

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-VII (NEW) EXAMINATION – WINTER 2018

Subject Code: 2170908

Date: 19/11/2018

Subject Name: Switch Gear and Protection

Time: 10:30 AM TO 01:00 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) Explain the following requirements of protection system. **03**
(i) Selectivity (ii) Reliability (iii) Security
- (b) Discuss time and current grading schemes of over current protection. **04**
- (c) Discuss the working principle of an induction relay and also derive an expression for the torque produced by it. **07**

- Q.2**
- (a) Clearly distinguish the terms “Overload” and “Overcurrent”. **03**
- (b) Explain, what are the basic requirements of a protective System. **04**
- (c) Compare following **07**
(i) Measuring CT and Protection CT
(ii) Electromagnetic type PT and Capacitor type PT

OR

- (c) Define the terms ‘Plug Setting Multiplier’ and ‘Time Multiplier Setting’ used in context of an IDMT relay. An IDMT type overcurrent relay is used to protect a feeder through a 500/1A CT. The relay has a plug setting of 125% and TMS=0.3. Find the time of operation of the said relay if a fault current of 5000A flows through the feeder. Make use of the following characteristics: **07**

PSM	2	3	5	8	10	15
Time for TMS=1	10	6	4.5	3.2	3	2.5

- Q.3**
- (a) What problems, if any, do you anticipate in applying conventional differential protection to a transmission line? **03**
- (b) What are the limitations found in the simple differential protection of a transformer? How are they overcome? **04**
- (c) With the help of schematic diagram, discuss various components of digital/numerical relays. **07**

OR

- Q.3**
- (a) What are the conditions which lead to incipient faults in transformer? What type of protection is required? **03**
- (b) What are advantages of numerical relays? **04**
- (c) Draw a detailed protection scheme for biased differential Protection of a 11/66KV, 45 MVA, DY power transformer. Suggest suitable CT ratios. What is minimum recommended percentage bias? **07**

- Q.4**
- (a) Compare minimum oil CB and bulk oil CB. **03**

	(b)	Explain the need for a three stepped distance protection of a transmission line.	04
	(c)	Explain power line carrier current protection by direction comparison showing schematic connection dia. of equipments used in it.	07
		OR	
Q.4	(a)	What are the advantages of power line carrier?	03
	(b)	Explain Following with reference to Circuit Breaker: (a) Breaking Current (b) Making Current	04
	(c)	Write short note on SF6 circuit breaker.	07
Q.5	(a)	Explain the effect of natural frequency on TRV.	03
	(b)	Explain the physics of arc phenomena. On what factors does the arc phenomenon depends?	04
	(c)	What is meant by loss of excitation in a generator? What protection is used against it?	07
		OR	
Q.5	(a)	Explain reactance relay with characteristics.	03
	(b)	An air- blast CB designed to interrupt a transformer magnetizing current of 15A (rms) chops the current at an instantaneous value of 12A. The value of L and C in the circuit are 8H and 0.009 μ F. Find the voltage that appears across the circuit breaker. Assume that the inductive energy is transformed to capacitance.	04
	(c)	List and explain various protections used for an induction motor.	07
