Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – II • EXAMINATION – WINTER 2012

Subject code: 1720707 **Date: 02-01-2013**

Subject Name: Flexible AC Transmission System

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)**	Explain the principle of operation of a TSC-TCR static var generator. Also explain the functional control scheme of the same.	**07**
	(b)	Discuss the effect of mid-point shunt compensation on the power transfer of a transmission line . Derive the equations for the active and reactive power. Also draw the phasor diagram.	**07**
Q.2	**(a)**	If two SVC's are connected in parallel to a system bus, discuss : 1. Load sharing between them considering current droop. 2. Load sharing between them considering no current droop.	**07**
	(b)	How is the transient stability margin of a system improved using series compensation. Illustrate the same using equal area criterion for an uncompensated system and a series compensated system.	**07**
		OR	
	(b)	The FACTS controllers enhance the controllability and power transfer capability in A.C. systems. Comment on the above statement giving comparison with simple A.C. systems and HVDC systems.	**07**
Q.3	**(a)**	Explain in detail, the principle of operation of a TCSC with a neat diagram of the controller module.	**07**
	(b)	Give the comparison of different SVC's.	**07**
		OR	
Q.3	**(a)**	Discuss as to how the degree of series compensation is controlled in a step wise manner by increasing or decreasing the number of series capacitors using a TSSC.	**07**
	(b)	Discuss operation of a TSC along with its operating characteristic.	**07**
Q.4	**(a)**	Discus the operating principle of a Unified Power Flow Controller(UPFC). How can it be implemented using two back to back voltage source converters.	**07**
	(b)	Draw the building block of a three phase six pulse STATCOM and explain its analysis.	**07**
		OR	
Q.4	**(a)**	Discuss the operation of an SSSC. How is the power flow controlled by it.	**07**
Q.4	**(b)**	A STATCOM has overall superior functional characteristics, better performance and greater application flexibility as compared to that attainable with an SVC. Justify the above statement.	**07**
Q.5	**(a)**	Describe the operation of a basic TCR with the firing delay angle control and operating waveform. Also discuss its V-I characteristic.	**07**
	(b)	How is power flow control obtained using a Thyristor controlled transformer (TCT)?	**07**
		OR	
Q.5	**(a)**	Discuss the modeling of TCSC for stability studies.	**07**
	(b)	Write a note on the mitigation of subsynchronous resonance using TCSC.	**07**

****