COMP – 5-3 (RC)

T.E. (Comp.) (Semester – V) Examination, November/December 2009
(Revised Course)
MICROPROCESSORS AND MICROCONTROLLERS

Duration : 3 Hours Total Marks : 100

Instructions: *1) Answer **any five full** questions with atleast **one** question from **each** Module.*
*2) Assume suitable data, if **necessary**.*
*3) Draw figure **whenever** required.*

MODULE – 1

I. a) Discuss the various instruction groups for Intel 8086 microprocessor with examples. **8**

b) Write an algorithm and 8086 assembly language program to multiply 32 bit unsigned integer by 32 bit unsigned integer number. **6**

c) Suppose that you have the following initial content of registers and memory :
AX=1A22H BX=3C40H CX=4502H SP=1000H BP=1002H
Determine the content of SP, and modified registers and memory locations after the execution of each of the following instructions starting from the initial content of the registers and memory (Fig. 1), for the execution of each instruction.

i) POP AX
ii) PUSH BX
iii) MOV CX, [BP + 1]
iv) Call Sub, where the call is a near call and Sub is at an offset address 3000H from the Code Segment. Suppose that the instruction following the Call Sub instruction is at offset FE11H.
v) RET 1. **6**

Memory	Location Content
0FFD	1A
0FFE	CF
0FFF	36
1000	1B
1001	60
1002	32
1003	FF

Fig. 1 Memory Contents

P.T.O.

II. a) What are instruction prefixes in the instruction set of the 8086 ? Explain their usage with appropriate examples. 6

b) Discuss the segmented memory organization of the 8086 microprocessor. What is a logical address and physical address ? Give advantages and disadvantages of segmented memory. 8

c) Describe the response of 8086 to the following five primitive string operations : MOVS CMPS, SCAS, LODS and STOS. 6

MODULE – 2

III. a) Convert the decimal number 2345.5625 to binary, normalized binary, long-real and temporary real format and explain why are most floating point numbers are approximations. 6

b) i) Which 8087 stack register is ST after a reset ?

ii) Which 8087 stack register will be ST after one data item is read into the 8087 ?

iii) Describe the operation that will be done by the 8087 FADD st(2), st(3) instruction.

iv) How does the operation of the instruction FADDP st(2), st(3) differ from the operation of the instruction ? Given in (iii). 4

c) Write a program to compute the roots of a quadratic equation $ax^2 + bx + c = 0$ using 8087 co-processor instructions. 6

d) Discuss various exception condition which can occur when 8087 is executing its instructions. How does 8087 takes care of these exceptions ? Discuss NAN for 8087. 4

IV. a) Explain the architecture of the 8087 floating math co-processor with a neat diagram. Highlight the host processor – coprocessor interface. 7

b) Briefly describe the conditions cause the 8086 to perform each of the following types of interrupts : Type 0, Type 1, Type 2, Type 3 and Type 4. 5

c) Implement the external procedures for inputting and outputting integer numbers through the keyboard. (Use interrupt services and appropriate comments). 8

MODULE – 3

V. a) Write a program and command word to intialize 8255 in the configuration given below :

Port A : Simple Input

Port B : Simple Output

Port CL : Output

Port CU : Input

Assume address of the control word register of 8255 is 83H. 3

b) Interface stepper motor to the 8086 microprocessor system and write an 8086 assembly language program to control the stepper motor. 8

c) Interface an ASCII keyboard to 8086 through 8255 for interrupt I/O and write ALP to get 100 characters. Make suitable assumptions for interrupt driven programs and comment all assumptions. 9

VI. a) Interface an ADC to 8086 and demonstrate the BSR mode of 8255 operation. Write 8086 ALP to acquire 100 data by polling. 10

b) Explain a method of measuring the period between two events (events generates pulses) using 8254. 6

c) Describe different modes of communication supported by 8251. 4

MODULE – 4

VII. a) Interface four 4K X 8 EPROMs and four 4K X 8 RAM chips with 8086. Draw suitable memory maps. 10

b) List the major hardware and software features that 80286 microprocessor has beyond those in the 8086. 6

c) What is the purpose of IDTR ? Explain briefly. 4

VIII. a) Draw the block diagram of 8051. Explain each block in detail. 10

b) List out SFRs supported by 8051 and its purpose. 6

c) Explain different types memories used in 8051 with its prime purpose. 4