United International University (UIU)

Dept. of Computer Science & Engineering (CSE)

Final Exam::Trimester::Spring 2022

Course Code: CSE 425 Course Title: Microprocessor, Microcontroller and Interfacing
Sec: (A, B, C) Total Marks: 40 Duration: 2 hours

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

Question 1: Answer all the questions. (10 Marks)

a. [3 + 2 + 1]

Global Descriptor Table	
Index	**Address**
3H	Base: A1270000, Limit: 0FFFFH, Access right: 05H, G = 1
4H	Base: A2370000, Limit: 0FFFFH, Access right: F1H, G = 0
5H	Base: A3470000, Limit: 0FFFFH, Access right: 11H, G = 1
6H	Base: A4570000, Limit: 0FFFFH, Access right: B2H, G = 1
7H	Base: A5670000, Limit: 0FFFFH, Access right: FEH, G = 1
8H	Base: A6770000, Limit: 0FFFFH, Access right: 07H, G = 0

Local Descriptor Table	
Index	**Address**
3H	Base: B1270000, Limit: 0FFFFH, Access right: 02H, G = 1
4H	Base: B2370000, Limit: 0FFFFH, Access right: C1H, G = 0
5H	Base: B3470000, Limit: 0FFFFH, Access right: FEH, G = 1
6H	Base: B4570000, Limit: 0FFFFH, Access right: C2H, G = 1
7H	Base: B5670000, Limit: 0FFFFH, Access right: D1H, G = 1
8H	Base: B6770000, Limit: 0FFFFH, Access right: A0H, G = 0

The above table is the descriptor table for 80386 uP, For a segment register value of 39H, determine the followings:

I. Which entry, table and requested privilege level are selected?
II. Starting and Ending address of the segment.
III. For an offset value of 15H, determine the physical address.

b. In the paging memory technique, a paging table is shown below. Answer the followings: [2+2]

I. If a program task is in virtual page address no. 10, then explain what will happen when the microprocessor tries to execute the task.
II. Which virtual page address numbers generate 'page fault' according to the below table.

Question 2: Answer all the questions. (10 Marks)

a. [1+3]

I. In the SAP-1 architecture, why is the input to RAM from MAR 4 bit but the output from RAM to the bus is 8 bit?
II. Write down the program (assembly language and machine language) to get the result in SAP-1 for the following arithmetic expression: **25+20-18-30** (decimal)

Virtual Page Address	Real Page Address
5	0
9	1
2	2
8	3
0	4
1	5
7	6
3	7
10	8
4	9
6	10

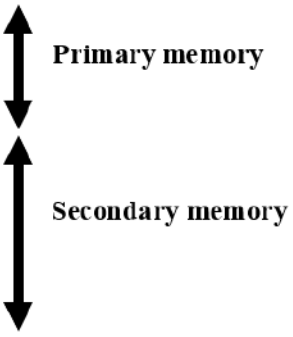

Fig: Table for question 1b

b. For LDA <memory address> (Load the content of memory address to Accumulator) instruction, write the control words for Execute Cycle (T4, T5, T6) [6]

Control Word = $C_P E_P \bar{L}_M \overline{CE}$ $\bar{L}_I \bar{E}_I \bar{L}_A E_A$ $S_u E_u \bar{L}_B \bar{L}_O$

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

a. Consider a weather monitoring system. It has two modules. An outdoor module is used to collect environmental data from sensors. Another module is the central base station. The base station utilizes the collected data to forecast the weather condition. Now, suggest a system build for each module whether you will use a microprocessor or microcontroller based system. Give reasoning using two to three sentences for each build. [4]

b. I. What is quantization error? The 10-bit ADC of the Arduino on a 5V system. If the analog voltage is 3.54V then what will be the ADC report as a value? [3+3]

II. In the microcontroller, 12 bit digital to analog (DAC) resolution is set. During the digital to analog conversion programming, you have called "analogWrite (2048)" instruction. Calculate the duty cycle. Draw the duty cycle diagram. Consider the system voltage is 6 V.

Question 4: Answer all the questions. (10 Marks)

a. Draw the BUS timing diagram for write operation in 8086 for all the necessary PINS. [4]

b. a. Slave (index: 15H) sends a 3 byte data (char 'Hi') to a master (index: 4H). Draw the corresponding sequence diagram. [4+2]

b. If another master (index: 5H) wants to read the data from the slave (index: 15H), explain briefly when the master (index: 5H) will start to talk on the bus to read the data if bus busy technique is used.