SNS COLLEGE OF ENGINEERING

Kurumbapalayam (Po), Coimbatore – 641 107

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE NAME : 19EE605 PROTECTION AND SWITCHGEAR

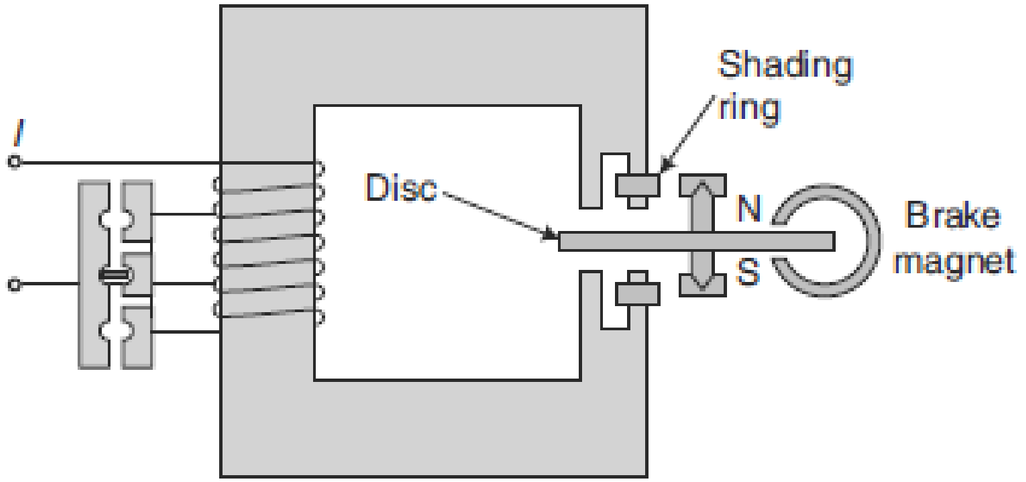
III YEAR /VI SEMESTER

Unit 2- ELECTROMAGNETIC RELAY

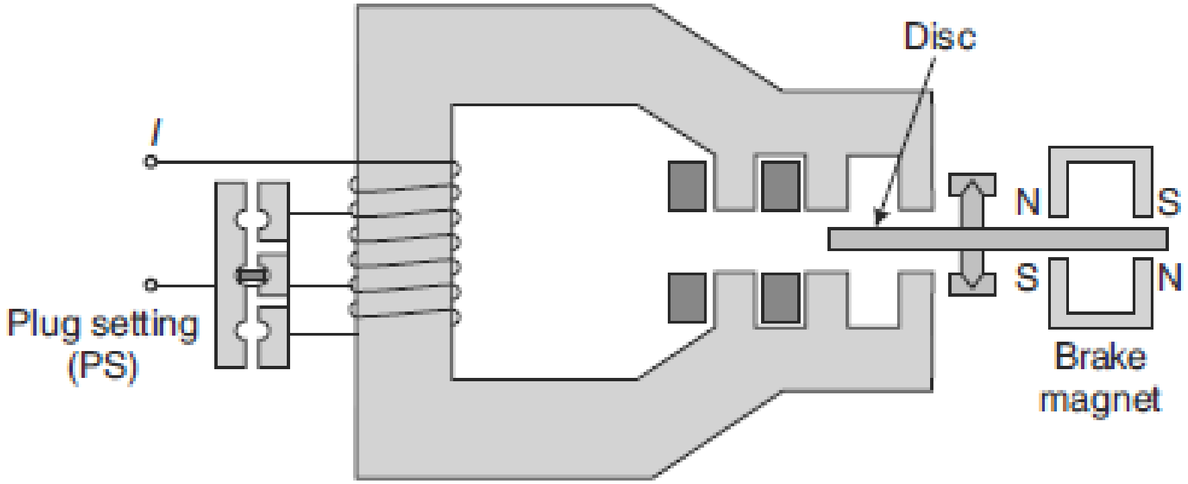
Topic: Induction Disc Relay

Shaded Pole Induction Disc Relay

- The rotating disc is made of aluminium.
- In the shaded pole type construction, a C-shaped electromagnet is used.
- One half of each pole of the electromagnet is surrounded by a copper band know as the shading ring.
- The shaded portion of the pole produces a flux which is displaced in space and time with respect to the flux produced by the un shaded portion of the pole.
- Thus two alternating fluxes displaced in space and time cut the disc and produce eddy currents in it.
- Torques are produced by the interaction of each flux with the eddy current produced by the other flux.
- The resultant torque causes the disc to rotate.



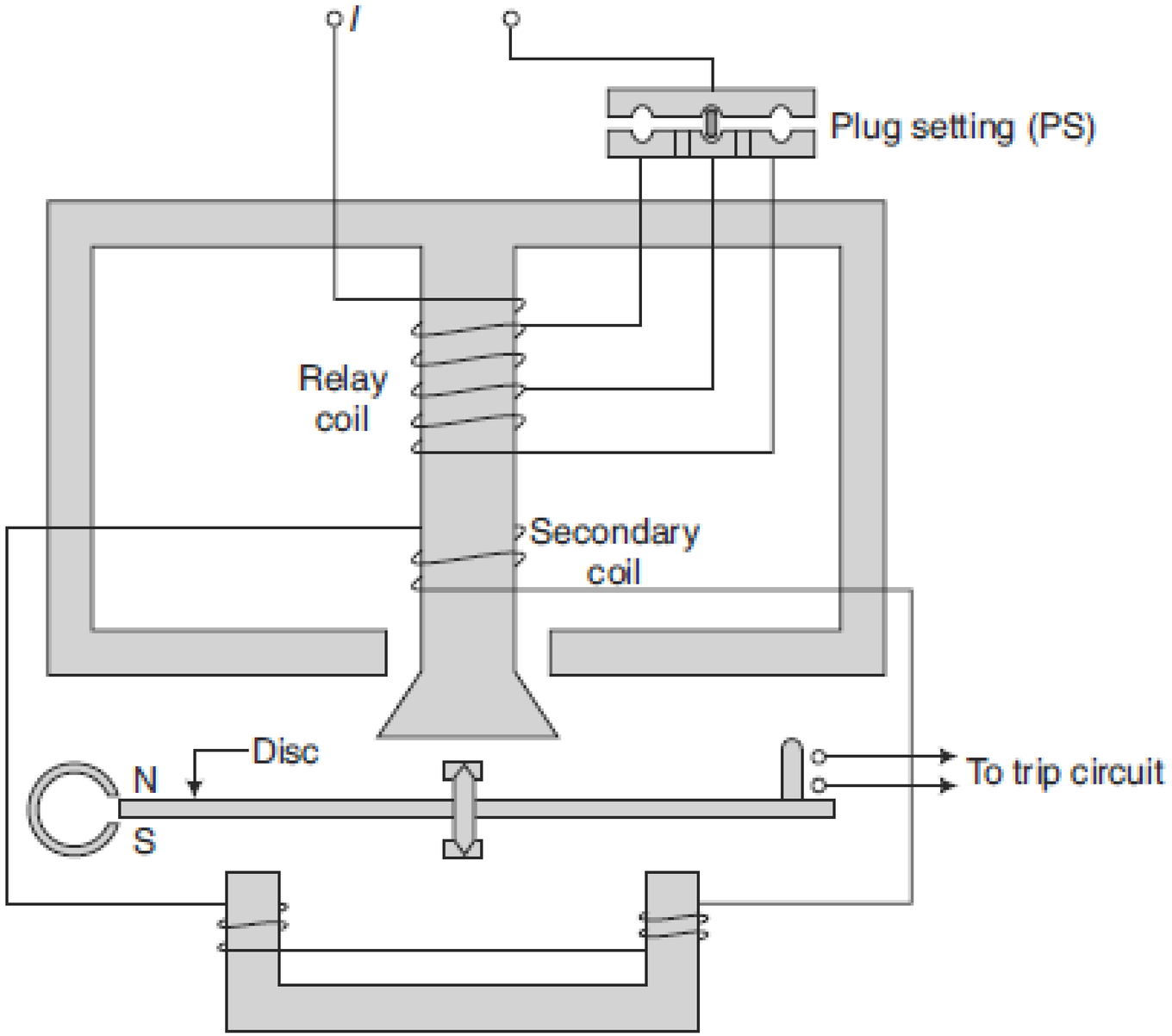
(a) Simple construction



(b) Construction in practice

Wattmetric Type Induction Disc Relay

- In wattmetric type of construction, two electromagnets are used: upper and lower one.
- Each magnet produces an alternating flux which cuts the disc.
- To obtain a phase displacement between two fluxes produced by upper and lower electromagnets, their coils may be energised by two different sources.
- If they are energised by the same source, the resistances and reactance's of the two circuits are made different so that there will be sufficient phase difference between the two fluxes.
- Induction disc type construction is robust and reliable.


I
Plug setting (PS)
Relay coil
Secondary coil
Disc
N
S
To trip circuit

- Induction disc type construction is robust and reliable.
- It is used for overcurrent protection.
- Disc type units gives an inverse time current characteristic and are slow compared to the induction cup and attracted armature type relays.
- The induction disc type is used for slow-speed relays.
- Its operating time is adjustable and is employed where a time-delay is required.
- Its reset/pick-up ratio is high, above 95% because its operation does not involve any change in the air gap.

Assessment

What is the primary advantage of using solid-state relays compared to electromechanical relays for protection applications?

A. Faster operation time

B. High current carrying capacity

C. Lower maintenance requirements

D. All of the above.

References

1. SuniS Rao, “Switchgear, Protection and Power System (Theory, Practice & Solved Problems)”, Khanna Publishers, New Delhi, 2019.

2. Paithankar Y G, Bhide S R, “Fundamentals of Power System Protection”, Prentice Hall of India Pvt Ltd., New Delhi, 2nd Edition, 2014.

3. Badriram, Vishwakarma B.H, “Power System Protection and Switchgear”, New Age International Pvt Ltd Publishers, 2nd Edition 2017.

Thank You