

Quiz 1 Solution

رقم الشعبة: 1

رقم التسجيل:

الاسم:

Instructions: Time 20 minutes. Open book and notes exam. No calculators. Please answer all problems in the space provided and limit your answer to the space provided. **No questions are allowed.**

Q1. Consider the following sequence of PIC16F84A instructions:

<5 marks>

```

movlw 00
movwf porta
movwf portb
btfss porta, 3 ;assume that A[3] = 0
goto Label1
bsf portb, 3
bcf portb, 4
Label1
bcf portb, 3
bsf portb, 4

```

a) How many instruction cycles are needed to fetch and execute this sequence of instructions?

The following pipeline diagram shows the execution of this sequence (F: fetch, E: execute, n: flush).

	1	2	3	4	5	6	7	8	9
movlw 00	F	E							
movwf porta		F	E						
movwf portb			F	E					
btfss porta, 3				F	E				
goto Label1					F	E			
bsf portb, 3						F	n		
bcf portb, 4									
Label1									
bcf portb, 3						F	E		
bsf portb, 4							F	E	

It takes 9 cycles to execute this sequence.

b) If the microcontroller runs on 8-MHz external clock, what is the total time needed to execute this sequence of instructions?

Processor clock = 8 MHz / 4 = 2 MHz

Instruction clock period = 1 / 2 MHz = 0.5 microsecond

Time to execute the sequence = 9 * 0.5 = 4.5 microseconds

Q2. What is the main advantage of the Harvard memory organization that is used in the PIC microcontrollers?

<1 mark>

Improves concurrency of program and data memory and thus improves the performance.

Q3. What is the main difference between the PIC18 microcontrollers and the PIC 32-bit microcontrollers?

<1 mark>

The PIC18 microcontrollers are 8-bit microcontrollers, whereas the latter are 32-bit microcontrollers.

Q4. Explain why the Status register is connected to the data bus in the PIC12F508 microcontroller.

<1 mark>

So that our programs can access its contents similar to the other SFR and GPR registers.

Q5. Out of the seven microcontrollers of the PIC 16 series studied in the class, which one do you select for low power applications?

<1 mark>

PIC16LF84A.

Q6. What is the main function of the instruction register?

<1 mark>

Holds the fetched instruction during the execution cycle.

<Good Luck>