

# **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 3- APPARATUS PROTECTION

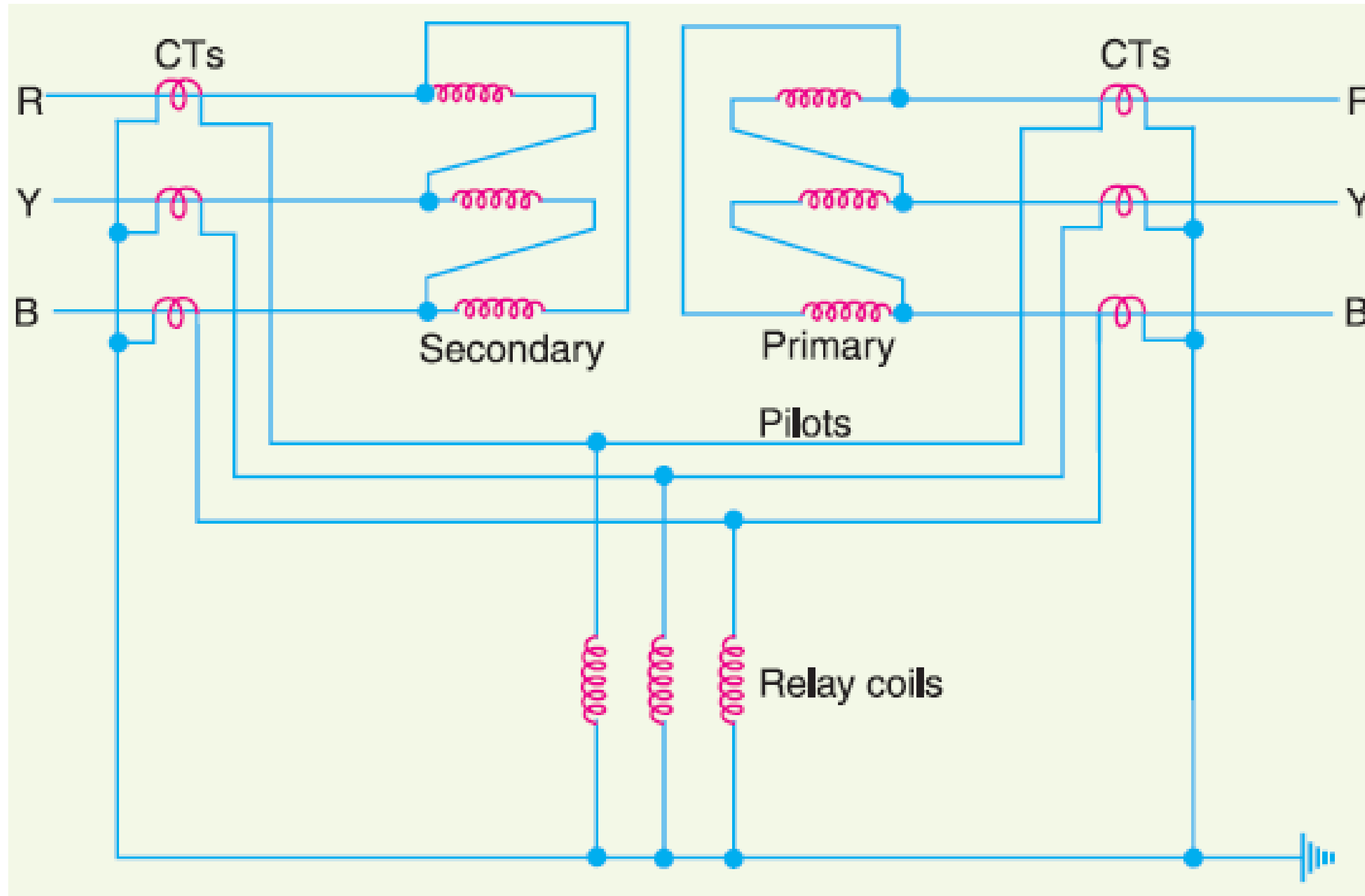
Topic: Circulating Current Scheme for Transformer Protection



# Introduction

- Merz-Price circulating-current scheme for the protection of a 3- phase delta/delta power transformer against phase-to-ground and phase-to-phase faults.
- Note that *CTs* on the two sides of the transformer are connected in star.
- This compensates for the phase difference between the power transformer primary and secondary.
- The *CTs* on the two sides are connected by pilot wires and one relay is used for each pair of *CTs*.

# Construction





# Common transformer faults



- During normal operating conditions, the secondaries of *CTs* carry identical currents.
- Therefore, the currents entering and leaving the pilot wires at both ends are the same and no current flows through the relays.
- If a ground or phase-to-phase fault occurs, the currents in the secondaries of *CTs* will no longer be the same and the differential current flowing through the relay circuit will clear the breaker on both sides of the transformer.
- The-protected zone is limited to the region between *CTs* on the high-voltage side and the *CTs* on the low-voltage side of the power transformer.



- It is worthwhile to note that this scheme also provides protection for short-circuits between turns on the same phase winding.
- When a short-circuit occurs between the turns, the turn-ratio of the power transformer is altered and causes unbalance between current transformer pairs.
- If turn-ratio of power transformer is altered sufficiently, enough differential current may flow through the relay to cause its operation.
- However, such short-circuits are better taken care of by Buchholz relays.



# Assessment



Merz-Prize protection is used for

- A. Substation
- B. Capacitor bank
- C. Induction motor
- D. Generator.







# 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, 2<sup>nd</sup> Edition, 2014.
3. Badriram, Vishwakarma B.H, “Power System Protection and Switchgear”, New Age International Pvt Ltd Publishers, 2<sup>nd</sup> Edition 2017.

**Thank You**