Department of Computer Science & Information Technology
Faculty of Computing & Applied Sciences
Sir Syed University of Engineering & Technology

Mid Term Examination Solution: Spring 2021

Microprocessor & Assembly Language (CS-330)

Time Allowed: 1.5 Hour **Total Marks: 20 Marks**

Student Name:_____

Student Roll Number:_____

Instructions:

1. Use of scientific calculator is allowed while programmable calculator is prohibited.
2. Mobile Phones are strictly prohibited in examination premises.
3. Cheating attempt of any type will disqualify the candidate.
4. Do not detach the sheets. (Paper will be cancelled, if the sheets are detached).
5. Write your answers in ink. For drawings pencils may be used.
6. The work must be neat & clean. Over-writing, cutting will be considered as mistake.
7. Exchange / Borrow of Calculator or Stationery is not allowed.
8. The Answer Script must be returned back to invigilator before leaving exam hall.

This paper has a total of 05 pages including this title page

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Q.1. With the help of internal block diagram of 8086 microprocessor model briefly explain the pipelined microprocessor architecture. Also highlight the advantage and disadvantage of pipelined microprocessor architecture. **(05)**

Answer of Question # 1:

Follow Lecture # 01 from VLE for complete answer.

Q.2.

Q.2. (a) Find the errors in the following code: **(02)**	**Q.2. (b)** Write an assembly code for the given task: **(03)**

.MODEL ENORMOUS
.STACK
.CODE
DATA1 DB 1234H
.DATA
MAIN PROC NEAR
MOV AX, DATA
MOV DS, @DATA
MOV AL, DATA1
ADD AL, 4FH
START ENDP
END
	Write a program that transfers 100 words with the same value of 5689H from memory location 0100H to memory location with offset of 0500H.

Answer of Question # 2(a):

- There is no ENORMOUS model.
- PROC and ENDP must have same labels.
- .CODE and .DATA directives need to be switched.
- MOV AX, DATA should be MOV AX, @DATA
- MOV DS, @DATA should be MOV DS, AX
- END must have the entry point label MAIN.

Answer of Question # 2(b):

```
        .MODEL SMALL
        .STACK 64
        .DATA
        ORG 0100H
DATA1   DW 100 DUP (5689H)
        ORG 0500H
COPY    DW 100 DUP (?)
        .CODE
MAIN    PROC FAR
```

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```
        MOV AX, @DATA
        MOV DS, AX
        MOV SI, OFFSET DATA1
        MOV DI, OFFSET COPY
        MOV CX, 100
T_LOOP: MOV AX, [SI]
        MOV [DI], AX
        ADD SI, 2
        ADD DI, 2
        DEC CX
        JNZ T_LOOP
        MOV AH, 4CH
        INT 21H
MAIN    ENDP
        END MAIN
```

Q.3. Consider that DS = 1245H, SS = DAE8H, BP = 7356H, SI = 9876H, DI = B3D7H, BX = AF32H and AX = 69FBH, CX = 8653H and DX = 5654H. Identify the addressing mode and calculate the physical address of the memory and the contents of memory locations in each of the following: **(05)**

i) MOV [SI], AX
ii) MOV [DI+35], BX
iii) MOV [BX][DI]+280, CX
iv) MOV [3A26], DX

Answer of Question # 3:

(i) **Addressing Mode:** Indirect Register Addressing.
Physical Address: PA = (DS x 10H) + SI = 12450 + 9876 = 1BCC6H
Memory contents: 1BCC6 (FBH) and 1BCC7 (69H)

(ii) **Addressing Mode:** Indexed Relative Addressing.
Physical Address: PA = (DS x 10H) + DI + 35
PA = 12450 + B3D7 + 35 = 1D85CH
Memory Contents: 1D85C (32H) and 1D85D (AFH)

(iii) **Addressing Mode:** Based Indexed Relative Addressing.
Physical Address: PA = (DS x 10H) + BX + DI + 280
PA = 12450 + AF32 + B3D7 + 280 = 1F9D9H
Memory Contents: 1F9D9 (53) and 1F9DA (86)

(iv) **Addressing Mode:** Direct Addressing.
Physical Address: PA = (DS x 10H) + 3A26 = 12450 + 3A26 = 15E76H
Memory Contents: 15E76 (54H) and 15E77 (56H)

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Q.4. All the jumps below are short jumps, meaning that the labels are in the range of -128 to +127. Find the following for the given code of instructions: **(05)**

i) The IP address of all the jumps given in the code.
ii) State the forward jump or backward jump in the code.
iii) How many bytes each jump takes to reach its label.

IP	Opcode	Code
E06C	733F	JNC ERROR1
E06E	……..	MOV AX, 3456H
……..	……..	……
E072	7139	JNO ERROR1
E074	……..	MOV CX, 100H
……..	……..	……
???	8ED8	C8: MOV DS, AX
……..	……..	……..
E0A7	EBE3	JMP C8
E0A9	……..	CMP AX
……..	……..	……...
???	F4	ERROR1: HLT

Answer of Question #4:

(i) IP Address of ERROR1 by using JNC ERROR1:

3F + 6E = 0 0 1 1 1 1 1 1
0 1 1 0 1 1 1 0
1 0 1 0 1 1 0 1
(A) (D)

So, the IP Address of ERROR1 is **E0AD**.

IP Address of ERROR1 by using JNO ERROR1:

39 + 74 = 0 0 1 1 1 0 0 1
0 1 1 1 0 1 0 0
1 0 1 0 1 1 0 1
(A) (D)

So, the IP Address of ERROR1 is **E0AD**.

IP Address of C8 by using JMP C8:

E3 + A9 = 1 1 1 0 0 0 1 1
1 0 1 0 1 0 0 1
1 1 0 0 0 1 1 0 0
(8) (C)

So, the IP Address of C8 is **E08C**, and the carry is dropped.

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(ii) **JNC :** Forward Jump
JNO : Forward Jump
JMP : Backward Jump

(iii) JNC ERROR1 moves 63 bytes forward to reach its label.
JNO ERROR1 moves 39 bytes forward to reach its label.
JMP C8 moves -29 bytes backward to reach its label.