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MCS-012

MASTER OF COMPUTER APPLICATION/BACHELOR OF COMPUTER APPLICATION (REVISED) (MCA/BCA)

Term-End Examination

December, 2020

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.*

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1. (a) Perform the following computation using binary 2's complement notation, assuming the register size to be of 8 bits. Also check for occurrence of overflow : 6

   (i) – 63 + 74

(ii) – 128 + 39

(iii) + 86 + 42

(b) Explain the meaning of 'minterm' in the context of digital logic circuits. Make the truth table and simplify the following Boolean function in SOP form using K-maps. Also draw the logic diagram : 5

$F(A, B, C) = \Sigma (0, 1, 4, 6, 7)$

(c) The main memory of a computer is of 64 K words size having a word size of 16 bits. The cache of this computer also has a block size of 16 bits having 256 blocks. Answer the following questions if direct mapping scheme has been followed : 5

(i) Size of tag and index fields of cache address.

(ii) In which address of cache a main memory address (AFBA) can be found ?

(iii) What will be the action of memory management system if the stated memory address is not found in cache location ?

(d) What is an Interrupt ? Explain any ***one*** technique that can be used to determine which device has issued the interrupt. 4

(e) Assume that an instruction has been fetched in Instruction Register (IR) of a computer, and has been decoded. R register DR is to be used for fetching the operand and AC register is to be used for calculation. Write and explain the various micro-operations for the purpose of execution of the instruction :

Add AC, A

where A is memory location which has the operand and the address of A is presently stored in MAR. 4

(f) Explain the horizontal and vertical micro-instruction format with the help of a diagram each. Which of the two micro-instructions is faster ? Give reason in support of your answer. 6

(g) Write a program in 8086 assembly language that stores $(FEDC)_h$ in AX register and $(BA98)_h$ in BX register. It then stores the values of AL, AH, BL and BH in four consecutive byte locations in the memory. Make suitable assumptions. 6

(h) What is Memory Interleaving ? Discuss its advantages. 4

2. (a) Explain the concept of S-R flip-flop with the help of logic diagram and characteristic table. Make and explain the excitation table of S-R flip-flop. 6

(b) How normalization and biasing are used for representation of floating point numbers ? Explain using a suitable example. 5

(c) Briefly explain the following : 6

(i) RAID

(ii) Charge Coupled Devices

(iii) Seek Time of a Disk

(d) Describe the concept of address space and memory space in virtual memory with the help of an example. 3

3. (a) Explain the following addressing schemes with the help of an example of each : 6

(i) Indexed Addressing

(ii) Base Register Addressing

(iii) Relative Addressing Scheme

(b) Explain the concept of instruction pipelining with the help of a diagram. 5

(c) Explain the following instructions of 8086 microprocessor : 6

(i) CMP

(ii) JMP

(iii) RCL

(iv) SHR

(d) Explain the advantages of using segments in 8086 microprocessor. 3

4. (a) Draw the truth table of a 8 × 3 encoder. Also, write the expressions for the outputs in terms of inputs. 5

(b) Explain the advantages of having densely packed integrated circuits. 4

(c) What is an I/O interface in a computer ? List the functions of I/O interfaces. 5

(d) Explain the features and uses of the following I/O devices : 6

(i) DVD-ROM

(ii) Printer

(iii) Scanner

5. (a) What is an Interrupt Vector Table (IVT) for a 8086 microprocessor ? Explain with the help of a diagram, how interrupts are processed using IVT. 6

(b) What is the role of flag register in 8086 microprocessor ? Explain the use of (i) overflow flag (ii) string direction flag, (iii) parity flag in 8086 microprocessor. 4

(c) Explain the working of Wilkes control unit with the help of a diagram. 5

(d) List any ***five*** characteristics of RISC machines. 5