Department of Electrical & Computer Engineering (ECE)

North South University

Course Code: 331, Section: 2

Course Title: Microprocessor Interfacing & Embedded System

Mid Exam, Summer 2018

Time: 75 Minutes **Marks: 50**

*Please read the questions very carefully and answer accordingly. All the answers should be written in the answer script that is provided. Calculators/pens/pencils are allowed. Adopting any unfair means during the exam will automatically result in expulsion without any prior/post notice. You **must return back your question paper** with your answer script.*

Q1. Please answer all the following questions:

(a) Draw the **rudimentary** block diagram of a microprocessor based system. Explain the **problems** involved in the rudimentary block diagram. How the problems can be addressed providing a **standard** block diagram? **5**

(b) Write both **ASM Code** for the following instruction: **3**

Read three numbers from AX, BX and CX registers. Compare the numbers and write the **smallest number** in the **last memory** location of MPU 8086 and **largest number** in the **first memory** location of MPU 8086.

(c) The following **ASM code** is stored in **CSM** :- **12**

(Instruction 1) 0100:3FFE - MOV AX, 0002 H ; *66 B8 02 00*

(Instruction 2) 0100:3FFA - MOV DS:[BX], AX ; *67 66 89 07*

(i) What are the **Segment Base Address (SBA)** for the above ASM instruction? Calculate the **Physical Address** for both Instruction.

(ii) Show how the codes will be stored in the **physical memory location** using a memory-table.

(iii) What will be the values of **BHE/, RD/, WR/, M-IO/, DT-R/, DEN/** physical pins of MPU 8086 for the prompted ASM code?

(iv) How many **Machine Cycles** are required for individual instruction?

Q2. Please answer all the following questions: **3**

(a) Find out the **addressing mode** for the following ASM codes:

i. IN AL, 02 H

ii. MOV AX, 0009 H

iii. MOV AX, 0000 H
MOV DS, AX

(b) Write the ASM Code for the following instructions: **4**

i. Check whether AL is **even or odd**
ii. Clear the **bits** of BL register those are in **even position** (*starting index: 1*)

(c) Check whether the data stored in AL register is **Palindromic.** **4**

(d) Explain the difference between **Signed Jump** and **Unsigned Jump**? What are the difference between the following operational codes:- **6**

CMP, SUB **SAR, SHR**

(e) **Set** the **sign bit** of AX register and store the value of AX in the **SSM.** **3**

3. **Please answer <u>any one</u> question:** **6**

(a) What is **flag** register? Show the values of the **Status** flags once the following instructions have been executed:

(i) MOV AX, FFF5 H

(ii) MOV AL, 80 H
MOV BL, 01 H
SUB AL, BL

(iii) MOV AL, FD H
MOV BL, 02 H
ADC AL, BL

(iv) PUSHF

(b) How many **physical pins** and **data buses** are there in **RAM 6116**? How many **addresses** can be defined using those address lines. Write an ASM code to read the data from the **first memory** address of a **variable port address** of **PIO 8255** and write it to the **last memory** address of a **fixed port address of PIO 8255**. **4**

<u>OR</u>

(a) Draw the **internal architecture** of MPU 8086. Explain the **fetch** and **execution** mechanism with a neat figure for the following ASM code stored in CSM:- **7**

2000:3012 : MOV AX, WORD PTR DS:[BX] ; *67 66 8B 07*

(b) Define **Control Matrix (CM)**, **Instruction Stream Byte Queue (ISBQ),** and **Control Byte Register (CR)**. **3**