

8E4111

B.Tech. VIII Semester (Main/Back) Examination, 2014

Electrical Engineering

8EE3 SWITCHGEAR AND PROTECTION

(Common with 8EX3)

Time: 3 Hours

Maximum Marks: 80

Min. Passing Marks: 24

Instructions to Candidates:

Attempt any five questions, selecting one question from each unit. All questions carry equal marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.)

Unit-I

- Q.1 (a) Explain the Hall effect devices. How can they be used as phase comparator. [8]
(b) With the help of the block diagram and circuit, explain instantaneous over current relay. [8]

OR

- Q.1 (a) Discuss the duality between phase & amplitude comparator? [8]
(b) Giving the name of some static relays, discuss the advantages of static relays over electromagnetic relays. [8]

Unit-II

- Q.2 (a) Describe the circuit of static differential relay for three-phase winding transformer. [8]
(b) How static MHO relay is realized using a phase comparator? Explain with its characteristic. [8]

OR

- Q.2 (a) Explain, why the percentage bias differential relay is used in place of differential relay protection of alternators? [8]
(b) Describe the principle of differential system of protection applied to a power transformer. What are the difficulties experienced and how are they overcome? [8]

Unit-III

- Q.3 (a) How, quadrilateral characteristics are realized with the help of phase comparators? Explain. [8]

- (b) What is the principle of operation of directional comparison and phase comparison carrier protection? [8]

OR

- Q.3 (a) Discuss in detail, the basic apparatus and schemes of power line carrier system. [8]
(b) What are blinders? Explain elliptical relay briefly. [8]

Unit-IV

- Q.4 (a) Explain the principle of operation of minimum oil circuit breaker. [8]
(b) What is resistance switching? Derive the expression for critical resistance which gives no transient oscillation. [8]

OR

- Q.4 (a) Discuss the different arc-interruption theories for interruption of arc in circuit breakers. [8]
(b) In a 220 kV system, the reactance & capacitance upto the location of circuit breaker is 8Ω and $0.025\mu\text{F}$ respectively. A resistance of 600 ohms is connected across the contacts of the circuit breaker. Determine:-
(i) Natural frequency of oscillation
(ii) Damped frequency of oscillation
(iii) Critical value of resistance which will give no transient oscillation.
(iv) The value of resistance which will give damped freq. of oscillation, one fourth of the natural freq. of oscillation. [8]

Unit-V

- Q.5 (a) Describe the construction & operating principle of vacuum circuit breaker. What are its advantages over conventional type circuit breaker? [8]
(b) With a neat sketch, describe the working principle of an arial air blast type circuit breaker. Explain, why resistance switching is used with this type of circuit breaker? [8]

OR

- Q.5 (a) Describe digital relay, with the help of its block diagram. [8]
(b) Explain the following:-
(i) Selection of circuit breakers for different ranges.
(ii) Transmission live distance protection . [8]