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No. of Printed Pages : 8

MCS-012

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%

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

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

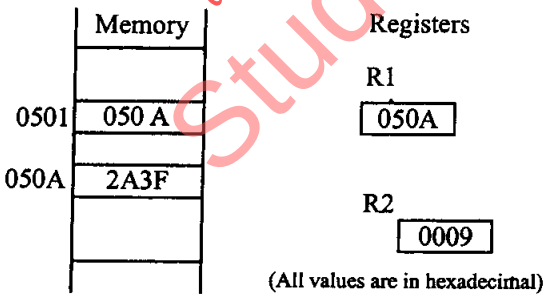
(i) What is the size of tag and index fields of cache ?

(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 $(0501)_h$ (Direct Addressing)

(ii) LOAD Indirect $(0501)_h$ (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) : $(FABF)_h$

Instruction Pointer (IP) : $(1432)_h$

(ii) Stack Segment (SS) : $(OFFF)_h$

Stack Pointer (SP) : $(0110)_h$

(i) Write a program using 8086 assembly language that finds the sum and average of two byte values stored in memory locations X_1 and X_2. 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 2×4 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