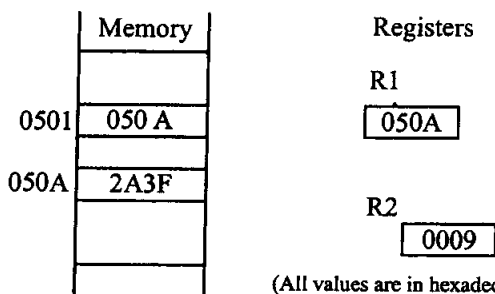
1. (a) Perform the following operations using 8 bit signed 2's complement notation. Also state whether overflow has occurred or not. 6
- (i)  $(-56) + (-72)$

(ii)  $(-73) + 84$

(iii)  $57 + 71$

- (b) Simplify the following Boolean function in SOP form by using k-map. Also draw the logic diagram of the simplified function using AND-OR-NOT gates : 5
- $F(A, B, C, D) = \Sigma(0, 2, 8, 10, 12, 13, 14)$ .
- (c) Consider a main memory of the size 64 kB with each word being of 8 bits (one byte) only and a direct mapping Cache memory of size 4 kB also having data word size of 8 bits. Find the following : 4
- (i) What is the size of tag and index fields of cache ?
- (ii) In what location of Cache, hexadecimal address to main memory (AABB) (if exists in cache) will be located ?
- (d) What is Programmed Input/Output ? Explain with the help of a diagram. 3

- (e) A disk has 300 tracks with each track having 500 sectors. The disk rotates at a speed of 9000 r.p.m. (revolution per minute) and has a seek time of 20 millisecond. Find the access time on the disk. 3
- (f) Consider the following memory and register values (all values and addresses are in hexadecimal) :



What will be value of operand, if the following addressing modes are used ? 4

- (i) LOAD (0501)<sub>h</sub> (Direct Addressing)
- (ii) LOAD Indirect (0501)<sub>h</sub> (Indirect Addressing)
- (iii) Load Indirect R1 (Register Indirect Addressing)
- (iv) Load IA R2 0501 (IA → Indexed Addressing)

- (g) What is fetch cycle in the context of an Instruction cycle ? Explain the sequence of micro-operations that will be required in fetch cycle. 5
- (h) Find the physical address in the context of 8086 microprocessor, given the following values of register pairs (all values are in hexadecimal) : 4
- (i) Code Segment (CS) : (FABF)<sub>h</sub>  
Instruction Pointer (IP) : (1432)<sub>h</sub>
- (ii) Stack Segment (SS) : (OFFF)<sub>h</sub>  
Stack Pointer (SP) : (0110)<sub>h</sub>
- (i) Write a program using 8086 assembly language that finds the sum and average of two byte values stored in memory locations X<sub>1</sub> and X<sub>2</sub>. The sum should be stored in AX register and average in BX register. 6
2. (a) Assume a 4 bit binary exponent in a floating point number has a bias of 8. How will you represent the following exponent.

values (in binary) (Also indicate if a value cannot be represents) : 3

(i) - 7

(ii) 3

(iii) 9

(b) What is a parity bit ? Explain with the help of an example. What is an error detection and correction code ? Is parity bit an error detection and correction code ? Give reasons in support of your answer. 5

(c) What is the use of decoder ? Draw the truth table and logic diagram for  $2 \times 4$  decoder. Also explain the working of the decoder. 6

(d) Draw the logic diagram and make the characteristic table of a J-K flip-flop. Construct the excitation table for J-K flip-flop from the above, explain the process of construction. 6

3. (a) Explain the sector layout on a CD-ROM with the help of a diagram. Assume that a CD-ROM and a hard disk has same number of tracks, sector size and recording surfaces, which of the two will have more storage capacity ? Justify your answer. 6
- (b) What is the role of DMA ? Explain the functioning of a DMA with the help of a diagram. 6
- (c) Explain any *four* of the following terms in the context of input/output technologies : 8
- (i) SCSI
  - (ii) Scan codes in keyboard
  - (iii) Resolution of display devices
  - (iv) Colour depth in display devices
  - (v) Drive cache
  - (vi) Print resolution

4. (a) Explain the role of stack in subroutine call and return statements with the help of an example and diagram. 6
- (b) A register R1 contains 01110110, what would be the content of register R2 if the following operations are to be performed on R1 using R2 ? 6

Attempt any *three* of the following :

- (i) Selective set of upper four bits of R1.
- (ii) Selective complement of lower four bits of R1.
- (iii) Masking the lower four bits of R1 to zeros, upper four bits remain unchanged.
- (iv) Clear all the bits of R1.
- (c) Explain the working of Wilkes control unit with the help of a diagram. 5
- (d) List any *three* characteristics of RISC architecture. 3

5. (a) Explain with the help of an example, how loops can be implemented in 8086 assembly language programming. 5
- (b) List any *three* features of EXE programs. 3
- (c) Explain the following 8086 assembly language instructions with the help of an example each : 9
- (i) XCHG
  - (ii) CMP
  - (iii) ROL and RCL
- (d) What is a NEAR procedure call in 8086 assembly language ? 3