Assignment - 1 23AM1A04617

1) Explain V-I characteristics of LCD?

2) Draw the circuit diagram of an NPN junction transistor CE Configuration and describe the static input and output characteristics. Also define active, saturation and cut off regions and saturation resistance of a CE transistor.

3) Explain about input and output characteristics of a transistor when it is connected in Common base Configuration.

1) V-I characteristics of LCD :-

some characteristics of liquid Crystal displays (LCDs)

Brightness :- LCDs offer excellent brightness which contributes to their Crystal clear picture quality.

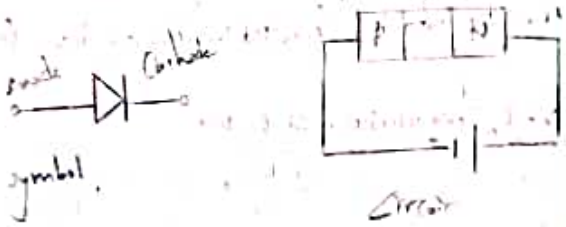
Contrast :- LCD's have superior Contrast, which also contributes to their Crystal clear picture quality.

Resolution :- LCDs provides excellent resolution & display information best at their native resolution.

sharpness :- LCDs provide perfect sharpness at their native resolution.

1) LCD [liquid Crystal display] is a type of flate panel display, which makes use liquid Crystal in its primary form of operation.

A liquid - crystal display (LCD) is a flat - panel display or other electronically modulated optical device that uses the light - modulating properties of liquid crystals. Combined with polarizers liquid crystals do not emit light directly but instead use a back light or reflector to produce image in color or monochrome.



Construction of LCD diode circuit diagram :-

A liquid Crystal display [LCD] is made of two layers, each consisting two polarized filters and electrodes, the layers are made of combination of liquid and solid materials, with solid compound being a crystal the liquid crystal used in LCD can have different chemical formula

How circuit work :-

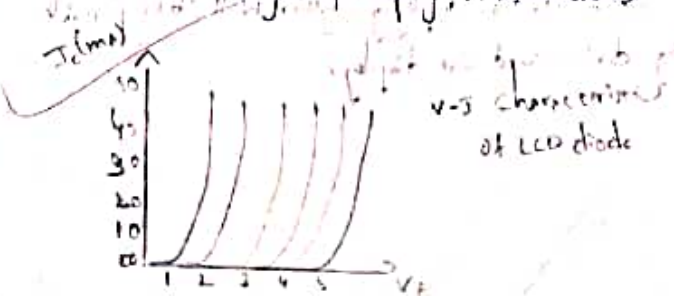
An external light source passes through one of the polarized glasses

An electric current is applied to the liquid crystal molecule, causing them to align the polarized light travels from the first layer to the second polarized glass, creating an image on the screen.

Working principle of LED diode :-

The principle behind the LCD is that when an electrical current is applied to the liquid crystal molecule, the molecules tends to untwist this causes the angle of the polarized light which is passing through the molecules of the polarized glass and also causes a change in the angle of the top polarizing filter

The basic principle of LED is that liquid crystal (LC) molecules work alight value of control the light. The LC molecules is usually a rod - like (or) disk - like shape and can rotate. under an electric field LCD displays work by controlling the liquid crystal to either block or allow light to pass through, creating characteristics and symbols on the screen. It Controlled by sending data and commands to its controller, which is form manages the displays of information



V-I characteristics of LED diode

LCD displays are not only small in size, thin in thickness, light in weight, low in energy consumption, low in operating voltage [1.5 to 6v] and non-radiative flickers free and can be directly method.

It is light thinner and flexible LED provides excellent resolution brightness and contrast so the picture quality is clarity. Clear LCDs can be suitable with CMOS integrated circuits so making an LCD is very easy it gives perfect sharpness at the native resolution.

LCD monitors radiative much less than CRT monitors (no low not completely without radiation and electronic products have more or less radiation) which is a born for the who work in front of computers all day long.

Applications :-

LED's are used in a wide range of application including LCD television, Computer monitors, instrument panels, aircrafts, Cockpit displays, and indoor and outdoor signage.

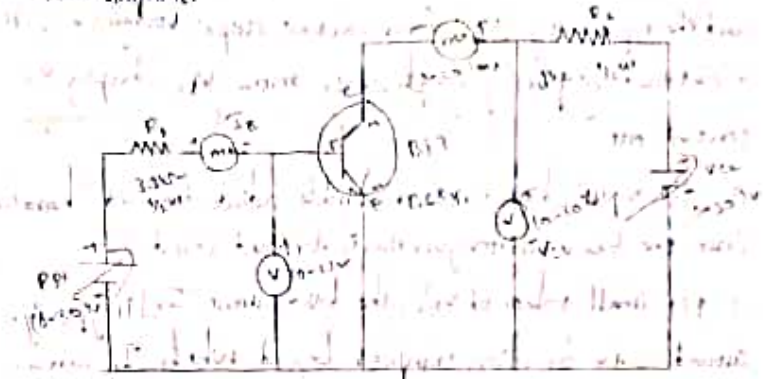
clocks used in displaying digital wall clocks portable gaming device and car displays.

2.1] Common emitter Configuration :-

The Configuration in which emitter is Connected b/w the Collector and base is known as a Common emitter Configuration

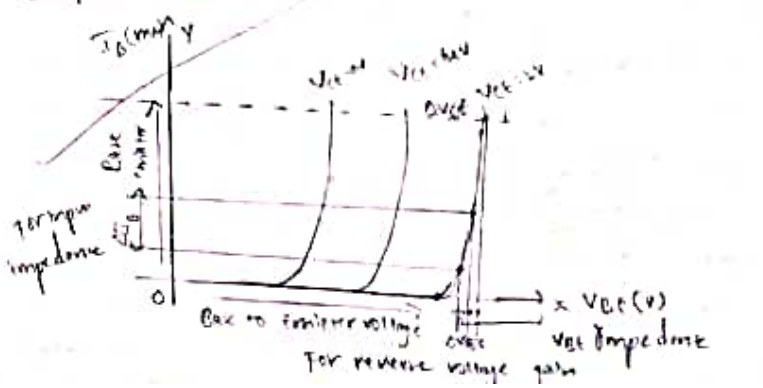
This arrangement places the emitter b/w the Collector and the base. The emitter and base forms the Connection for the input circuit, while the collector and emitter provides the Connection for the output Circuit

→ The Common emitter circuit is the most widely used of junction transistor amplifier



In the Common emitter (CE) Configuration the emitter is Common to both the input and output Circuits. The basic diagram.

Input Characteristics



NPN transistor :- The transistor has three terminal emitter[E] Base[B] Collector[C]

Input side :- The input signal is applied b/w the base[B] and emitter [E]

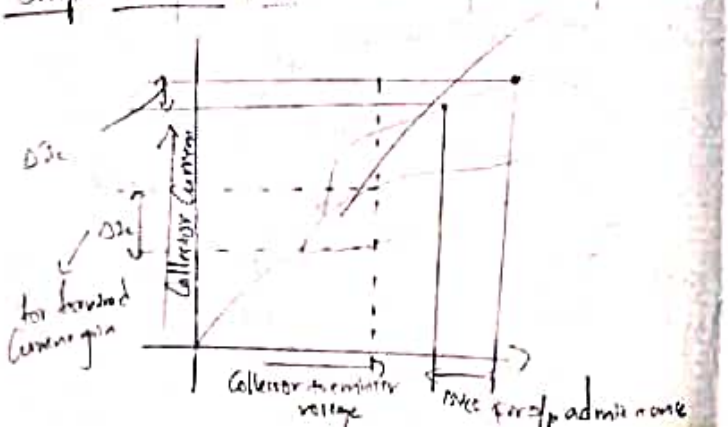
Resistor :- A resistor is connected in series with the base terminal to limit the base current.

Input characteristics :- The relationship b/w the input current and the input voltage [V_{BE}] for a constant output voltage[V_{CE}]. It is obtained by plotting a graph of I_B versus V_{BE}, keeping V_{CE} constant.ent

→ The input characteristics resemble a diode forward characteristics since the base-emitter junction is forward biased.

→ For small values of V_{BE}, the base current [I_B] is typically around 0.7V for silicon transistor beyond which I_B increases rapidly.

Output characteristics :-



output side :-

Collector :- The output signal [V_{out}] is taken across the collector [C] and emitter [E]

Resistor :- A load resistor is connected in series with the collector terminal.

V_{CC} :- The supply voltage [V_{CC}] is connected to the collector

output characteristics :-

The relationship b/w the o/p current [I_C] and the output voltage [V_{CE}] for a constant i/p current [I_B] It is obtained by plotting a graph of I_C versus V_{CE}, keeping I_B constant.

→ The output characteristics show three distinct regions the active region, the saturation region, and cutoff region.

→ In the active region, I_C depends on I_B and is relatively independ of V_{CE}

→ In the saturation region, both the base collector and base - emitter junctions are forward biasing resulting in maximum I_C.

→ In the cutoff region, both junction are reverse biased, and I_C is minimal (close to zero).

Active region :- In this region the transistor operates as an amplifier, the base emitter junction is forward biased, and the base - collector junction is reversed biased the collector current [I_C] is proportional to the base current [I_B] and the transistor operates in a linear region.

Saturation region :- In this region both the base emitter & base Collector junctions are forward biased the transistor is fully on, and behaves like a closed switch and the Collector-emitter voltage is very low

Cutoff-region :- In this region both the base-emitter and base Collector junctions are reverse biased the transistor is fully off, and the Collector Current [I_C] is minimum close to zero the transistor behaves like an open switch.

Saturation resistance :- The saturation resistance of a CE transistor refers to the small present b/w the Collector and emitter terminals when the transistor is in the saturation region.

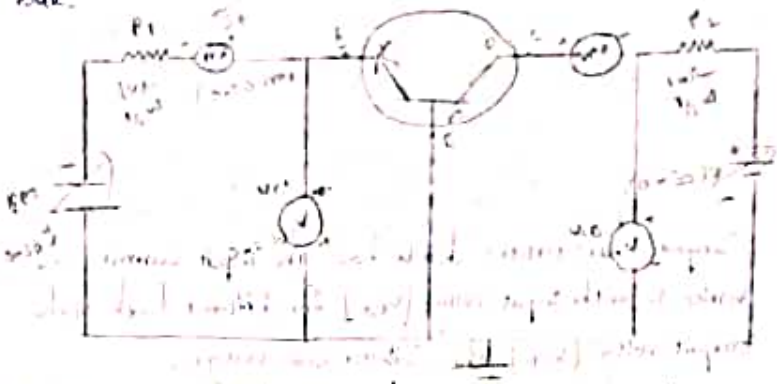
The characteristics and regions are critical in understanding the operation of the transistor in various application, particularly in amplification and switching.

3.A] :- Common base Configuration :-

Common base Configuration also known as grounded base Configuration, is a circuit arrangement for a bipolar junction transistor [BJT] where the base terminal is shared by both the input and output circuits. In this Configuration, the input signal is applied to the emitter terminal and the output is taken from the Collector terminal.

→ Input and output terminals, the i/p terminal is emitter base [I_E] and the output terminals is Collector-base [I_C]

→ CB Configuration can be used as an amplifier. In this circuit arrangement base, and output is taken from the Collector and base.



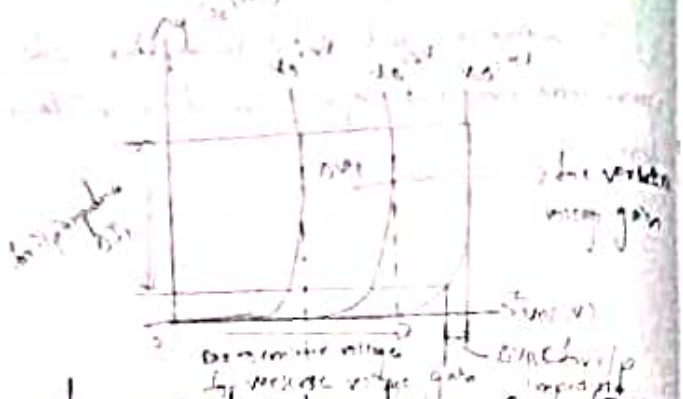
In Common base Configuration, the transistor input and output characteristics can be analyzed.

Input characteristics :-

* Input terminal :- emitter [E] with respect to base [B] which is typically grounded.
* Input voltage :- [V_{BE}] voltage b/w the emitter and base
* Input Current [I_E] :- Current flowing into the emitter

The input Current increase rapidly with small increase in the emitter-base voltage [V_{BE}] after surpassing the cut in voltage.

Input characteristics :-



Input characteristics describe how the input Current [I_E] varies with the input voltage [V_{BE}] for different levels of the output voltage [V_{CB}], the Collector base voltage.

Typically, the input characteristics resemble the forward biased diode Curve as the emitter base junction is forward biased.

Input impendance :- low because, the emitter base junction is forward biased.

Output characteristics :-

output terminals :- Collector with respect to the base.

output voltage :- [V_{CB}] :- voltage b/w the Collector and base.

output Current [I_C] :- Into Current leaving into the Collector

The output characteristics describes how the o/p Current [I_C] varies with the o/p voltage [V_{CB}] for different levels of I/p Current [I_E]

for a Constant input Current [I_E] the o/p Current [I_C] remains nearly Constant over a wide range of Collector-base voltage [V_{CB}] This is the active region, where the transistor operates efficiently as an amplifier. In this region $I_C \approx I_E$, since the Common base Current gain [α] is close to 1.

output impedance :-

High because the Collector base junction is reverse biased in the active region

Current gain :- less than 1 [$\alpha \approx 0.95$ to 0.99] because in a Common base Configuration the Current gain is the ratio of the Collector Current [I_C] to the emitter Current [I_E]

The Common base Configuration is typically used in high-frequency application due to its stability and low input impedence.