

Electrical Questions from power electronics updated on Jan 2025

Electrical interview questions from power electronics

Electrical questions from semiconductor, power diodes, transistor, thyristor, MOSFET and IGBTs, bridge converter etc....

What are the different operation regions of the SCR?

SCR or thyristor will have three regions of operations based on the mode in which the device is connected in the circuit.

Reverse blocking region: When the cathode of the thyristor is made positive with respect to the anode and no gate signal is applied. In this region SCR exhibits the reverse blocking characteristics similar to diode.

Forward blocking region: In this region the anode of the thyristor is made positive with respect to the cathode and no gate signal is applied to the thyristor. A small leakage current flows in this mode of operation of the thyristor.

Forward conduction region: When the forward voltage applied between the anode and cathode increases at a particular break over voltage avalanche breakdown takes place and thyristor starts conducting current in forward direction. By this type of triggering the device damages the SCR. Hence a gate signal is applied before the forward break over voltage to trigger the SCR.

What is Latching current?

Gate signal is to be applied to the thyristor to trigger the thyristor ON in safe mode. When the thyristor starts conducting the forward current above the minimum value, called Latching current, the gate signal which is applied to trigger the device is no longer required to keep the SCR in ON position.

What is Holding current ?

When SCR is conducting current in forward conduction state, SCR will return to forward blocking state when the anode current or forward current falls below a low level called Holding current.

Note: Latching current and Holding current are not the same. Latching current is associated with the turn on process of the SCR whereas holding current is associated with the turn off process. In general holding current will be slightly lesser than the latching current.

Why thyristor is considered as Charge controlled device?

During the triggering process of the thyristor from forward blocking state to forward conduction state through the gate signal, by applying the gate signal (voltage between gate and cathode) increases the minority carrier density in the p-layer and thereby facilitates the reverse break over of the junction J₂ and thyristor starts conducting. Higher the magnitude of the gate current pulse, lesser is the time required to inject the charge and turning on the SCR. By controlling the amount of charge we can control the turning on time of the SCR.

What is the relation between the gate signal and forward break over voltage (VBO)?

Thyristor can be triggered by increasing the forward voltage between anode and cathode, at forward break over voltage thyristor starts conducting. However this process may damage the thyristor, so thyristor is advised to trigger on through the gate pulse. When a gate signal is applied thyristor turns on before reaching the break over voltage. Forward voltage at which the thyristor triggers on depends on the magnitude of the gate current. Higher is the gate current lower is the forward break over voltage

What are the different losses that occur in thyristor while operating?

Different losses that occur are

Forward conduction losses during conduction of the thyristor

Loss due to leakage current during forward and reverse blocking.

Power loss at gate or Gate triggering loss.

Switching losses at turn-on and turn-off.

What are the advantages of speed control using thyristor?

Advantages :

1. Fast Switching Characteristics than MOSFET, BJT, IGBT
2. Low cost
3. Higher Accurate.

What happens if i connect a capacitor to a generator load?

Connecting a capacitor across a generator always improves powerfactor, but it will help depends up on the engine capacity of the alternator, other wise the alternator will be over loaded due to the extra watts consumed due to the improvement on pf. Secondly, don't connect a capacitor across an alternator while it is picking up or without any other load.

Why the capacitors works on ac only?

Generally capacitor gives infinite resistance to dc components (i.e., block the dc components). it allows the ac components to pass through.

Explain the working principal of the circuit breaker?

Circuit Breaker is one which makes or breaks the circuit. It has two contacts namely fixed contact & moving contact under normal condition the moving contact comes in contact with fixed contact thereby forming the closed contact for the flow of current. During abnormal & faulty conditions (when current exceeds the rated value) an arc is produced between the fixed & moving contacts & thereby it forms the open circuit Arc is extinguished by the Arc Quenching media like air, oil, vacuum etc.

What is the difference between Isolator and Circuit Breaker?

Isolator is a off load device which is used for isolating the downstream circuits from upstream circuits for the

reason of any maintenance on downstream circuits. it is manually operated and does not contain any solenoid unlike circuit breaker. it should not be operated while it is having load. first the load on it must be made zero and then it can safely operated. its specification only rated current is given. But circuit breaker is on load automatic device used for breaking the circuit in case of abnormal conditions like short circuit, overload etc., it is having three specification 1 is rated current and 2 is short circuit breaking capacity and 3 is instantaneous tripping current.

What is the difference between earth resistance and earth electrode resistance?

Only one of the terminals is evident in the earth resistance. In order to find the second terminal we should recourse to its definition: Earth Resistance is the resistance existing between the electrically accessible part of a buried electrode and another point of the earth, which is far away.

The resistance of the electrode has the following components:

- (A) the resistance of the metal and that of the connection to it.
- (B) the contact resistance of the surrounding earth to the electrode.

What is use of lockout relay in ht voltage?

A lock-out relay is generally placed in line before or after the e-stop switch so the power can be shut off at one central location. This relay is powered by the same electrical source as the control power and is operated by a key lock switch. The relay itself may have up to 24 contact points within the unit itself. This allows the control power for multiple machines to be locked out by the turn of a single key switch.

What is the power factor of an alternator at no load?

At no load Synchronous Impedance of the alternator is responsible for creating angle difference. So it should be zero lagging like inductor.

How to determine capacitor tolerance codes?

In electronic circuits, the capacitor tolerance can be determined by a code that appears on the casing. The code is a letter that often follows a three-digit number (such as 130Z). The first two are the 1st and 2nd significant digits and the third is a multiplier code. Most of the time the last digit tells you how many zeros to write after the first two digits and these are read as Pico-Farads.

Why most of analog o/p devices having o/p range 4 to 20 mA and not 0 to 20 mA?

4-20 mA is a standard range used to indicate measured values for any process. The reason that 4mA is chosen instead of 0 mA is for fail safe operation. For example- a pressure instrument gives output 4mA to indicate 0 psi, up to 20 mA to indicate 100 psi, or full scale. Due to any problem in instrument (i.e) broken wire, its output reduces to 0 mA. So if range is 0-20 mA then we can differentiate whether it is due to broken wire or due to 0 psi.

Two bulbs of 100w and 40w respectively connected in series across a 230v supply which bulb will glow bright and why?

Since two bulbs are in series they will get equal amount of electrical current but as the supply voltage is constant across the bulb ($P=V^2/R$). So the resistance of 40W bulb is greater and voltage across 40W is more ($V=IR$) so 40W bulb will glow brighter.

What is meant by knee point voltage?

Knee point voltage is calculated for electrical Current transformers and is very important factor to choose a CT. It is the voltage at which a CT gets saturated. (CT-current transformer).

What is reverse power relay?

Reverse Power flow relay are used in generating station's protection. A generating stations is supposed to fed power to the grid and in case generating units are off, there is no generation in the plant then plant may take power from grid. To stop the flow of power from grid to generator we use reverse power relay.

What are the advantage of free wheeling diode in a Full Wave rectifier?

It reduces the harmonics and it also reduces sparking and arching across the mechanical switch so that it reduces the voltage spike seen in a inductive load

what is the full form of KVAR?

We know there are three types of power in Electrical as Active, apparent & reactive. So KVAR is stand for ``Kilo Volt Amps with Reactive component.