

Paper Id:

120730

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B.TECH
(SEM VII) THEORY EXAMINATION 2019-20
POWER SYSTEM PROTECTION

*Time: 3 Hours**Total Marks: 70***Note:** 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. **Attempt all questions in brief.** **2 x 7 = 14**
- a. Draw the circuit diagram of basic protection scheme.
 - b. Explain the operating principle of differential relay.
 - c. Define RRRV.
 - d. What do you understand by the term “Current Chopping”?
 - e. Give the classification of circuit breakers based on medium used for arc quenching.
 - f. Explain the terms Primary and Backup protection.
 - g. What do you understand by pilot wire protection scheme?

SECTION B

2. **Attempt any three of the following:** **7 x 3 = 21**
- a. Explain the operating principle of Induction type relay. Derive the expression for the force exerted on the plates of Induction type relay.
 - b. Explain the operation of Impedance Relay along with its characteristics.
 - c. What do you understand by Carrier Current Protection scheme? Explain Phase Comparison Carrier Current Protection in detail.
 - d. What are the different methods of testing circuit breakers? Discuss their merits and demerits. Which method is more suitable for testing the circuit breakers of large capacity?
 - e. Describe the construction, operating principle and application of vacuum circuit breaker. What are its advantages over other circuit breakers?

SECTION C

3. **Attempt any one part of the following:** **7 x 1 = 7**
- (a) What do you understand by zone of protection? Discuss various zones of protection with the help of single-line diagram.
 - (b) Explain how gas actuated relay operates. Also write down its applications.
4. **Attempt any one part of the following:** **7 x 1 = 7**
- (a) Give a detailed comparison between static and electromagnetic relay.
 - (b) Describe in detail the operation of directional earth fault relay along with their applications.
5. **Attempt any one part of the following:** **7 x 1 = 7**
- (a) Explain Circulating Current scheme used in wire pilot protection.
 - (b) What is a carrier blocking scheme? Discuss its merits and demerits over other types of carrier aided distance protection.

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6. Attempt any *one* part of the following:**7 x 1 = 7**

- (a) For a 132 kV system, the reactance and capacitance up to the location of the circuit breaker is 3Ω and $0.015 \mu\text{F}$, respectively. Calculate:
- i. Frequency of transient oscillations.
 - ii. Maximum value of restriking voltage across the contacts of circuit breaker.
 - iii. Maximum value of RRRV.
- (b) Discuss how making capacity and breaking capacity of a circuit breaker are tested in a laboratory type testing station.

7. Attempt any *one* part of the following:**7 x 1 = 7**

- (a) Discuss the properties of SF_6 which makes it most suitable for circuit breakers.
- (b) Discuss the selection of circuit breakers for different ranges of the system voltages.

RAJESH KUMAR TEWARI

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