

**324612(24)**

**B. E. (Sixth Semester) Examination 2020**

**(Old Scheme)**

**(Branch : Elect.)**

**POWER SYSTEM PROTECTION & SWITCHGEAR**

***Time Allowed : Three hours***

***Maximum Marks : 80***

***Minimum Pass Marks : 28***

***Note : Attempt all questions. The first part in each question is compulsory which is of 2 marks. Attempt any two parts from the rest three, each is of 7 marks.***

**Unit - I**

1. (a) Draw a typical time current characteristics of inverse over current relays.
- (b) Describe the construction and principle of operation of an induction type over current relay.

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- (c) Derive the torque equation for impedance relay, reactance relay & Mho relay with the help of universal torque equation. Draw the R-X diagram for all the relays also.
- (d) Explain with neat diagram the construction and working of Buchholz relay.

#### Unit - II

2. (a) What are the major faults which may occur on an alternator.
- (b) Describe the schemes of protection against inter-turn fault for an alternator.
- (c) Explain the frame leakage protection scheme for bus bar arrangement.
- (d) Give the detailed analysis of automatic field suppression and neutral circuit breaker of an alternator.

#### Unit - III

3. (a) What are the various CT arrangement in different star delta power transformer differential protection scheme.

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- (b) What are the difficulties encountered in differential protection of transformer. Give the remedies to overcome difficulties.
- (c) Explain the principle of time graded protection for parallel and ring main feeders equipped with IDMT overcurrent relays.
- (d) Explain the carrier current protection scheme for transmission lines.

#### Unit - IV

4. (a) What do you mean by comparators?
- (b) Describe the duality between amplitude and phase comparators.
- (c) Explain averaging type and phase splitting type instantaneous amplitude comparators.
- (d) Describe coincidence type phase comparator.

#### Unit - V

5. (a) Define restriking voltage & recovery voltage?
- (b) Explain the construction, principle & operation of minimum oil circuit breaker.

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- (c) Describe the construction, principle of operation and application of SF<sub>6</sub> circuit breaker.
- (d) Discuss the operation & construction of HRC fuse. Explain the characteristics of HRC fuse.