Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII • EXAMINATION – WINTER • 2014

Subject Code:170903 **Date: 04-12-2014**

Subject Name: Power System Protection

Time: 10:30 am - 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.**

Q.1	(a)	What is magnetizing inrush? How does a transformer differentiate between the fault current and the inrush current?	08
	(b)	Why are the 30°, 60° and 90° connections made in directional relays. Draw the vector diagram of the 90° connection finding what is the maximum torque angle.	06
Q.2	(a)	Define: PSM, TMS, unit protection, through fault, blind spot, under-reach, relay sensitivity.	07
	(b)	Discuss how a radial feeder is protected against phase and ground faults using 2 over current and 1 earth fault relay. Draw the figure and explain.	07
		OR	
	(b)	Discuss the type of protection used for the stator phase and ground faults on the armature winding of a generator.	07
Q.3	(a)	Which electromagnetic type relay is used to realize the characteristic of a reactance and MHO relay. Explain its principle and prove its torque equation.	08
	(b)	Why does an IDMT relay offer an inverse time-current characteristic for low values of the fault current and a definite time-current characteristic for high values of the fault current.	06
		OR	
Q.3	(a)	Prove the torque equation of a reactance relay. Draw its characteristic. Why is a circular directional characteristic preferred in reactance relays?	07
	(b)	How are parallel feeders and ring main system protected using directional relays.	07
Q.4	(a)	What is CT ratio error and CT phase angle error. How do these errors pose problems in the simple differential protection of a transformer.	07
	(b)	What are advantages of numerical relays? Draw the block diagram for interface of an over current relay.	07
		OR	
Q.4	(a)	Discuss with an example as to what are incipient faults? What type of protection is used in a transformer to cater to such type of faults.	07
	(b)	Discuss the three zone protection in impedance relays. Why does the first zone protect only 80-85% of the first line section.	07

Q.5	(a)	Explain the directional comparison carrier current scheme	07
	(b)	Discuss differential protection of busbars.	07

OR

Q.5	(a)	What is meant by relay discrimination? What is the result of lack of relay discrimination. Explain with an example.	07
	(b)	Explain the phenomenon of over fluxing in a transformer. What protection is used for the same?	07

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