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Sixth Semester B.E. Degree Examination, June/July 2013

Microprocessors

Time: 3 hrs.

Max. Marks: 100

Note: Answer FIVE full questions, selecting at least TWO questions from each part.

PART – A

1. a. With a neat diagram, explain the CPU architecture of 8086. (08 Marks)
- b. Define any four addressing modes used in 8086 microprocessor. Identify addressing modes used in each of the following 8086 instructions:
 - i) MOV BX, 0354H
 - ii) ADD AL, [BX + 04]
 - iii) MOV AX, [BX + SI]
 - iv) MOV AX, [BX + SI + 04] (08 Marks)
- c. If DS = AB40H, CS = 9960H, SS = 3B00H, BP = 7E74H, SP = 0135H, SI = 1245H, DI = 4356H, then determine physical address of the following instructions:
 - i) MOV [BP + DI + 6], AH
 - ii) ADD AL, [5036H] (04 Marks)
2. a. What do you mean by segment override prefix? Give an example. (04 Marks)
- b. Explain the role of AAD and AAM instruction of 8086 microprocessor with an example. (06 Marks)
- c. Write an assembly level language program to sort the numbers in ascending order using Bubble sorting technique. The program should be written using assembler Directives. (10 Marks)
3. a. What are Assembler Directives? Explain the following directives with an example for each:
 - i) ASSUME
 - ii) PUBLIC and EXTRN
 - iii) GLOBAL
 - iv) ALIGN16 (09 Marks)
- b. Write an ALP to search a given character in the array of characters using string instructions. What is the role of SI, DI registers and DF bit? (05 Marks)
- c. Write an ALP to read a string from the keyboard and display the reversed string on the monitor screen. (06 Marks)
4. a. Define interrupts. Explain TYPE0, TYPE1, TYPE2, TYPE3 and TYPE4 interrupts. (06 Marks)
- b. Explain hardware interrupts of 8086 microprocessor. (04 Marks)
- c. Differentiate macros and procedures. (04 Marks)
- d. Write a macro to read a character without echo and to read a string of characters from the keyboard. (06 Marks)

PART – B

5. a. Define Stepper motor. Explain the interfacing of a stepper motor to 8086 microprocessor with necessary circuit diagram. Write an ALP to rotate the stepper motor clockwise by n steps and anticlockwise by m steps. (10 Marks)
- b. Interface 4 × 4 keyboard to 8086 microprocessor using 8255. Write the necessary circuit diagram and an ALP. (10 Marks)

- 6 a. What are the functions of following 8087 instructions? Explain.
- i) FCOMP
 - ii) FENI
 - iii) FDECSTP
 - iv) FSTENV
 - v) FYL2XPI
- (10 Marks)
- b. Write a program using 8087 instructions to compute the volume of the sphere using MASM syntax.
- (06 Marks)
- c. Explain the control register format of 8087.
- (04 Marks)
- 7 a. With a neat diagram, explain the maximum mode operation of 8086. (08 Marks)
- b. What are the characteristics of PCI and USB interface? (06 Marks)
- c. Interface Printer 8086 processor with relevant signals of importance. Explain using a flowchart. (06 Marks)
- 8 Write short notes for the following:
- a. 80386 special registers (06 Marks)
 - b. Salient features of 80486 processor (06 Marks)
 - c. Pentium CPU architecture (08 Marks)

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PART – A

- 1 a. Explain with neat diagram, the internal architecture of 8086 microprocessor. Clearly state the function of the following:
 - i) BUS interface unit
 - ii) Execution unit
 - iii) Segment registers. (08 Marks)
- b. What is addressing mode? Explain with example the different addressing modes in 8086? (08 Marks)
- c. Explain “program status word” in 8086 with example. (04 Marks)
- 2 a. Explain template for 8086 MOV instruction. Also generate the op-code for the following instructions:
 - i) MOV AX, BX
 - ii) MOV AX, [BX]. (08 Marks)
- b. What are assembler directives? Explain the following assembler directives with examples:
 - i) EQU
 - ii) ORG
 - iii) PROC. (04 Marks)
- c. Discuss the different types of 8086 arithmetic instructions with example for each type. (08 Marks)
- 3 a. Explain REPE CMPSB instruction with example. (06 Marks)
- b. Differentiate between MACROS and PROCEDURES. (06 Marks)
- c. Write a procedure to convert a packed BCD number to its binary equivalent. Use the method of passing parameters in registers. (08 Marks)
- 4 a. Describe the action taken by 8086 when NMI pin is activated. (06 Marks)
- b. Write a subroutine to perform the following in 8086: i) Set trap flag; ii) Reset trap flag. (06 Marks)
- c. What are hardware interrupts? Write the function of atleast-five dedicated software interrupts in 8086. (08 Marks)

PART – B

- 5 a. Write an ALP to rotate stepper motor five rotation clockwise and five rotation anti clockwise direction with same speed for both the direction. Assume step angle of stepper motor is 1.8 degree. Assume rotor teeth = 200. (10 Marks)
- b. Interface an 4 × 4 keyboard and write a program to read the code of a pressed key. (10 Marks)

- 6 a. Describe with examples the integer data types in 8087 and compute the range of values that can be represented by these data types? (08 Marks)
- b. Represent 23.25 using 80 bit temporary real format use hex format for expressing the answer. (04 Marks)
- c. Explain the following instruction of 8087 with example: i) FMULP ST(1), ST; ii) FSUBP ST(1), ST; iii) FCOM ST(2); iv) FLDPI. (08 Marks)
- 7 a. Explain minimum mode configuration of 8086, with a neat diagram. (08 Marks)
- b. Differentiate between minimum mode and maximum mode. (05 Marks)
- c. Explain the operation of reset section of 8284A clock generator. (07 Marks)
- 8 a. Explain the function of the following 80386 pins:
i) $\overline{\text{LOCK}}$; ii) $\overline{\text{ADS}}$; iii) $\overline{\text{NA}}$; iv) $\overline{\text{READY}}$; v) $\overline{\text{ERROR}}$; vi) $\overline{\text{RESET}}$; vii) $\overline{\text{D/C}}$. (07 Marks)
- b. Draw and discuss the register set of 80386 and explain a typical function of each of the register. (07 Marks)
- c. List the salient features of 80486 (06 Marks)

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