No. of Printed Pages : **4**

MCS-012

MCA (Revised)

07367

Term-End Examination

June, 2012

MCS-012 : COMPUTER ORGANISATION & 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.*

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1. (a) Perform the following operations using 2's complement notation . You may assume the length of register / operand to be maximum of 8 bits. Also indicate the overflow condition, if any: **5**

(i) $-27 + (-101)$

(ii) $-59 + 75$

(iii) $+27 + 101$

(iv) $-75 + 69$

(b) A combinational circuit takes four bit input and output an odd parity bit for the input bits. For example, if input is 0001, the output is 0 as the number 1's in the input string is odd; whereas for an input 0101, it output 1. 7

(i) Draw the truth table for the proposed circuit.

(ii) Use K-map to find the optimal expression for the output.

(iii) Draw the resultant circuit using AND-OR-NOT gates.

(c) Assume that a computer has 64 byte RAM. The system has a cache of 4 blocks with each block of 32 bit size. Find the location of main memory whose address is 17 , if: 6

(i) Direct mapping is used

(ii) Two way set associative mapping is used.

(d) What is an Interrupt ? How can an interrupt help in enhancing the performance of Input / Output ? 3

(e) What is a micro-operation ? What are the various micro-operations that will be performed in sequence to fetch an instruction from the memory to an Instruction Register (IR) ? Assume suitable set of available registers. 5

(f) What is an instruction in the context of computer organisation ? Explain the purpose of various elements of an instruction with the help of a sample instruction format. 4

(g) What is the purpose of Interrupt Vector Table in 8086 micro processor ? Explain. 4

(h) Write a program in 8086 assembly language to find the largest value in an array of 5 elements stored in the memory . You have to store the result in a memory location. 6

2. (a) What is the difference between S-R and J-K flip-flops ? Draw the logic diagram and characteristic table for J-K flop-flip. Create the excitation table for J-K flip-flop from the characteristics table. Show the steps of this process. 10

(b) What is DMA ? Why is it needed ? How is it different from an I/O processor ? 5

(c) What is the use of large register file of RISC architecture ? Explain with the help of an example/diagram. 5

3. (a) The average seek time of a disk is 20 ms. The disk has 4 platters and each track has 128 sectors. Assuming that the disk rotates at 3000 rpm, find the access time of the disk. Make suitable assumptions, if any. 5

(b) Name any four hard drive interfaces . Why are such interfaces needed ? 4

(c) Consider the register R1 has the value 01011010. Choose register R2 values to perform following operations on register R1. 6

(i) Mark the upper four bits of R1

(ii) Insert the value 1100 as the upper four bits of R1

(iii) Clear R1 register

(iv) Complement the lower four bits of R1.

(d) Explain the following 8086 microprocessor addressing modes with the help of an example each : 5

(i) Direct

(ii) Register indirect

(iii) Indexed

4. (a) Explain the execution of CALL and RETN (function/ subroutine call and return from subroutine /function) instructions with the help of an example and / or diagram. 6

(b) Write a program in 8086 assembly language that compares two strings stored in the memory . Assume that strings end with a character @. 8

(c) What is a multiplexer ? Why is it needed ? Draw a logic diagram and related truth table for a multiplexer. 6

5. Explain the following with the help of an example /diagram , if needed : 20

(a) Floating point number representation

(b) RAID level 1 and level 3

(c) Programmed Input / Output

(d) Segment registers in 8086

(e) Wilkes control unit