

Roll No

EE/EX-5003 (CBGS)**B.E. V Semester**

Examination, November 2018

Choice Based Grading System (CBGS)**Switchgear and Protection***Time : Three Hours**Maximum Marks : 70***Note:** i) Attempt any five questions.

ii) All questions carry equal marks.

iii) Assume suitable value for missing data, if any.

1. a) Explain what is the difference between symmetrical components of positive, negative and zero phase sequence.
- b) Distinguish between symmetrical and unsymmetrical faults occurring in power system. Draw the sequence network diagram for the following types of faults at the terminal of an unloaded generator:
 - i) Three phase short circuit fault
 - ii) Single line to ground fault
2. a) Describe different types of induction relays. Derive the torque equation and show how different time and current settings can be obtained from it.
- b) What are the essential qualities of protection in a protective system? Discuss various zones of protection.
3. a) What are the Arc quenching methods? Discuss the recovery rate theory and energy balance theory of arc interruption.
- b) Explain the construction and working of SF₆ circuit breaker. What are the Physical, chemical and dielectric properties of SF₆ gas.

4. a) Describe with neat sketches, the differential protection system applied to Delta-Star connected transformer.
- b) The neutral point of a three phase 20MVA, 11kV alternator is earthed through a resistance of 5 Ohms. The relay is set to operate when there is out of balance current of 1.5Amp. The CTs have a ratio of 1000/5. Calculate what percentage of winding is protected against an earth fault.
5. a) Differentiate between surge diverter and surge absorber. What are the characteristics of an Ideal surge diverter?
- b) Explain the term insulation coordination and describe the construction of volt-time curve.
6. a) For a 132kV system, the reactance and capacitance up to the location of the circuit breaker is 3 Ohms and 0.015μF respectively. Calculate the following:
 - i) The frequency of transient oscillations
 - ii) The maximum value of restriking voltage
 - iii) The maximum value of RRRV
- b) Explain the HRC cartridge fuse in detail. What are its advantages and disadvantages?
7. a) Describe the Vacuum circuit breaker in detail with neat sketches.
- b) Describe the operating principal and constructional features of a directional relay. Draw 30° and 90° connection of directional relay.
8. Write short notes on the following (any four):
 - a) MHO relay
 - b) Basic impulse insulation
 - c) Peterson coil
 - d) Time graded system and current graded system
 - e) Current limiting reactors
 - f) Static relays
