Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII • EXAMINATION – SUMMER • 2015

Subject code: 170903 **Date:12/05/2015**

Subject Name: Power System Protection

Time:02.30pm-05.00pm **Total Marks: 70**

Instructions:

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

Q.1	**(a)**	Discuss various zones of protection for a modern power system. Explain the difference between primary and back-up protection. What are the various methods of providing back-up protection?	**07**
	(b)	What are the merits and demerits of static relays over electromagnetic relays? Explain why attracted armature type relays are noisy. What measures are taken to minimize the noise?	**07**
Q.2	**(a)**	Explain directional over current relay with neat sketch. Also draw only the phasor diagram for 30° and 60° connection.	**07**
	(b)	Derive an expression for torque produced by an induction relay. What are the merits of induction cup construction over the induction disc construction?	**07**
		OR	
	(b)	Discuss the essential qualities of a protective relay.	**07**
Q.3	**(a)**	Explain various types of over current relays along with their time-current characteristics. Discuss their area of applications.	**07**
	(b)	With the help of schematic diagram, discuss various components of numerical relays.	**07**
		OR	
Q.3	**(a)**	Show the characteristics of following distance relays on R-X diagram. (i) Reactance relay (ii) Mho relay (iii) Impedance relay Discuss suitability of above distance relays for short, medium and long transmission line protection.	**07**
	(b)	Compare following: (i) Measuring CT and Protection CT (ii) Electromagnetic type PT and Capacitor type PT	**07**
Q.4	**(a)**	What is carrier aided distance protection? Discuss the permissive over-reach transfer tripping scheme of protection.	**07**
	(b)	Explain stator inter-turn fault protection for generator.	**07**
		OR	
Q.4	**(a)**	Draw a schematic diagram of a phase comparison carrier current protection scheme and explain the main carrier equipments used in it.	**07**
	(b)	Explain restricted earth fault protection for transformer.	**07**
Q.5	**(a)**	Discuss the protection employed against loss of excitation of an alternator.	**07**
	(b)	What type of protection scheme is employed for the protection of a	**07**

large power transformer against short-circuits? With neat sketch discuss its working principle.

OR

Q.5	**(a)**	Explain following motor protection for the fault against (i) Overloads (ii) Unbalanced supply voltages including single phasing.	**07**
	(b)	Explain installation and commissioning tests to be performed on a relay.	**07**

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