

**IV B.Tech I Semester Supplementary Examinations, July/Aug - 2021****SWITCHGEAR AND PROTECTION****(Electrical and Electronics Engineering)****Time: 3 hours****Max. Marks: 70***Question paper consists of Part-A and Part-B**Answer ALL sub questions from Part-A**Answer any FOUR questions from Part-B***\*\*\*\*\*****PART-A (14 Marks)**

1. a) Define the arc phenomena in a circuit breaker. [3]
- b) Write the function of directional relay. [2]
- c) What is restricted earth fault protection? [2]
- d) What is the carrier system of protection? [2]
- e) List out the merits and demerits of static relays. [3]
- f) What protective measures are taken against lightning over voltage? [2]

**PART-B (4x14 = 56 Marks)**

2. a) What are different types of air blast circuit breakers? Discuss their operating principle? [7]
- b) In a 220 kv system, the reactance and capacitance up to the location of circuit breaker is 8 ohms and .025 $\mu$ f respectively a resistance of 700 ohms is connected across the contacts of the circuit breaker. Determine
  - i) natural frequency of oscillation . ii) damped frequency of oscillation [7]
3. a) Explain what is IDMT relay and why I.D.M.T relays are widely used for over current protection? [7]
- b) What is impedance relay? Explain its operating principle. [7]
4. a) What is percentage differential protection? Explain it for star delta transformer. [7]
- b) An 11kV, 100MVA generator is grounded through a resistance of 6 ohms CT have a ratio of 1000\5. The relay is to set operate when there is out of balance current of 1A what is percentage of generator winding will be protected by the percentage differential scheme of protection. [7]
5. a) What is PSM and TSM? Explain in detail. [8]
- b) Determine the PSM for rating 5 A, 2.2 sec IDMT and having a replay setting of 125% TMS=.6. It is connected to a supply circuit through a C.T 400/5 ratio. If the fault current is 3500 amps. [6]
6. a) List out the static relay components and explain with the help of block diagram. [8]
- b) Give the advantages and disadvantages of static relays. [6]
7. a) Explain the term insulation coordination. Describe the construction of volt-time curve and the terminology associated with impulse testing. [7]
- b) Explain the phenomenon of Arching grounds and suggest the methods to minimize the effects of this phenomenon. [7]