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15EC42

## Fourth Semester B.E. Degree Examination, June/July 2017 Microprocessor

Time: 3 hrs.

Max. Marks: 80

**Note: Answer FIVE full questions, choosing one full question from each module.**

### Module-1

- 1 a. Explain the internal architecture of 8086 with its neat block diagram. (08 Marks)  
 b. Explain briefly any 4 addressing modes of data of 8086 with an example for each. (06 Marks)  
 c. If CS = 1000 H, DS = 25A0H, SS = 3210H, ES = 5890H, BX = 43A9H, BP = 3400H, find the physical address of the source data for the following instructions:  
     (i) MOV AL, [BX+1200H]  
     (ii) ADD BL, [BP+05] (02 Marks)

**OR**

- 2 a. Write down the instruction formats for the following two types of cases of 8086 and form the opcode for the indicated instruction:  
     (i) Register to Register; ADD AX, BX  
     (ii) Immediate to Register; ADD CX, 1200 H. (06 Marks)  
 b. Write 8086 program to find the smallest number out of N 16 bit unsigned numbers stored in a memory block starting with the address 2000 H. Store the result at word location 3000 H. (08 Marks)  
 c. Briefly explain the following 8086 instructions:  
     (i) XLAT      (ii) NEG (02 Marks)

### Module-2

- 3 a. Write a complete assembly language program in 8086 which replaces all the occurrences of character '-' in a given string by '\*'. (08 Marks)  
 b. Verify whether any of the following instructions are wrong and correct them with reasons. Assuming following is a program, what is the value of register BX and flags CY, Z, P, S at the end.  
     (i) MOV BX, 0804H  
     (ii) INC [BX+02]  
     (iii) ADD 06H, AL  
     (iv) SHR DX, 02  
     (v) XOR BL, BL (08 Marks)

**OR**

- 4 a. Briefly explain the operations of the string instructions of 8086, indicating the initializations required to use them. (06 Marks)  
 b. Write a complete assembly language program for block move of a source data (10 bytes) present in a memory block starting with address SOURCE to a destination block starting from address DSTN, using MOVS instruction. Consider overlapping of blocks also. (08 Marks)  
 c. Explain briefly any 4 assembler directives. (02 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
 2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

**Module-3**

- 5 a. (i) Explain the stack structure of 8086 and the operations of PUSH and POP instructions.  
 (ii) Sketch the content of stack memory indicating the value of SP register before PUSH BX operation and after the PUSH BX operation. Assume SS = 2500 H, BX = 432AH and SP = 1000 H. (08 Marks)
- b. Write a procedure in 8086 assembly language which computes the factorial of an 8 bit number passed through AL register. The factorial value (maximum 8 bit) is returned through AL register. (08 Marks)

**OR**

- 6 a. What are the sequence of actions taken by 8086 and the device, when a device interrupts 8086 over INTR line? Explain about the software and reserved internal interrupts of 8086. (08 Marks)
- b. What are the differences between a procedure and a macro? Create a macro that would find the logical NAND value of two operands. (04 Marks)
- c. What are the methods that can be used to pass parameters to a procedure? Explain any one of them with an example. (04 Marks)

**Module-4**

- 7 a. Sketch the minimum mode configuration of 8086 and explain the operation briefly. (08 Marks)
- b. Interface two 4K×8 EPROM and two 4K×8 static RAM chips to 8086. The addresses of RAM and ROM should start from FC000H and FE000H respectively. (08 Marks)

**OR**

- 8 a. Sketch the maximum mode configuration of 8086 and explain the operation briefly. (08 Marks)
- b. Interface a 7-segment LED to 8086 using a 74LS373 latch for I/O address 0CH. Write a program that simulates a single digit seconds counter on the LED digit. (Assume a one second software delay is available) (08 Marks)

**Module-5**

- 9 a. Interface ADC 0808/0809 to 8086 using 8255 and write a program to convert the analog voltage connected to the last channel. Store the digital value in the location 2000H. (08 Marks)
- b. Interface a stepper motor to 8086 using 8255 and write a program to rotate the motor in clockwise direction 5 steps or in counter clockwise direction 10 steps, depending on whether the content of memory location 2000H is 00H or FFH respectively. (08 Marks)

**OR**

- 10 a. Explain the architecture of NDP-8087 with its internal block diagram. (08 Marks)
- b. Write a program in 8086 using DOS 21H interrupt which waits for a key to be pressed from the keyboard. If the key is 'G' display the message 'GOOD' on the CRT and display the message 'VERY GOOD', if the key V is pressed. Display 'NOT VALID' if any other key is pressed. (05 Marks)
- c. Explain mode-2 operation of 8254 timer briefly. What is the control word to be used to operate counter-1 in mode-2 binary? (03 Marks)

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