MCS-012

MCA (Revised)

Term-End Examination

December, 2008

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.*

1. (a) Add the following using 2's complement representation in 8-bit register.

(i) + 50 and − 60

(ii) + 75 and + 25

(iii) − 70 and − 65

(iv) + 75 and − 45

What do you mean by overflow in binary arithmetic ? Indicate overflow, if any, in the problems above. *6*

(b) Explain the construction of a 4-bit Adder/Subtractor circuit. 6

(c) Explain the output of the following instructions. (Register AX = $0A60_H$) 6

(i) ROL AX, 2

(ii) SHR AX, 2

(iii) NEG AX

(d) Represent $75{\cdot}5 \times 10^3$ in IEEE-754 single precision format. 4

(e) List the main features of RISC machines. 4

(f) How is programmed input/output different from interrupt driven input/output ? 2

(g) Draw and explain the logic diagram of a RAM cell. 5

(h) What is meant by "General Purpose Register Architecture" ? What are its advantages and disadvantages ? 4

(i) Write the code sequence in 8086 assembly language to evaluate the following C statement :

Z = A – B * C ; 3

2. (a) Explain the Hamming Error Correcting Code for 4-bit data. A 4-bit data 1100 is transmitted and received as 1000. Show how the error is detected by Hamming Error Correcting Code. *8*

(b) A computer uses a memory unit with 256 K words of 32 bits each. A binary instruction code is stored in one word of memory. The instruction has four parts : (1) an indirect bit, (2) an operation code, (3) a register code part to specify one of the 64 registers, (4) a memory operand part to specify a direct memory operand. *6*

(i) How many bits are there in the operation code, register code part and address part of the memory operand ?

(ii) Draw the instruction word format and indicate the number of bits in each part.

(c) Explain the use of stack in subroutine call in 8086 micro-processor using suitable diagram. *6*

3. (a) Explain the following addressing modes for 8086 processor with the help of one example each : *5*

(i) Indirect Addressing

(ii) Base Addressing

(b) Write an Assembly Language program to find the sum of first ten natural numbers. 5

(c) Discuss the advantages of using DMA for data transfer in a computer system. Discuss operations of DMA with the help of suitable diagram. 5

(d) List the four types of micro-operations. Give one example for each type of micro-operation. 5

4. (a) Differentiate between hardwired control unit and micro-programmed control unit. Also draw the block diagram for hardwired control unit and explain the control memory organization. 8

(b) Explain the concept of instruction pipelining, with the help of a suitable diagram. How does it improve the performance of a computer system ? What are the problems associated with instruction pipelining ? 8

(c) The seek time of a disk is 20 ms. It rotates at the rate of 6000 revolutions per minute (r.p.m.). Each track on this disk has 200 sectors. Calculate the access time for this disk. 4

5. (a) Explain the main features and architecture of 8086 processor with the help of suitable diagram. Also discuss the importance of using segment registers. *10*

(b) Explain the following with the help of a suitable example/diagram : *10*

(i) Optical storage devices

(ii) Virtual memory

(iii) Programmable Logic Arrays (PLA)

(iv) EEPROM