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

Term-End Examination

June, 2023

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) Describe the structure of 8086 micro-processor with the help of a diagram. 6

   (b) What is an instruction cycle ? Explain with the help of a flowchart. 6

   (c) Represent the following numbers using IEEE-754 floating point single precision number format : 4

      (i) 1010.0001

      (ii) – 0.0000111

   (d) Explain instruction pipeline with the help of a diagram. 4

   (e) What are the different kinds of Interrupts ? How does CPU know that an interrupt has occurred ? 5

   (f) What is DMA ? Explain the functions of DMA. 5

   (g) Consider a four variable Boolean function :

   $$F = \Sigma(0, 4, 6, 7, 8, 10, 11, 15)$$

   Minimize this function using K-map and draw the resultant function using logic gates. 6

   (h) Convert decimal number $(49.25)_{10}$ into : 4

      (i) binary

      (ii) hexadecimal

      (iii) octal

2. (a) Explain the differences between micro-programmed control and hardwired control. 5

(b) Draw and explain the logic diagram of a 3 × 8 decoder. 5

(c) Design a combinational circuit with three inputs x, y, z and three outputs A, B, C. When the binary equivalent of input to this circuit is 0, 1, 2 or 3 the binary output is one greater than the input. When the binary equivalent of input is 4, 5, 6 or 7 the binary output is one less than the input. Also draw the truth table. 6

(d) Find the 9's and 10's complement of 128. Then convert 128 to binary and find 1's and 2's complement. 4

3. (a) Add 25 and (– 25) in binary using 8-bit register for the following representations : 6

   (i) Signed magnitude representation

   (ii) Signed 1's complement

   (iii) Singed 2's complement

(b) Explain the following instructions of 8086 assembly language with the help of an example : 8

   (i) ADC

   (ii) MUL

   (iii) XOR

   (iv) ROL

(c) Explain the role of Interrupt Vector Table (IVT) in the context of 8086 micro-processor with the help of a diagram. 6

4. (a) The following memory units are specified by the number of words times the number of bits per word. How many address lines and input-output data lines are needed in each case ? 4

   (i) 2K × 16

   (ii) 64K × 8

(b) What is a micro-operation ? Explain the sequence of micro-operations required to fetch an instruction stored in the memory in the context of a Von Neumann machine. 6

(c) Explain the following addressing modes with the help of an example of each : 6

   (i) Register addressing

   (ii) Index addressing

   (iii) Direct addressing

(d) Find the even and odd parity bits for the following 7-bit data : 4

   (i) 1010101

   (ii) 0000111

5. (a) Explain the terms ASCII and UNICODE. 3

(b) Register 'A' holds 8-bit binary 11011001. Determine B operand and the logic micro-operation to be performed in order to change the value in A to :   6

(i) 0000 1001

(ii) 1111 1001

(iii) 0010 0110

(c) Write the assembly language code using 8086 assembly language for performing the following operation :   6

$$Z = ((A - B) / 10 * C) * 2$$

(d) Explain the use of circular overlapped register window in a RISC processors with the help of a diagram.   5