

SNS COLLEGE OF ENGINEERING

Kurumbapalayam (Po), Coimbatore – 641 107

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

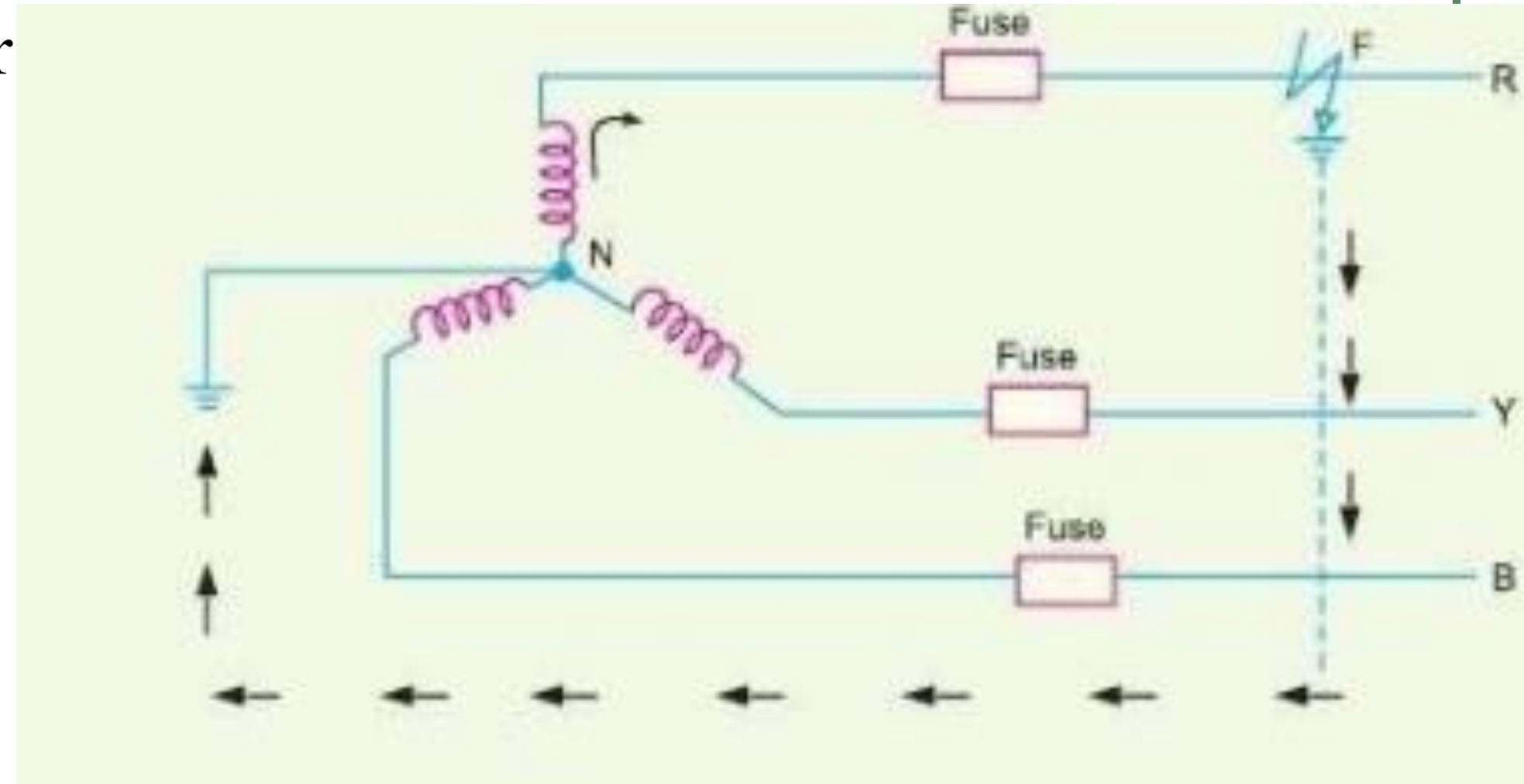
COURSE NAME : 19EE605 PROTECTION AND SWITCHGEAR

III YEAR /VI SEMESTER

Unit 1- PROTECTION SCHEMES

Topic: Types of Neutral Grounding

- The process of connecting neutral point of 3-phase system to earth (i.e. soil) either directly or through some circuit element (e.g. resistance, reactance etc.) is called neutral grounding.
- Suppose a single line to ground fault occurs in line R at point F. This will cause the current to flow through ground path.





- Note that current flows from R-phase to earth, then to neutral point N and back to R-phase.
- Since the impedance of the current path is low, a large current flows through this path.
- This large current will blow the fuse in R-phase and isolate the faulty line R.
- This will protect the system from the harmful effects (e.g. damage to the equipment, electric shock to personnel etc.) of the fault.



Methods of Neutral Grounding

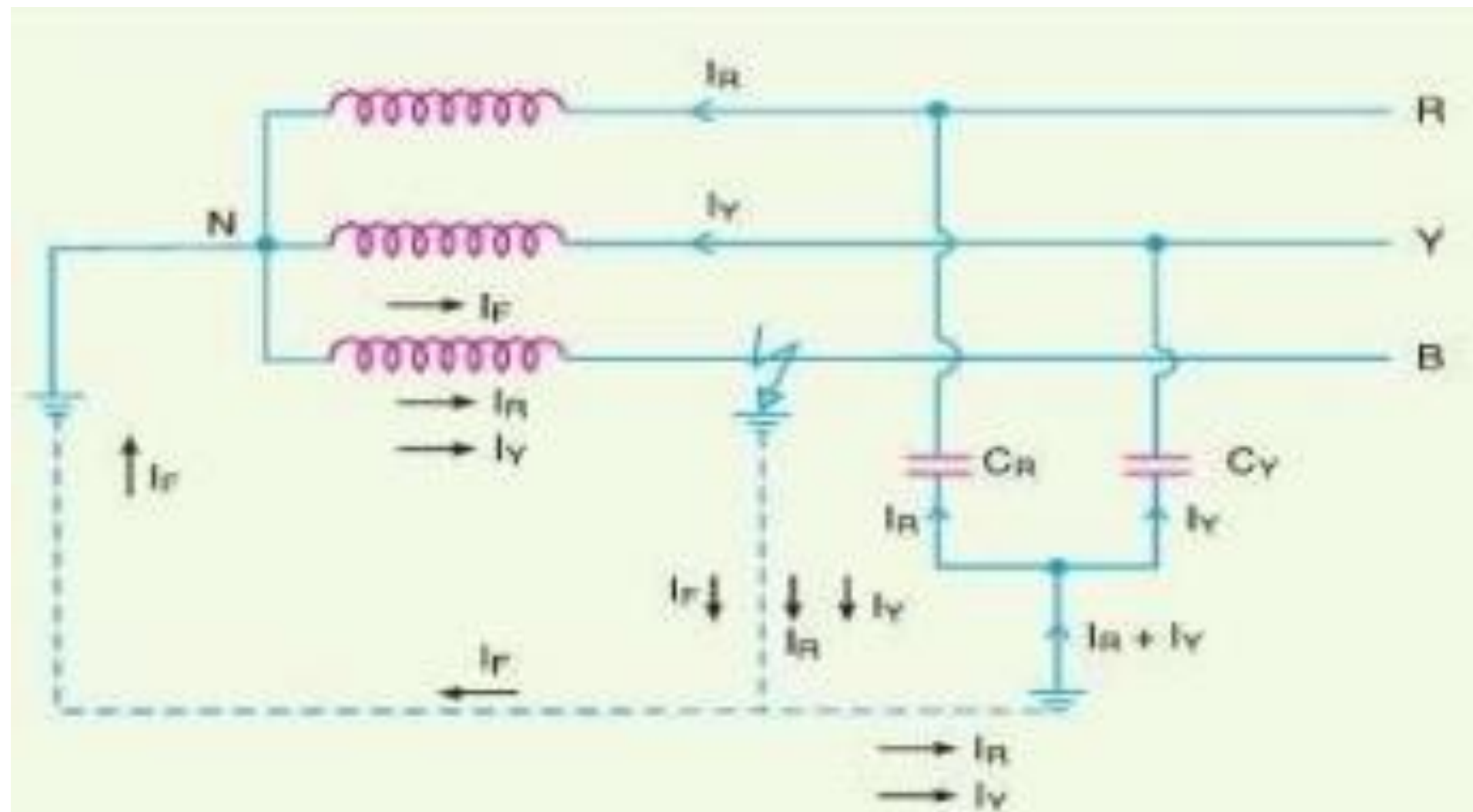


➤ The methods commonly used for grounding the neutral point of a 3phase system are:

- (i) Solid or effective grounding
- (ii) Reactance grounding
- (iii) Resistance grounding
- (iv) Peterson-coil grounding

(i) Solid Grounding

- When the neutral point of a 3-phase system (e.g. 3 phase generator, 3-phase transformer etc.) is directly connected to earth (i.e. soil) through a wire of negligible resistance and reactance, it is called solid grounding or effective grounding



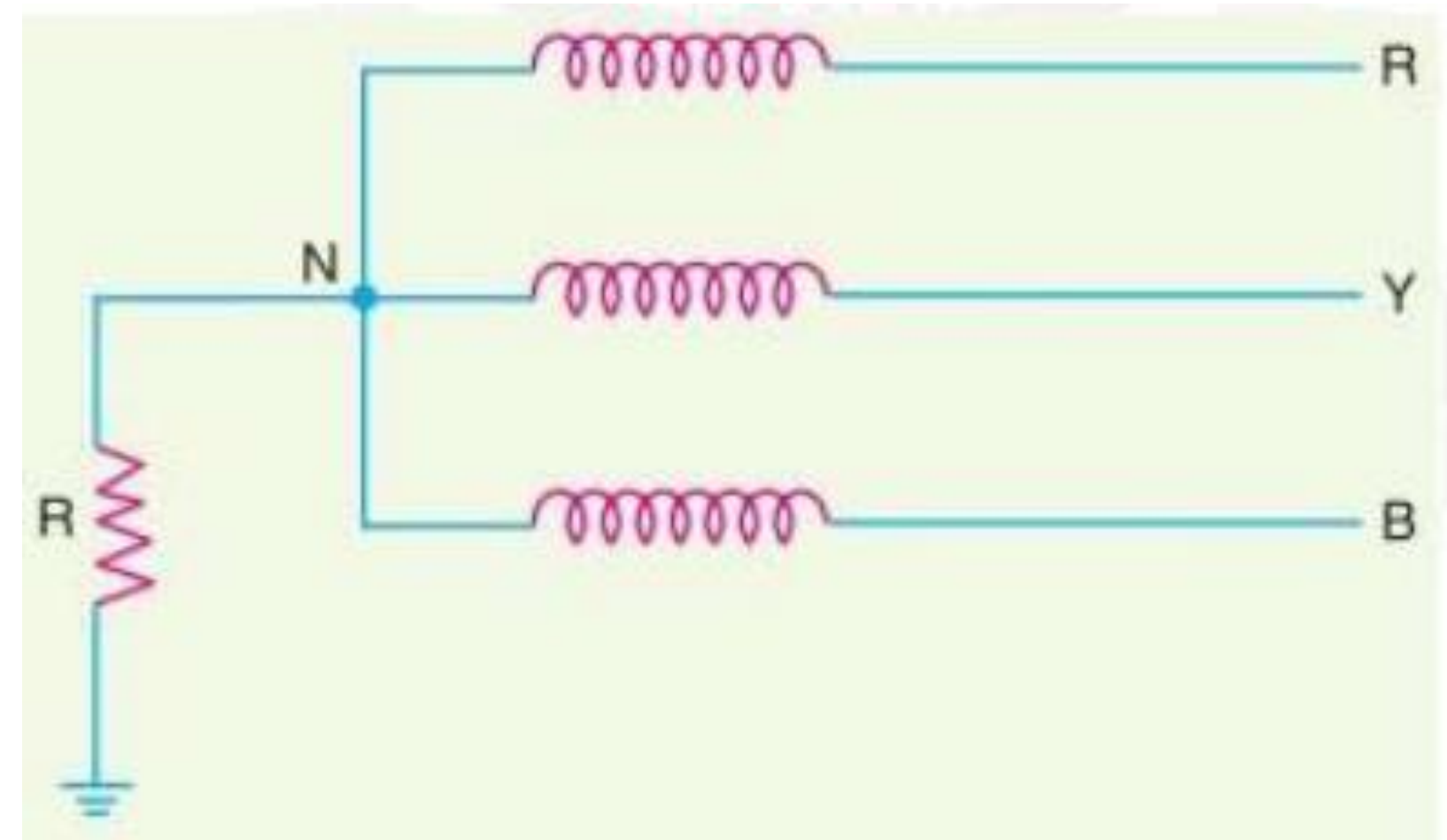


(ii) Resistance Grounding



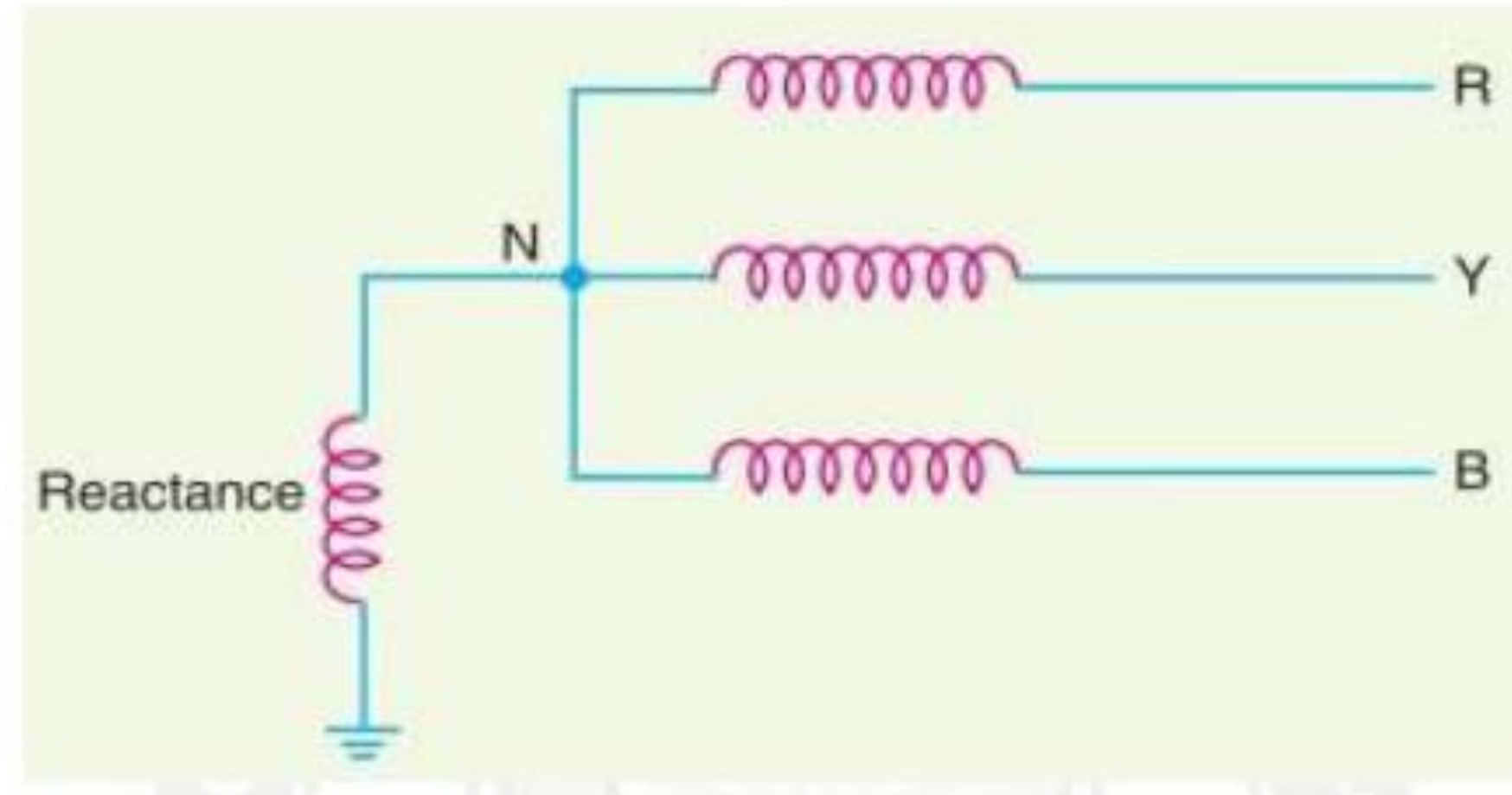
In order to limit the magnitude of earth fault current, it is a common practice to connect the neutral point of a 3-phase system to earth through a resistor. This is called resistance grounding

- When the neutral point of a 3-phase system (e.g. 3-phase generator, 3-phase transformer etc.) is connected to earth (i.e. soil) through a resistor, it is called resistance grounding



(iii) Reactance Grounding

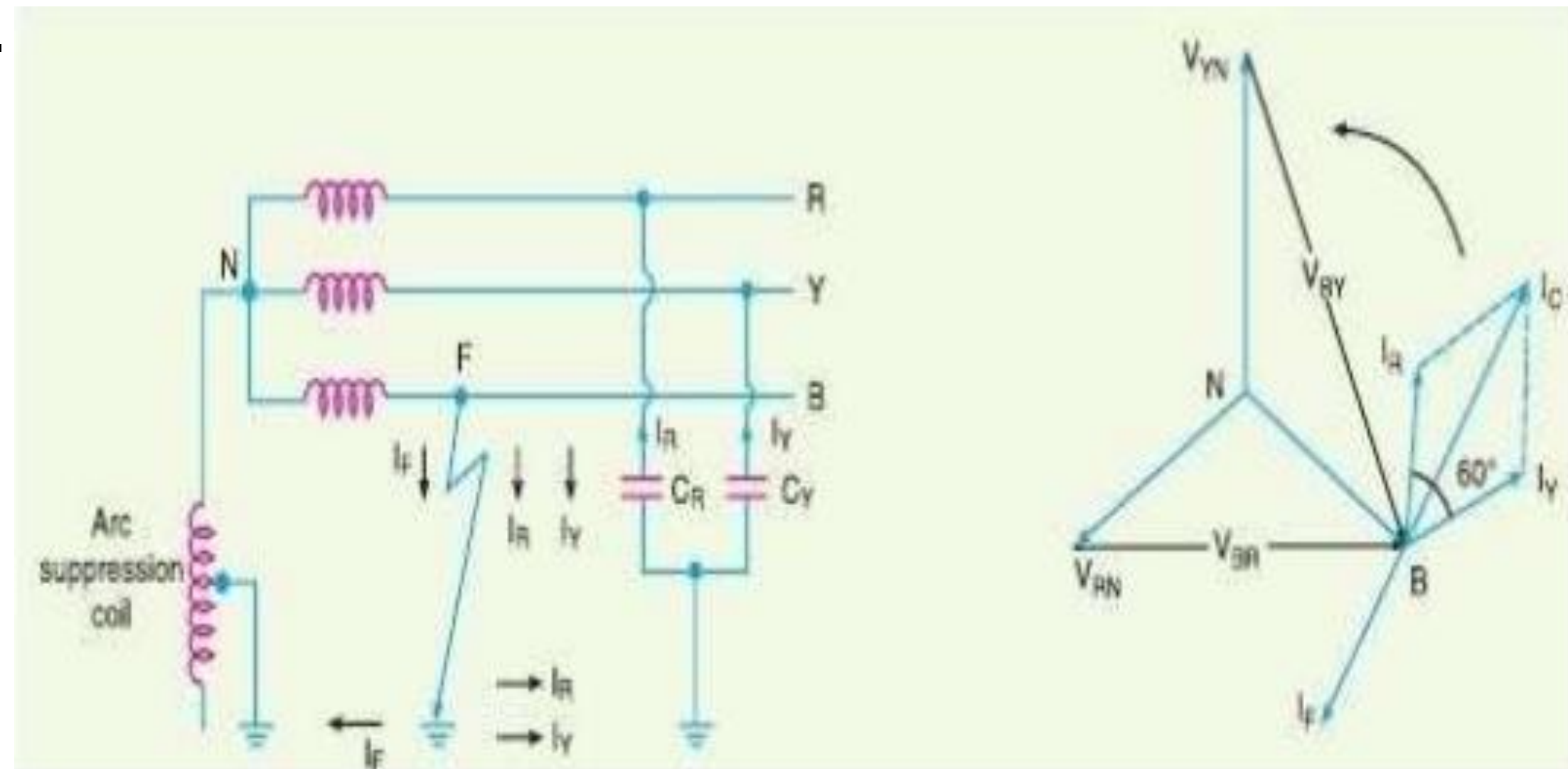
- In this system, a reactance is inserted between the neutral and ground.
- The purpose of reactance is to limit the earth fault current.
- By changing the earthing reactance, the earth fault current can be changed to obtain the conditions similar to that of solid grounding.



(iv) Arc Suppression Coil Grounding (or Resonant Grounding)



- When the value of L of arc suppression coil is such that the fault current I_f exactly balances the capacitive current I_c , it is called resonant grounding.





- The Peterson coil is completely effective in preventing any damage by an arcing ground.
- The Peterson coil has the advantages of ungrounded neutrals system.
- Due to varying operational conditions, the capacitance of the network changes from time to time.
- Therefore, inductance L of Peterson coil requires readjustment



Assessment



1. Which component ensures the safety of the line from damage?
 - a) Relay.
 - b) Circuit Breaker
 - c) Bus bar
 - d) Current Transformer





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