

## BEE Experiments Record.

## 5. DEMO OF DC/AC MACHINE AND PARTS.

★ PRE-LAB QUESTIONS  $\Rightarrow$ 

① What are the major parts of the DC generators?

$\rightarrow$  The major parts of the DC generators are:

1. STATOR = The main function of the stator is to provide magnetic fields where the coil spins. A stator includes two magnets with opposite polarity facing each other. These magnets are located to fit in the region of the rotor.
2. ROTOR = A rotor in a DC machine includes a slotted iron laminations with slots that are stacked to shape a cylindrical armature core. The function of the lamination is to decrease the loss caused due to eddy current.
3. ARMATURE WINDINGS = Armature windings are in a closed-circuit form and are connected in series and parallel for enhancing the sum of produced current.
4. YOKE = The external structure of the DC generator is known as yoke. It is made either of cast iron or steel. It provides necessary mechanical power for carrying the magnetic-flux given through the poles.
5. POLES = The function of a pole is to hold the field windings. These windings are wound on poles and are either connected in series or parallel by the armature windings.
6. POLE SHOE = It is mainly utilized for spreading the magnetic flux to avoid the field coil from falling.



7. COMMUTATOR = It works like a rectifier that changes AC voltage to DC voltage within the armature winding. It is designed with a copper segment, each copper segment is protected from each other with the help of mica sheets. It is located on shaft of the machine.

8. BRUSHES = The electrical connections can be ensured between the commutator as well as the exterior load circuit with the help of brushes.

② In a DC machine, rectification process is carried out in order to get unidirectional output (DC). This rectification process is carried out by COMMUTATOR.

③ Why the armature of DC motor is laminated?

→ These individual, thin pieces have a higher resistance than one solid piece and therefore, produce less eddy currents and experience lower eddy currents loss. The individual iron pieces that make up the armature are referred to as laminations.

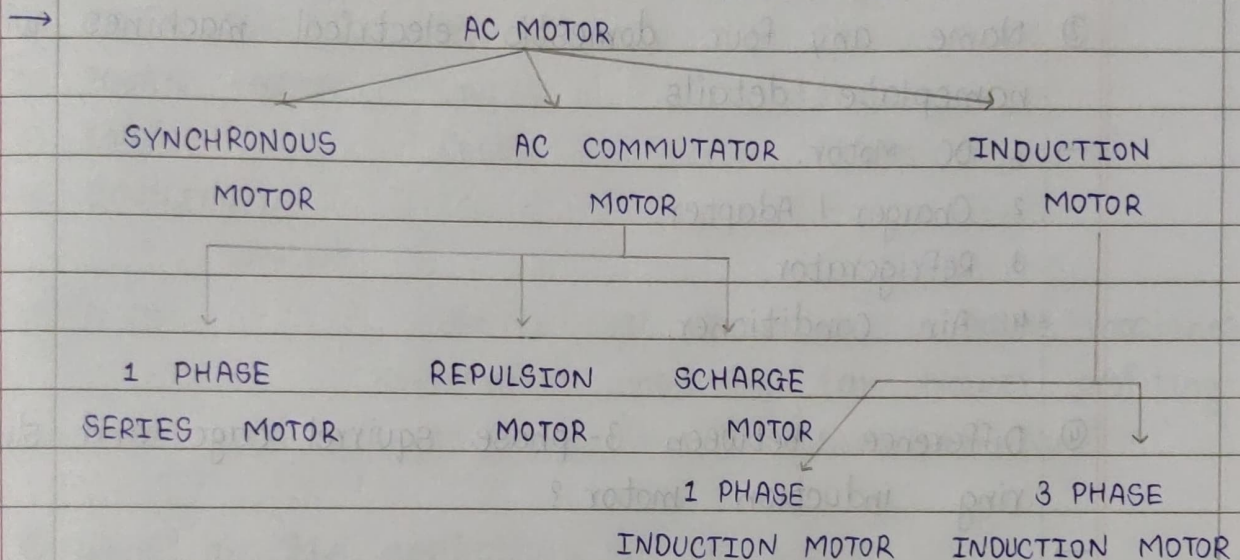
④ What is the use of brushes in DC motor?

→ A carbon brush is a critical part of a DC motor, which relies on brush for transmission of electrical current coming from the machine rotating part. The brush is also responsible for changing the course of current in the



conductors during the rotation process. The carbon brush also ensures the commutation of the current's direction several times per rotation of machine.

⑤ Give the classification of AC machines.



★ AIM ⇒

To know the construction of practical DC, AC machines and identify the parts.

★ POST-LAB QUESTIONS ⇒

① Why we need starter for machines?

→ Starters are used to protect DC motors from damage that can be caused by very high currents and torque during startup. They do this by providing external resistance to the motor, which is connected in series to the motor's armature winding and restricts the currents to an applicable level.

② What are the various types of rotors used in the alternators?



→ There are mainly two types of rotors used in construction of alternators are:-

1. Salient pole type.
2. Cylindrical rotor type.

③ Name any four domestic electrical machines with nameplate details.

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1. DC Motor.
  2. Charger / Adapter.
  3. Refrigerator.
  4. Air Conditioner.

④ Difference between 3-phase squirrel cage and slip-ring induction motor?

	BASIS FOR COMPARISON	SLIP-RING MOTOR	SQUIRREL-CAGE MOTOR
1.	DEFINITION	The rotor of motor is constructed as a slip ring type.	The rotor of motor is a squirrel cage type.
2.	OTHER NAME	Phase wound rotor.	Cage rotor.
3.	CONSTRUCTION	Complicated.	Simple.
4.	BRUSHES	Present.	Absent.
5.	STARTING TORQUE.	High.	Low.
6.	BRUSHES	Present	Absent.
7.	MAINTENANCE	Frequent maintenance required.	Less maintenance required.
8.	STARTER	The rotor resistance starter can be used.	Rotor resistance starter cannot be used.



9.	ROTOR	Cylindrical laminated core with parallel slots and each slot consists one bar.	The slots of the rotor are not parallel, but are skewed.
10.	EFFICIENCY	Low	High
11.	SPEED CONTROL	Possible	Not possible
12.	POWER FACTOR	Low	High
13.	COST	Costly	Cheap
14.	STARTING CURRENT	Low	High
15.	USES	Use in hoist, cranes, elevator where high torque is required.	Use in lathe machines, fan, blower, profiting machines, etc.

⑤ What are the applications of DC motors?

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TYPE OF MOTOR	CHARACTERISTICS	APPLICATION
1. SHUNT	Speed is fairly constant and medium starting torque.	i) Blowers and fans. ii) Lathe machines. iii) Machine tools. iv) Milling tools. v) Drilling tools. vi) Centrifugal pumps.
2. SERIES	High starting torque. No load condition is dangerous. Variable speed.	i) Cranes. ii) Hoists, Elevators. iii) Trolleys. iv) Conveyors. v) Electronic locomotives.

3 CUMULATIVE COMPOUND      High starting torque.  
No load condition is allowed.

- i) Rolling mills.
- ii) Punchers
- iii) Shears.
- iv) Elevators.
- v) Heavy planers.

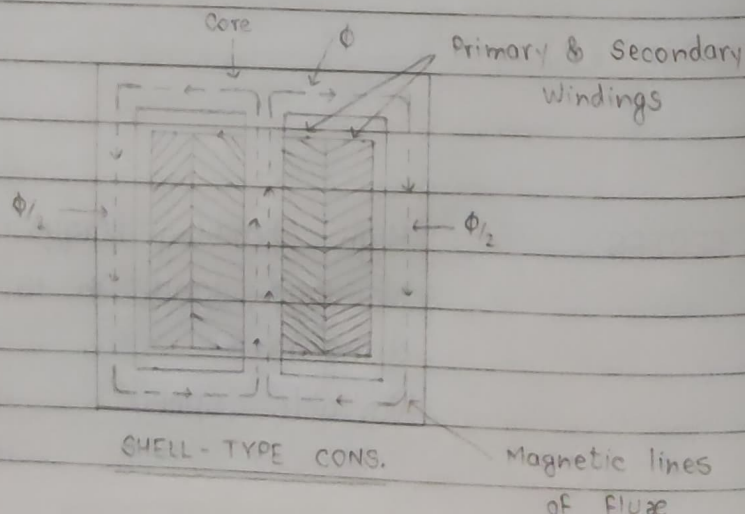
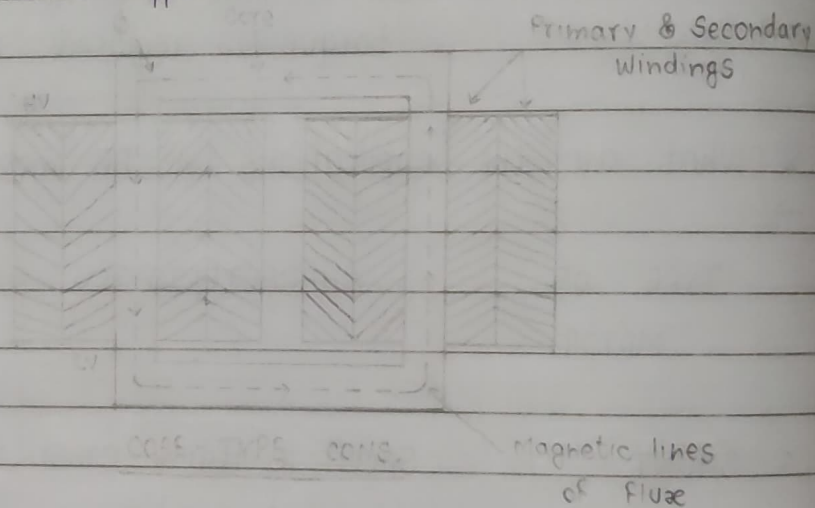
4 DIFFERENTIAL COMPOUND      Speed increases as load increases.

Not suitable for any practical applications.

★ DIAGRAMS ⇒

1. Core and Shell - type Transformer.

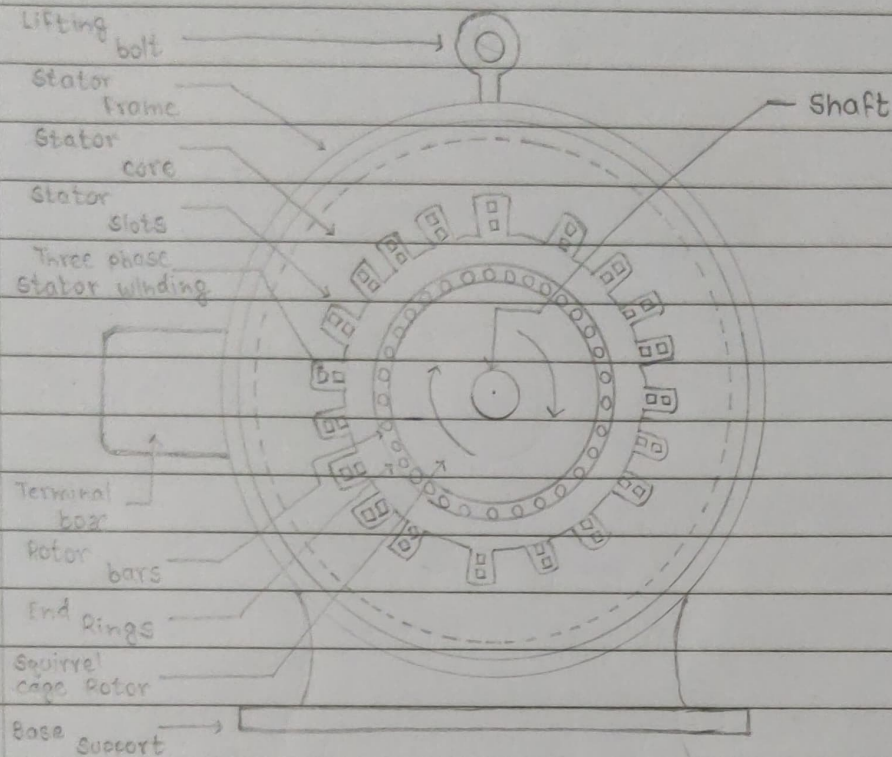
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## 2. $3\phi$ - Induction Motor (AC Machine).

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## 3. DC Machine.

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