

Seat No.: _____

Enrolment No. _____

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 restiking 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**
