Laboratory Attendance Slip

Electrical Engineering Department

Jadavpur University

Class CSc.E 1 Sec A1/A2 Experiment No 6 Lab M/C Date 06.11.2023

Name of the Experiment 6. Study of AC and DC Machine

Group : 3) 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36.

Roll Nos. Assigned

Signature of teacher Date 6/11/2023

JADAVPUR UNIVERSITY

Faculty of Engineering & Technology

Electrical Engg. Laboratory

Name: TATHAGATA SUR

Class: CSE-UG1 Sec.: A1 Roll No.: 002310501030

Date of Experiment: 06/11/2023 Date of Submission: 10/11/2023

Marks Obtained: .... Signature of Examiner: ....

CO-WORKER

NAME	ROLL
JOYOSMIT PAL	000023105010 28
	000023105010 29
ANIRUDH MODI	000023105010 31
	000023105010 32
	000023105010 33
	~~000023105010 34~~

Experiment No.: 06

Commence at: 11:00 A.M. Completed at: 2:00 PM

Name of Teacher concerned:

TITLE: STUDY OF AC AND DC MACHINE

OBJECT: (i) To inspect the various parts of a D.C. machine

(ii) To inspect various parts of a Squirrel Cage Induction Motor (SQIM)

EXPERIMENT NO.- 06

TITLE:- STUDY OF AC AND DC MACHINE

OBJECT:- To inspect the various parts of a D.C. Machine and a Squirrel Cage Induction Motor (SQIM)

DC MACHINE

NAME PLATE:-

1. Manufacturer: Siemens, Germany
2. Rated output: 3 H.P./2.2 KW
3. Rated voltage: 115 V
4. Rated current: 23.7 A
5. Rated speed: 1150 r.p.m.
6. Type of excitation: Compound (Shunt + Series)
7. Temperature rise: 40°C over and above the ambient temp. (40°C)

ARMATURE:-

1. Diameter and Length: 15.28 cm and 7.8 cm respectively
2. Number of slots: 29
3. Slot pitch: 2 cm
4. No. of ventilating ducts: NiL
5. Is the armature Laminated? Why?
   Yes, the armature is Laminated to reduce eddy current loss
6. What are the materials used for wedge and armature?
   The materials used are wood for wedge and annealed steel for armature.

FIELD

1. Number of main poles: 4
2. Number of interpoles: 4
3. a) Pole arc: 8.3 cm
   b) Pole pitch: 12.5 cm ($= \frac{\pi d}{4}$)
   c) Ratio = $\frac{\text{Pole arc}}{\text{Pole pitch}} = \frac{8.3}{12.5} = 0.66$
   d) Are the poles Laminated? Yes
4. Is there any Bevel in the pole shoe? Yes

FIELD COIL

1. Does the machine have a shunt field winding? Yes
2. Does the machine have a series field winding? Yes
3. Explain how do you identify them?
   There are two kinds of wires. First is the thin wire with a Large no. of turns (~~lower~~ higher resistance) which is the shunt field winding. Stalked below it, is the thick wire with less no. of turns (lower resistance) which is series field winding.

YOKE

1. Material of yoke: cast-steel/cast-iron
2. Length and thickness: 17 cm and 1.7 cm respectively
3. Functions of yoke:
   (i) Protects the poles and interpoles
   (ii) Provides mechanical strength
   (iii) Helps to complete the magnetic circuit

COMMUTATOR

1. Diameter: 10.2 cm
2. Ratio = $\frac{\text{Commutator diameter}}{\text{Ammature diameter}} = \frac{10.2}{15.28} = 0.67$

3. No. and width of commutator bars:
87 and 0.4 cm respectively
4. Material of the bar: Forged copper
5. Approx. thickness of mica seperators: 1 mm
why is mica seperator used?
Mica seperators are used for electrical insulation
6. Is the mica seperator undercut? Yes
7. Dimension of the riser:
(a) Height: 0.8 cm
(b) Thickness: 1.1 cm
(c) Width: 0.4 cm

BRUSH AND BRUSH HOLDER

1. Number of brush arms: 4
2. No. of brushes per arm: Not seen
3. Size of each brush holder:
(a) Length (axially): 2.5 cm
(b) width (Circumferentially): 1.8 cm

END FRAME

1. Open, semi-enclosed or closed Type:
Semi-enclosed Type
2. Do they support bearing? Yes, they support ball bearing
3. Are they made of cast steel, rolled steel or what? cast steel

SHAFT AND BEARING

1. Type of bearing used in machine: Ball bearing
2. Type of Lubrication: OIL/grease
3. Shaft diameter: 2.8 cm

SQUIRREL CAGE INDUCTION MOTOR

Name Plate:

1. Manufacturer: Elmech Enginners, Kolkata
2. Rated Output: 2.2 kW/3 H.P.
3. Rated Voltage: 415 V, phase 3
4. Rated current: 5.2 A
5. Rated speed: 1410 rpm (rotor)
6. No. of poles: 4
7. Temp. Rise: 120°C (Max. withstand temp.)
8. Frequency: 50 Hz
9. Duty cycle: Continuous
10. Insulation: E

STATOR

1. Diameter: 10.5 cm (Internal)
2. Number of slots: 36
3. Angular slot pitch = $\frac{\text{No. of poles}}{\text{No. of slots}} \times 180$

$= \frac{4}{36} \times 180 = 20$ (electrical degrees)

Also, electrical $\angle = \frac{\text{No. of poles} \times \text{Mechanical } \angle}{2}$

∴ Mechanical degrees = 10

4. Is the stator Laminated? Yes
5. What are the materials used for core and wedge?

Core → Annealed Steel, No wedge

ROTOR

1. Diameter: 9.4 cm
2. No. of slots: 45
3. Slot pitch: 0.66 cm

4. Whether the slots are parallel to the axis? No
5. Whether there is any conductor? Yes
6. Material of the conductor: Copper/Aluminium
7. Number of ventilating ducts: Nil
8. Width of the duct: Not applicable
9. Is the rotor laminated? Yes
10. What are the materials used for core and wedge?
    Core → Steel, No wedge
11. Why the rotor is called squirrel cage?
    The slots in the rotor are parallel to each other but not parallel to axis. Hence it resembles a cage and known as squirrel cage.

STATOR HOUSING

1. Material: Cast steel
2. Length and thickness: 17 cm and 0.5 cm respectively
3. Function: Stator housing provides mechanical strength

STATOR ASSEMBLY

Type of cooling:- Fan/Air cooling

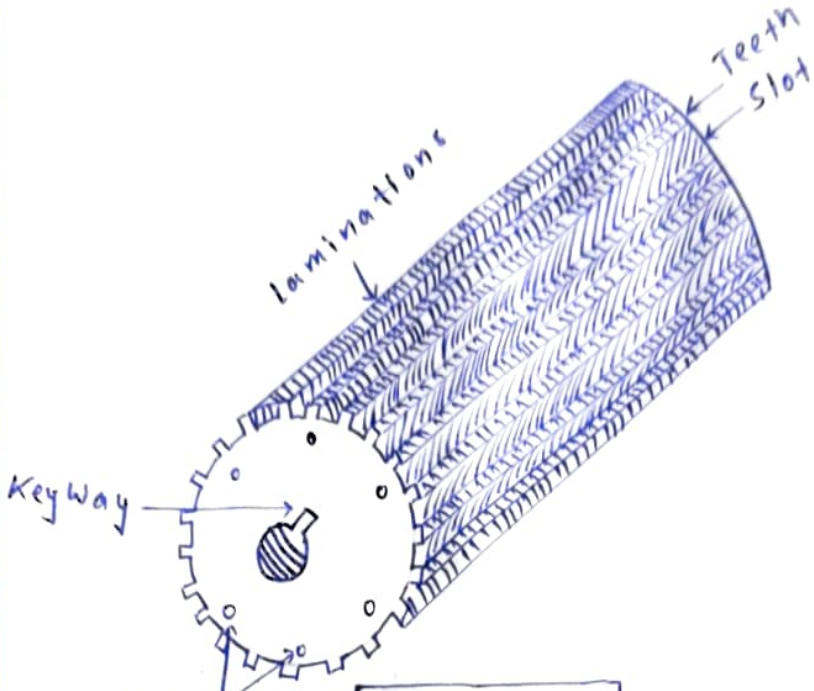
SHAFT AND BEARING

1. Type of bearing (driving side and non-driving side):
   Ball bearing
2. Types of Lubrication: Oil, grease
3. Shaft outside diameter and length:
   2.7 cm and 6 cm respectively
4. Shaft key way and dimension:
   Length = 6 cm, width = 0.7 cm, Depth = 0.4 cm

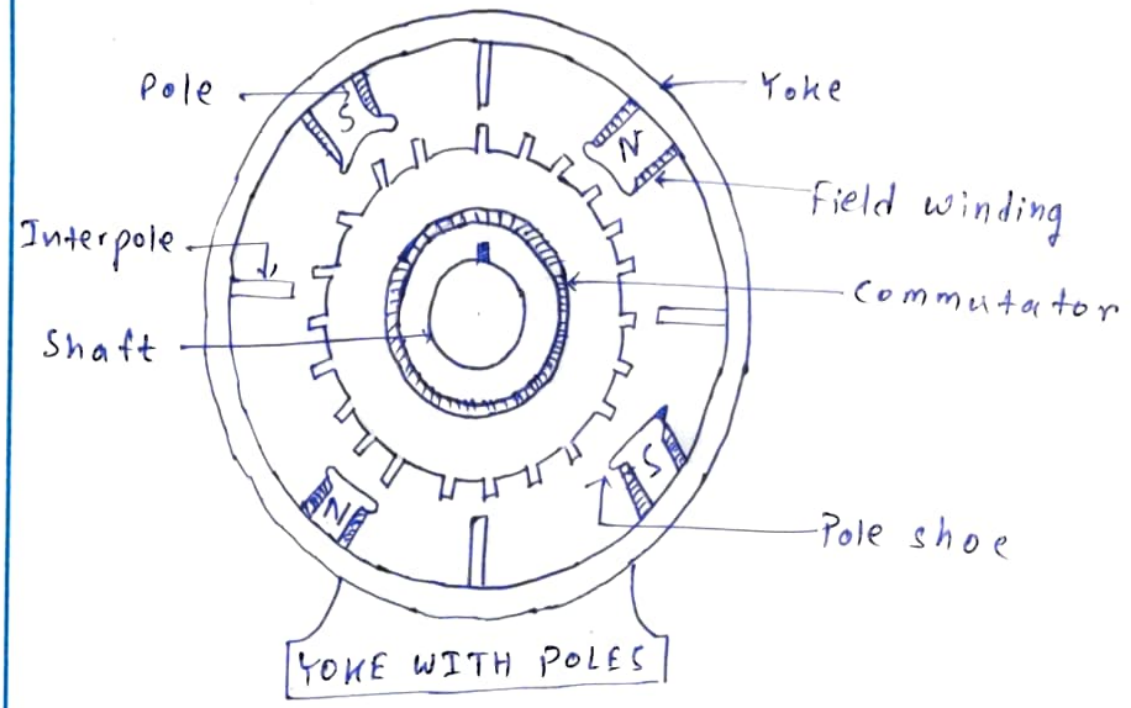
APPARATUS LIST

Sl. No.	Item	Qty.	Range Reading	Maker's name	Maker's no.
1.	Scale	2	0-30 cm	-	-
2.	Internal Caliper	1	-	-	-
3.	External Caliper	1	-	-	-
4.	Steel wire	1	-	-	-

DC MACHINE

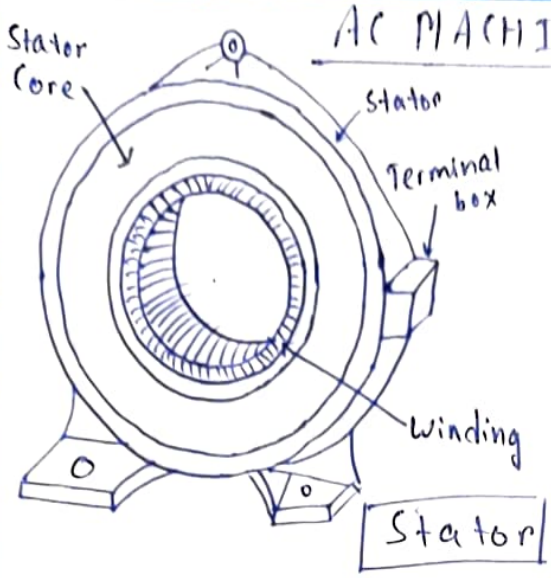


Armature

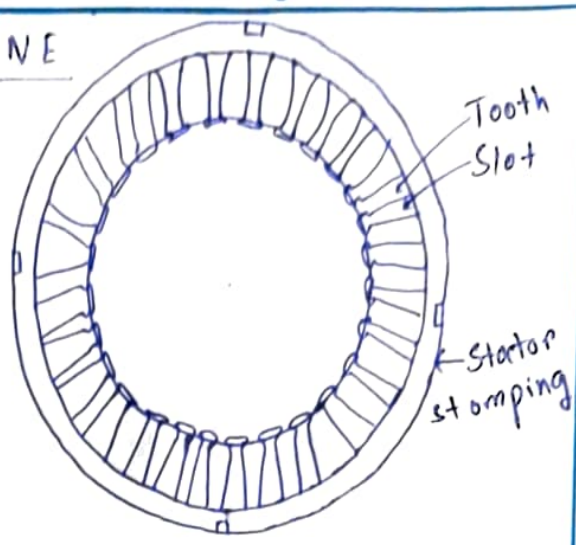


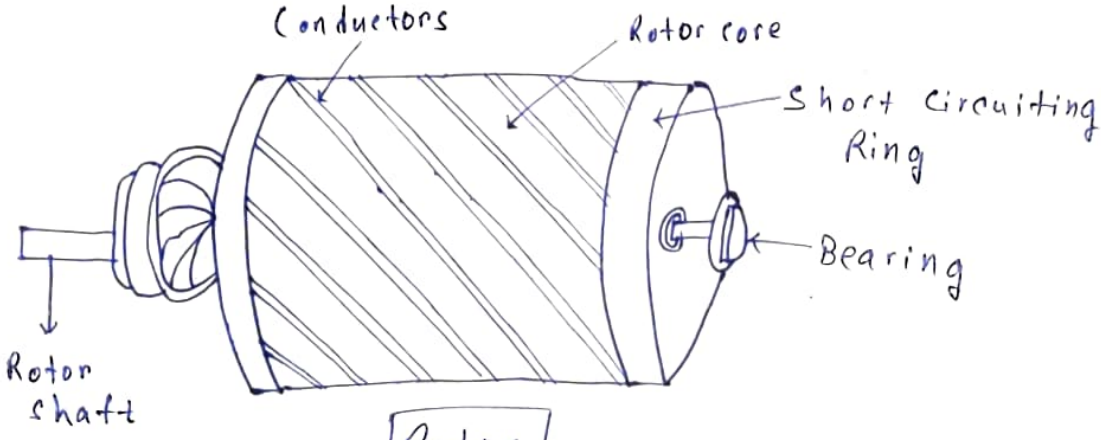
YOKE WITH POLES

AC MACHINE

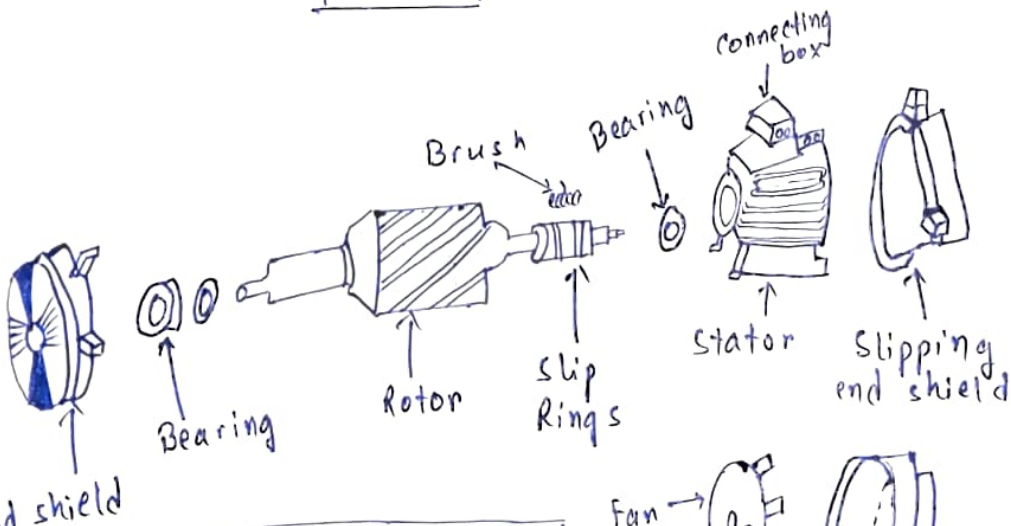


Stator





Rotor



Stator Assembly