EE213 Quiz 2 3/2/01 High: 97 Avg: 61 Low: 21
Closed Book, open crib sheet.
100pts 50 min

Score: 94

Name: Jesse Lai

Do not write on this sheet. Put all your answers on a separate sheet. You may put more than one answer on a page but use only one side of the page and do not mix up the answers. Put this sheet on top of your answers as a cover sheet. Do not staple or fold over the corner.

1. (25) The 8051's internal memory is initialized as:

SP	0B	C:100	83 84 85 86 87
R0	10	X:FE00	10 20 30
R1	12	D:08	05 06 07 08 09 0A 0B 20 21 22 32 33
ACC	02		
DPTR	FE00		
PC	0100		
TH1	23		

prior to the execution of each of the following instructions (ie, the instructions are not executed in sequence). List the state changes (register and memory) that occur as a result of executing:
a) a RET instruction,
b) a MOV A,@R1 instruction
c) a MOV @R0,TH1 instruction
d) a MOVC A,@A+PC instruction
e) a MOVX @DPTR,A instruction

2. (2) a) Which control signal (RD, WR, or PSEN) is used during the execution phase (not decode or fetch) of the MOVC instruction above?
(3) b) Which control signal (RD,WR, or PSEN) is used during the execution phase of the MOVX instruction above?

3. (10) a. What instructions are represented by the following 8051 machine code?
78 10 76 00 D8 FC 80 FE
(10) b. Write a short (less than 50 words) paragraph in clear English that explains what the program does.

4. (5) What is the target address of the AJMP instruction shown in the assembly listing line below. In other words, what is the hex value of symbol 'NEXT'?
67FF 21 34 AJMP NEXT

5. (5) What is the target address in hex of the SJMP instruction shown in the following assembly listing?
0100 80 05 SJMP SKIP

6. Problems 6a and 6b refer to the following listing:

```
LOC   OBJ             LINE     SOURCE

----                     1             cseg at 0
0000  7590FF              2             mov p1,#0ffh
0003  E590                3     loop:   mov a,p1
0005  D3                  4             setb c
0006  5470                5             anl a,#70h
0008  6001                6             jz skip
000A  C3                  7             clr c
000B  9290                8     skip:   mov p1.0,c
000D  80F4                9             sjmp loop
                         10
                         11             end
```

a) (10) This program performs a logic function. Sketch an appropriate logic diagram for this program showing the connections to bits of P1.

b) (15) What is the worse case propagation delay of this function in µS? Assume a 12 Mhz clock. Be sure to explain your answer. Do NOT simply give a number.

7. (10) What address mode is used by each of the following instructions?

a) INC A
b) INC ACC
c) INC @R0
d) INC R0
e) SJMP LOOP

8. (5) Briefly explain what must be done to an 8051 port to make it an input port and why this must be done.

1. a) RET , pops of high byte & low byte from stack

changes the PC to 0807H, SP = 09H ✓

b) MOV A, @R1 , moves data pointed to by location R1 into the acc.

R1 = 12, local 012H = 32H

ACC = 32H , PC = 0101H ✓

c) MOV @R0, TH1 moves the direct data at TH1 into the location pointed to by R0.

R0 = 10 TH1 = 23

Data location 10H = 23H , PC = 0102H check cycle

(24) d) MOVC A, @A + PC , moves into the acc the data at Code location pointed to by @A+PC

A = 02 PC = ~~0100~~ 101 @A+PC = 0102

ACC = ~~85~~ 86H − 1, PC = 0~~102~~ 101H

e) MOVX @DPTR, A . moves into xdata pointed to by DPTR the contents of the accumulator

DPTR = FE00

external data location FE00H = 02H , PC = ~~0102H~~ 101

2. a) MOVC instruction uses the ~~PSEN~~ signal ✓

(5) b) MOVX used to write data uses the ~~WR~~ signal. ✓

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3. a) 78 10 76 00 D8 FC 80 FE

```
     MOV   R0, #10H
LP:  MOV   @R0, #00H      1cycle
     DJNZ  R0, FCH  (LP)  2cycle
     SJMP  FEH  ($)
```

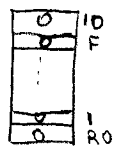
-1

(9)

FCH = 11111100
00000011
00000100

b) This code clears the data from data locations 00H to 10H.

(10)



4. 67FF 21 34 AJMP NEXT (6800) (6801)

0110 0111 ...

aaa 00001 aaaaaaaa
001|0 0001| 0011 0100

(4)

0110|0001|0011|0100

6134H -1

5. 0100 80 05 SJMP SKIP

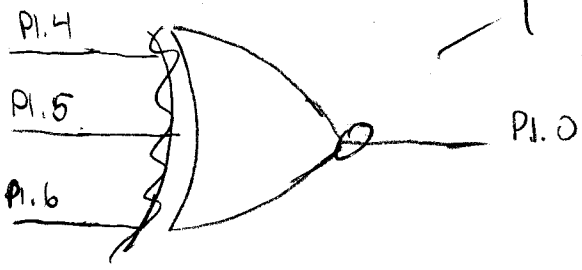
Source_addr + Offset = destination address

0102 + 05 = 0107

(5)

0107 H

6. a) P1 used as input FFH
SETB carry bit C=1
A = P1
A anded with #70 01110000 P1.4, P1.5, P1.6
JZ skip ?



	P1.0
000	1
001	1
010	1
011	1
100	1
101	1
110	1
111	0

(9)

(15) b) Worst case is the data on port changes just after port is read. Then the program must cycle through to end, then when repeating will catch the change. Therefore the worst case is 9 cycles to loop then again 8 cycles to output. This is 17 cycles, ∴ worst case is 17 μs

7. a) INC A — Immediate
b) INC ACC — Direct
c) INC @R0 — Register Indirect
d) INC R0 — Immediate X
e) SJMP LOOP — Relative

(8)

8. The bits ~~or the~~ port desired to be inputs must be set to a '1'. This is because if the bit is set to a zero and the external driver connects the port to V_{cc}, there is zero resistance between power and ground and the transistor in the port will be burned up.

(5)