Benha University
Shoubra Faculty of Engineering
Communication and Computer Department
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FACULTY OF ENGINEERING- SHOUBRA

Report on

Network Summer Training

Second Year

Presented by

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a) Describe all the pins of PIC16f877A. After that, your colleagues would have enough information once they need to interface the PIC16f877A with other hardware.

1 ***VDD*****:** +5V power supply and exist two pin from VDD

2 ***VSS*****:** Ground and exist two pin from VSS

3 ***MCLR/VPP*****:** Master Clear (it is used to perform reset)

4. ***OSC1/CLKIN and OSC2/CLKOUT*****:** Connect to crystal or external circuit or Resonator

5 ***PORTA (RA0–RA5)***

- **RA0–RA3: *Digital* I/O or ADC inputs (AN0–AN3), RA2/RA3 can be voltage references.**
- **RA4/T0CKI: Timer0 clock input, (needs pull-up "Sink").**
- **RA5/AN4/SS: ADC channel or SPI slave select.**
- ✓ **Note: By default PORTA pins are analog inputs after reset, must configure ADCON1 to use as digital I/O.**

6 PORTB (RB0–RB7)

- **RB0/INT: External interrupt and used as a normal digital I/O**
- **RB4–RB7: Interrupt-on-change**
- **RB6/PGC, RB7/PGD: These are special pins used when programming the chip and used as a normal digital I/O**
- **RB3/PGM: used as a normal digital I/O**

7 PORTD (RD0 – RD7)

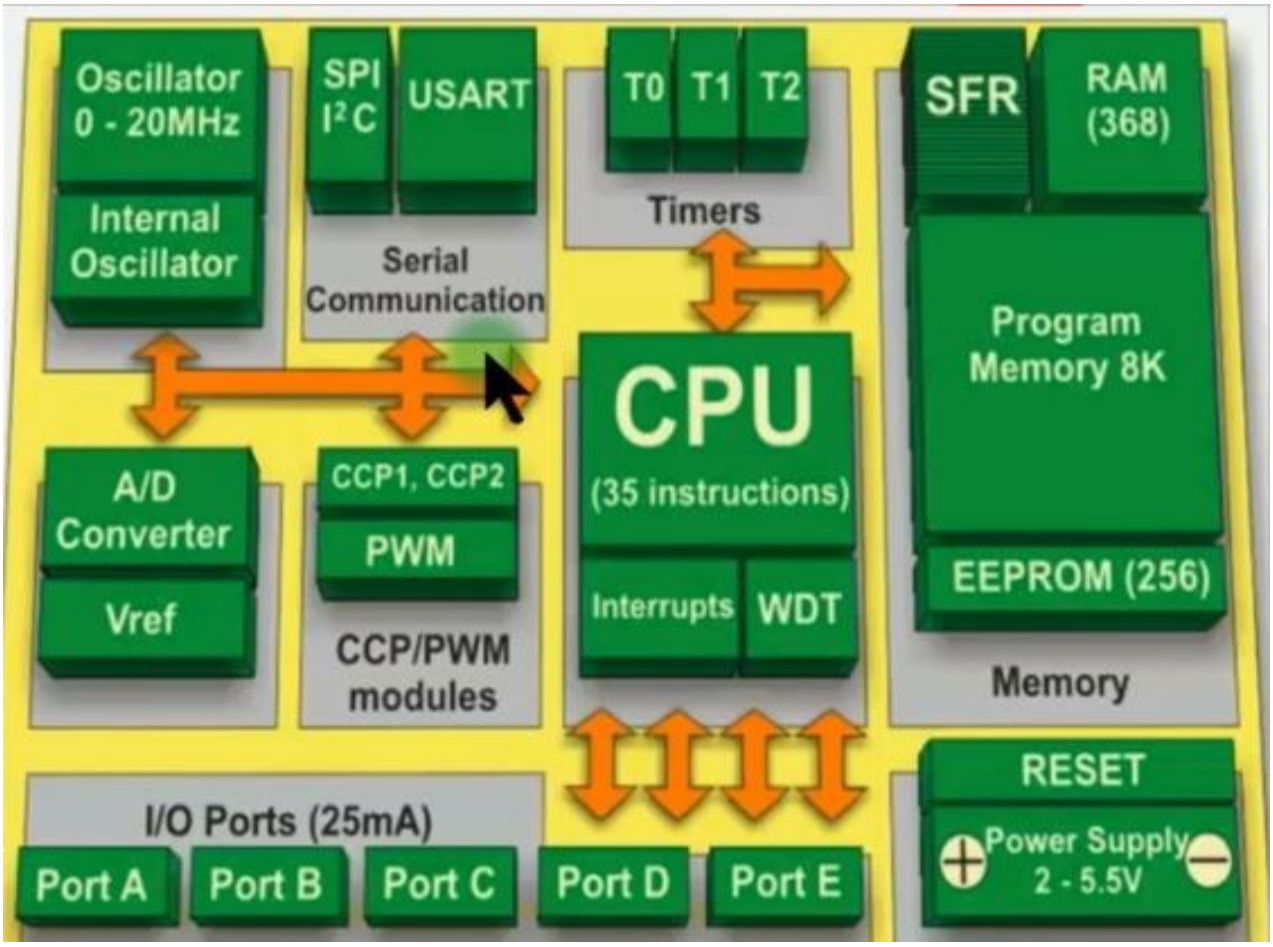
- **General digital I/O or used as Parallel Slave Port (PSP) data bus**

8 PORTC (RC0 – RC7)

- **RC0/T1CKI: Timer1 clock input and used as a normal digital I/O**
- **RC1/CCP2, RC2/CCP1: Capture/Compare/PWM and used as a normal digital I/O**
- **RC3–RC5: SPI / I²C pins and used as a normal digital I/O**
- **RC6/TX, RC7/RX: UART pins (transmit/receive Data) and used as a normal digital I/O**

9 PORTE (RE0 – RE2)

- **ADC inputs (AN5, AN6, AN7)**
- **Used also as a normal digital I/O**



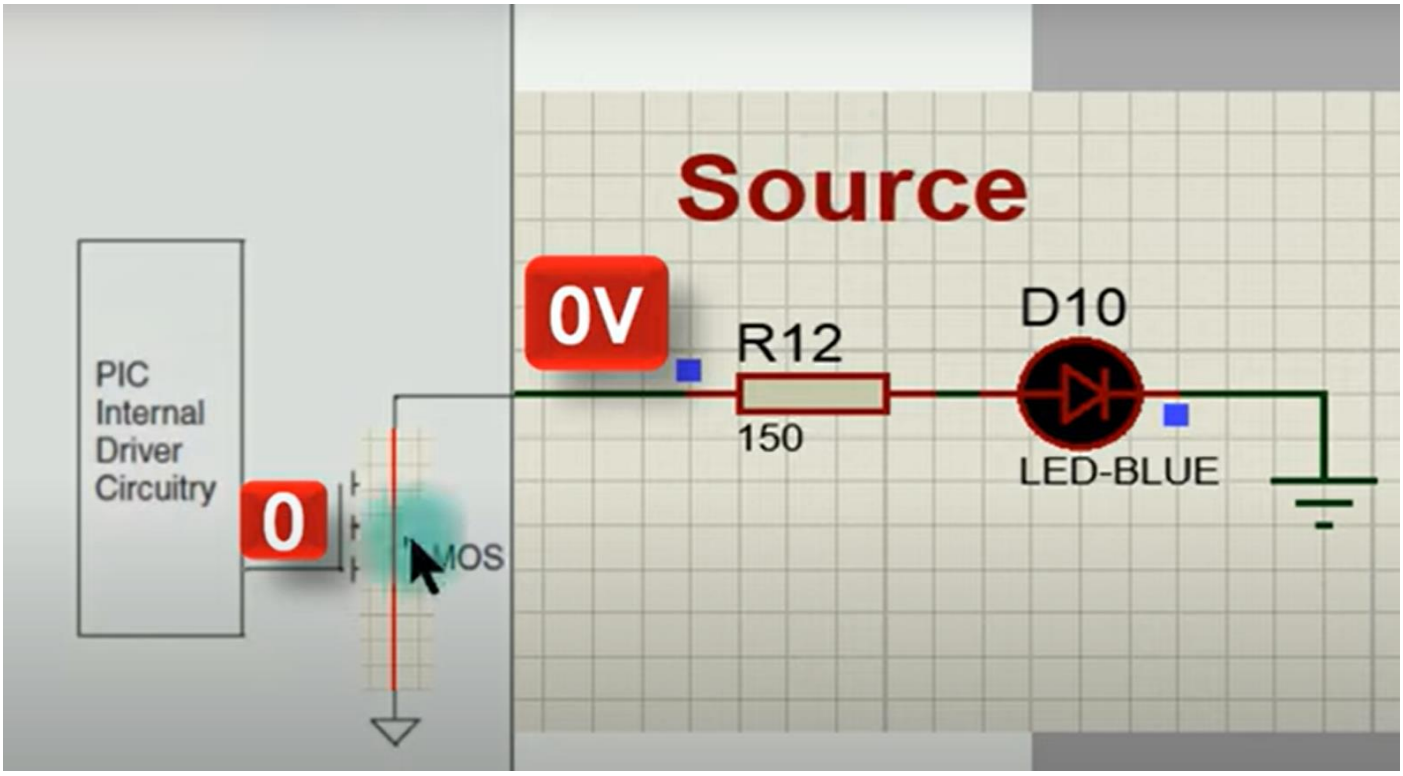
b) Explain to your colleagues the functions of the main blocks in PIC16f877A : ALU, Status and Control, Program Counter, Flash Program Memory, Instruction Register, Instruction Decoder.

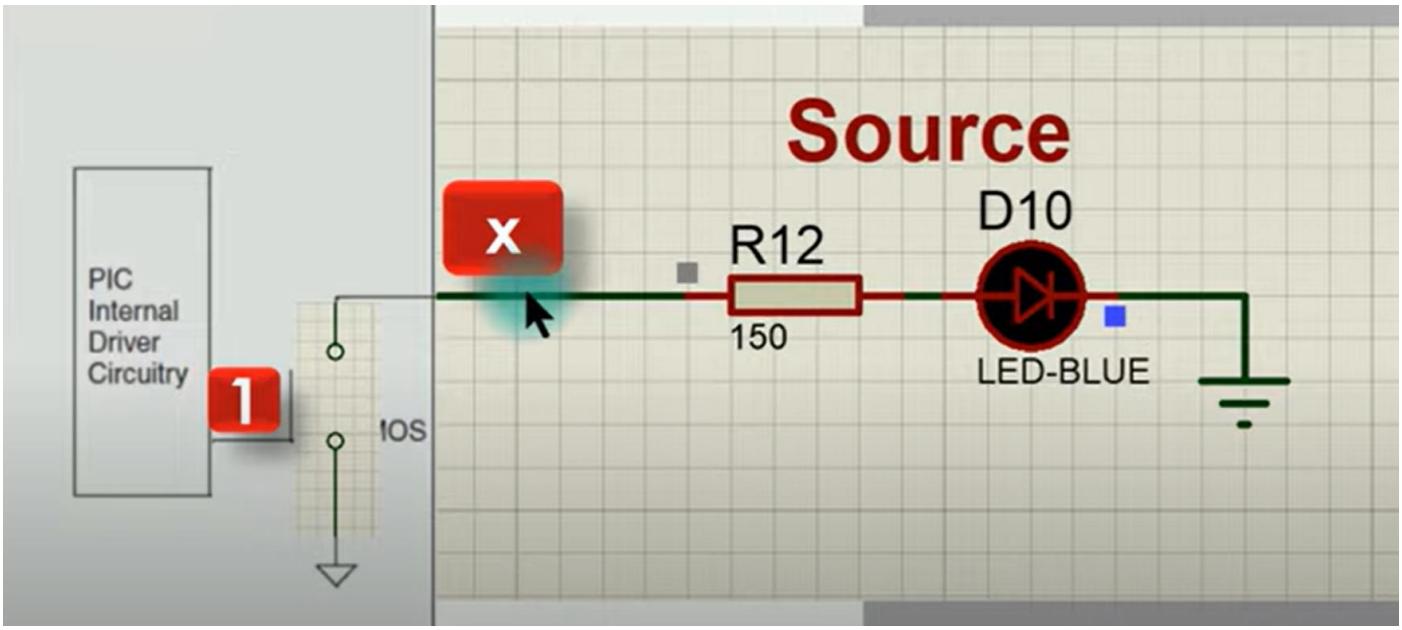
- **ALU (CPU)**: Executes arithmetic and logic operations
- **Flash Program Memory**: Stores program code
- **Program Counter (PC)**: Holds/Save next instruction address
- **Instruction Register (IR)**: Holds instruction before execut
- **Instruction Decode**: Translation instruction, generates/execut control
- **SFR**: Registers to control I/O, timers, ADC, UART

c) Examine the reasons why a led, which is connected to RA4 for flashing prepose not working probably.

RA4 is special compared to other pins:

- ✓ **PORTA pins default to analog inputs. Must set ADCON1 to configure as digital I/O**
- ✓ **RA4 cannot source current high by itself. Needs an external pull-up resistor (4.7k–10k)➔ (like sinks current)**
- ✓ **Wrong Direction: TRISA4 must be cleared (TRISA4 = 0) to make RA4 an output.**





d) ATMega328P [2] is also an 8-bit but AVR microcontroller. Evaluate the characteristics of ATMega328P versus PIC16f877A, by comparing the memory size, the power consumption, pin count… of those two MCUs.

1 Program Memory

- ATmega328P: 32KB Flash.
- PIC16F877A: 14KB Flash

2 RAM

- ATmega328P: 2KB
- PIC16F877A: 368 bytes

3 EEPROM

- ATmega328P: 1KB
- PIC16F877A: 256 bytes

4 Speed

- ATmega328P: Up to 20 MHz, ~20 MIPS (single-cycle instructions)
- PIC16F877A: Up to 20 MHz, ~5 MIPS (most instructions take 4 cycles)

5 Number of legs and size:

- ATmega328P: usually 28-Pin (smaller)
- PIC16F877A: 40-Pin (larger, useful if you want a lot of I/O)

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Give 2 examples of embedded systems where ATMega328P is a better choice than PIC16f877A.

- Used in Arduino Projects (Robotics, IoT) → Easy programming, many libraries
- Battery-powered Devices (Wearables, Sensors) → Lower power consumption.