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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

(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

(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

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

(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

(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 f 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

(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