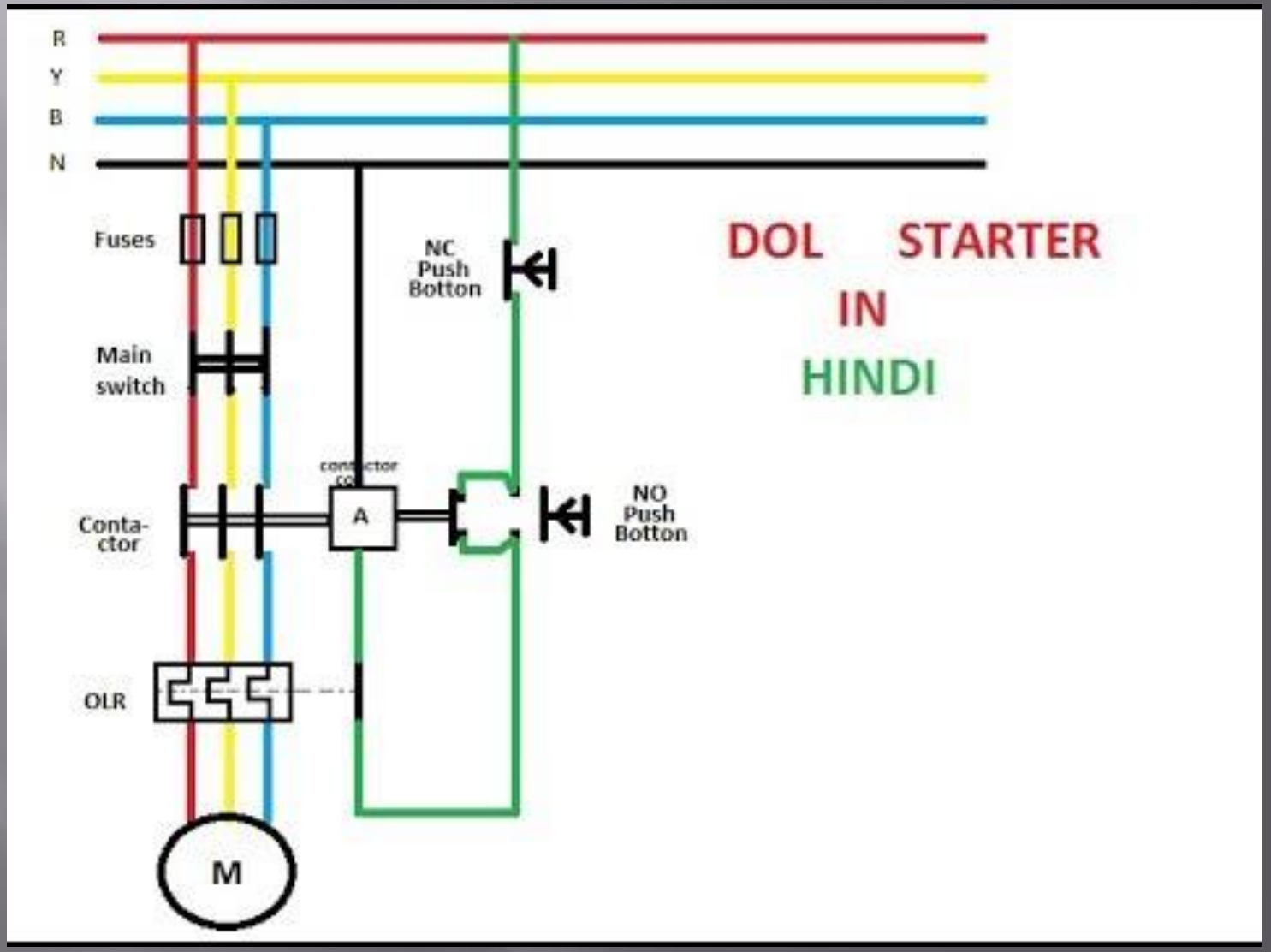
# ELECTRICAL ENGINEERING DESIGN AND DRAWING-2

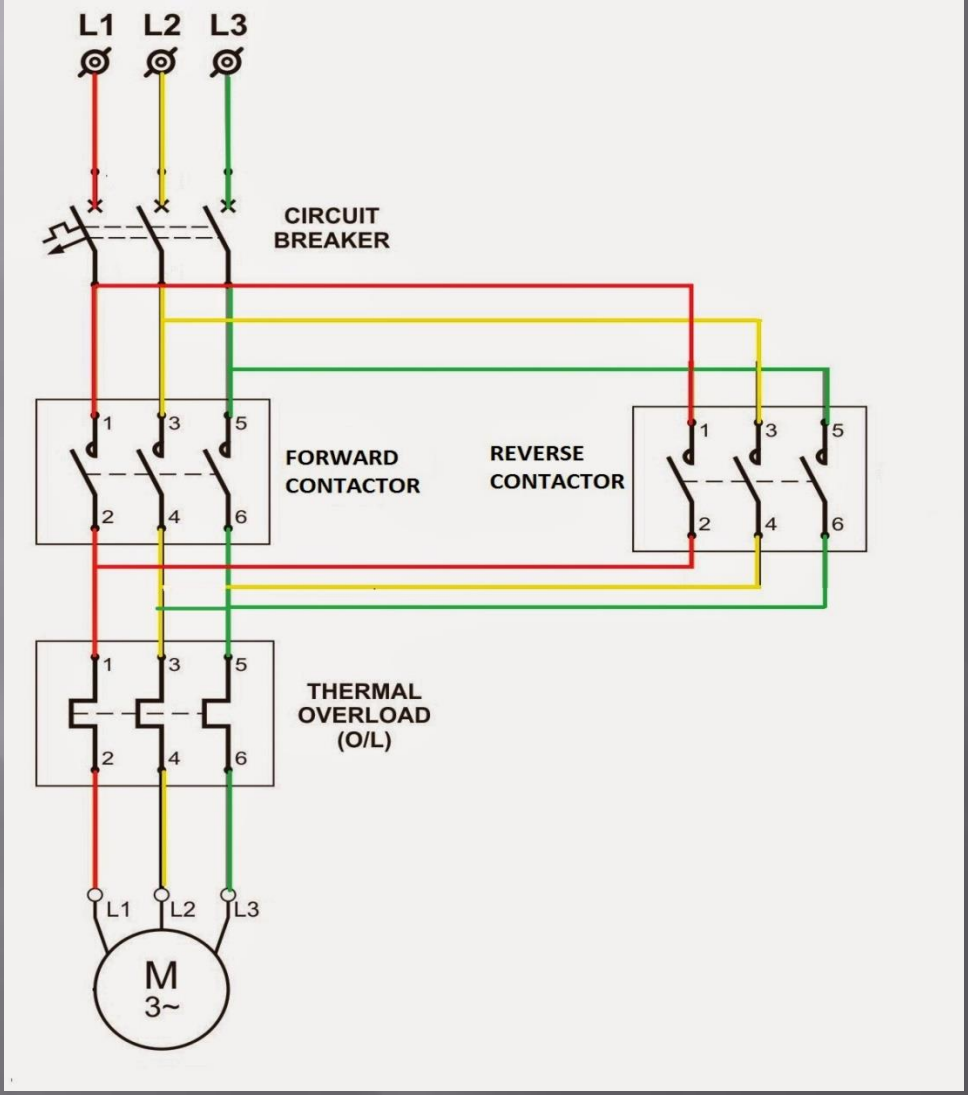
# Contractor control circuit

- 1.1 DOL Starter of 3 -phase induction motor
- 1.2 3 –phase induction motor getting supply from selected feeder
- 1.3 Forward/Reversing of a 3-phase induction motor
- 1.4 Two speed control of 3-pahse induction motor.
- 1.5 Limit switch control of a 3- Phase induction motor.
- 1.6 Sequential operating of two motors using time delay relay.
- 1.7 Manually generated star-delta starter for 3-phase induction motor

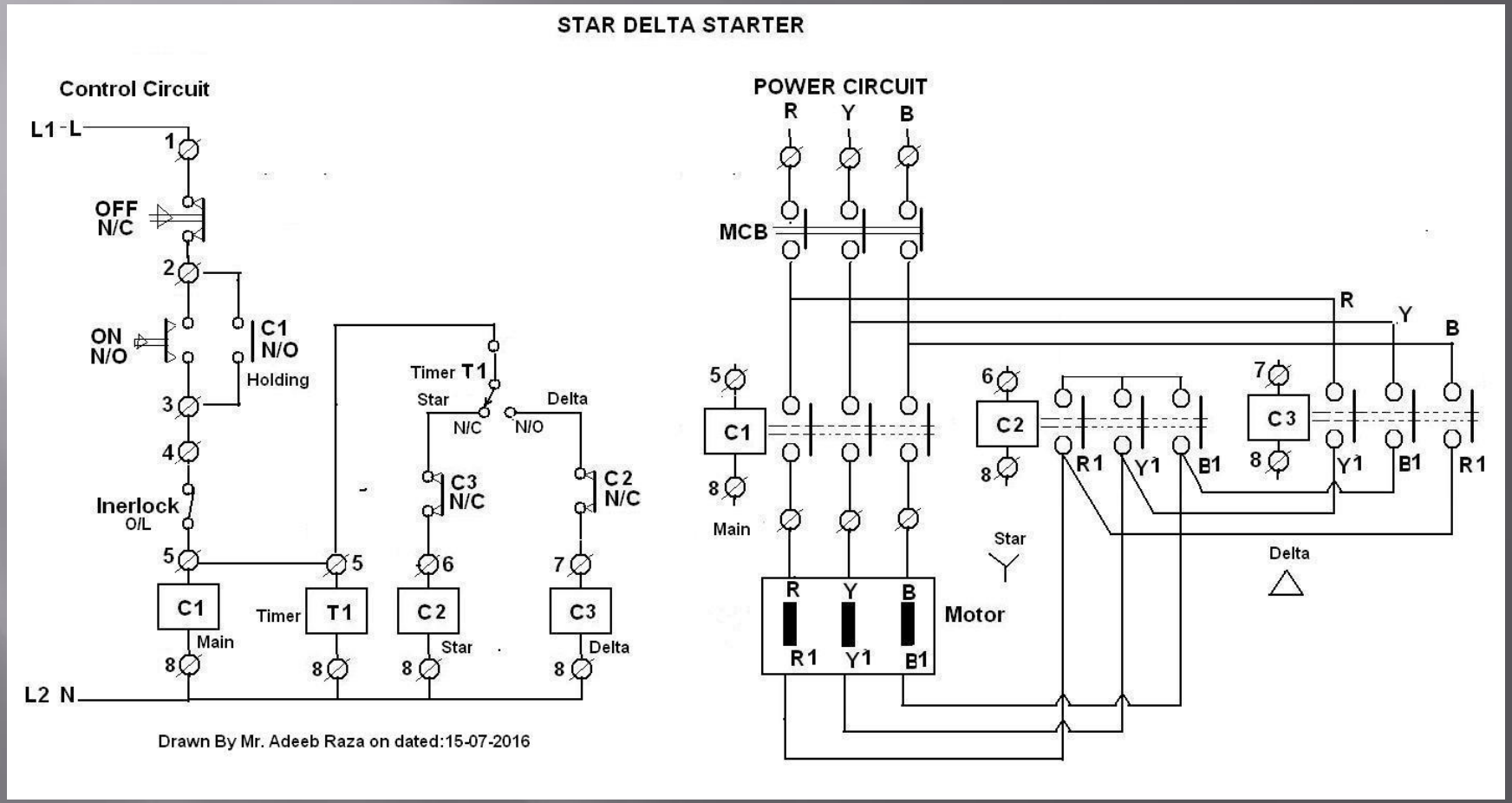
# DOL Starter


R
Y
B
N
Fuses
NC
Push
Botton
Main
switch
Conta-
ctor
A
NO
Push
Botton
OLR
M
DOL STARTER
IN
HINDI

# FORWARD/REVERSE CONTROL

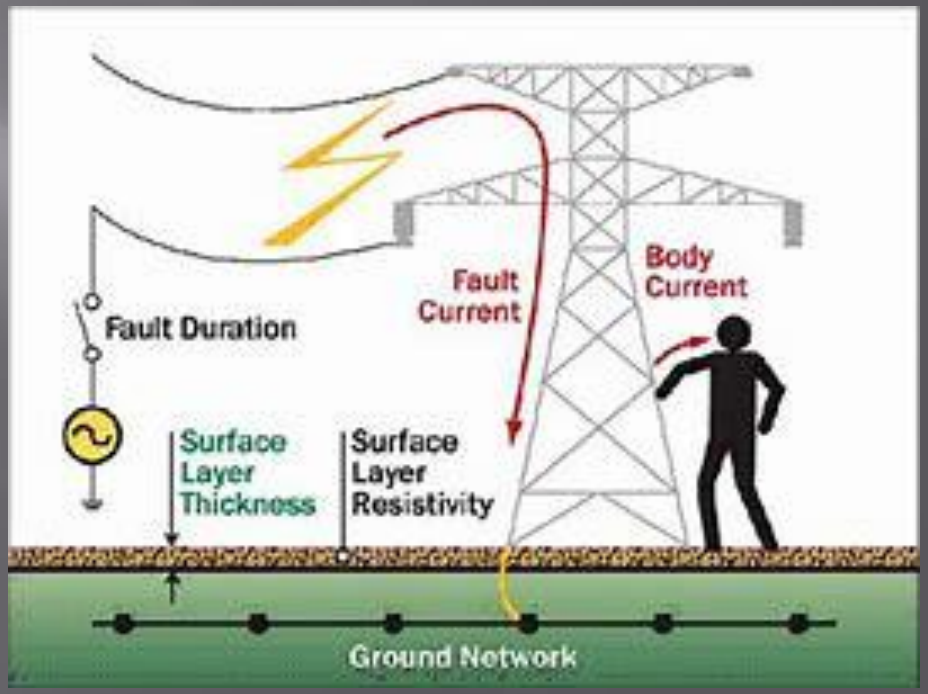


# MANUALLY CONTROL STAR DELTA STARTER



# EARTHING

- In an electrical installation an earthing system or grounding system connects specific parts of that installation with the Earth's conductive surface for safety and functional purposes. The point of reference is the Earth's conductive surface. The choice of earthing system can affect the safety and electromagnetic compatibility of the installation. Regulations for earthing systems vary considerably among countries, though many follow the recommendations of the International Electrotechnical Commission. Regulations may identify special cases for earthing in mines, in patient care areas, or in hazardous areas of industrial plants.
- In addition to electric power systems, other systems may require grounding for safety or function. Tall structures may have lightning rods as part of a system to protect them from lightning strikes. Telegraph lines may use the Earth as one conductor of a circuit, saving the cost of installation of a return wire over a long circuit. Radio antennas may require particular grounding for operation, as well as to control static electricity and provide lightning protection


Fault Duration
Fault Current
Body Current
Surface Layer Thickness
Surface Layer Resistivity
Ground Network

# TYPES OF EARTHING

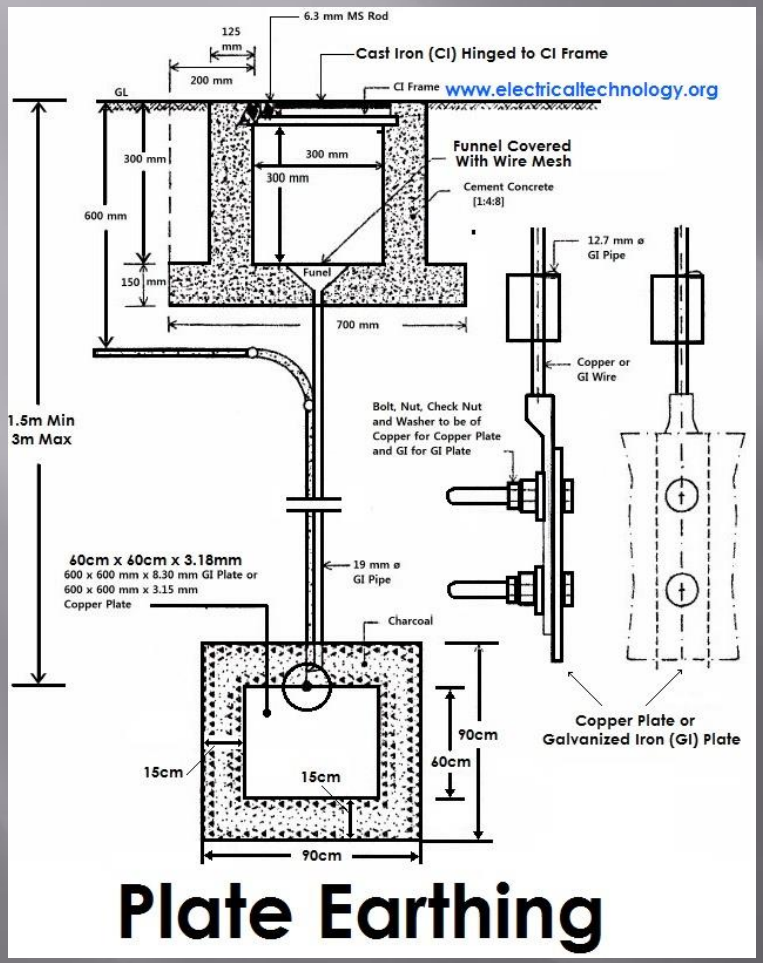
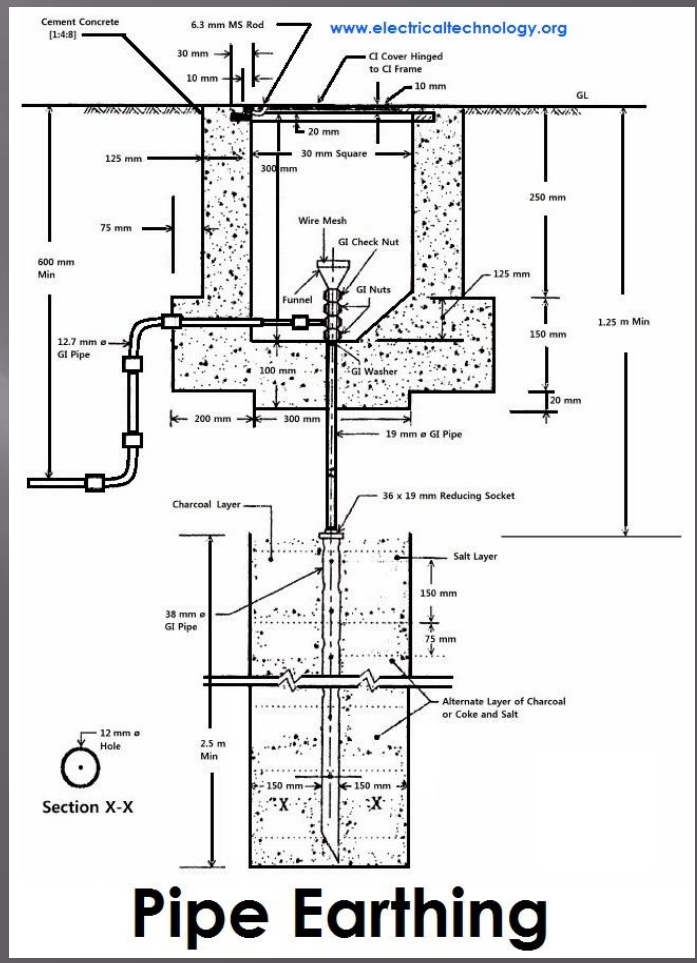
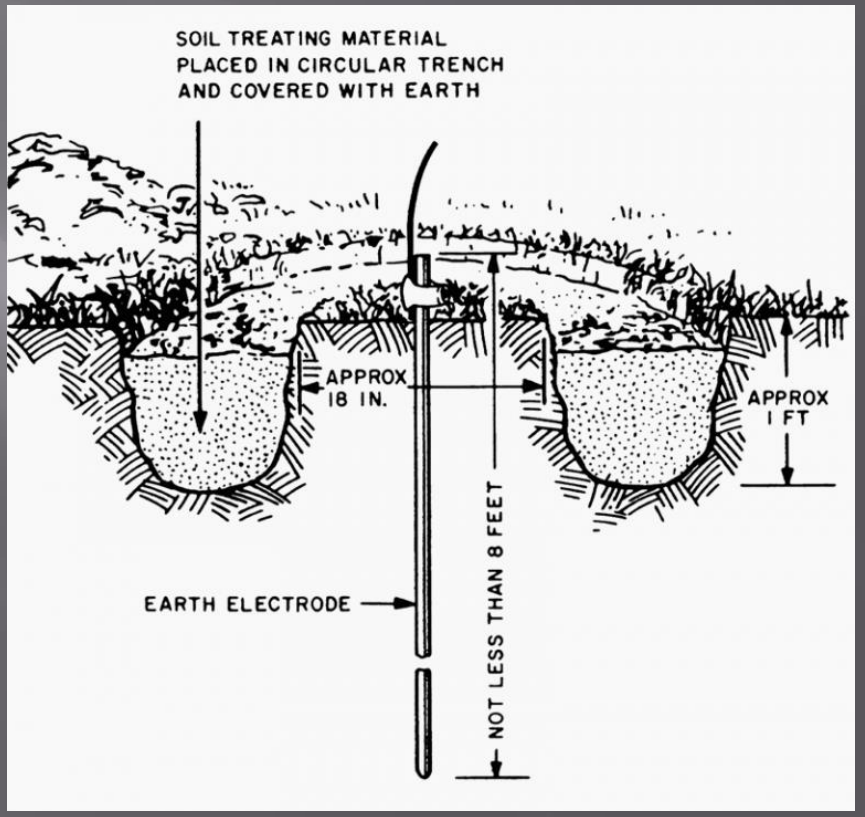



Plate Earthing



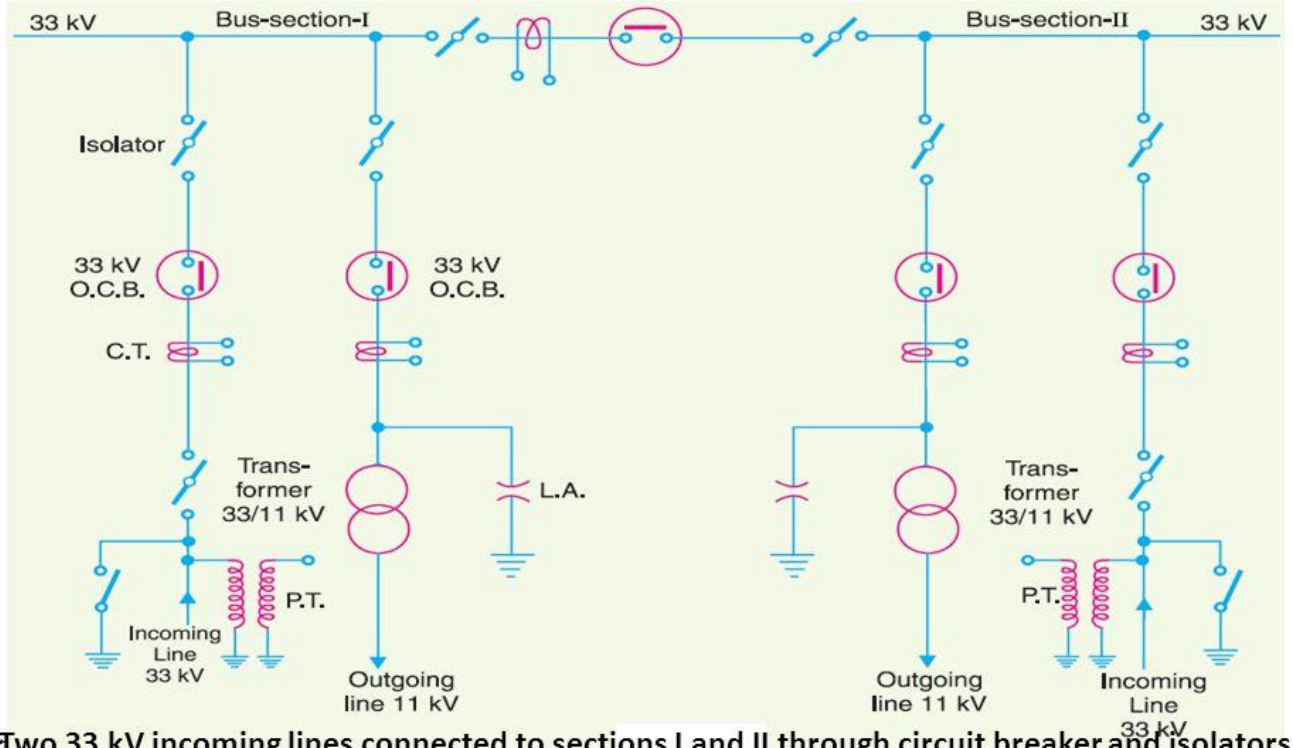

Pipe Earthing


EEP
ELECTRICAL ENGINEERING PORTAL


SOIL TREATING MATERIAL
PLACED IN CIRCULAR TRENCH
AND COVERED WITH EARTH
APPROX
18 IN.
APPROX
1 FT
EARTH ELECTRODE
NOT LESS THAN 8 FEET

# KEY DIAGRAM OF 33KV SUBSTATION

## (ii) Single bus-bar system with sectionalisation




- Two 33 kV incoming lines connected to sections I and II through circuit breaker and isolators.
- Each 11 kV outgoing line is connected to one section through transformer (33/11 kV) and circuit breaker.
- Each bus-section behaves as a separate bus-bar.

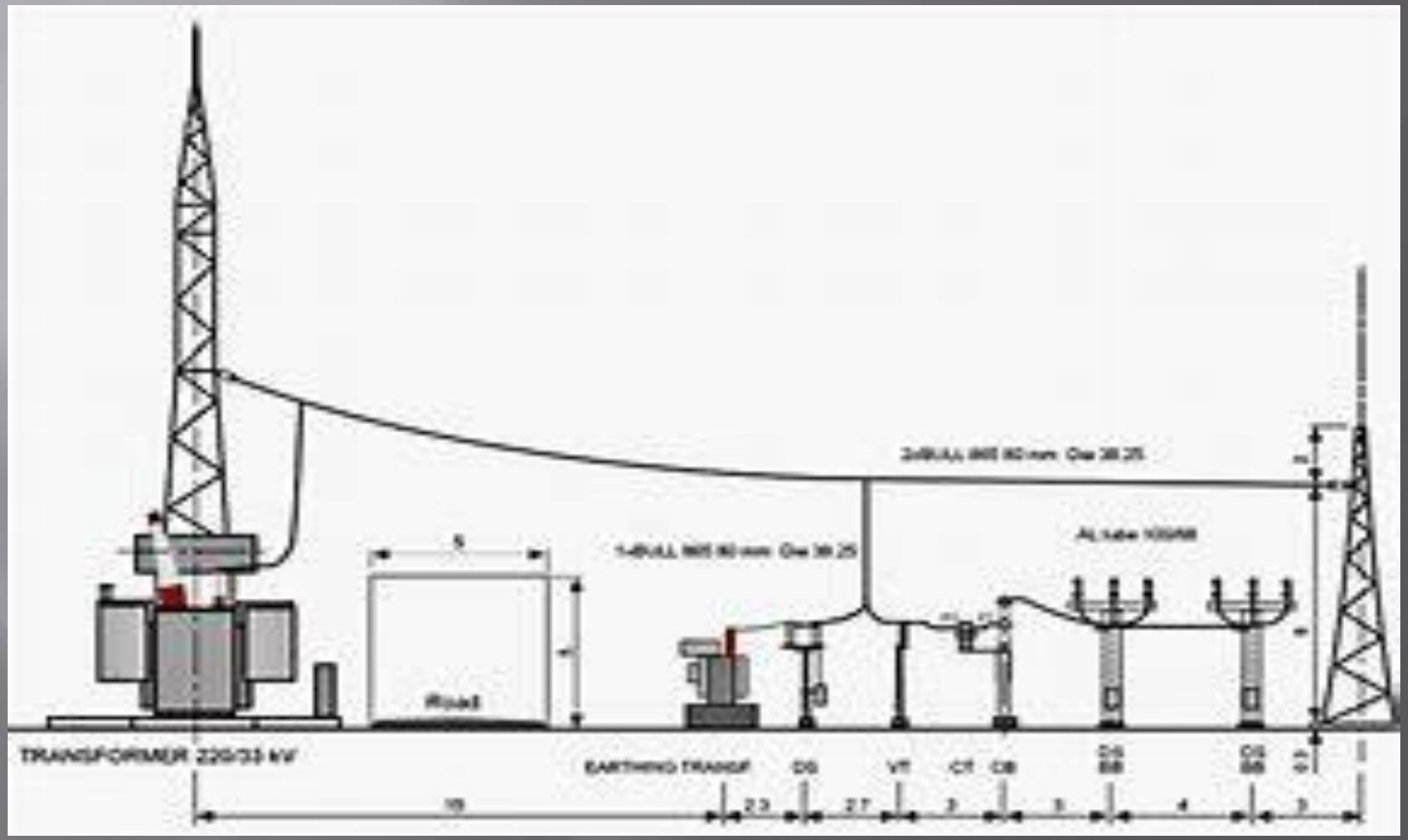
# WHAT IS EARTHING TRANSFORMER OR GROUNDING TRANSFORMER

Stability on External Earth Fault(E/F) on Delta Side of Star-Delta Power Transformer

If the earthing transformer on the Delta Side is outsides the Zone of protection the Earth Fault(E/F) in the delta system outside Current Transformer (CT) locations would produce current distributions as shown which circulate within the differential CT secondaries and is kept out of operating coils.

Zig-Zag or inter connected star grounding transformer has normal magnetising impedance of high value but for E/F, currents flow in windings of the same - core in such a manner that the ampere turn cancel and hence offer lower impedance.

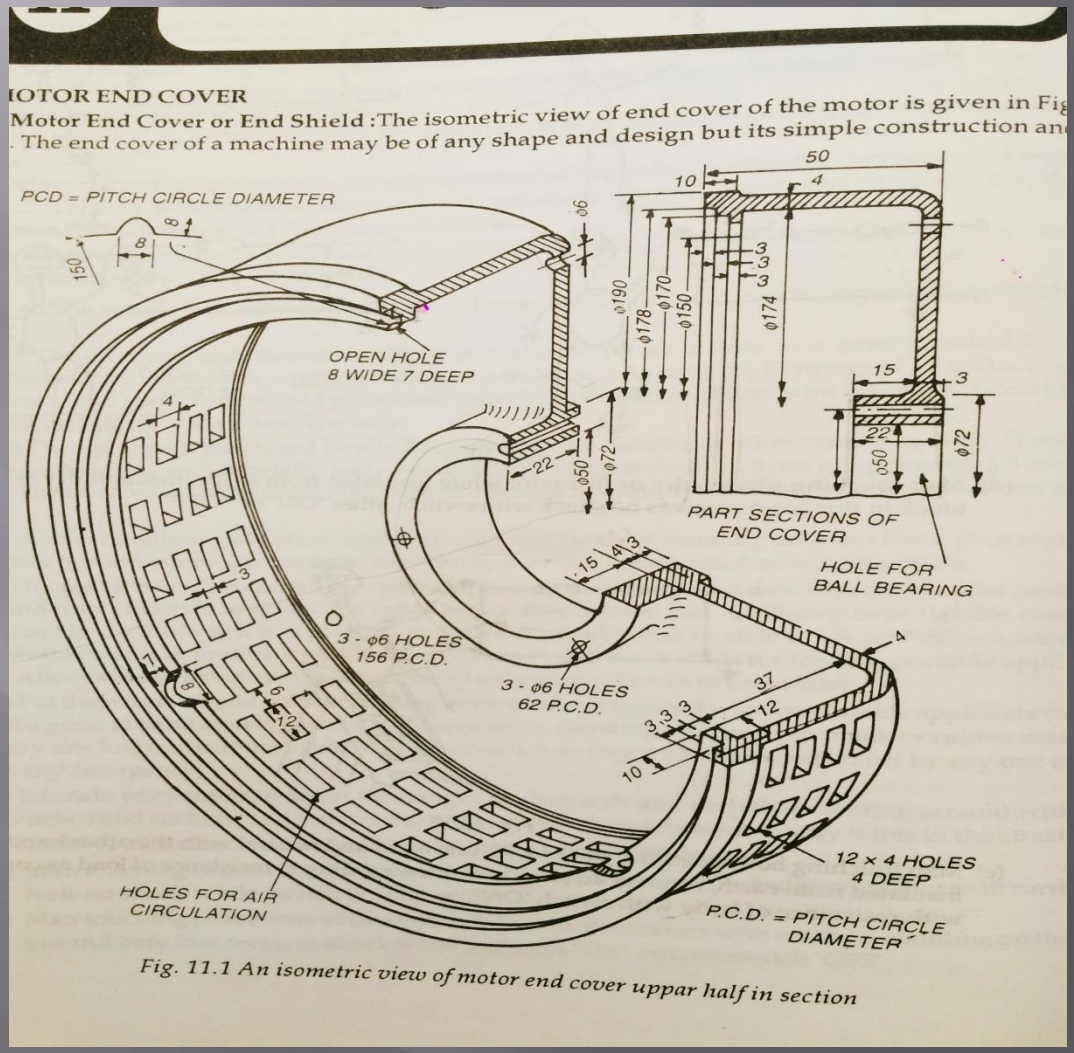
# EARTHING LAYOUT OF DISTRIBUTION TRANS.



# DRAWING AND MACHINE PARTS

- 3.1 End cover of 3-phase induction motor
- 3.2 Rotor of squirrel cage induction motor
- 3.3 Field coil of D.C. Motor
- 3.4 Terminal plate of induction motor
- 3.5 Motor body of an induction motor
- 3.6 Sliprings of 3-Phase induction motor

# End cover of 3-phase induction motor




IOTOR END COVER

**Motor End Cover or End Shield** :The isometric view of end cover of the motor is given in Fig
. The end cover of a machine may be of any shape and design but its simple construction an

*Fig. 11.1 An isometric view of motor end cover uppar half in section*

# Rotor of squirrel cage induction motor

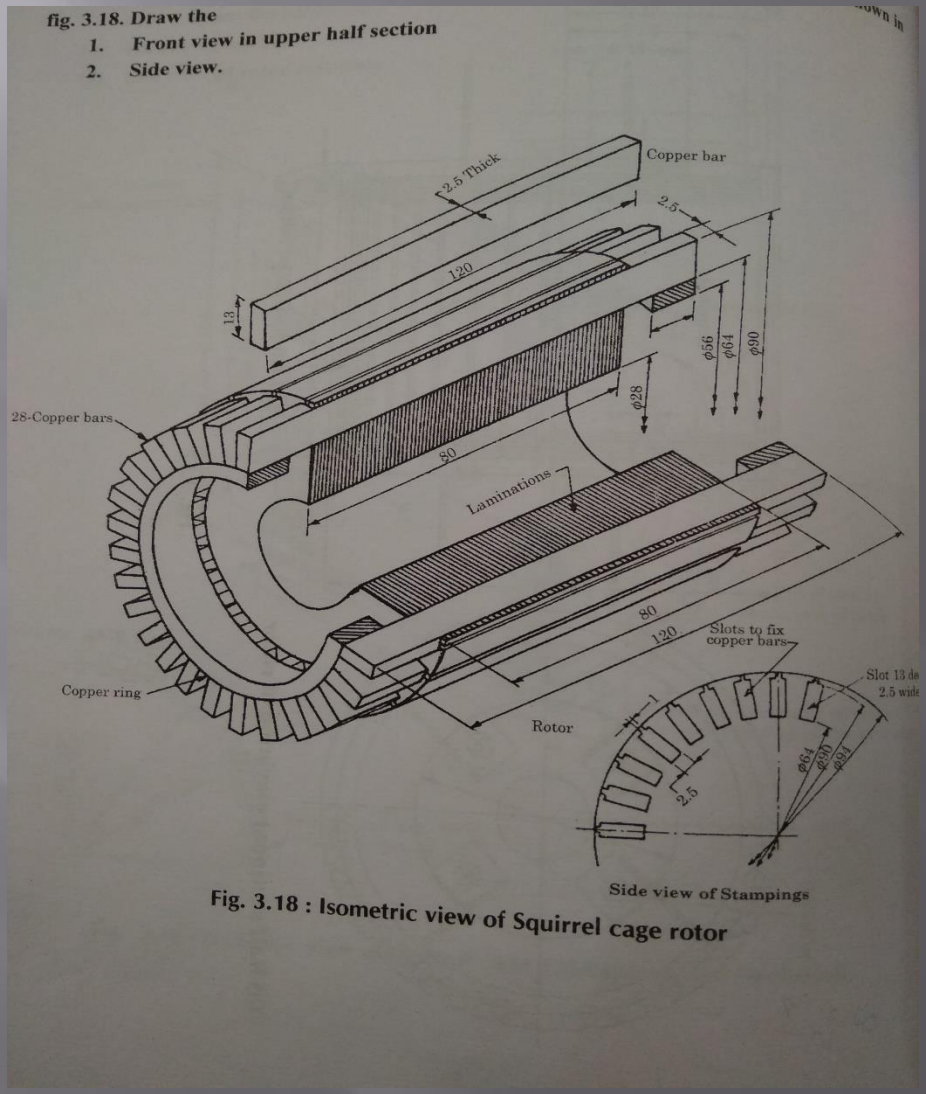



Fig. 3.18 : Isometric view of Squirrel cage rotor

# Field coil of D.C. Motor



**Example 3.4 The isometric view of field pole core and pole shoe is shown in fig. 3.21 Draw the**

**(*i*) Front view (pole core in right half section)**
**(*ii*) Top view**

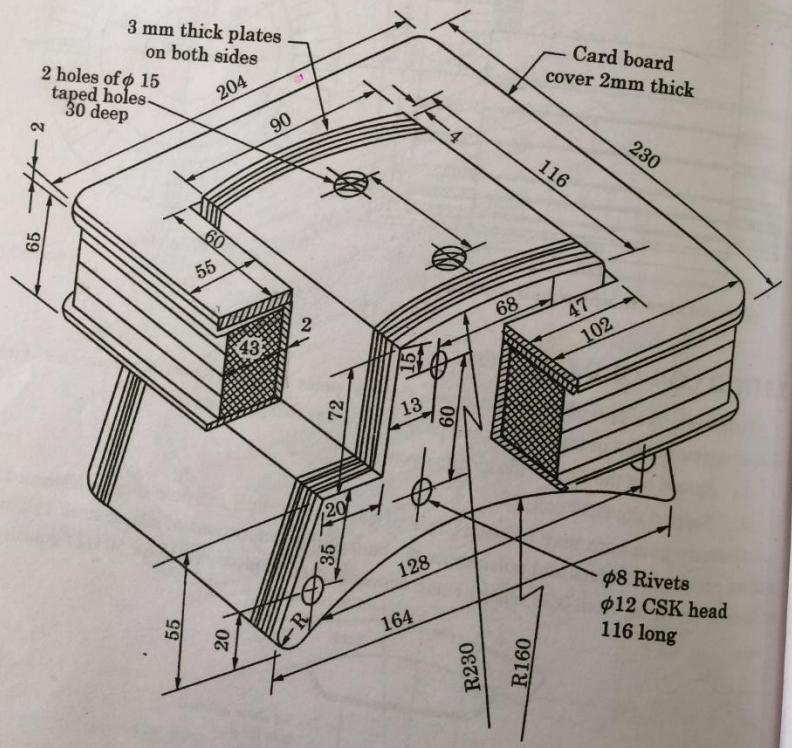
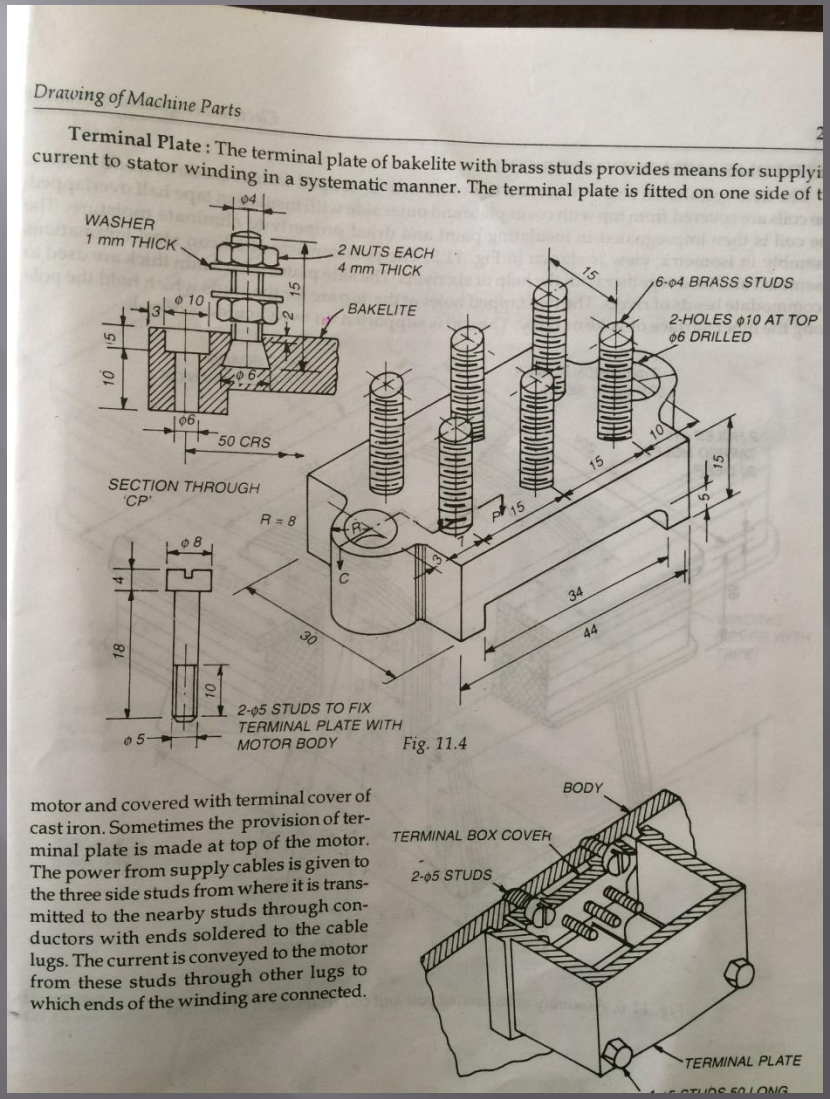



Fig. 3.21

# Terminal plate of induction motor



*Drawing of Machine Parts*

**Terminal Plate :** The terminal plate of bakelite with brass studs provides means for supplyi
current to stator winding in a systematic manner. The terminal plate is fitted on one side of t



Fig. 11.4

motor and covered with terminal cover of cast iron. Sometimes the provision of terminal plate is made at top of the motor. The power from supply cables is given to the three side studs from where it is transmitted to the nearby studs through conductors with ends soldered to the cable lugs. The current is conveyed to the motor from these studs through other lugs to which ends of the winding are connected.

# Motor body of an induction motor

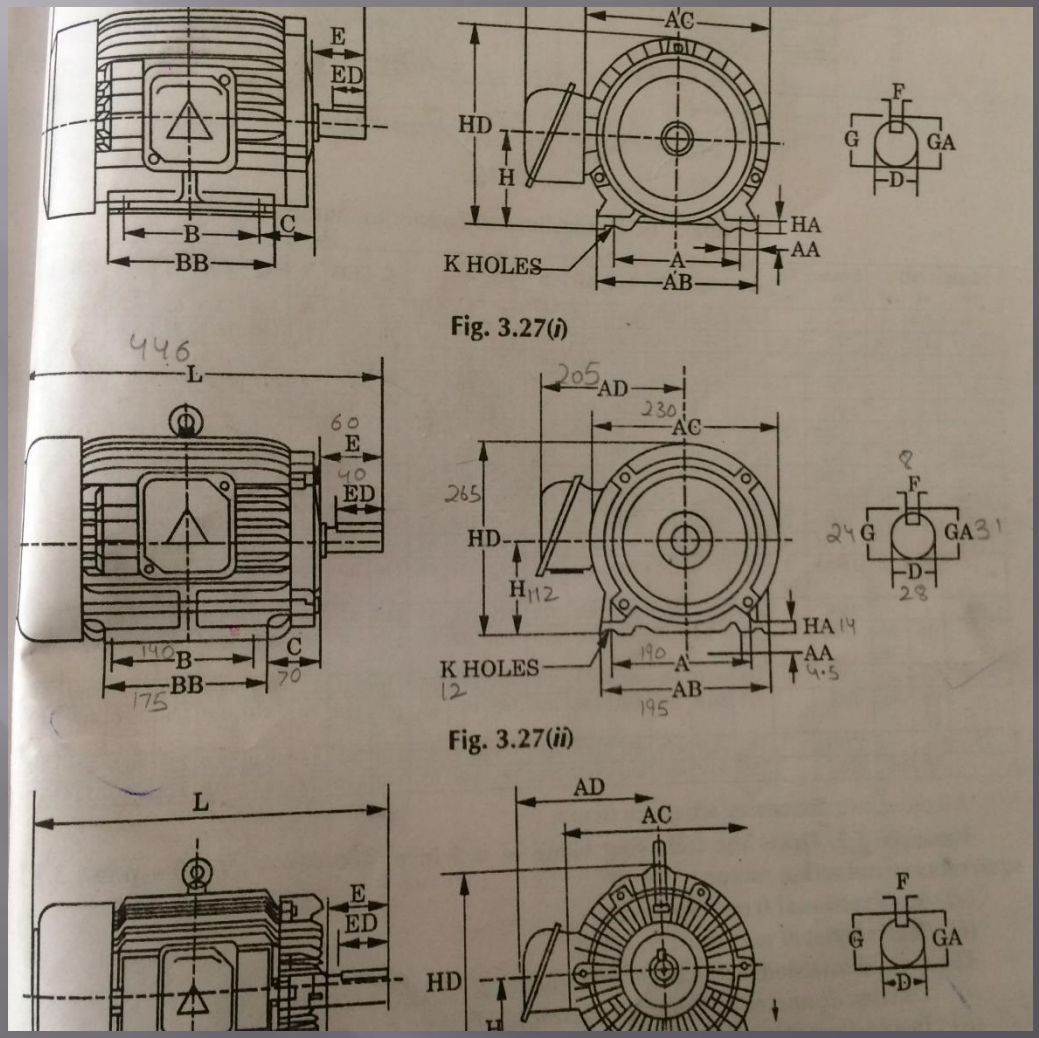



Fig. 3.27(*i*)




Fig. 3.27(*ii*)

# Sliprings of 3-Phase induction motor

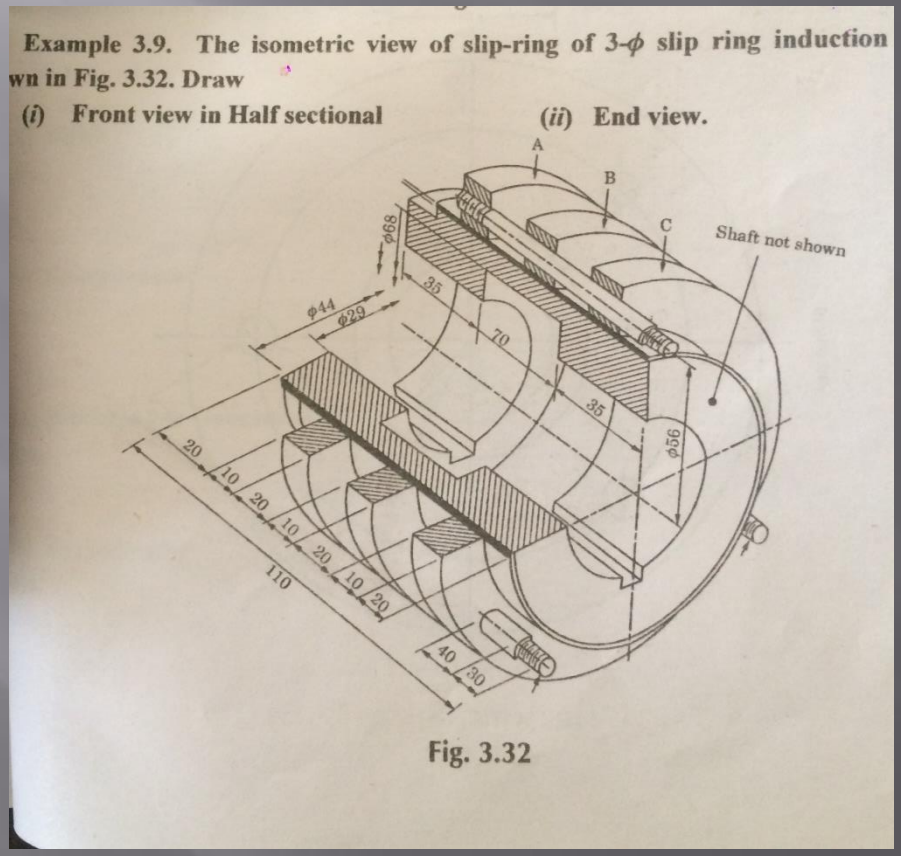



Fig. 3.32