Department of Computer Science & Engineering
University of Asia Pacific (UAP)

Final Examination **Fall 2021** **3rd Year 1st Semester**

Course Code: CSE 311 **Course Title: Microprocessors and Assembly Language** **Credits: 3**

Full Marks: 150 **Duration: 3 Hours**

Instructions:

1. There are **Six (6)** Questions. Answer all of them. All questions are of equal value. Part marks are shown in the margins.
2. Non-programmable calculators are allowed.

1. a. Illustrate the pin configuration of 8086 microprocessor using appropriate figure. **[10]**

   b. Discuss the utility of the following pins (any 5): **[15]**
   - i. DEN
   - ii. ALE
   - iii. M/IO
   - iv. RQ/GT0
   - v. QS1, QS0
   - vi. DT/R
   - vii. CLK

OR

a. Discuss the benefits of maximum mode configuration of 8086 microprocessor over minimum mode. State the reason of using multiplexed address/data lines in 8086. **[10]**

b. Illustrate the write cycle timing diagram for minimum mode operation and specify different control signals that are generated in different clock periods along with the purposes they serve during the cycle. **[15]**

2. a. 8086 has 16-bit data bus but the memory is organized in byte form. Explain how you can solve this problem using memory bank concept with proper diagram. **[10]**

   b. Explain the concept of pipelining to speed up microprocessor and how is it implemented in 8086. Mention the drawbacks of this concept (if any). **[15]**

OR

a. Evaluate the memory capacity or maximum addressable memory of a microprocessor containing the following specification: **[10]**

   Data Bus = 32 bit

   Address Bus = 32 bit

   Illustrate the corresponding memory architecture using bank layout.

b. Represent the block diagram of the internal architecture of 8086 microprocessor. **[15]**

3. a. Suppose, AL = (Last 2 digit of your student id) h. **[15]**

(i) Write a code segment that will set both LSB and MSB of AL keeping other bits unchanged.
(ii) Write a code segment that will clear the sign bit of AL.
(iii) Write a code segment that will toggle the bits of AL.

b. Write an assembly code to reverse a bit pattern using shift and rotate instruction. **[10]**

4. a. Assume, DX contains 0000h, AX contains 0005h and BX contains FFFEh. Determine the decimal quotient, decimal remainder and the values of AX and DX after the following operation has been performed: **[10]**

(i) DIV BX
(ii) IDIV BX

b. Evaluate the status of the CF, PF, ZF, SF and OF flags of the following instructions with proper justification where AX contains FFFFh, BX contains FFFFh and CX contains 8080h. Each of these instructions are independent of each other. **[15]**

i) MOV AX, -5
ii) ADD AX BX
iii) SUB AL, CL

5. a. Translate the following high level language assignment statement to assembly code: **[10]**
ANSWER = 7 * A + 13 – B * C + D where ANSWER, A, B, C and D are words in memory. Assume no overflow and perform unsigned multiplication.

b. Analyze the addressing modes of the following instructions providing appropriate justification for your answer: **[15]**

i) SUB BL, [SI+BP+4000]
ii) MOV AX, [BX+DI]
iii) MOV AX, [SI]
iv) ADD BL, 99
v) XCHG AX, DX

6. a. Suppose DH contains A7h, CF=1 and CL=3. Determine the values of DH and CF (carry flag) at each step after the instruction RCR DH, CL is executed. **[10]**

b. Divide the unsigned number 65143 by 8 using shift instruction. Put the quotient in BX. **[10]**

c. Suppose AH contains 56h. Perform a comparative analysis between ROR and RCR using the given value. **[5]**