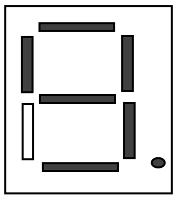
CSE 3108, Spring 2016
Ahsanullah University of Engineering and Technology
Lab Final

Total Marks : 30 Time : 1 hour

1. Assume CS = 1000, DS = 3000, SS = 5000, SI = 1234. What physical address will the instruction **MOV AL, BYTE PTR CS: [SI]** read? [2]
   Answer:
2. Suppose ten eight bit numbers are stored into 8086 memory starting from location [1000:1234]. Now, [5 + 5]
   i. Write an 8086 assembly code to produce the sum of those numbers using loop.
   ii. Convert the assembly code to its corresponding machine code.

Assembly Code	**Machine Code**

3. Suppose you want to show the following figure in 7-segment display of 8086. [2 + 3]



   i. What bitmask you need to send to **PORT A** of 8255A?
   ii. Write down the 8086 assembly code to show the above figure. [The port number of the control register of 8255A is **IF**]

Answer:

4. Highlight the dots of figure 2 those will be led in the given figure after execution of the given code snippet. For RED, GREEN and ORANGE color write down R, G and O on the dots respectively. Also give proper explanation of the output. [3 + 2]

```
CODE SEGMENT
ASSUME CS:CODE
ORG 1000H
MOV AL, 80H
OUT IEH, AL
MOV AL, 9FH
OUT 18H, AL
MOV AL, E7H
OUT 1AH, AL
MOV AL, 66H
OUT 1CH, AL
CODE ENDS
END
```

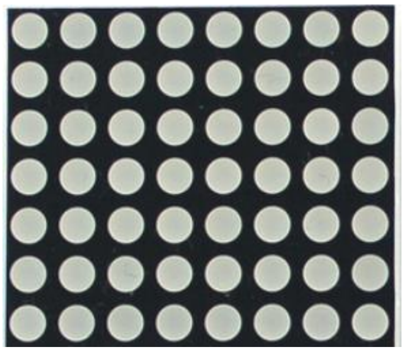
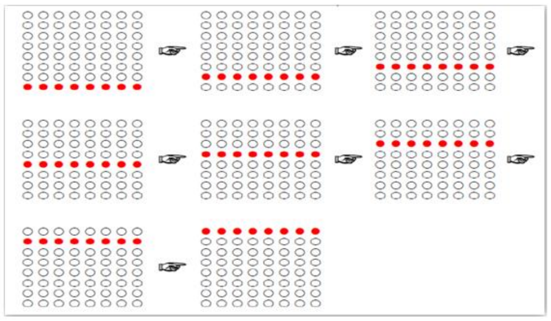


Figure 2: Dot matrix display of 8086

Explanation:

Find the code attached with the question that displays a red horizontal bar that rotates from bottom to top as shown in the following figure. Now modify the given code to display an orange vertical bar that rotates from left to right. [Ony write down the modified parts of the the code.] [8]



8086 Template for Data Transfer between Register and Register/Memory

Table 1: Machine Code Format

Instruction	Option	Machine Code Format		
MOV	Immediate to Register	1 0 1 1 w reg	data	data if w = 1
ADD	Reg./Memory with Register to Either	0 0 0 0 0 0 d w	mod reg r/m	
INC	Register	0 1 0 0 0 reg		
LOOP	Loop CX Times	1 1 1 0 0 0 1 0	disp	

Table 2: Register Code

3-bit Register code	*Register name*	
	When W = 1	*When W = 0*
000	AX	AL
001	CX	CL
010	DX	DL
011	BX	BL
100	SP	AH
101	BP	CH
110	SI	DH
111	DI	BH

i) MOD = 00 means R/M specifies memory with no displacement.
ii) MOD = 01 means R/M specifies memory with 8 bit displacement.
iii) MOD = 10 means R/M specifies memory with 16 bit displacement.
iv) MOD = 11 means R/M specifies a register.

Table 3: R/M Code

Case of MOD = 00, 01 or 10

R/M	MOD = 00 No Displacement	MOD = 01 8-bit signed displacement d8	MOD = 10 16-bit signed displacement d16
000	[SI+BX]	[SI+BX+d8]	[SI+BX+d16]
001	[DI+BX]	[DI+BX+d8]	[DI+BX+d16]
010	[SI+BP]	[SI+BP+d8]	[SI+BP+d16]
011	[DI+BP]	[DI+BP+d8]	[DI+BP+d16]
100	[SI]	[SI+d8]	[SI+d16]
101	[DI]	[DI+d8]	[DI+d16]
110	~~[BP]~~ Direct Addressing	[BP+d8]	[BP+d16]
111	[BX]	[BX+d8]	[BX+d16]

```
; Code for displaying red horizontal bar that rotates from
;  bottom to top.

CODE SEGMENT
ASSUME CS:CODE,DS:CODE,ES:CODE,SS:CODE

    PPIC_Control EQU 1EH
    PPIC EQU 1CH
    PPIB EQU 1AH
    PPIA EQU 18H

    ORG 1000H

    MOV AL, 10000000B
    OUT PPIC_Control, AL      ; Take PortA, PortB, PortC to output modes

    MOV AL, 11111111B
    OUT PPIC, AL              ; Since all columns should be lit at the same
time

    MOV AL, 11111111B
    OUT PPIA, AL              ; We'll never light up the green lights
                              ; So, output 11111111 to turn off all green
outputs

L1: MOV AL, 11111110B         ; Since only one row to be lit at a time
    MOV CX, 08H
L2: OUT PPIB, AL
    CALL TIMER
    STC
    ROL AL, 1
    LOOP L2
    JMP L1
    INT 3

; TIMER procedure
TIMER: PUSH CX
       MOV CX, 8FFFH
TIMERLOOP: NOP
    NOP
    NOP
    NOP
    LOOP TIMERLOOP
    POP CX
    RET
    ;
CODE ENDS
END
```