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Fourth Semester B.E. Degree Examination, June/July 2016
Microprocessors

Time: 3 hrs.

Max. Marks: 100

**Note: Answer any FIVE full questions, selecting
atleast TWO questions from each part.**

PART – A

1. a. What is a microprocessor? Explain how data, address and control busses interconnect various system components. (05 Marks)
 b. Explain in detail with a neat diagram, the working of the internal architecture of the 8086 microprocessor. (10 Marks)
 c. Giving the format of the 8086 microprocessor's flag register, explain in detail each flag bit. (05 Marks)

2. a. Explain the following addressing modes with examples :
 i) Direct addressing
 ii) Immediate addressing
 iii) Register indirect addressing
 iv) Base plus index addressing
 v) Base relative plus index addressing. (10 Marks)
 b. Explain how virtual address is translated into physical address in 8086 microprocessor. Given : CS = 2000h, DS = 4000h, ES = 6000h, SS = 8000h, BX = 300h, BP = 200h, SI = 100h and LIST = 0014h
 Find the physical address for the following :
 i) MOV DL, LIST[SI]
 ii) MOV AL, LIST[BX] [SI]
 iii) MOV AH, CS : [BX]
 iv) MOV CL, 23h [BP]. (06 Marks)
 c. Explain the working of PUSH and POP instructions indicating the state of the stack after the execution of the instructions. (04 Marks)

3. a. Giving the general machine language instruction format of a MOV instruction, generate the machine code for the following instructions :
 i) MOV DL, [DI]
 ii) MOV [1000H], DL
 iii) MOV [BP], DL
 iv) MOV WORD PTR [BX + 1000H], 1234H. (10 Marks)
 b. Write an ALP to sort five 8-bit numbers stored in an array in descending order using bubble sort algorithm. (06 Marks)
 c. Explain the working of XLAT instruction, illustrate its importance using a suitable program. (04 Marks)

4. a. Explain the following instructions with examples :
 i) DAA ii) RLC iii) AAM iv) MOVSB. (08 Marks)
 b. Write an ALP using 8086 instruction set to count the number of ones in a given 8 – bit number and store the result at a memory location. (07 Marks)
 c. What is a procedure? Explain the sequence of operations that take place when a procedure is CALLED and RETURNed. (05 Marks)

PART – B

- 5 a. Differentiate between :
- i) Assembler and linker
 - ii) PUBLIC and EXTERN
 - iii) Macros and procedures. (06 Marks)
- b. What are modular programs? Explain. Using the PUBLIC and EXTERN directives write a program in assembly language that reads a string into an array in one module and converts the string to uppercase in another module. (08 Marks)
- c. What is recursion? Explain. Write an ALP to find the factorial of a single digit positive number using recursive procedure. (06 Marks)
- 6 a. Explain the significance of the following pins of an 8086 microprocessor :
- i) READY ii) $\overline{\text{TEST}}$ iii) ALE iv) HOLD. (04 Marks)
- b. With neat timing diagrams explain read bus cycle and write bus cycle. (08 Marks)
- c. With a neat diagram, explain the minimum mode configuration of 8088 microprocessor based computing system. (08 Marks)
- 7 a. Differentiate between memory mapped IO and IO mapped IO. (04 Marks)
- b. What is address decoding? Why is it required? Explain how a 3 – 8 line decoder could be used to interface 64K memory using 8K memory chips. (08 Marks)
- c. Design a memory system to interface $8 \times 8\text{K}$ EPROM and $8 \times 4\text{K}$ SRAM to 8088 microprocessor. Assuming SRAM memory starts from 00000H and EPROM from E0000h. (08 Marks)
- 8 a. Explain the control word format of 8255 PPI in IO mode and BSR mode. Construct control words for the following :
- i) Port A input, PORT B output and PORT C output ports
 - ii) PORT A bi-directional mode, PORT B output port
 - iii) Set PC1 and reset PC5. (08 Marks)
- b. With a neat block schematic diagram explain the internal architecture of 8254 PIT. (08 Marks)
- c. What is DMA? Why is it required? Explain the basic DMA operation. (04 Marks)
