T.E. (Computer Engineering) (RC) (Semester – V)
Examination, Nov./Dec. 2012
MICROPROCESSOR AND MICROCONTROLLER

Duration : 3 Hours | Max. Marks : 100

Instructions : 1) *Assume **suitable** data **if** necessary.*
2) *Answer **any five** questions; attempt at least **one** question from **each** Module.*
3) *Draw **neat** diagrams **if** required.*
4) *Write question numbers **legibly** while answering.*
5) *Write description for the questions based on the marks **allotted**.*

MODULE – I

1. 1) Consider the following :

```
.data
Var 1 BYTE 12h, 13h, 14h, 15h, 16h, 17h, 18h, 19h
Var 2 LABEL WORD
Var 3 LABEL DWORD
Num EQU 5
Var 4 BYTE 22h, 23h, 24h, 25h, 26h, 27h, 28h, 29h.
```

Answer the following :

a) What is the value contained in AX after the execution of the following statement (pick one and give the proof) :

MOV AX, OFFSET var3

A) 0008h B) 000Ah C) 0001h

b) What is the value of register BX after the execution of the following instruction (pick one and give the proof) :

MOV BX, Var 2 + 6

A) 2726h B) 2827h C) 2928h

c) What is the value of register EBX (EBX is 32 bit base register supported in 80386 processor and onwards) after the execution of the following instruction ?

MOV EBX, Var3

A) 29282726 h B) 25242322h C) 27262524h **6**

P.T.O.

2) Can we write following instructions for microprocessor 8086 ? Also state the reason for validity and invalidity.

MOV CX, AL

MOV DS, 437AH

MOC BL, [BX]

MOV 43 H [SI], DH

MOV CS : [BX], DL . 5

3) For the following instructions compute the address of the memory operand for 8086 :

a) MOV Ax, [BX]

b) MOV AL, [BP + SI]

Assume :

CS = 0100H DS = 0200H SS = 0400H ES = 0030H

BP = 0010H DX = 0020H SI = 0300H SP = 0030H

Clearly show computations. 5

4) What is the difference between Shift Right (SHR) and Shift Arithmetic Right (SAR) instructions ? 2

5) What is the difference between AND and TEST instructions ? 2

2. 1) Write an 8086 program to sort in ascending order using bubble sort algorithm, given set of byte sized unsigned numbers in memory. The sorted elements should replace the original unsorted elements in memory. Use comments to explain the logic and assumptions. 10

2) What are re-entrant procedures ? With the help of a neat diagram explain the program execution flow for re-entrant procedure. 6

3) With the help of neat timing diagram explain the read cycle of 8086. 4

MODULE – II

3. 1) Write a program to compute the roots of a quadratic equation $ax^2 + bx + c = 0$. Using 8087 co-processor instructions. 8

   2) Explain the architecture of the 8087 floating math co-processor with a neat diagram. Highlight the host processor – coprocessor interface. 12

4. 1) 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. 6

   2) Discuss with suitable examples all data type supported by 8087 math coprocessor. 6

   3) What is IO processor 8089 ? Describe the need of that processor in 8086 architecture. Explain with outline diagram. 8

MODULE – III

5. 1) Draw a circuit for interfacing an 8 × 8 matrix keyboard to 8086 through 8255A. Write 8086 ALP to identify a key being pressed. 10

   2) Discuss the organization and architecture of 8255 programmable peripheral interface IC with a functional block diagram. 10

6. 1) Design a stepper motor controller and write an ALP to rotate shaft of a stepper motor in clockwise 5 rotations. The 8255 port A address is 0740H. The stepper motor has 200 teeth. 10

   2) With the help of neat diagram, explain Synchronous and Asynchronous serial transmission with the help of USART. 10

MODULE – IV

7. 1) It is required to interface two chips of 32 K × 8 ROM and four chips of 32 K × 8 RAM with 8086, according to following memory map

ROM 1 and 2 F0000H-FFFFFH

RAM 1 and 2 D0000H-DFFFFH

RAM 3 and 4 E0000H-EFFFFH

Show the implementation of this memory system. **10**

2) Describe how segment based protection is implemented in an 80386 system operating in protected mode. **10**

8. 1) Draw the Block diagram of 8051. Explain each block in detail. **10**

2) Explain the timer register of 8051. **5**

3) Explain the memory map of 8051. **5**