



United International University (UIU)

Dept. of Computer Science & Engineering (CSE)

Final-Term Exam::Trimester::Summer 2022

Course Code: CSE 425 Course Title: Microprocessor, Microcontroller and Interfacing

Sec: (A, B) Total Marks: 40

Duration: 2 hour

Any examinee found adopting unfair means would be expelled from the trimester/ program as per UIU disciplinary rules.

Question 1: Answer all the questions.

(14 Marks)

- a. For microprocessor 80286, the value of the DS register is 30H. The offset value is 21H. G bit is set to 1. Now consider the following table and answer the questions:

[3 + 2 + 3]

Global descriptor table	
Index	Address
5H	Base: A07000H limit: 0FFFFH access right: 1H
6H	Base: A06000H limit: 0FFFFH access right: 0H
7H	Base: A05000H limit: 0FFFFH access right: 2H
8H	Base: A04000H limit: 0FFFFH access right: 1H
9H	Base: A03000H limit: 0FFFFH access right: 0H
AH	Base: A02000H limit: 0FFFFH access right: 2H

Local descriptor table	
Index	Address
5H	Base: B70000H limit: 0FFFFH access right: 1H
6H	Base: B60000H limit: 0FFFFH access right: 0H
7H	Base: B50000H limit: 0FFFFH access right: 2H
8H	Base: B40000H limit: 0FFFFH access right: 2H
9H	Base: B30000H limit: 0FFFFH access right: 1H
AH	Base: B20000H limit: 0FFFFH access right: 0H

- Which entry, table and requested privilege level are selected?
- Calculate** the starting and ending physical address of the segment.
- Calculate** the physical address of the offset value.

- b. **Explain briefly** how virtual memory solves the limited physical memory problem.

[2]

- c. Consider the following fetch cycle in an 8086 BIU:

[4]

[Fetch, Fetch, Fetch, Fetch, Fetch, Fetch, Fetch, Fetch]

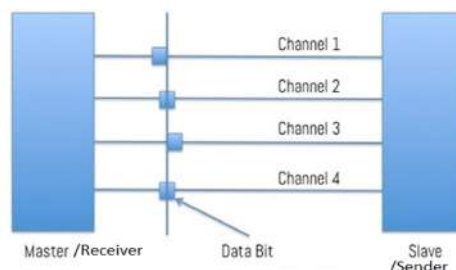
When the first instruction is being executed, two instructions are fetched and saved in the instruction queue. If the 2nd instruction is a '**MOV <address>**' instruction and the 5th is a '**JUMP <7th instruction address>**', then **draw** the corresponding BIU and EU's cycle.

Question 2: Answer all the questions.

(8 Marks)

- a.

[3]



Describe the phenomenon in the above picture. Explain briefly why it occurs.

- b. Master (index:3H) receives 4 byte data (char 'FaIL') from the slave (index:9H). **Draw** the corresponding sequence diagram.

[5]

Question 3: Answer all the questions.**(10 Marks)**

- a. An SAP has following instruction sets:

[6]

Instruction Syntax	Op-code of the Instructions	Machine Code	A Register (Initial value 1H)	B Register (Initial value 6H)
LDA <address>	1H	75H		
ADD <address>	3H	59H		
SUB <address>	5H	17H		
LDB <address>	7H	36H		
OUT	9H	92H		
HLT	8H	81H		

Table i : Opcode

Table ii : Machine code

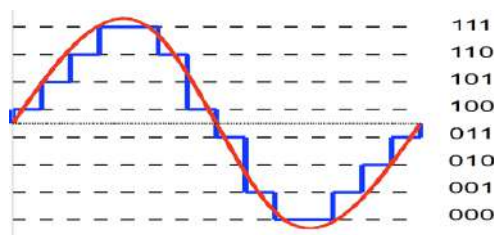
Now, **Determine** the A and B register value after execution of each instruction in table ii

- b. Write an assembly code and corresponding machine code for evaluating the following expression. Use the opcode given in **Question 3.a** :
 $-20 - 12 - 5$.

4

Question 4: Answer all the questions.**(8 Marks)**

- a. An electrical sensor has the four inputs A, B, X and Y where the value of these inputs can be either 0 or 5V. The output of the sensor depends on these four inputs where the output voltage relation is $V_{out} = A + \frac{1}{2}B + \frac{1}{4}X + \frac{1}{8}Y$. Now, answer the followings: [2 + 2]
 i) **Explain in detail** if the above sensor is an Analog or a digital sensor.
 ii) If $V_{out} = 1.25V$, then **determine** this sensor's input reading.
- b. An ADC on an Arduino system converts an input analog signal to the output digital signal as shown in **Fig. 4(c)**. The quantization levels are shown in the figure. [2+2]

**Fig. 4(c)**

Now, answer the following questions:

- i) If the analog voltage is 2.7V, then **determine** the converted digital binary output for a 3.5V Arduino system.
- ii) In **Fig. 4(c)**, we can see that the digital signal is not as accurate as the analog signal, **explain briefly** what you should do to get a more accurate digital signal, similar to the analog signal

