

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 : **07**
1. Load sharing between them considering current droop.
 2. Load sharing between them considering no current droop.
- (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)** Discuss 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**
