Paper Id: | **120730** | **Roll No:** [   ]

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.

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 3 Ω and 0.015 μF, 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.