Name: CHANDANA R. GALGALI
Batch: P6-1
Roll No.: 160104222234
EEEE - IA - 2

Q.1 write short notes on various switchgear like fuses, MCBs, ELCBs, CFLs, and LED lamps used for domestic purposes.

Answer: switchgears are electrical equipment used to control, protect and isolate electrical circuits and equipment. They are typically used in power systems to manage the flow of electricity and protect equipment from damage caused by overloads, short circuits, and other electrical faults. switchgears can be classified into different types based on their voltage levels, construction, and applications. Some common types of switchgears include air-insulated switchgears (AIS), gas-insulated switchgears (GIS), and hybrid switchgears. switchgears are essential components of modern power systems and are used in a wide range of applications, including power generation, transmission, and distribution.

1. Fuses: Fuses are electrical safety devices that protect electrical circuits from overloading or short-circuiting. They work by melting and breaking the circuit when the current exceeds a certain level. Fuses are commonly used in domestic electrical systems to protect appliances and devices from damage due to electrical faults.

2. MCBs: Miniature circuit breakers (MCBs) are automatic switches that protect electrical circuits from overloading or short-circuiting. They work by tripping the circuit when the current exceeds a certain level. MCBs are commonly used in domestic electrical systems as a replacement for fuses.

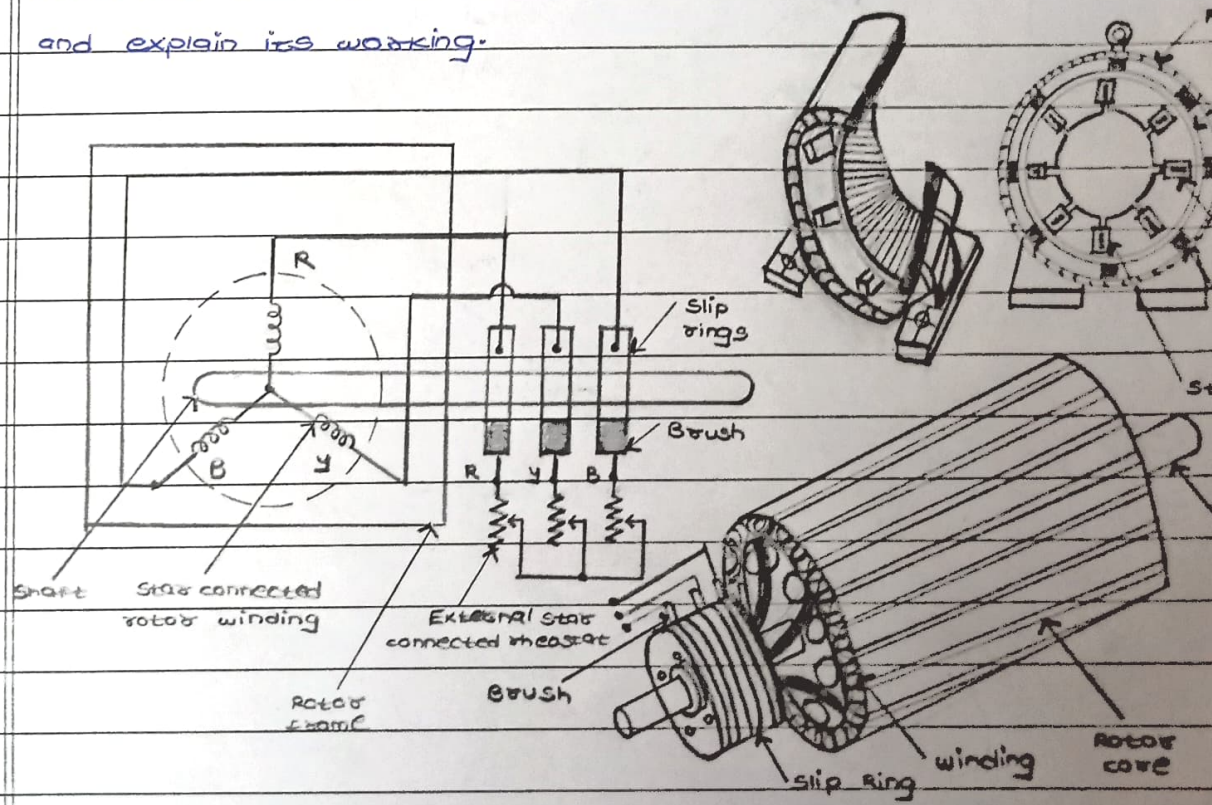
3. ELCBs: Earth leakage circuit breakers (ELCBs) are safety devices that detect and interrupt electrical circuits when there is a leakage of current to earth. They work by sensing the difference in current between the live and neutral wires. ELCBs are commonly used in domestic electrical systems to protect against electric shock.

4. CFLs: Compact Fluorescent Lamps (CFLs) are energy-efficient light bulbs that use less electricity than traditional incandescent bulbs. They work by passing an electric current through a gas, which produces ultraviolet light that is then converted into visible light by a phosphorescent coating. CFLs are commonly used in domestic lighting fixtures.

5. LED lamps: Light Emitting Diode (LED) lamps are energy efficient light bulbs that use even less electricity than CFLs. They work by passing an electric current through a semiconductor material, which produces light. LED lamps are commonly used in domestic lighting fixtures as a replacement for traditional incandescent bulbs.

Q.2 Draw the internal construction of a three-phase induction motor and explain its working.

Answer:

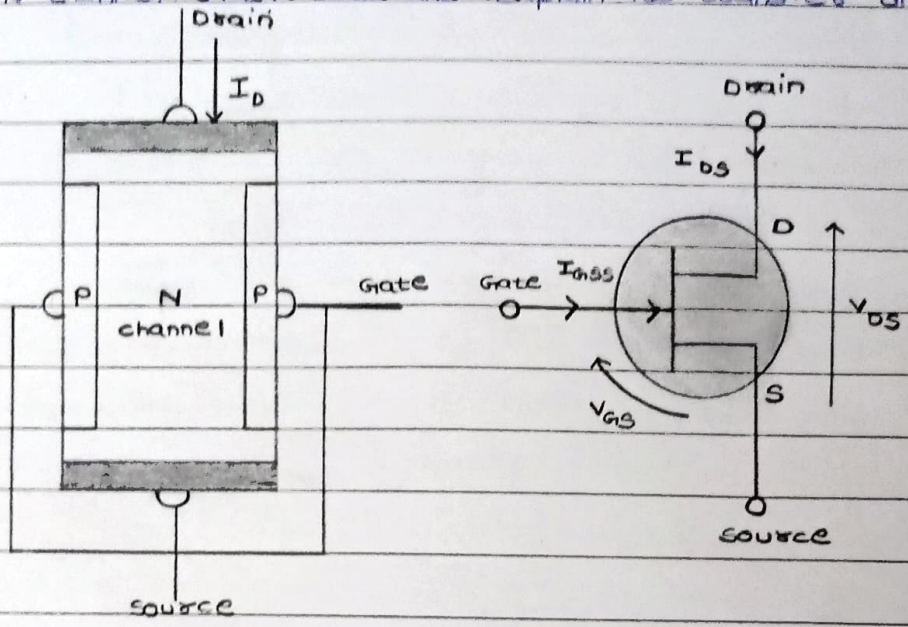


A three-phase induction motor is a type of AC motor that operates on a three-phase power supply. It is a common type of motor used in industrial and commercial applications due to its reliability, efficiency and low maintenance requirements.

The internal construction of a three-phase induction motor consists of a stator and a rotor. The stator is the stationary part of the motor and is made up of a series of laminated steel plates with slots on the inner periphery. The slots are used to hold the stator windings, which are made up of three-phase windings that are evenly spaced around the stator. The rotor is the rotating part of the motor and is also made up of a series of laminated steel plates with slots on the outer periphery. The slots are used to hold the rotor windings, which are made up of conductive bars that are short-circuited at both ends by end rings. The rotor windings are not connected to any external power source and are instead induced with a magnetic field by the stator windings. When three-phase AC power is applied to the stator windings, a rotating magnetic field is created that rotates at a speed determined by the frequency of the AC power and the number of poles in the stator. The rotating magnetic field induces a magnetic field in the rotor windings, which causes the rotor to rotate in the same direction as the rotating magnetic field. The speed of the rotor is slightly less than the speed of the rotating magnetic field, which is known as slip. The amount of slip depends on the load on the motor and the design of the motor. As the load on the motor increases, the slip also increases, which causes the rotor to rotate at a slower speed. In summary, a three-phase induction motor works by creating a rotating magnetic field in the stator windings, which induces a magnetic field in the rotor windings and causes the rotor to rotate. The speed of the rotor is slightly less than the speed of the rotating magnetic field, which is known as slip.

Q.3 With the help of a neat diagram, explain the principle, and working of N-channel JFET. Draw and explain its transfer and output characteristics

Answer:



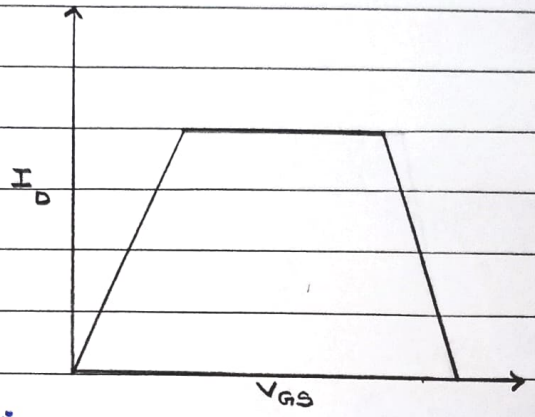
Principle: An N-channel JFET (Junction Field Effect Transistor) is a three-terminal semiconductor device that operates on the principle of controlling the flow of current through a channel of N-type material by varying the voltage applied to a P-type gate region. The device is made up of a thin layer of N-type material (the channel) sandwiched between two regions of P-type material (the source and drain).

Working: When a voltage is applied to the gate, it creates an electric field that controls the width of the channel and hence the flow of current between the source and drain. The gate voltage is negative with respect to the source voltage, which creates a depletion region in the channel and reduces the width of the channel. As the gate voltage becomes more negative, the depletion region widens, and the channel becomes narrower, reducing the flow of current.

Transfer characteristics of N-channel JFET:

The transfer characteristics of an N-channel JFET show the

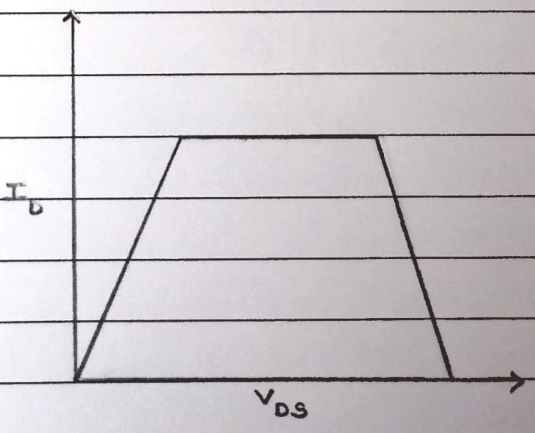
relationship between the gate-source voltage (VGS) and the drain current (ID) for a constant drain-source voltage (VDS).



In the diagram, the curve shows that the drain current (ID) is almost constant for a range of gate-source voltages (VGS) below the pinch-off voltage (VP). Beyond the pinch-off voltage, the drain current decreases rapidly with increasing gate-source voltage.

Output characteristics of N-channel JFET:

The output characteristics of an N-channel JFET show the relationship between the drain current (ID) and the drain-source voltage (VDS) for a constant gate-source voltage (VGS).



In the diagram, the curve shows that the drain current (ID) increases linearly with increasing drain-source voltage (VDS) until it reaches a saturation point, beyond which the drain current remains almost

constant. The saturation point occurs when the channel is completely pinched off, and the drain current is limited by the pinch-off voltage (V_P).