

2123

**M.E. Electrical Engineering (Power System)**  
**Third Semester**  
**EE-8305 (b): Flexible AC Transmission Systems Controllers**

Time allowed: 3 Hours

Max. Marks: 50

*NOTE: Attempt any five questions.*

x-x-x

- I. Explain the implementation of variable shunt compensation for controllable VAR generation in a power system for
- (a) SVC mode (5)
- (b) VSC mode (5)
- II. (a) Write a short note on FACTS Technology, its objectives and benefits of FACTS Controllers over the conventional controllers. (7)
- (b) Derive the governing equation for real and reactive power flow in a Electric Transmission system. (3)
- III. Draw the block diagram and explain the control scheme for
- (a) TSC-TCR. (5)
- (b) TSR. (5)
- IV. (a) Present the analogy between TCR and GCSC. (5)
- (b) Present the comparison STATCOM and SVC. (5)
- V. Explain the working and operating characteristics of SSSC from point of view of switching converter type VAR compensator. (10)
- VI. (a) Draw the diagram for TCR and its V-I char. Show how continuous control in line current can be obtained using TCR. (5)
- (b) What is TCSC series controller? How can it work as simple TSSC controller? Explain and draw the waveforms for capacitive and inductive mode of operation of TCSC controller. (5)
- VII. (a) For phase angle as 0 degrees and 30 degrees ,draw the controllable range for UPFC and explain its control on P and Q along with required compensation with angle control. (5)
- (b) For a co-ordinated control of two-converter in IPFC, draw the diagram and explain its working for operating point located on arbitrarily selected voltage compensation line and voltage phasor perpendicular to the resultant voltage phasor. (5)
- VIII. (a) Explain in detail how shunt compensation can be used to have reactive power control and improve transient stability of power systems. (4)
- (b) Draw the diagram for STATCOM. Explain how operation of STATCOM is similar to that of rotating synchronous machine? Explain how four quadrant operation can be obtained using STATCOM. (6)

x-x-x