



University of Technology
Department of Communication Engineering
Final Examination 2016-2017

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UNIVERSITY OF TECHNOLOGY

Subject: Microprocessor Engineering(I)
Division: all Divisions
Examiner: Dr. Sundus Dhamad

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Time: 3 Hours
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Answer Five (5) Questions



Q.1: What are the addressing mode and the physical address for the specified operand in each of the following instructions? If you know that: (ES) = 1A00H, (DS) = 4200H, (SS) = D000H, (BX) = 0200H, (BP) = 1000H, (DI) = 0300H, (SI) = 0400H, (SP) = 1020H, temp = 0245H.

- 1- Destination operand of: MOV [BX+4H], DX.
- 2- Source operand of: MOV AL, [SI].
- 3- Source operand of: MOV CL, temp [BP].
- 4- Destination operand of: MOV [BP+DI], AX.
- 5- Source operand of: MOV AX, [temp].
- 6- Source operand of: MOV BL, [BP+SI-9H].
- 7- Source operand of: MOV DH, temp [100H].
- 8- Destination operand of: MOV [BX], CH.
- 9- Destination operand of: MOV temp [DI], DL.
- 10- Source operand of: MOV AH, [030FH].

(20 Marks)

Q.2: (Choose any two)

A) Draw the waveforms of Input bus cycle of 8086 MPU in minimum mode of operation.

(10 Marks)

B) What are the types of buses? Explain with block diagram.

(10 Marks)

C) Find the organization for each of the following with the indicated number of address and data pins: (i) 11 address, 8 data SRAM. (ii) 13 address, 16 data ROM. (iii) 9 address, 4 data DRAM. (iv) 16 address, 8 data ROM. (v) 8 address, 2 data DRAM.

(10 Marks)

Q.3: Write an 8086 assembly language program to find the result of the following equation:

$$Z = 10X - 5Y + \frac{1}{4}(X + Y)$$
, using the shift instructions to implement multiplication and division operations. If you know that the values of X and Y are stored in memory locations starting with offset [100H], store the result in memory location with offset [400H].

(20 Marks)

Q.4: Answer the following:

- 1- What are the types of interrupt?
- 2- Write a single instruction that will load BX from address [1E20 H] and ES from address [1E22 H].
- 3- What is the duration of bus cycle in 8086 MPU if the clock is 10 MHz and three wait states are inserted?
- 4- If (CL) = 02H and (AX) = D3A2H, determine the new content of AX and carry flag after executing the instruction SAR AX, CL.
- 5- When the BIU is free to read the next instruction code?

(20 Marks)

Q.5:

1. When **MN /MX** is grounded, ----- mode of operation is selected for 8086 MP.
2. A physical address is a ----bit address; an offset address is a ----bit address.
3. To set all bits of an operand to 1, it should be ORed with -----.
4. Which register is used as the offset register with segment register CS? -----.
5. The CPU is divided into two independent functional units: -----, -----.
6. What is the information appears on the address/data bus of the 8086 while ALE is active?
-----.
7. If READY pin is grounded, it will introduce -----state into the bus cycle of the 8086 MP.
8. The bus is -----.

(20 Marks)

Q.6: Write an 8086 assembly language program to compute the average of numbers that stored in memory locations with the offset between [400H- 40FH], store the average in memory location starting with the offset [250H].

(20 Marks)

