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MCS-012

**MASTER OF COMPUTER
APPLICATIONS/BACHELOR OF
COMPUTER APPLICATIONS/POST
GRADUATE DIPLOMA IN COMPUTER
APPLICATIONS (MCA/BCA/PGDCA)**

Term-End Examination

December, 2021

**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 indicate overflow, if it occurs : 5
- (i) Subtract (– 56) and (+ 72)

(ii) Add (– 58) and (– 70)

(iii) Add (– 75) and (+ 38)

(iv) Add (– 25) and (+ 76)

(v) Add (+ 57) and (– 57)

- (b) Simplify the following function in SOP form by using K-map. Also draw the logic diagram of the simplified function using AND-OR-NOT gates : 5

$$F(A, B, C, D) = \Sigma(0, 2, 5, 7, 13, 15)$$

- (c) Consider a DRAM chip is a square memory array of size (1024 × 1024 × 8) bits. 4
- (i) What would be the number of address lines for this memory array ?
- (ii) How many input or output data bit lines will be required for this chip ?
- (iii) What is the need of refresh counter which is part of a DRAM chip ?
- (iv) How many such chips will be needed to make a memory of 4 MByte ?
- (d) What is the need of an I/O interface in a computer ? 3

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- (e) What is FAT in the context of a disk ? How is it different to Inode ? 3
- (f) Explain the following addressing schemes with the help of an example each : 6
- (i) Indexed addressing scheme
 - (ii) Register indirect addressing scheme
 - (iii) Relative addressing scheme
- (g) Explain the sequence of micro-operations of an interrupt cycle for a simple machine having registers Accumulator (AC), Instruction Register (IR), Memory Address Register (MAR), Memory Buffer Register (MBR) and Program Counter (PC). 4
- (h) Write a program in 8086 assembly language that compares the two byte values stored in two consecutive memory locations. The bigger of the two values is put in AL register. 5

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- (i) Explain with the help of an example, how a 16-bit address of an operand in an instruction of 8086 microprocessor, is converted to 20 bit address with the help of segment register(s). 3
- (j) What is an assembler ? 2
2. (a) Explain any *three* advantages of densely packed integrated circuits. 3
- (b) Explain the differences between fixed point representation and floating point representation. 4
- (c) Explain the process of error detection and correction with the help of a diagram. 4
- (d) Draw logic diagram to show how NOR gate can be used to implement NOT, OR and AND logic. 4
- (e) Draw the logic diagram of T flip-flop. Explain its working and make

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characteristics table for T flip-flop. Also make the excitation table for T flip-flop. 5

3. (a) Explain with the help of a diagram the Direct Cache mapping scheme for a machine having 64 byte memory with cache memory of size 8 byte. Assume the block size of main memory as 1 byte and size of each cache line as 1 byte. Make and state suitable assumption, if any. 5
- (b) Differentiate between programmed I/O and DMA techniques of I/O. 5
- (c) Explain any *five* of the following in the context of I/O organisation and technologies : 5×2=10
- (i) Access time of magnetic disk
 - (ii) Disk layout of CD-ROM and its advantages
 - (iii) Scan codes in the context of Keyboard
 - (iv) Classification of printers

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- (v) Memory mapped I/O
- (vi) Daisy chaining scheme of interrupt handling
- (vii) Graphic accelerators

4. (a) Given the content of register R1 as 10101100, and register R2 as 00110110. Perform the following operations on register R1 using register R2 : 4
- (i) Selective set R1
 - (ii) Selective clear R1
 - (iii) Selective complement R1
 - (iv) Mask operation on R1
- (b) What is an Instruction Pipeline ? Assuming that an instruction pipeline has only three stages as :
Instruction Fetch (IF), Decode (DE) and Execute (EX), draw a diagram that shows execution of 4 consecutive instructions using this pipeline. 4

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- (c) Compare the features of horizontal micro-instruction to vertical micro-instructions. Draw the diagram for a vertical micro-instruction. 5
- (d) List any *four* characteristics of RISC machine. 4
- (e) What are the different components of an instruction ? Explain with the help of an example. 3
5. (a) How can DOS function call be used to read a single character ? Explain with the help of an example. 4
- (b) Given the values of $AL = (05)_h$, $BL = (0A)_h$ and $CL = (01)_h$. What will be the value of carry flag and zero flag when the following instructions are executed :
- (i) $CMP\ AL, (0A)_h$ 1
- (ii) $CMP\ BL, (0A)_h$ 1
- (iii) $CMP\ CL, (0A)_h$ 2

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- (c) Explain the following instructions of 8086 microprocessor with the help of *one* example each : 8
- (i) ROL
- (ii) DEC
- (iii) XCHG
- (iv) XOR
- (d) Differentiate between .COM and .EXE program in the context of 8086 microprocessor. 4

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