SET- A

AMERICAN INTERNATIONAL UNIVERSITY-BANGLADESH
Faculty of Science and Technology
Department of Computer Science
COE 3205 Computer Organization and Architecture (Section: ALL)

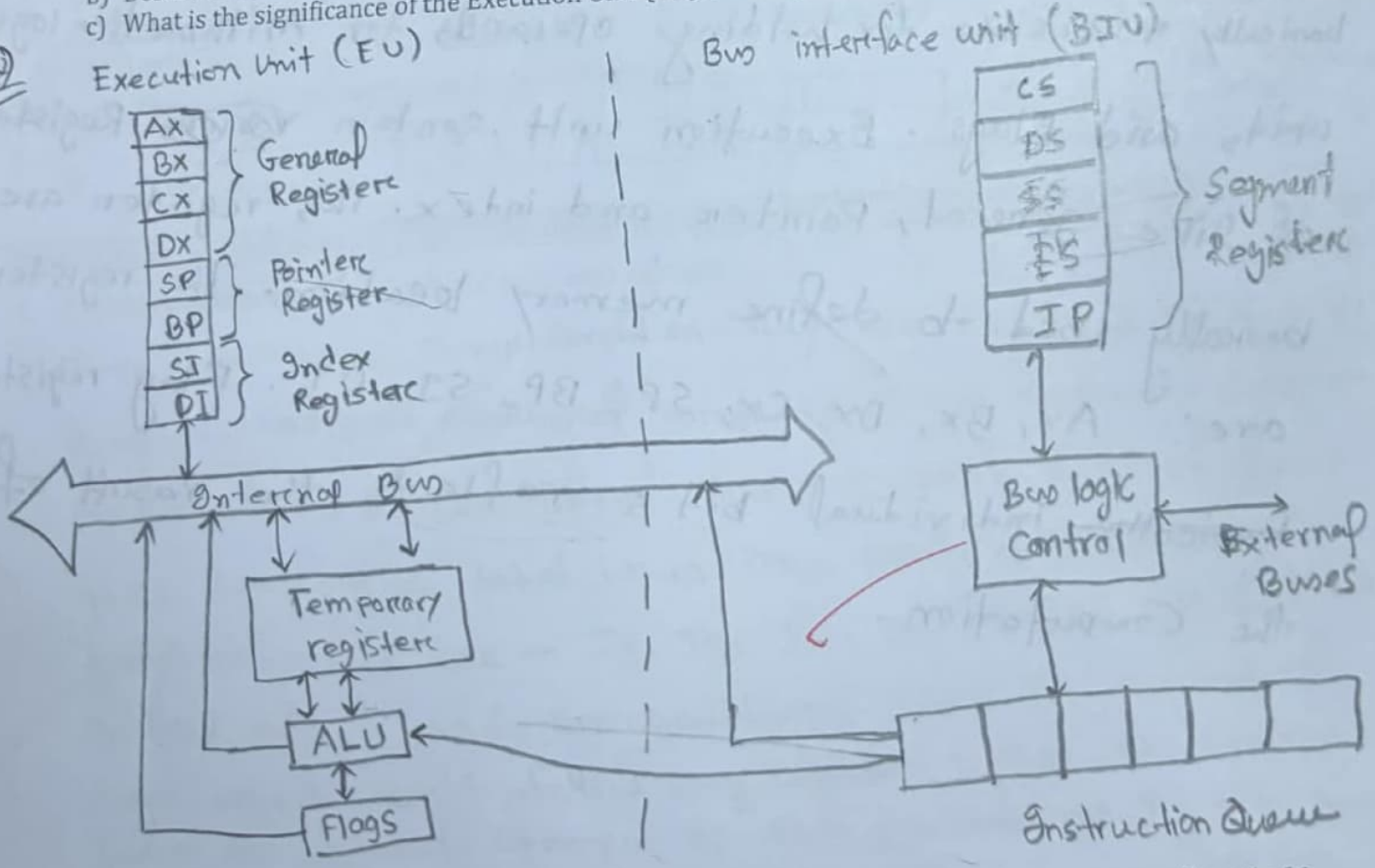
Mid Term Examination | Summer 2023-24
Total Marks: 100 | Moderator: Dr. Mohammad Rabiul Islam | Time: 2 hours

Specific Instructions:
1. There are five parts [Part-A, Part-B, Part-C, Part-D and Part-E].
2. Part-A is for OBE evaluation. Attempting this part is MANDATORY.
3. Answer Part-B [MCQ], in box as given on this Question Paper.
4. Answer ALL in the space provided in the Question Paper. You may use loose sheet for Part -E only.
5. Use of calculator is *STRICTLY* prohibited.

Name: Asadulla Al Mamun		Section: D	Invigilator's Sign
ID: 21-45862-3	Permit No: 0061726577 6	Date: 11-07-24	
Part – A (Answer All)	OBE Evaluation for CO3		[1 x 15=15 Marks]
	Evaluation Rubric		
Diagram Completeness (5)	Explanation of Components (5)	Depict of the Solution (5)	Total
5	4.5	4.5	14

1. You are given the task of designing a simple microprocessor communication system. Based on the design & demonstrate of your understanding define the following solution.
   a) Draw and label the internal organization of the 8086 microprocessors.
   b) Describe the role of the Bus Interface Unit (BIU) and how it interacts with other components?
   c) What is the significance of the Execution Unit (EU) in the operation of the 8086 microprocessors?

(a)



Part – B (Answer All)	Multiple Choice Questions	SET- A
		[10 x 1.5 = 15 Marks]

1. Subtraction is generally carried out by –
   (A) 1's complement method (B) 2's complement method
   (C) Both of them (D) None of them
2. The 16-bit flag registers of 8086 microprocessor are responsible to indicate_____
   (A) The result of the addition (B) The condition of ALU operation
   (C) The condition of memory space (D) None of them
3. When program is loaded in memory, SS will contain the ___ number of the stack.
   (A) Pointer (B) Register (C) Offset (D) Segment
4. A register in microprocessor that keeps tracks of the answers of arithmetic or logic operations is called—
   (A) Stack Pointer (B) Accumulator (C) Program Counter (D) Instruction pointer
5. If you have a computer with a processor of 4.3 GHz, how many pulses are generated per second from your computer?
   (A) 4300000000 (B) 430000000 (C) 43000000000 (D) None of them
6. The IP (instruction pointer) is ____ bits in length.
   (A) 4 bits (B) 8 bits (C) 16 bits (D) 32 bits
7. Suppose registers 'X' and 'Y' contain 30H and 20H respectively. After instruction MOV A, B; what will be the contents of registers A and B?
   (A) 20H, 20H (B) 30H, 30H (C) 20H, 30H (D) 30H, 20H
8. **Classroom** of AIUB is an example of _____
   (A) Bus (B) Register (C) Contents (D) Address
9. Which of the following are legal numbers?
   (A) 2B01 (B) 1,001 (C) 2467 (D) None of them
10. After the execution of MOV AX, -8 instruction which of the following flag register will be affected?
    (A) Carry Flag (B) Zero Flag (C) Overflow Flag (D) None of them

Write the Correct MCQ answer below in the Answer-box

1	2	3	4	5	6	7	8	9	10
B	C	D	C	A	B	A	D	C	D

Part – C (Answer 5 out of 6)	Mathematical Questions	[5 x 5 = 25 Marks]

1. Explain conditional and unconditional jump with example. [5]

There are three Jump Condition. they are (1) Signed conditional Jump. (2) Unsigned conditional Jump (3) Single statement Jump/un-Conditional Jump. Conditional Jump is that kind of Jump which jump to a label when any condition matched. The Conditional Jumps are — Jg, Jge, Jle, Jl, JA, JAE, JB, JBE etc. On the other hand, unconditional Jump is a kind of Jump which don't follow any condition rather it directly Jump to a label. Example of this unconditional Jump is Jmp.

ABFD2h
(-) ABD2h
A1400h

A9h
DEh
1CBh

-11
4

25
-14
11

A4h
DEh
25
-13
12

2. Determine the segment of a physical address ABFD2h, where the given offset is ABD2h in *segment: offset* form. [5]

Given Physical Address = ABFD2h
offset = ABD2h
Segment = ?

We know, PA = 10h × Segment + offset

⇒ 10h × Segment = PA − offset

⇒ 10h × Segment = A1400h

⇒ Segment = $\frac{A1400h}{10h}$

∴ Segment = A140h.

3. Write the content of AX and BX after executing the following instructions. [5]

1 MOV AX, A9A4H
2 MOV BX, 3ABAH
3 ADD BH, AL
4 SUB AH, BL
5 NEG AH
6 XCHG BH, AH

line NO	AH	AL	BH	BL
1/2	A9h	A4h	3Ah	BAh
3			DEh	
4	EFh			
5	11h			
6	DEh		11h	

∴ AX = DEA4h

~~BX = 35BAh~~

∴ BX = 11BAh

4. Translate the following high-level language to assembly language using MOV, ADD, and SUB instructions only, [5]

*B=A-2*B+3*

```
MOV AX,A
MOV BX,B
Add BX,B
Add BX,B
Add BX,3
SUB AX,BX
MOV B,AX
```

1100 1011
0011 0100
+ 1
0011 0101

35L

16) 30(1 14) 31(1
16 16
14 15

5. Consider AX contains 7FFFH, and BX contains 7FFFH, write the changes in the status flags after executing ADD AX, BX? [5]

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AX = 7FFFH
BX = 7FFFH

ADD AX, BX →

```
  1   1   1
  7   F   F   F   h  +
  7   F   F   F   h  +
-------------------
  F   F   F   E   h  (1)
(1)
```

1111 1110

SF = 1

ZF = 0

OF = 1

PF = 0

CF = 0

6. Assume AX contains 2DE6H and BX contains FD9Eh. Show SUB BH, AL using 2's complement and find the value of AX and BX. [5]

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Part – D (Answer All)	Output Tracing	[1 x 15=15 Marks]

2. Trace the output of the following code. [15]

```
.MODEL SMALL
.STACK 100H
.DATA
  CR EQU 0DH
  LF EQU 0AH
  MSG1 DB 'SAMPLE MESSAGE$'
  MSG2 DB 'STOP$'
.CODE
MAIN PROC
  MOV AX, @DATA
  MOV DS, AX
  MOV CX,5
  PRINT_:
  LEA DX, MSG1
  MOV AH,9
  INT 21H
  MOV AH, 2
  MOV DL, CR
  INT 21H
  MOV DL, LF
  INT 21H
  DEC CX
  JNZ PRINT_
  MOV AH, 2
  MOV DL, 0DH
  INT 21H
  MOV DL, 10
  INT 21H
  LEA DX, MSG2
  MOV AH,9

  INT 21H
  MOV AH,4CH
  INT 21H
  MAIN ENDP
END MAIN
```

Write the output here:

SAMPLE MESSAGE
SAMPLE MESSAGE
SAMPLE MESSAGE
SAMPLE MESSAGE
SAMPLE MESSAGE
STOP

Part – E (Answer 2 out of 3)	Code Writing	[2 x 15=30 Marks]

1. Write an assembly program to a) display '@' 5 times (use proper jump instruction), b) read 2 alphabets from the user on the next line c) display them in the correct order on the subsequent line. [15]

Sample Output:

@@@@@
ENTER TWO ALPHABETS: VR
THE CORRECT ORDER IS: RV

2. Write an assembly program to a) take TWO decimal digits from the user and store them in user defined variables, b) check the inputs are valid or not, c) display them and their subtraction on the next line according to the output. [15]

Sample output:

ENTER FIRST NUMBER: 7
ENTER SECOND NUMBER: Q
INVALID! TRY AGAIN
ENTER SECOND NUMBER: 5
THE DIFFERENCE OF 7 AND 5 IS 2

3. Write an assembly program that will a) display your name, ID and age within the new line, b) for ID, it takes three digits as user Inputs and, c) show the ID according to the output. [15]

Sample output:

ENTER THREE DIGITS: 123
YOUR NAME: MR. JOHN
YOUR ID: 11-22222-3
YOUR AGE: 20

Write the code in the extra loose sheet