Ans to the Q. No 11 (a)

Number of commutator segment = 16

Number of coil sides = 16 × 2 = 32

Pole pitch, = 32/4 = 8

$$Y_F = \frac{Z}{P} - 1 = \frac{32}{4} - 1 = 7$$

$$Y_B = \frac{Z}{P} + 1 = \frac{32}{4} + 1 = 9$$

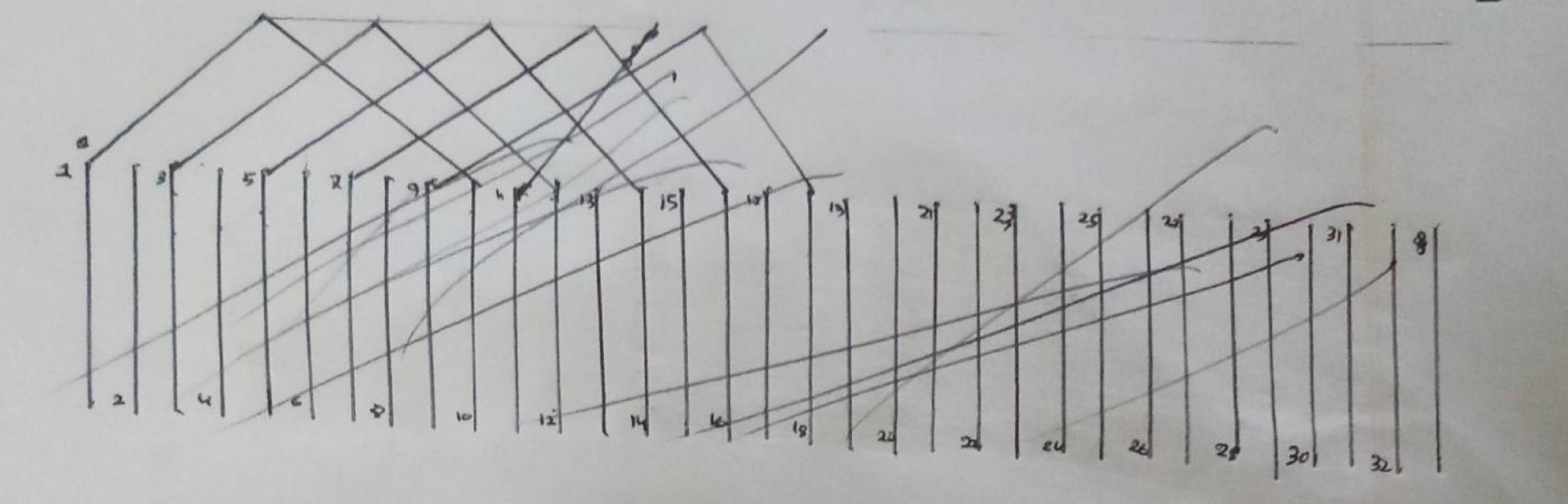
simple winding table given below:

Back conn.		Front conn.
1 to (1+9) = 10	⟶	10 to (10 − 7) = 3
3 to (3+9) = 12	⟶	12 to (12 − 7) = 5
5 to (5+9) = 14	⟶	14 to (14 − 7) = 7
7 to (7+9) = 16	⟶	16 to (16 − 7) = 9
9 to (9+9) = 18	⟶	18 to (18 − 7) = 11
11 to (11+9) = 20	⟶	20 to (20 − 7) = 13
13 to (13+9) = 22	⟶	22 to (22 − 7) = 15
15 to (15+9) = 24	⟶	24 to (24 − 7) = 17
17 to (17+9) = 26	⟶	26 to (26 − 7) = 19
19 to (19+9) = 28	⟶	28 to (28 − 7) = 21
21 to (21+9) = 30	⟶	30 to (30 − 7) = 23
23 to (23+9) = 32	⟶	32 to (32 − 7) = 25
25 to (25+9) = (34−32) = 2	⟶	2 to (34 − 7) = 27

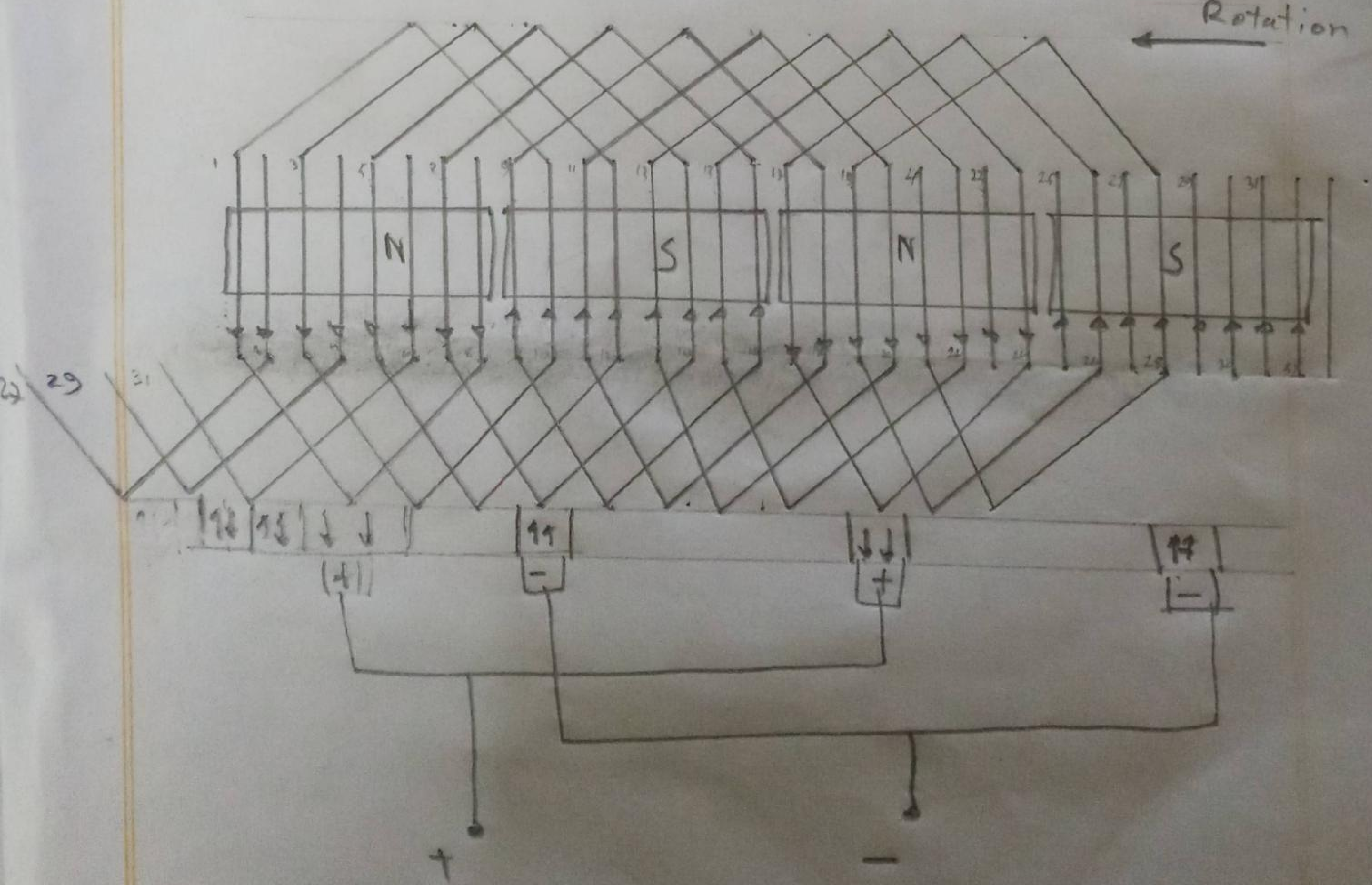
27 to $(27+9)=36=(36-32)=4 \longrightarrow 4$ to $(36-7)=29$

29 to $(29+9)=38=(38-32)=6 \longrightarrow 6$ to $(38-7)=31$

31 to $(31+9)=40=(40-32)=8 \longrightarrow 8$ to $(40-7)=33=(33-32)$
$=1$



Back



front

Ans to the Q-No-2 (b)

50 kW generator

F.L voltage drop = 500 × 0.06 = 30V

F.L current = 50000 / 500 = 100A

Drop per ampere = 30/100 = $\frac{3}{10}$ V/A

100 kW generator

F.L drop = 500 × 0.04 = 20 V

F.L current = 100,000 / 500 = 200 A

Drop per ampere = 20 / 200 = 1/10 V/A

If I_1 and I_2 are current supply by two gen and V the terminal voltage, then

1st gen ⟶ $V = \left[500 - \left(\frac{3}{10} I_1\right)\right]$ —— ①

2nd gen ⟶ $= \left[500 - \left(\frac{1}{10} I_2\right)\right]$ —— ②

① = ②

$$500 - \frac{3}{10} I_1 = 500 - \frac{1}{10} I_2$$

Also we know that,

a) Total current, $I_1 + I_2 = 240$ —— (iv)

$\Rightarrow 3I_2 + I_2 = 240$

$\Rightarrow 4I_2 = 240$

$\Rightarrow I_2 = 60A$

Put this in eqn (iii) (iv)

$I_1 + I_2 = 240$

$\Rightarrow I_1 = (240 - 60) A$

$= 180 A$

Ans

~~Ans~~

b) Terminal voltage, $V = 500 - \left(\frac{3}{10} \times 60\right)$

$= 482 V$

Ans.

Ans to the Q. No - 2(a)

Armature reaction: The armature reaction represents the armature flux on the main field flux. The armature field is produced by the armature conductors when currents flows through them.

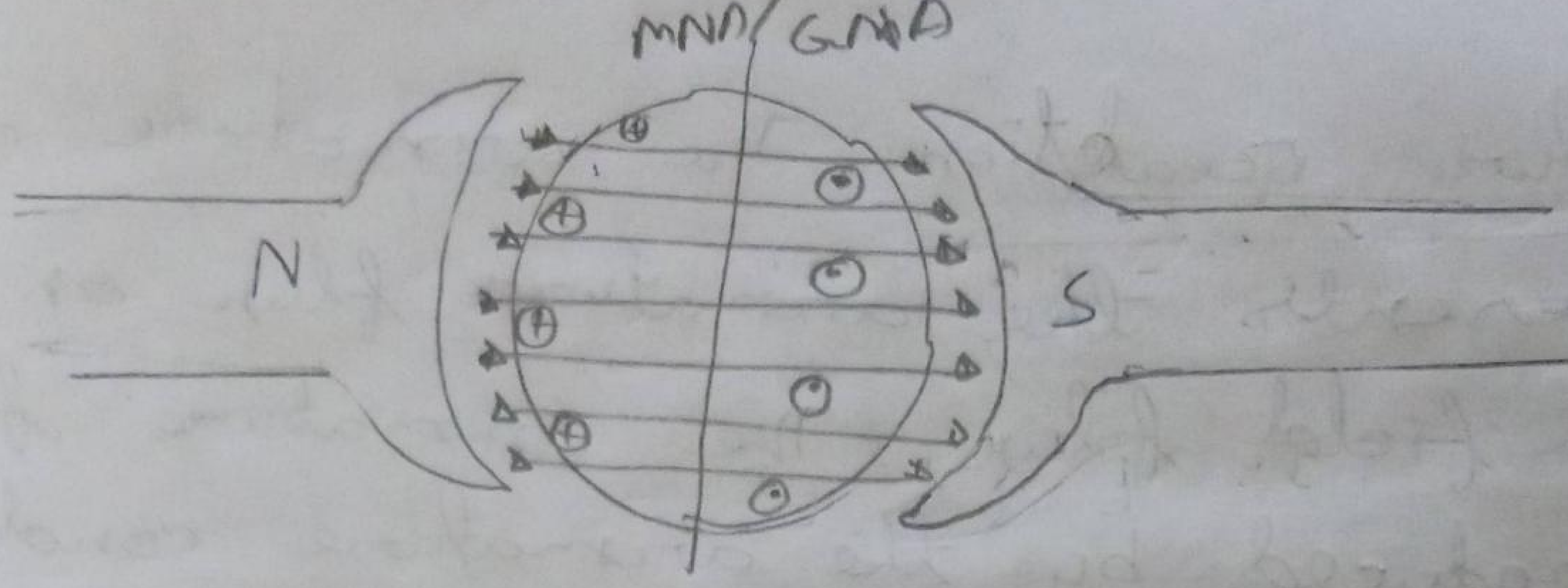
We can also say that:
The effect of magnetic field set up by the armature current on the distribution of main pole flux.

It has two effects:

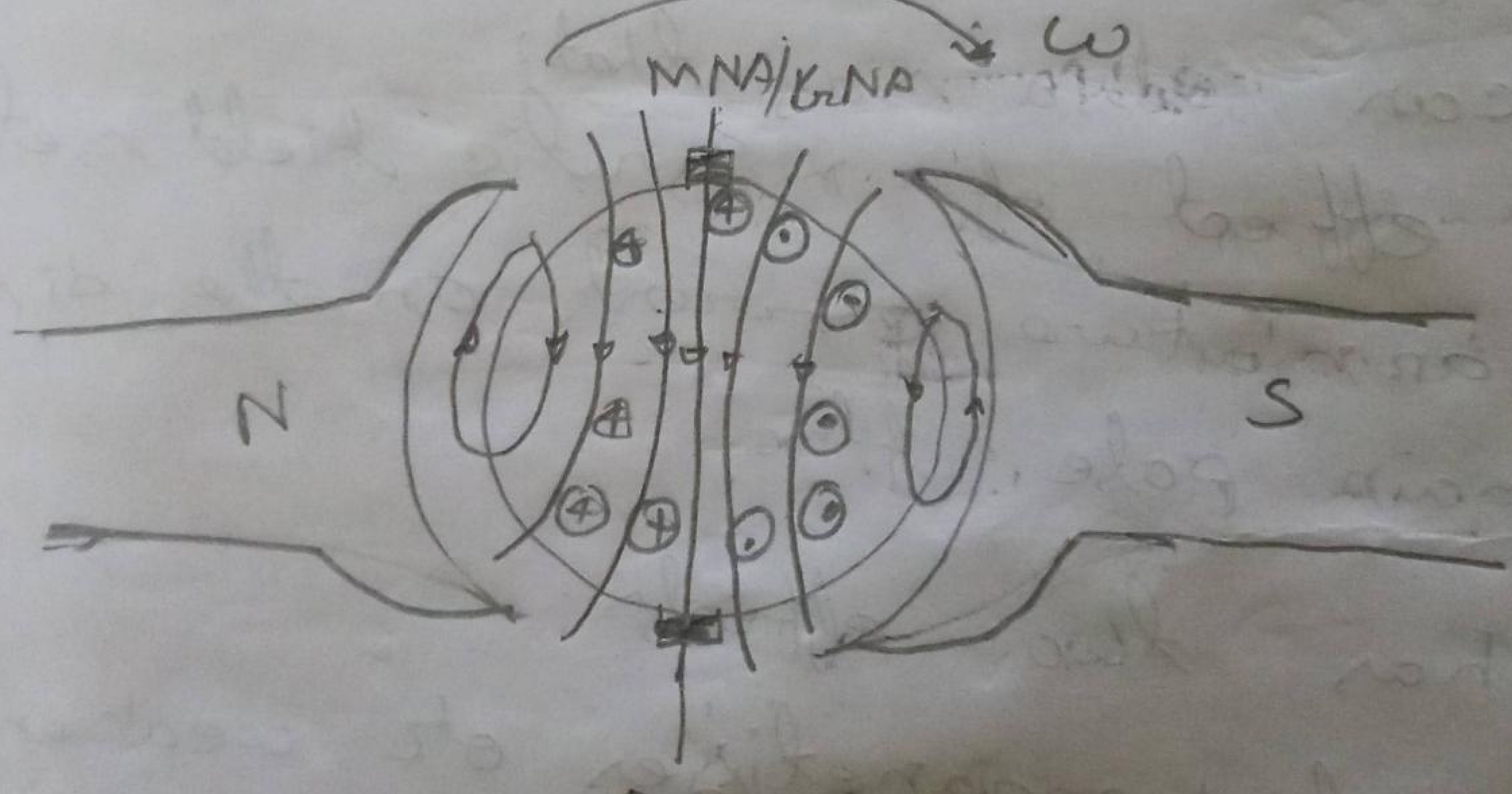
(i). It demagnetises or weakens the main flux.

(ii) It cross - magnetizes or ~~distorts~~ disorts the flux.

Geomatric Neutral axis (GNA)
Magnetic Neutral axis (MNA)

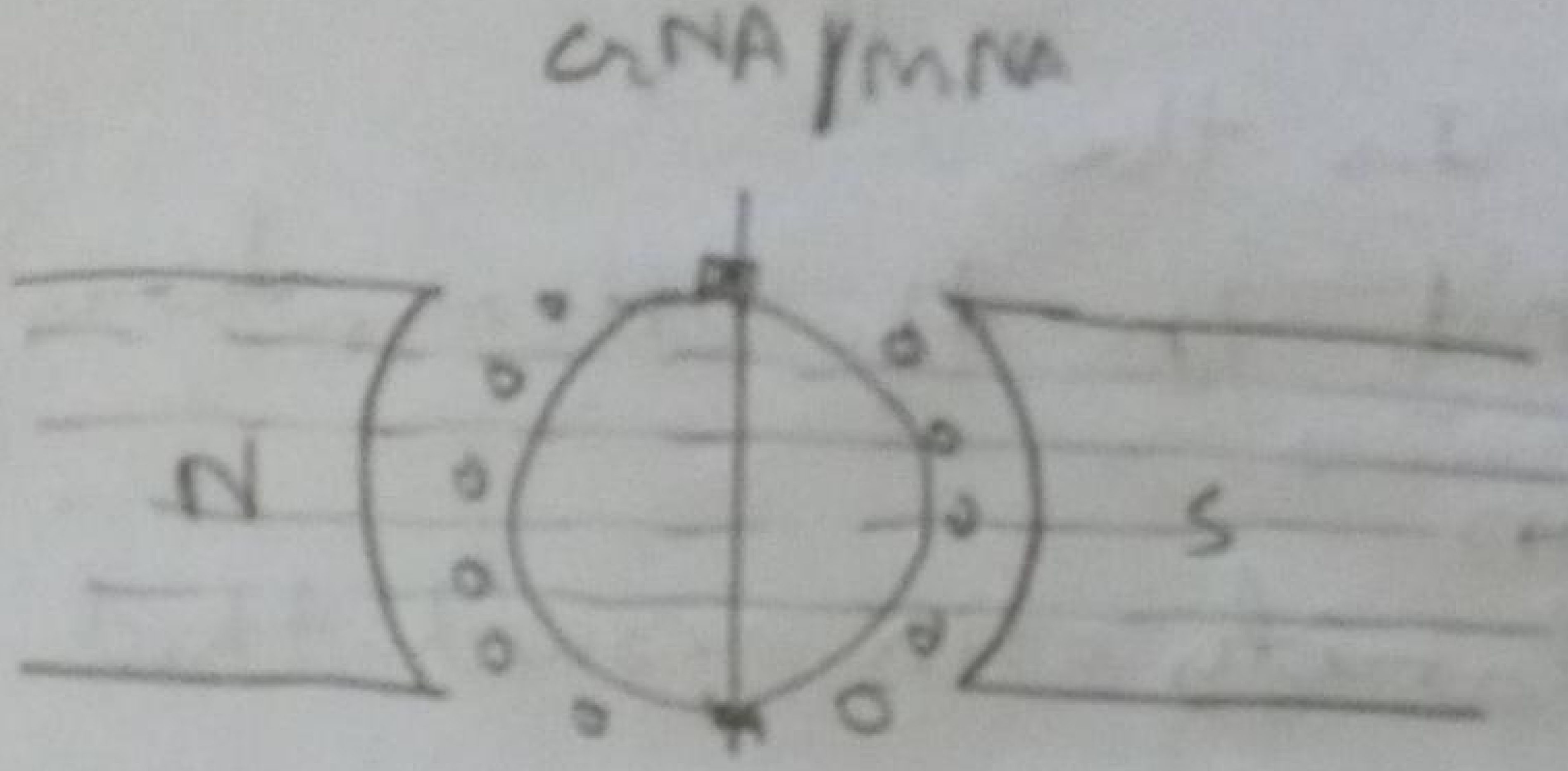


Flux due to pole only.

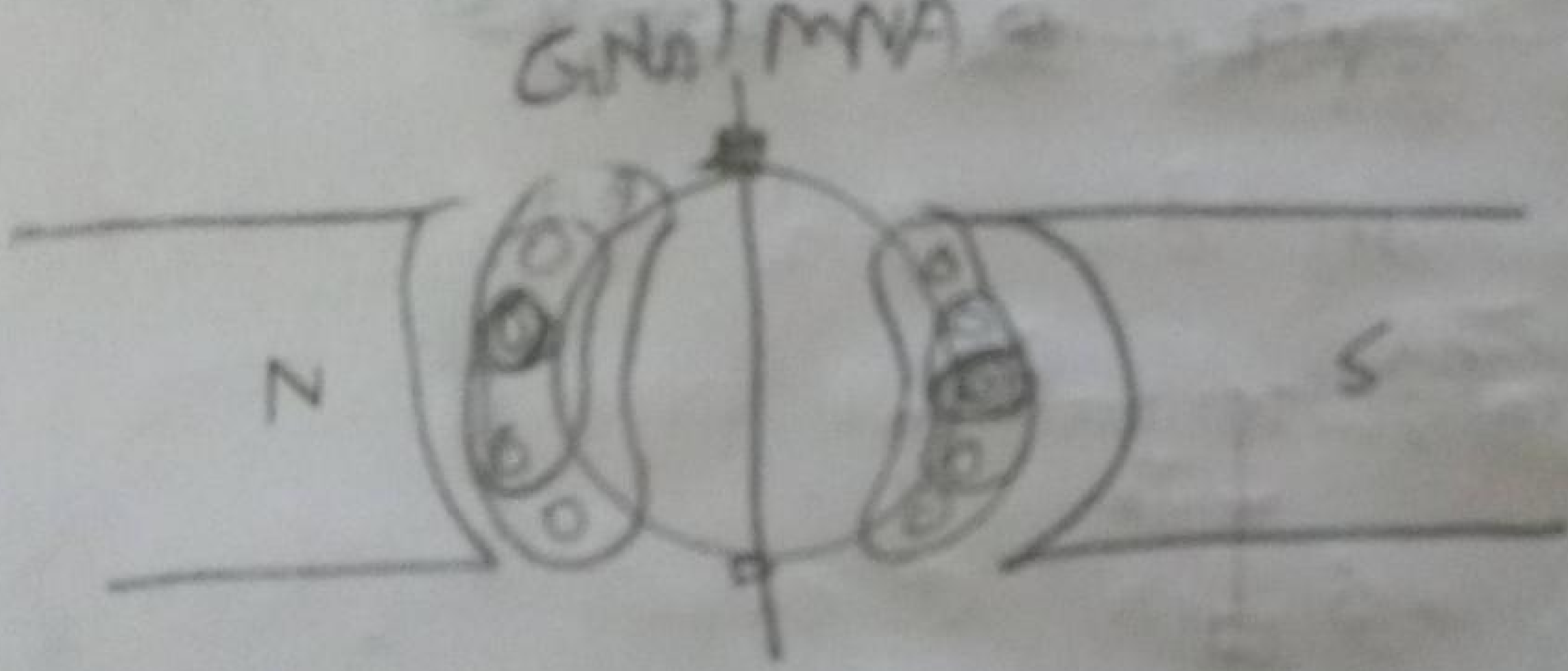


flux due to armature current only.

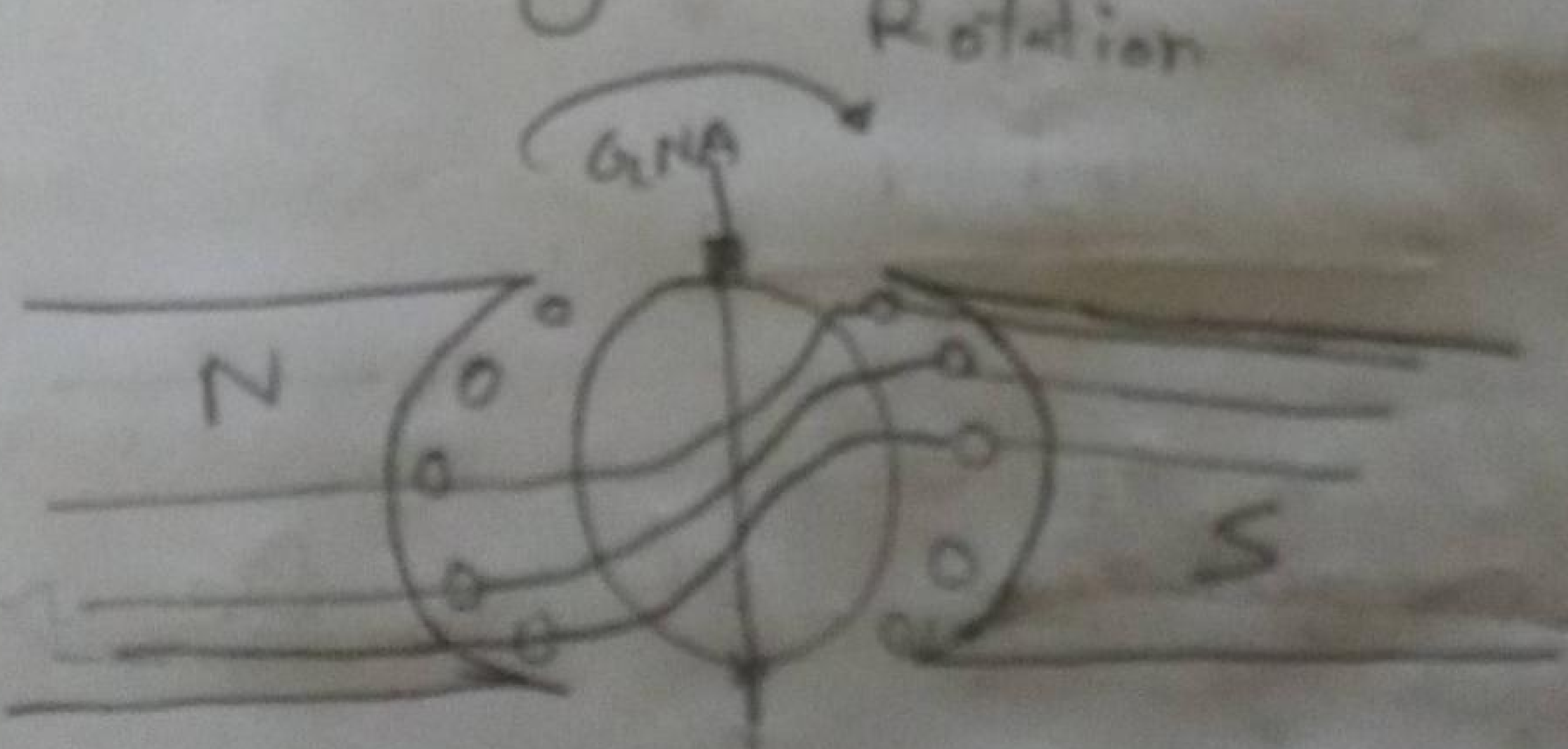
Armature reaction



(1)



(2)



(3)

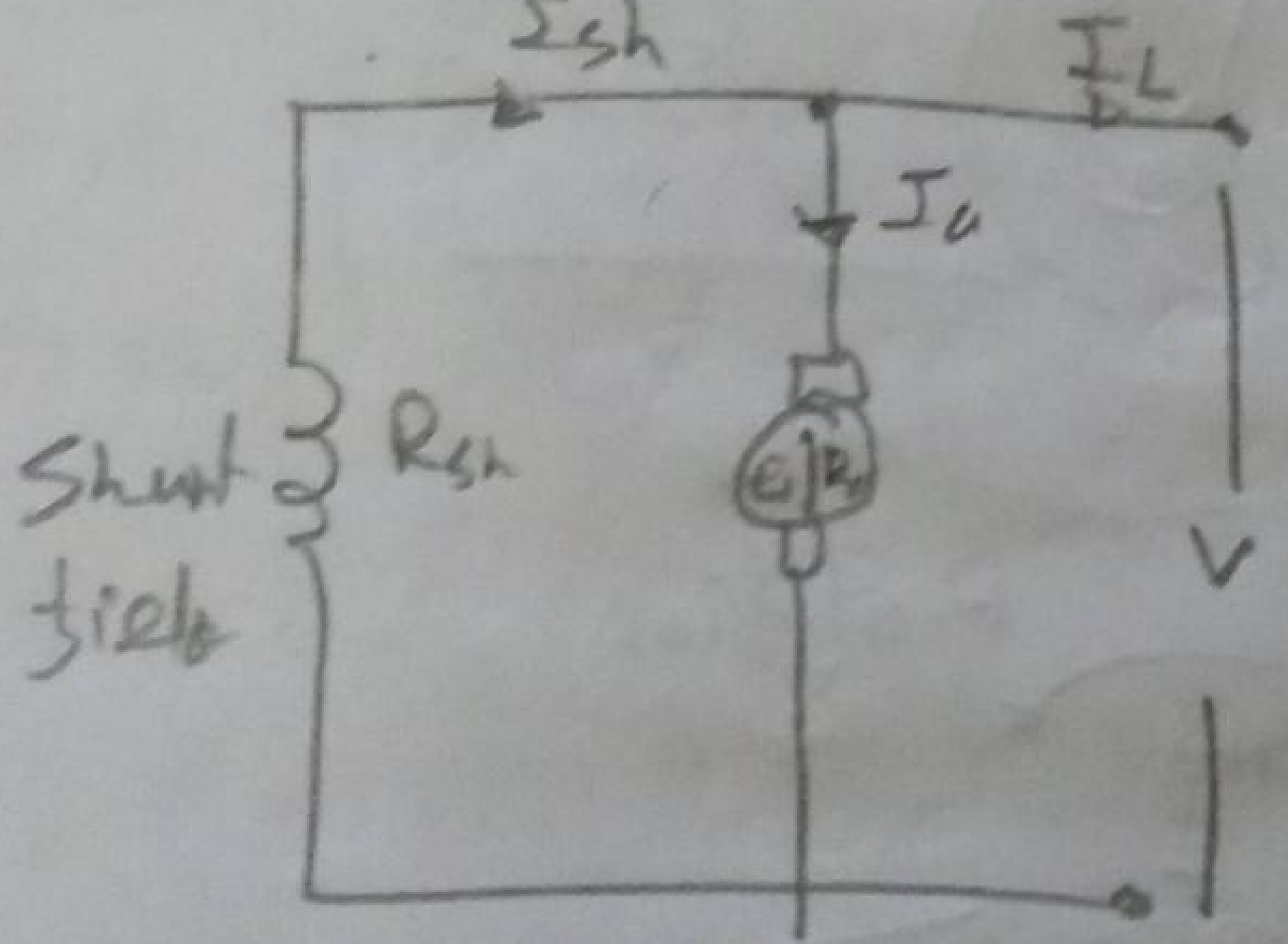
Ans to the Q.No-3(a)

Back EMF: Is the

. Induced e.mf in the armature due to the rotation.

. It's polarity is such that it opposes the applied voltage (Lenz's rule

. [illegible]



(B)

speed regulatio of a Dc motor is defined as the change in speed from no load to full load.

Ans to the Q-No - 4(a)

Merits and Demerits.

① Speed chandes with every charg in load, ~~to~~

② Maximum power developed in diminishe in the same ratio ~~as~~ as speed

② Maximum power developed in diminished in the same ratio as speed.

③ It needs expensive arrangement for dissipation of heat produced in the controller resistance

Ans to the Q. No - 4(b)

Losses in a rotatin DC machine

(a) copper losses.

1. Arm. cu loss
2. Field cu "
3. Loss due to ~~the~~ brush contact.

. Iron losses

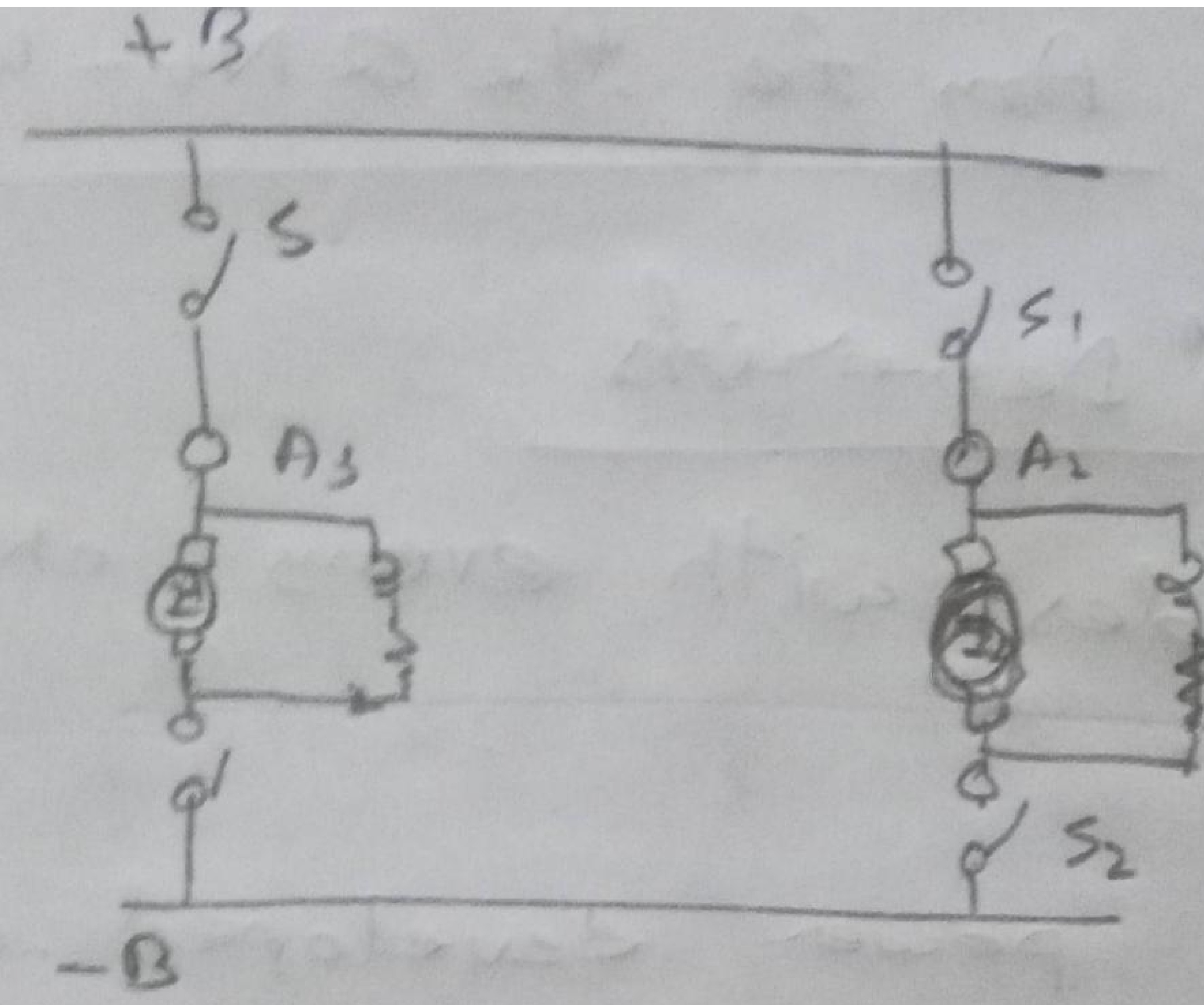
1. Hysteresis loss
2. Eddy current loss

. Mechanical loss.

1. Friction loss
2. windage loss

Ans to the Q-No - 1 (b)

- The +ve and -ve terminal of generator must be connected to +ve of bus bars.
- Induced e.m.f of generators should be preferably sam.
- Armature is speeded up to the rated speed and then switch S_2 close.
- Excitation of the G_2 is changed until voltmeter V reads zero.
- Switch S_1 is closed after that.
- Under this condition G_2 is not taking any load (floating condition
- Excitation of G_2 is increased until it takes the proper share of load.



Load sharing: