Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII • EXAMINATION – SUMMER • 2014

Subject Code: 170903 Date: 05-06-2014

Subject Name: Power System Protection

Time: 02:30 pm - 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.**

Q.1	**(a)**	Explain the principle of the directional relay with the help of an appropriate phasor diagram. Also, explain the significance of the maximum torque angle of the directional relay.	**08**
	(b)	Discuss the important requirements to be satisfied by a protective system.	**06**
Q.2	**(a)**	Explain the construction and working of an over current relay. Hence define the terms PSM and TMS. How do the plug settings vary for a phase fault and an earth fault over current relay.	**07**
	(b)	Define the following terms as applied to protective relays and systems: Burden, Pick-up, Reset, Reach, CT ratio error, CT phase angle error, blind spot.	**07**
		OR	
	(b)	Discuss the effect of saturation on the performance of metering and protective Current transformers.	**07**
Q.3	**(a)**	Restricted earth fault protection is provided to alternators though it does not protect the complete wiring against earth faults. Justify this type of protection.	**07**
	(b)	Discuss why directional over current relays are used at the load end of parallel feeders.	**07**
		OR	
Q.3	**(a)**	Explain briefly the functions of a coupling capacitor, a line trap, transmitter and receiver in the carrier current protection of a transmission line.	**07**
	(b)	State and explain the application of very inverse and extremely inverse over current relays.	**07**
Q.4	**(a)**	Discuss briefly the problems that arise in the application of differential protection of a power transformer and indicate the solutions employed.	**07**
	(b)	List the type tests carried out on the relays. Discuss any three of them.	**07**
		OR	
Q.4	**(a)**	Explain the phenomenon of magnetizing inrush current in power transformers. Describe, with the help of a neat diagram, the method used for preventing tripping of the differential protection due to inrush of magnetizing current.	**07**
	(b)	Discuss the principle of operation of a reactance type distance relay along with its characteristics on the R-X diagram. What type of directional feature is provided in the reactance relays and why?	**07**

Q.5 **(a)** Explain the basis of setting three step distance relays for the first, second and third zones of distance measurement. **07**

(b) Draw the single line diagram of differential bus protection and explain the same. What are its limitations . How can they be overcome? **07**

OR

Q.5 **(a)** Explain the transverse differential protection scheme as used for the protection of generators from inter-turn faults. **07**

(b) With the help of a block diagram, explain the organization of a numerical relay. **07**

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