

Roll no:

CS321: Midterm Examination

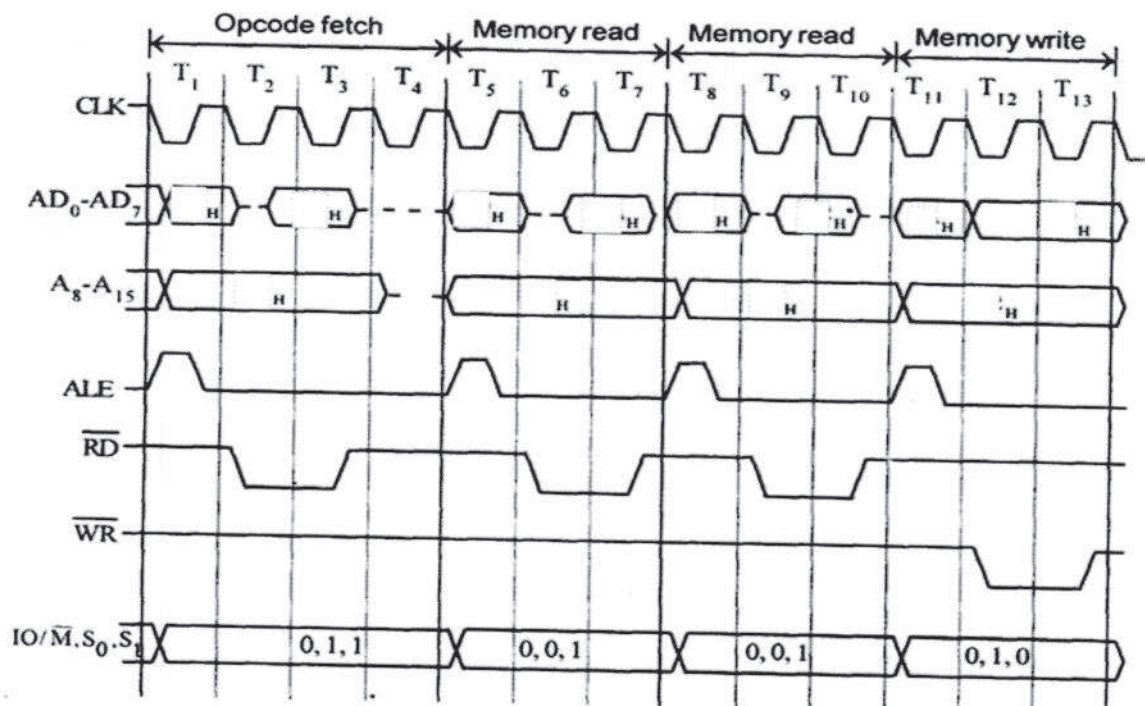
Max Marks: 100; Time: 2 hours

Q1: In C, type char is a signed, 8-bit integer. With that in mind, what does this output?
char a = 100;
char b = 30;
char c = a + b;
printf("%d\n", c); //

(5 points)

Ans:

Q2: Figure shows the timing diagram of STA 1234H instruction in 8085. Assuming that Accumulation contains AA_H and instruction is stored in memory starting 1010 H, which contains opcode 32H, fill the content of Address and Data bus in the timing diagram (places marked H)



(10 Points)

Q3. State whether the following sentence is True or false. If it is false explain?. **Also fill the blanks if applicable.** (13 points)

a) Reading memory from the heap is slower than reading from a local variable allocated on the stack. This statement is (explanation if any write in the main answer book)

b) An x86 program which uses **lea** instructions can be translated to a functionally equivalent version which does not use any **lea** instructions. The equivalent instruction is

(c) Check A and B are equivalent declaration

A: line **DB** 5, 4, 3 DUP(2, 3 DUP(0), 1)

B: line **DB** 5, 4, 2, 0, 0, 0, 1, 2, 0, 0, 0, 1, 2, 0, 0, 0, 1

d) The address lines, along with CS signal, determine the selection of a particular port or control register in an 8255.

e) In an 8254, there are two 16-bit counter registers, each of which can be programmed as a timer or an event counter. This statement is

f) In a x86-32 architecture pointers point to locations in memory that are multiples of 32 bits apart. This statement is

g) Assume that 8155 programmed as counter, A high reset input resets the counter. To restart counting after resetting, a START command is not required through the control register. This statement is

h) 8259s can be cascaded in master-slave configuration and to have levels of interrupts

i) 8155 has 8-bit word RAM memory

j) X86 assembly store the return value is always in when a function is finished

k) Function performed by **CALL addr.** instruction is equivalent to(instruction) followed by(instruction)..

l) A **ret** instruction is equivalent to(instruction)

m) The INT 10H instruction (8086) calls the interrupt service procedure whose address is stored beginning atmemory location

Q4: Consider the following C code.

if (a1 > b1) AND (b1 > c1)

X = 1;

The following assembly code was generated by one student. Check whether the implementation is correct, if not correct appropriately and fill blanks the comments

```
        cmp al,bl    ;.....
        ja L1
        jmp next
L1:      cmp bl,cl    ;.....
        ja L2
        jmp next
L2:      mov X,1      ;.....
```

next:

(b) Give an alternative assembly implementation (with reduced number of instructions) of the above C statements

Ans:

(c) Convert the following assembly in equivalent C statement code

```
cmp al,bl
ja L1
cmp bl,cl
jbe next
L1:mov X,1
next:
```

(7 Points)

Q5:In a x86 processor

.data

array1 DB 10h,20h,30h

```

array2 DW 1000h,2000h,3000h
array3 DD 10000000h,20000000h,30000000h
.code
mov esi,OFFSET array1
mov al,[esi]
inc esi
mov al,[esi]           ; AL = .....
inc esi
mov al,[esi]           ; AL = .....
mov esi,OFFSET array2
mov ax,[esi]           ; AX = .....
add esi,2
mov ax,[esi]           ; AX = .....
add esi,2
mov ax,[esi]           ; AX = .....

```

(5 Points)

Q6: Assume that

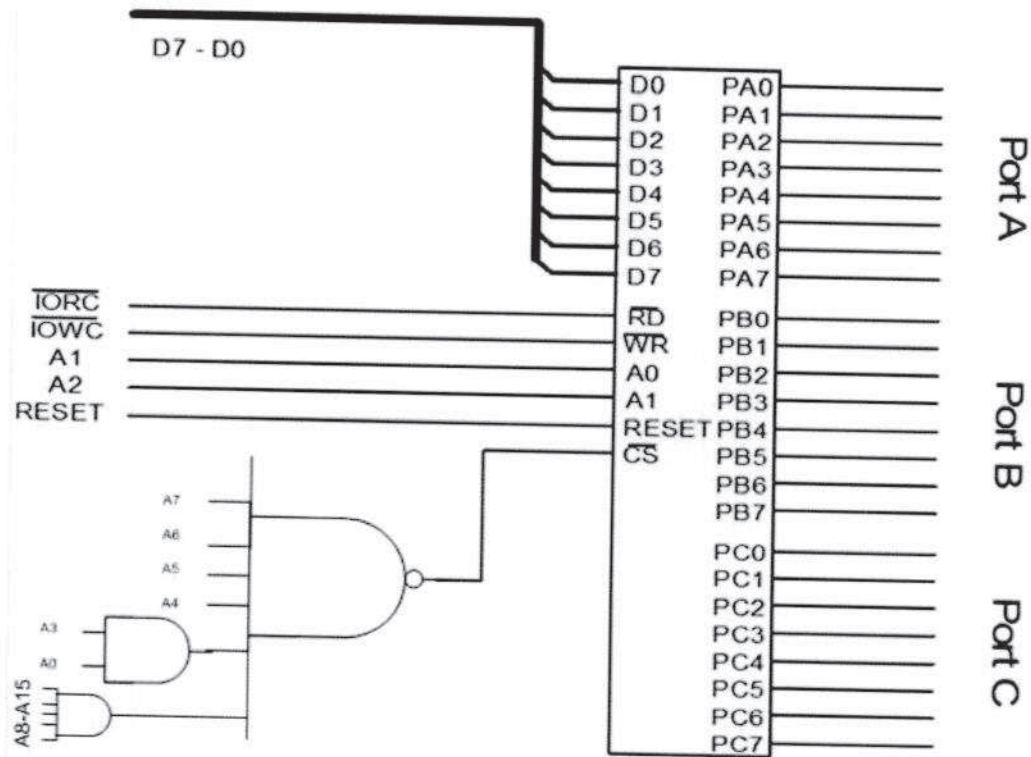
j DW 10 ; i DW 20; Check the following instructions legal/ illegal Complete the table. Fill legal/ illegal in the respective row. (10 Points)

	instruction	comment
1	MOV AX, BL	
2	MOV AL, BL	
3	MOV AH, BL	
4	MOV i, AL	
5	MOV AL, i	
6	MOV i, j	
7	ADD 2, AX	
8	ADD AX, 2	
9	MOV AL, j	
10	MOV AL, Byte PTR j	
11	MOV DS, 1234	

Q7: In a given 8086 based system, 8255 interfaced as shown and its PORT A used for monitoring the temperature. Write Assembly language instructions to monitor that port A continuously for the temperature of 100 degrees. If it reaches 100, sends it to port address B

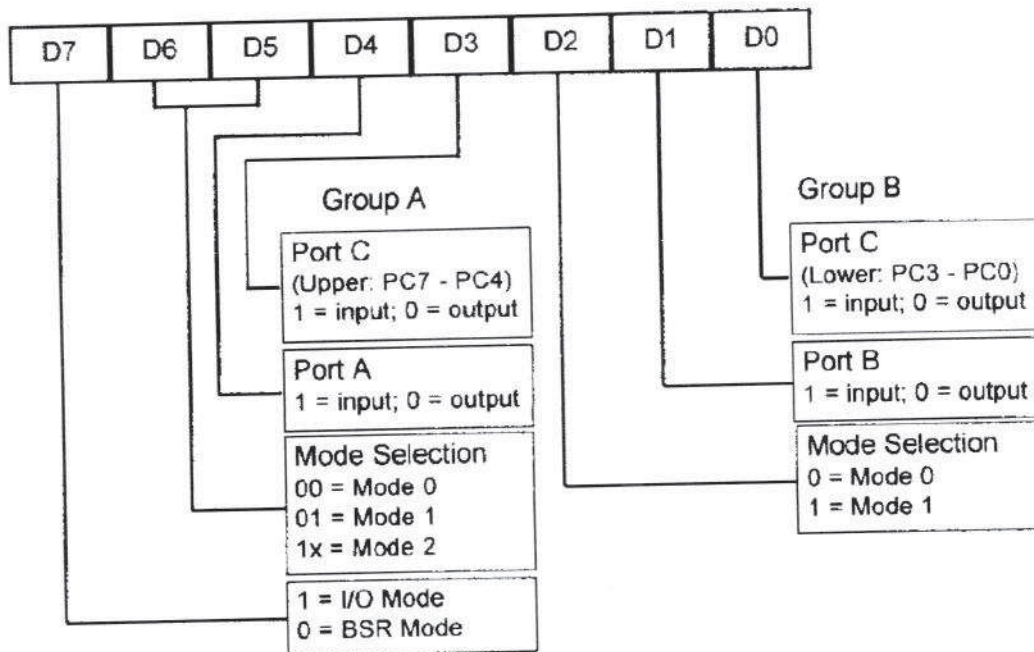
(use appropriate control word- refer figure in Q8)

(10 Points)



Q8: Find the control word for 8255 if PA = out, PB = in, PC0- PC3 = in, and PC4 - PC7 = out.

(5 Points)

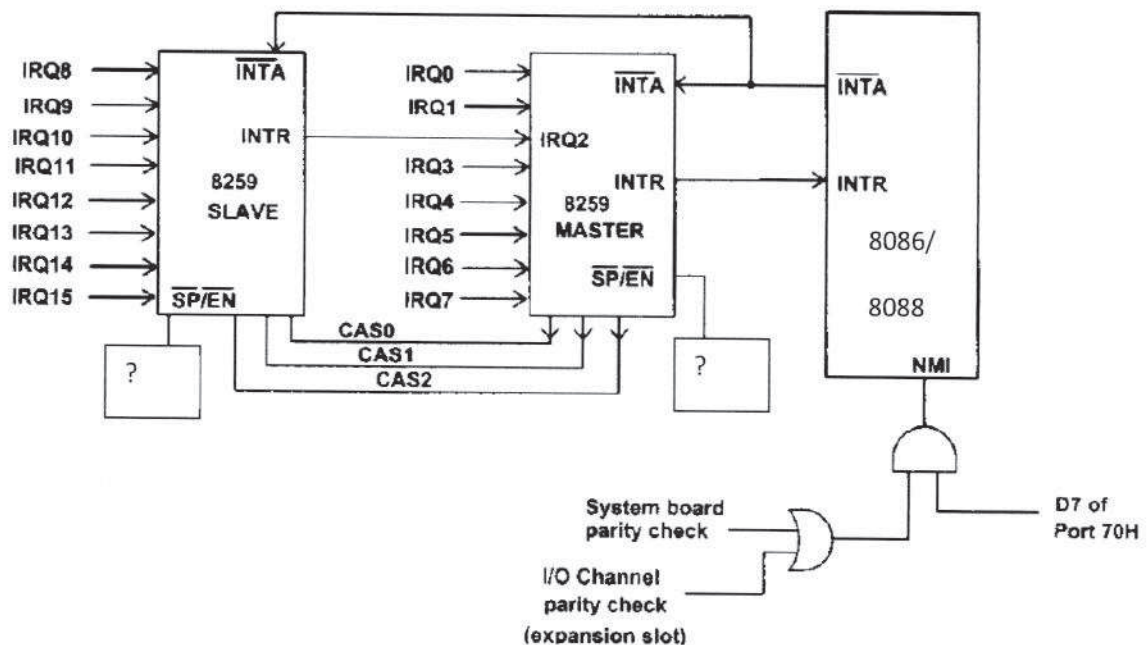


Ans:

(b) Write an assembly language program that toggles the bits of Port A continuously in every 0.5s. Assume that each instruction takes one cycle. The processor operates at 1 MHz. Show delay calculations clearly. Assume the same 8086 interface as shown in Q7

(10 Points)

Q9: Figure shows an IBM PC, interrupt configuration. In figure mark the priority of the interrupts from (1 to 16). Also fill the box with ? what should be logic applied (logic 0 or logic 1) for this configuration.



(5 Points)

Q10: Program 8255 for the following A) set PC2 to high B) Use PC6 to generate a square wave of 66% duty cycle. Assume the same 8086 interface as shown in Q7

(10 Points)

**Q11: Compare I/O Mapped I/O and Memory mapped I/O (considering 8086 as an example)
(10 Points)**