

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VII(NEW) EXAMINATION – SUMMER 2019****Subject Code:2170908****Date:14/05/2019****Subject Name:Switch Gear and Protection****Time:02:30 PM TO 05:00 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

MARKS

- Q.1** (a) Define following terms in context to protective relay (i) Reliability (ii) Selectivity (iii) Discrimination **03**
- (b) Discuss necessity of Back up protection and types of backup protection in brief. **04**
- (c) Explain the principle of Directional relay with the help of appropriate phasor diagram. Also explain the significance of maximum torque angle of the directional relay. **07**
- Q.2** (a) Prove that the slope of the internal fault characteristics for a single-end fed system is 200%. **03**
- (b) What are the drawbacks of a simple differential scheme? Explain how the percentage differential relay overcomes the drawbacks of simple differential relay. **04**
- (c) What are incipient faults? Discuss in detail the type of protection provided in transformer to cater to such type of faults. **07**
- OR**
- (c) Explain the 3 zone protection of transmission line using MHO relays. How under-reach and over-reach are set to avoid in this type of protection? **07**
- Q.3** (a) List and Explain various options for implementing the carrier communication channel. **03**
- (b) How do different distance relays perform with respect to their behavior on load, effect of arc resistance on the reach and response to power swing? **04**
- (c) Explain the operation of the unit type of carrier based directional protection. **07**
- OR**
- Q.3** (a) Differentiate between longitudinal and transverse differential protection in context to generator protection. **03**
- (b) What causes loss of prime mover? Can a generator be allowed to run with its prime mover lost? If not, why? **04**
- (c) Explain various abnormal conditions to which a modern turbo alternator is likely to be subjected. **07**
- Q.4** (a) Why is protection of an induction motor against reversal of phase sequence required? **03**
- (b) Explain ratio error and phase angle error in CTs. **04**
- (c) List and explain various abnormal conditions an induction motor is likely to be subjected. **07**
- OR**
- Q.4** (a) List and explain advantages of numerical relays over other conventional relays. **03**

- (b) Define following terms (i) Recovery voltage (ii) Re-striking voltage (iii) RRRV. Derive an expression for the restriking voltage in terms of system inductance and capacitance. **04**
- (c) Draw and explain block diagram of Numerical relay. **07**
- Q.5** (a) What causes the initiation of electric arc at the instant of contact separation ? Which of these is chiefly responsible for the creation of arc in circuit breaker and why? **03**
- (b) Explain current chopping in brief. **04**
- (c) Explain auto reclosing. **07**
- OR**
- Q.5** (a) List the properties of SF₆ gas and its advantages over other arc quenching medium. **03**
- (b) Explain following terms: symmetrical breaking current, asymmetrical breaking current & making current as applied to circuit breaker and show how these currents can be determined from oscillograms taken during short circuit tests on a three phase circuit breaker. **04**
- (c) Write short note on vacuum circuit breaker. **07**

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