

# Lab 1 – PIC Microcontrollers

**All Answers must be types. This lab must be done individually. Don't forget the Coversheet (your name, lab number, course name)!**

Read data sheet for PIC18F45K20 ;

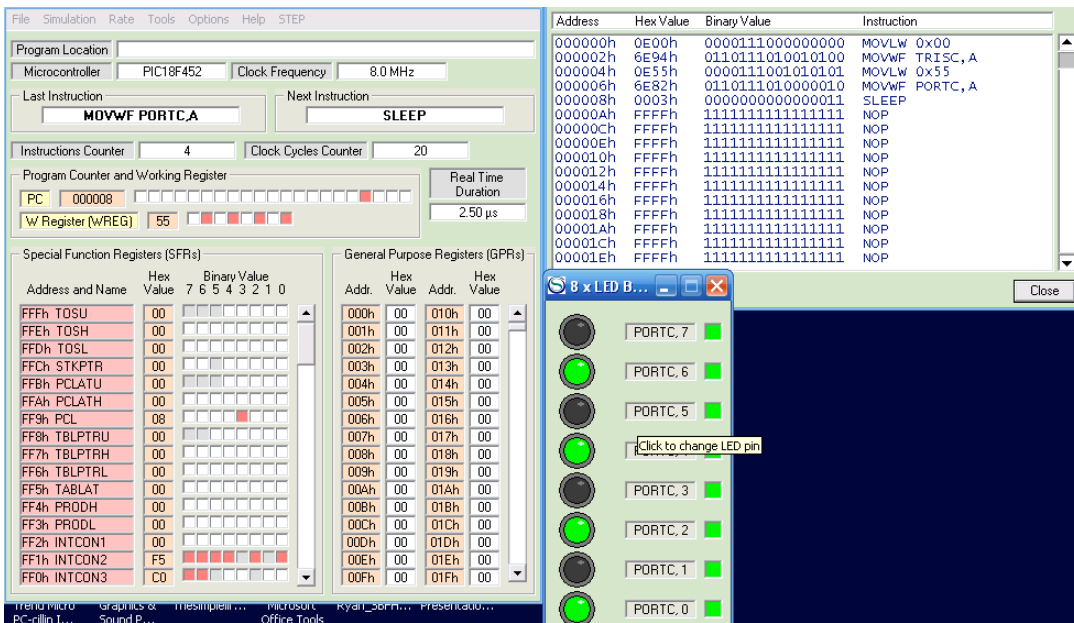
Use FIGURE 1-2 to answer the questions (<http://ww1.microchip.com/downloads/en/DeviceDoc/41303D.pdf>)

## Part I

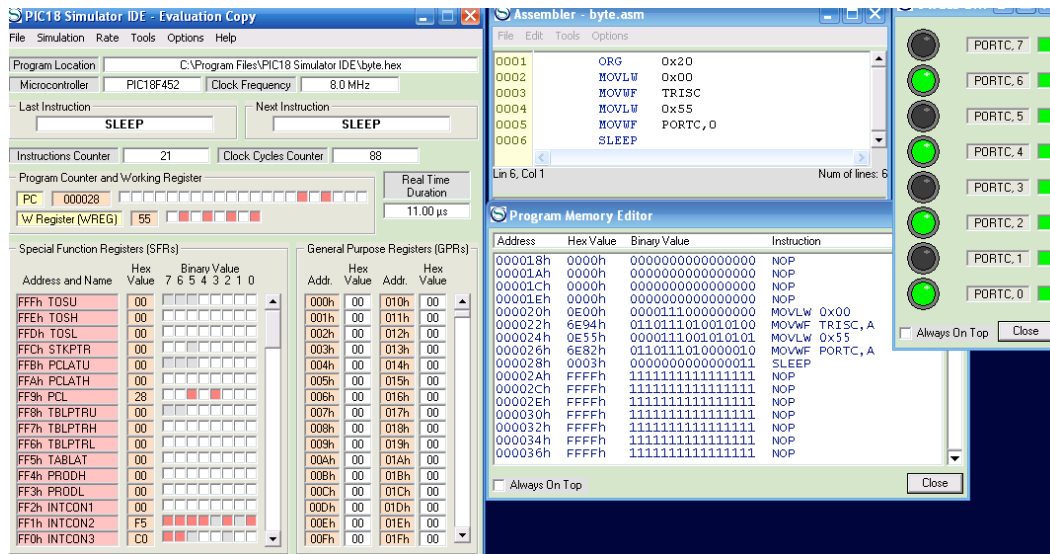
- 1- How many timers are available in this architecture?
- 2- Explain the purpose of Capture/Compare PWM. What is PWM (Hint: You may want to refer to your digital textbook)?
- 3- How many Capture/Compare PWM are available in the block diagram?
- 4- Which I/O ports can act as A/D converter?
- 5- Which I/O ports are used for MSSP?
- 6- Which ports can be setup as parallel slave port?
- 7- What is the data bus width going to each I/O port?
- 8- What is the size of the WREG in the processor in terms of bits?
- 9- What is BSR? What is the size of BSR in bits?
- 10- Which memory block can be accessed via BSR?
- 11- What special features are supported by PIC18F4X2 architecture? Briefly explain each feature. Make sure you tabulate your answers.
- 12- Which I/O port can be used for interfacing with external devices or peripherals to interrupt the processor?
- 13- What is the largest possible data RAM address in Hex?
- 14- What is the largest possible program memory address in Hex?
- 15- What is the purpose of file select registers? What part of the MPU are they located at?
- 16- How many file select registers are available in the MPU and how wide is the register?
- 17- Where does the instruction decoder get inputs from (which memory block)?
- 18- What does bank select register do? What is this register connected to in the block diagram?
- 19- What is the difference between PIC18F and PIC18C in terms of memory capabilities?
- 20- The following questions are regarding PIC45K20:
  - a. Using the resources available on [www.microchip.com](http://www.microchip.com), show the pin out.
  - b. What is the instruction size for the chip?
  - c. How many I/O pins does it have?
  - d. What is the total number of pins on the chip?
  - e. What is the size of the EEPROM?
- 21- Using the resources available on [www.microchip.com](http://www.microchip.com), find and show all different types of PIC18F4XK20 families.
- 22- Which chip in PIC18F family has the largest RAM size?

Part II:

- 1- Read Appendix F, up to F.1.2 and demonstrate how to obtain Fig. F.1. You must provide a screen snapshot. Make sure the device is set to PIC18F452 [Hint: Make sure your program is setup as follow – there are several errors in the textbook!]



- 2- Read up to F.1.15. Create the Byte.asm file as shown below. Include a snap shot of all your windows. After loading the program you must see the following windows:



- 3- Answer the following questions:
  - a. What does ORG command do?
  - b. What is the value of PORT C after the program is executed?
  - c. What is the value of the PC counter after the program is completed?
  - d. What do you have to do to store the program starting at 0046 HEX?
  - e. How can you change the program to set the WREG value to be A2 after the program is executed?

- 4- In this section, you are required to use the 7-Segment LED panel and display 2010 on the panel. Hint: make sure you are using common Anode.