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Q1) Explain Rectifier with half wave and full wave rectification.

Ans) Half wave Rectifier:-

The process of removing one-half of the input signal to establish a dc level is called half-wave in Half wave rectification the rectifier conduct current during positive half cycle of input ac signal only.

Negative half cycle is suppressed.

OR

in a single-phase half-wave rectifier, either negative or positive half of the AC voltage flows, while the other half of the AC voltage is blocked. Hence the output receives only one half of the AC wave. A single diode is required for a single phase supply. Half wave rectifier produce more amount of ripple content than full wave rectifiers and to eliminate the harmonics it requires much more filtering. for a sinusoidal input voltage, the no-load output DC voltage for an ideal half wave rectifier

is

$$V_{RMS} = V_{Peak} / 2$$

$$V_{DC} = V_{Peak} / \pi$$

where - V_{DC} , V_{AV-DC} output voltage or average output voltage.

- V_{Peak} - Peak value of input phase voltage
- V_{RMS} - the output voltage of root mean square value.

Full wave rectifier:

This rectifier is essentially made of two half-wave rectifiers, and can be made with two diodes.

(i) when the voltage of the alternating current is positive one of the diodes become forward biased whereas the other gets reverse biased. Hence, current flow through the forward biased diode.

(ii) when the voltage of the alternating current is negative, the previous reverse biased diode become forward biased whereas the other gets reverse biased, Hence, current flow through the forward biased diode.

(iii) Thus, current flows at least through one of the diodes at a time.

Q16) Differentiate between intrinsic and extrinsic semiconductor.

| Intrinsic Semiconductor | Extrinsic Semiconductor |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>An intrinsic semiconductor is a pure semiconductor.</p> | <p>Extrinsic semiconductor is not pure semiconductor.</p> |
| <p>The density of electrons and holes in the intrinsic semiconductor is same i.e. the number of free electron present in the conduction band is equal to the number of holes in the valance band.</p> | <p>In the case of extrinsic semiconductor the number of electron and holes are not equal. In a p-type semiconductor, the holes are in excess and n-type semiconductor the number of electron is greater than the number of holes.</p> |
| <p>The electrical conductivity of an intrinsic semiconductor is low.</p> | <p>The electrical conductivity of extrinsic semiconductor is high.</p> |
| <p>The pure form of silicon and germanium crystal is used in an intrinsic semiconductor.</p> | <p>The impurity like arsenic, antimony, phosphorus, aluminium indium, etc is added to the pure form of silicon and germanium crystal is used in</p> |

Intrinsic Semiconductor

- Ratio of majority and minority carriers is unity.

Extrinsic semiconductor
to form of extrinsic semiconductor.

- Ratio of majority and minority carriers is not unity.

Q2a) what is Transistor? Differentiate between BJT and FET.

Transistor.

Transistor is an electronic semiconductor device made of three layers of semiconductor material.

~~that can act~~ The construction is similar to the diode.

Transistor often take place of mechanical switches and relays.

A transistor can be thought of as two diodes that share a common center layer.

A three lead semiconductor device that act as.

- an electrically controlled switch.
- a current amplifier.

BJT

- Bipolar junction transistors are bipolar devices, in this transistor there is a flow of both majority and minority charge carriers.
- Bipolar junction transistors are current controlled.
- Bipolar junction transistor consist of three terminal namely, emitter, base and collector. These terminals are denoted by E, B and C.
- The input impedance of field effect transistors has high compared with bipolar junction transistors.
- The BJT is responsible for overheating due to a negative temperature coefficient.
- BJT are applicable for low ~~voltage~~ current application.
- A BJT need a small amount of current to switch on the transistor. The heat dissipated on bipolar stops the total

FET

- Field effect transistors are unipolar devices, in this transistor there are only the majority charge carriers flows.
- Field effect transistors are voltage controlled.
- Field effect transistor consist of three terminal namely source, drain, and gate. These terminals are denoted by S, D and G.
- The input impedance of field effect transistors are low compared with field effect transistors.
- FET has a +ve temperature coefficient for stopping over heating.
- FET are applicable for low voltage applications.
- When ever the 'G' terminal of the FET transistor has been charged, no

number of transistors that can be fabricated on the chip.

Current is required to keep the transistors.

Q2b) Differentiate between inverting and non inverting amplifiers.

Inverting amplifier

- The inverting amplifier the output is out of phase with input.
- The input signal in the inverting amplifier is applied at the negative terminal of the op-amp. on the contrary.
- The gain provided by the inverting amplifier is the ratio of the resistances.
- In the inverting amplifier, the non-inverting terminal is grounded.

Non-Inverting amplifier

- Whereas as for the non-inverting amplifier both input and output are in the same phase.
- The input in the case of non-inverting amplifier is provided at the positive terminal.
- As agains, the gain of the non-inverting amplifier is the summation of 1 and the ratio of the resistances.
- Whereas as in the non-inverting amplifier, the inverting terminal of the op-amp is grounded.

Inverting amplifier

- The achieved gain of the inverting amplifier is negative thus it provide inverted output.

Non-inverting amplifier

- But for a non-inverting amplifier, the gain is positive and hence the achieved output is non-inverted in nature.

Q35)

Different between NPN and PNP transistor.

NPN Transistor

- The conduction of NPN transistor is because of electron.
- The emitter terminal of NPN transistor is connected to the negative terminal of the battery on the contrary.
- The direction of flow of current in NPN transistor is from collector to emitter.
- The conduction of NPN transistor is high.

PNP Transistor

- While the conduction in PNP transistor is due to holes.
- The emitter terminal of PNP transistor is connected to the positive terminal of the battery.
- While the direction of current in PNP transistor is from the emitter to collector.
- than that of PNP because the mobility of electron is more in comparison to that of holes.

NPN Transistor

- The NPN transistor turns ON when the base current starts increasing.
- the majority of n-types are present
- ~~this~~ the terminal base is supplied with increased amount of current then the transistor gets switch to ON mode.

PNP Transistor.

- while the PNP transistor exactly of opposite of it
- the majority p-type material are present.
- in this case for the low value of the current the transistor is ON. otherwise for high values of current transistors it is off.

Q3a) Different between active and saturation region of transistor.

Active region

Active region is one in which Base emitter junction is forward biased and base collector junction will be reverse biased in a transistor. In NPN transistor when you bias it in active region the current flowing through it will be as follows. The current flowing through the three terminals of BJT are emitter, Base collector.

saturation region

saturation region is one in which both emitter base and Base collector junction of the transistor are forward biased. in this region high currents flows through the transistor, as both junction of the transistor are forward biased and bulk resistance offered is very much less.