

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt any five questions.

x-x-x

- I. (i) Explain how an SSSC controls power flow in a transmission line. Use mathematical expressions to support your answer. (5)
(ii) How does STATCOM improve dynamic voltage stability compared to SVC? (5)
- II. (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)
- III. (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)
- IV. (a) Explain in detail how shunt compensation can be used to have reactive power control and improve transient stability of power systems. (5)
(b) Explain the working of FC-TCR with its V-I Characteristics. (5)
- V. (a) Explain the operation of GCSC with relevant waveforms. (5)
(b) Considering a simple two-machine model for a power system, explain the process of Power Flow Control as obtained by Phase Angle Regulator. (5)
- VI. (a) Draw the internal control scheme for TSSC and explain its working. (5)
(b) Elaborate the internal control of UPFC using a control scheme. (5)
- VII. (a) Draw the block diagram and explain the control scheme for TSC-TCR. (5)
(b) Present the analogy between TCR and GCSC. (5)
- VIII. (a) Explain how transfer of real power and compensation of reactive power is limited in a transmission system. (5)
(b) Highlighting the functions of FACTS controllers, explain their importance in transmission system. (5)

x-x-x