Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E. SEMESTER III–EXAMINATION – WINTER 2015

Subject code: 2734501 **Date: 04/12/2015**

Subject Name: Application of Power Electronics to Power System

Time: 2:30 PM to 5:00 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 basic construction, working and operating characteristic of Thyristor Control Reactor (TCR).	**07**
	(b)	Draw the dynamic V-I characteristics for reduction in the SVC reactive-power rating by the current slope and explain it.	**07**
Q.2	**(a)**	Explain the principle of operation of basic Thyristor-Controlled Series Capacitor (TCSC) scheme.	**07**
	(b)	Derive the ratio of reactive power compensation to be provided by a series compensator and a midpoint shunt compensator, to achieve the same change in active power transfer through a given transmission line. Assume identical voltages at respective ends of the line in both the cases. Calculate this ratio for a line operating with a 15° phase angle difference between the two ends.	**07**
		OR	
	(b)	Explain operating characteristics of FC-TCR without step-down transformer.	**07**
Q.3	**(a)**	Discuss the role of SVC as a voltage controller.	**07**
	(b)	Explain the principle of operation of Static Synchronous Series Capacitor (SSSC) scheme.	**07**
		OR	
Q.3	**(a)**	Explain load sharing between parallel connected SVCs with diagram	**07**
	(b)	Show that a TCSC compensated line could not cause or participate in a subsynchronous resonance. State the condition assumed for such property of TCSC based circuit.	**07**
Q.4	**(a)**	Using relevant phasor diagram and equations, explain how a shunt connected switching converter type var generator can be used as a bidirectional active-reactive power compensator based on the principle of operation of STATCOM.	**07**
	(b)	Explain principle of operation of UPFC with relevant phasor diagram and describe its implementation using back to back VSCs with schematic diagram	**07**
		OR	
Q.4	**(a)**	Draw and explain the V-I characteristics of STATCOM and give a brief comparison with the V-I characteristics of TSC-TCR.	**07**
	(b)	Explain the construction and working of a IPFC.	**07**
Q.5	**(a)**	Explain the basic working principle of Thyristor Controlled Transformer.	**07**
	(b)	Explain synchronous reference frame theory.	**07**
		OR	
Q.5	**(a)**	Explain significance of reactive power control. Also Compare Series and Shunt Capacitor compensators.	**07**
	(b)	Explain Instantaneous reactive power theory.	**07**

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