

**GEC-R14**

### III B. Tech II Semester Supplementary Examinations, November 2017

## SWITCHGEAR AND PROTECTION

(Electrical and Electronics Engineering)

**Max. Marks: 60**

**Note:** All Questions from **PART-A** are to be answered at one place.

Answer any **FOUR** questions from **PART-B**. All Questions carry equal Marks.

## PART-A

**6 × 2 = 12M**

1. What is attenuation and distortion of travelling waves?
2. Write the operational differences between fuse and circuit breaker.
3. a) List out various types of distance relays.  
b) Impedance relays can be used for\_\_\_\_\_ lines.
4. a) Overload protection is generally not provided for\_\_\_\_\_.  
A) Transformers  
B) Busbars  
C) Motors  
D) Alternators  
b) Automatic protection is generally not provided for\_\_\_\_\_ transformer.  
A) Large distribution  
B) small distribution  
C) Medium distribution  
D) None.
5. Explain about the Time Graded System in case of feeder protection.
6. What is surge absorber?

## PART-B

$$4 \times 12 = 48\text{M}$$

1. a) What is surge impedance of a line and why is it also called the natural impedance? (6M)  
b) A surge of 200 kV travelling in a line of natural impedance 400 ohms arrives at a junction with two lines of impedances 900 ohms and 300 ohms respectively. Find the surge voltages and currents transmitted into each branch line. (6M)
2. a) Calculate the RRRV of a 220kV circuit breaker with earthed neutral. The short circuit test data obtained is as follows:  
  
The current breaker is symmetrical and the restriking voltage has an oscillatory frequency of 15 kHz. The power factor of the fault is 0.2. Assume the short circuit to be an earthed fault. (6M)  
b) Discuss the performance of a circuit breaker when capacitive currents are interrupted? (6M)
3. a) Explain the operation of induction type overcurrent relay. (6M)  
b) Compare the characteristic of i) impedance relay ii) mho relay iii) reactance relay. Also give their applications. (6M)

4. a) Represent the scheme for protection of transformers using percentage differential protection and explain the principle. (6M)
- b) A 10MVA, 6.6KV 3phase star connected alternator is protected by Merz-Price circulating current system. If the ratio of the current transformer is 1000/5, the minimum operating current for the relay is 0.75A and the neutral point earthing resistance is 6ohms, calculate:
- i) the percentage of each of the stator windings which is unprotected against earth faults when the machine is operating at normal voltage.
- ii) the minimum resistance to provide protection for 90% of the stator winding (6M)
5. a) Explain about the distance protection of Transmission lines. (5M)
- b) Represent the Differential Pilot-Wire Protection of lines using Translay scheme and explain. (7M)
6. a) Write short notes on reactance grounding? (6M)
- b) With a neat diagram describe the operation of horn gap type arresters? (6M)

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