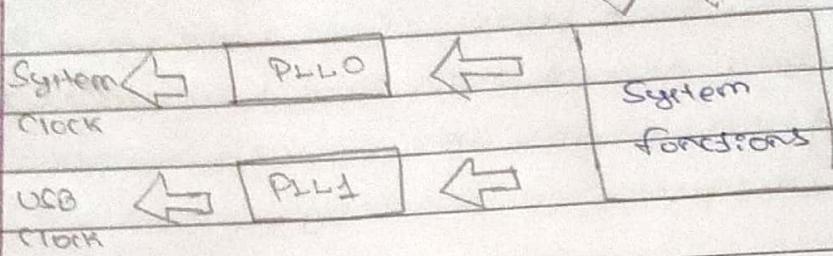


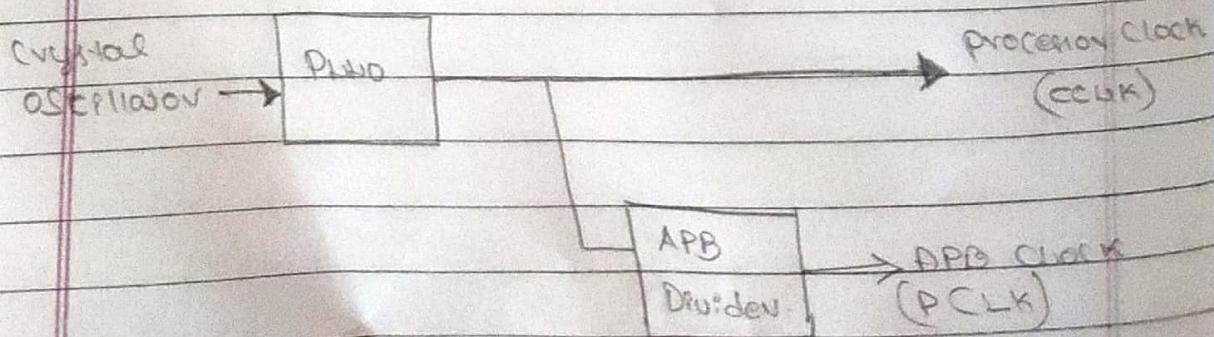
Assignment 2 :

6. Explain the PLL in LPC2148 with neat diagram.



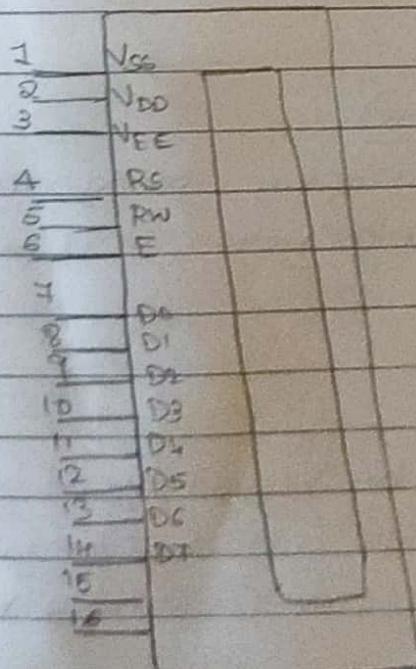
- There are two PLL Modules in LPC2148 microcontroller, i.e. PLL0 and PLL1
- PLL0 is used to generate the CCLK or clock.
- PLL1 PCB uses has to supply the clock for USB at the rate of 48MHz.
- These two PLL are identical with exception of PLL interrupt capabilities reserved only for the PLL0.
- PLL0 and PLL1 accept input clock frequency in range of 10MHz to 30MHz only.
- Input frequency is multiplied up the range of 10MHz to 60MHz for CCLK to 144MHz for USB clock using Current Condition Oscillation.
- Multiplier can be integer value from 1 to 32.

7. Explain the clock working in LPC2148 with neat diagram.



- ARM11 LPC4318 internal clock needs two clocks
one is the peripherals and other for CPU.
- CPU works faster with higher frequency
whereas peripherals need lower frequency to work with.
- The PCLK and CCLK gets clock input from a PLL
or from external source.
- After RESET, configuration of CLK and APB.
Divider would be first thing to do.
- Peripheral clock i.e. PCLK derived from CPU clock.
- APB Divider decides the operating frequency of DCLK.
- Input to the APB divider is CCLK and outputs
PCLK. By default PCLK runs at 1/4th the speed of
CCLK.

Q. Explain LCD pins with neat diagram.



- PIN1 (Ground / Source Pin)

This is GND pin of display, used to connect the GND terminal of the microcontroller unit or power source.

- PIN2 (Vcc / Source Pin)

This is the voltage supply pin of the display, used to connect Supply pin of power source.

- PIN3 (V_{REF} / Control Pin)

This pin requires difference of the display, used to connect a changeable Pot that can supply 0 to 5V.

- PIN4 (Register Select / Control Pin)

PIN toggles among data register, used to connect a micro controller unit pin and obtain either 0/1.

- PIN5 (Read/Write)

PIN toggles the display among read/write operation & connected micro controller unit pin of either 0/1.

- PIN6 (Enable)

This PIN should be held high to execute read/write process, it is connected to microcontroller unit & constantly held high.

- PIN7-14 (Data Pin): These pins are used to send data to the display. These pins are connected in two wire modes like tri-wire mode and bi-wire mode.

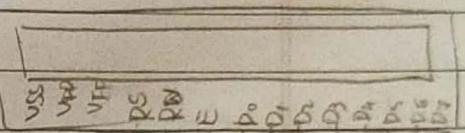
• PIN 15 (+ve pin of LED)

↳ PIN connected to +5V

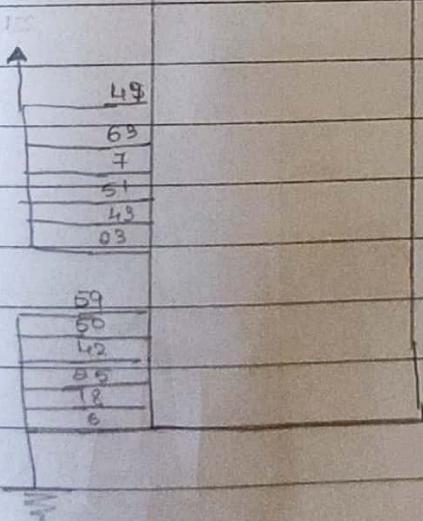
• PIN 16 (-ve pin of LED)

PIN connected to GND

9. LCD interfacing with 4 bit mode with LPT2148.



62		P0.0	19
G1		P0.1	20
3		P0.2	21
		P0.3	26
5		P0.4	27
		P0.5	29
		P0.6	30
		P0.7	31
		P0.8	34
		P0.9	36
		P0.10	



- In 4-bit mode, data is sent in nibble form.
- First we send higher nibble. And then lower nibble with same.
- RS, RW and EN pin functioning as we were doing. i.e.

4-bit mode

- To change the 4-bit mode of LCD, we need to follow

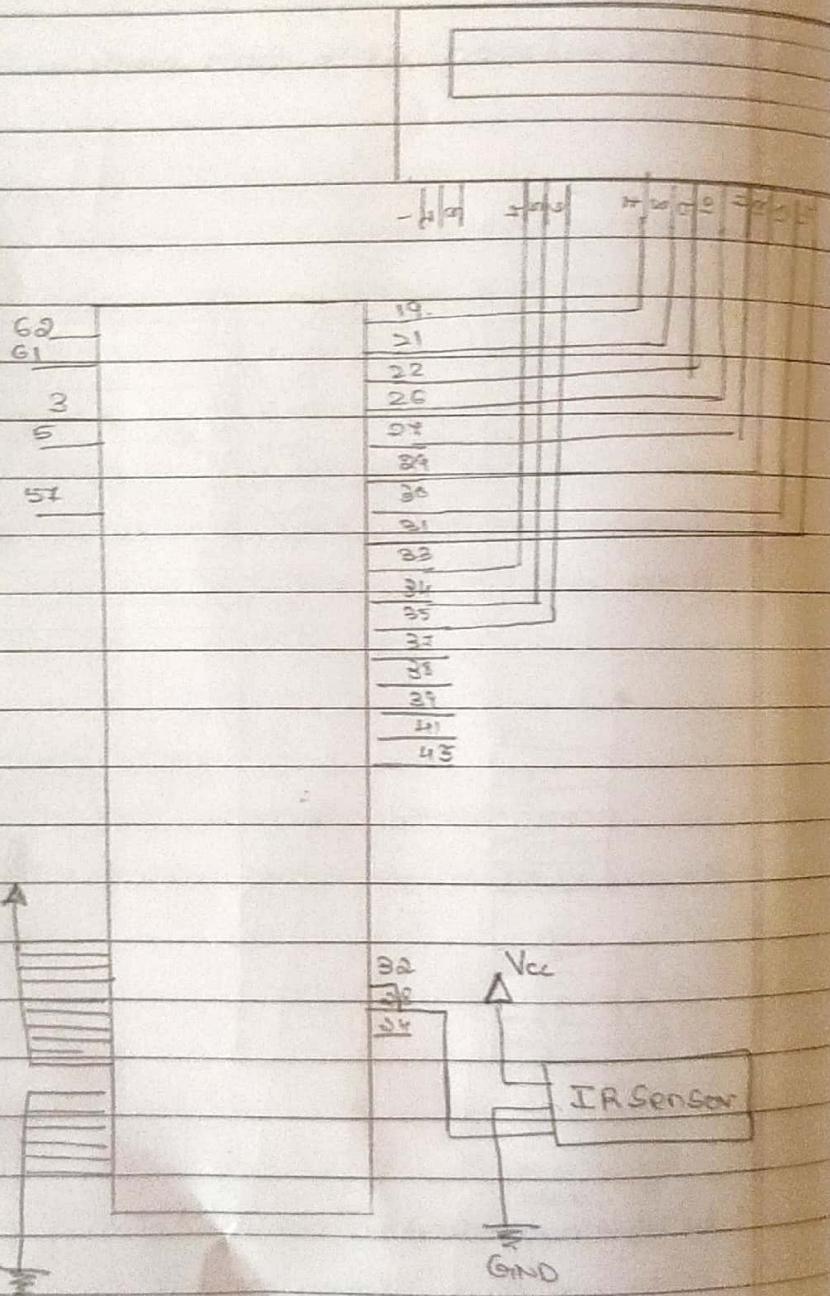
Special Sequence of instructions that tell the

LCD controller what user has selected lets make

- LCD can be configured in what mode by sending

- appropriate commands which are called commands

10. IR Sensor working and interface with PIC16F877A



- An IR Sensor consist of IR LED & IR Photodiode together they called as Photo Coupler
- As Infrared Obstacle Sensor has built in IR Transmitter and IR Receiver.
- An Infrared transmitter is light emitting diode.
- Infrared receiver also called as Infrared Sensor as they detect Radiation from IR Transmitter.
- In above diagram, Vcc - 5V, Gnd - ground, Out - P1.24
- LCD Connected to LPC8148,
RS - Po.8, RW - Po.9, E - Po.10 DataLine Po.0-Po.7

4. Types of LED. Interfacing of Single LED with LPC8148 > miniat use:

mostly single LED's But they are available in various shapes & sizes. - from 1mm to 8mm through holes & surface mount packages. And the current rating ranging between 1mA to above 20mA. The multiple LED die get attached to flexible backing tape from an LED chip.

2. AC Drivers:

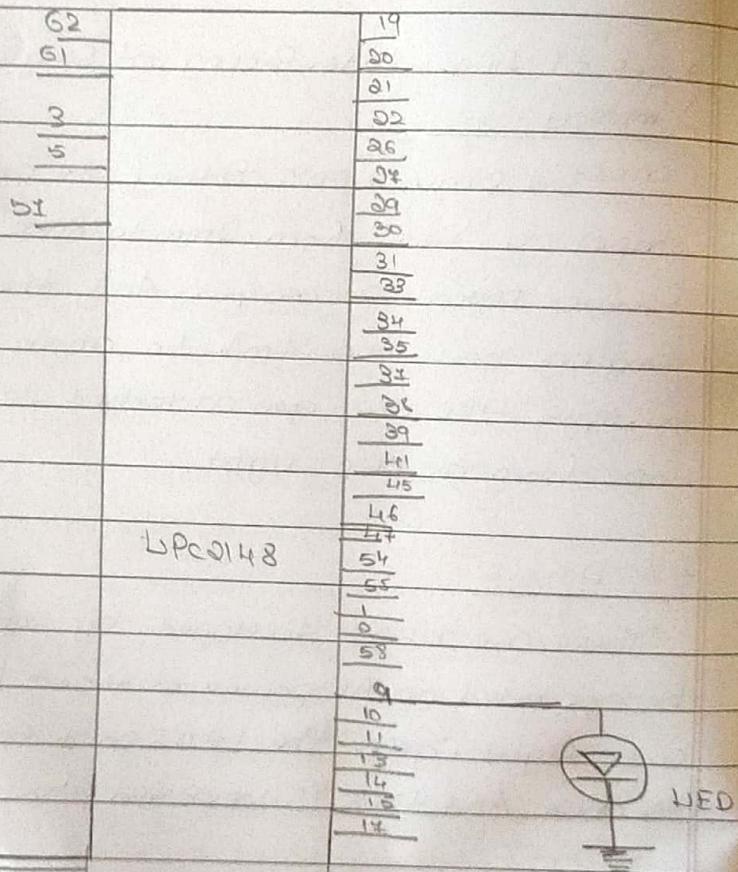
These are LED's developed by Semiconductor. It can be operated on AC power without DC converter for each light cycle. the LED's part emit light which is dark And this is reversed during next half cycle

3 High Power:

High output or High power LED's can be at current from 100mA to more than an Ampere. Some can emit thousands of lumens.

Interfacing LED with LPC2148

- It switches by toggling ON output button, turning it off then looping back to start.
- Operating speed of microcontroller is very high so the flashing frequency will be very fast to detect for human.
- In LPC2148, there are 8 number of port pins connected with 1/0 port lines (P1.16-P1.03) make Port pin high.



Different types of Switch: Interfacing of Switch with I/O cards.

1. Unmanaged Switch:

These are switches that are normally used in home network and small business as they plug in and instantly start doing job. These switches do not need to be watched or configured.

2. Managed Switch:

These switches have many features like highest level of security, precision control & full management of the network.

3. LAN Switch:

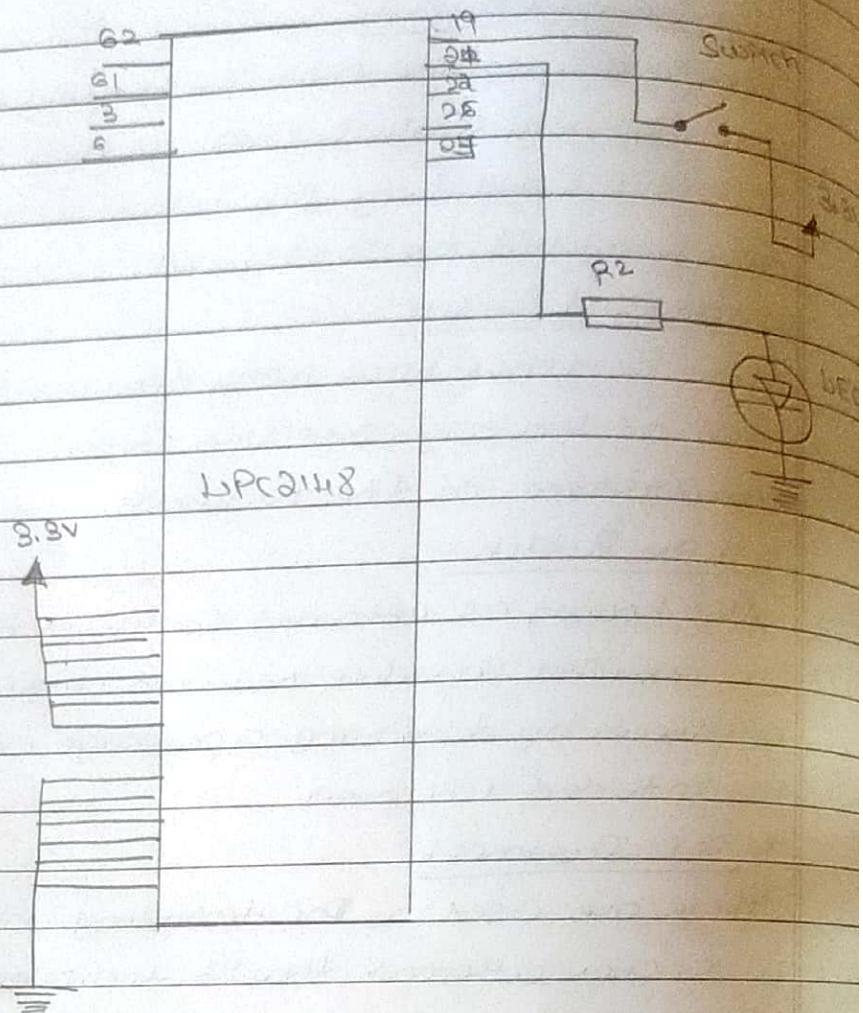
Also known as Ethernet Switch or data switches. and are used to reduce network congestion on bottleneck by delivering a package of data only to its intended recipient.

4. PoE Switches:

These are used in PoE technology which stands for power over Ethernet that is technology that integrates data & power electrical to receive data in parallel to power.

Interfacing Switch with LPC4468

- Controlling LED by using switches in LPC4468 board.
- It works by turning on LED either during it OFF when switch is going to low or HIGH.
- LPC4468 Board has 8 number of point LED's connected with 16 port linear memory port pin 16 to 23.
- In below diagram, Switch connected blue LPC4468 and LED.



3. LPC2148 GPIO programming Registers Involved.
- GPIO function is most frequently used functionality of microcontroller.
 - The GPIO function in both the parts are controlled by 4 Registers IOPIN, IODIR, IOSET, IOCLR
 - IOPIN:
 - GPIO port pin value register and can be used to read/write values directly to the PIN.
 - The status of the PINS that are configured as GPIO can always be read from its register irrespective of direction set on Pin

Syntax for 10PIN Pg, 10xPIN where x is PortA/PortB

IODIR:

GPIO Port Direction Control Register E is used to Set direction i.e. input or output of individual pins. When bit in this register is set to '1' corresponding pin in microcontroller configured as input. When bit set as '0' then configured as output.
Syntax: IODIR, x for Port A (PortB)

IOSET:

- GPIO Port Output Set Register A can be used to Set the value of GPIO pin that is configured as output to high.
- When bit in the IOSET Register is 1 then logic 1.
- Setting '0' in this register has no effect on PIN.

IOCLR:

- It is GPIO Port Output Clear register & can be used to Set value of GPIO pin that is configured as output to low.
- When bit is '1' Corresponding Pin set to logic 0 & clears the IOSET register.
- Setting '0' to IOCLR Register has no effect on PIN.