

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt any five questions. All questions carry equal marks.

x-x-x

- I. a) Explain the concept of a Phase Angle regulator (PAR).
b) Considering a simple two-machine model for a power system, explain the process of Power Flow Control as obtained by Phase Angle Regulator.
c) Draw the circuit diagram for continuous control of output voltage using thyristor tap-changer circuit. Explain its working using a pure inductive load. (2,4,4)
- II. a) With a basic representation scheme for a IPFC explain its operation for compensating several transmission lines at a given substation.
b) Explain the operation of UPFC to obtain simultaneous control of voltage, impedance and angle with help of appropriate diagram. Write about standalone operation of series and shunt converter in a UPFC. (4,6)
- III. Explain how there can be enhancement in Transient Stability limit and real power transfer of the power system by using:
a) Series compensators
b) Shunt compensators (10)
- IV. a) Draw the circuit for SSSC. Explain how capacitive and inductive compensation can be achieved using SSSC. How the problem related to sub-synchronous resonance handled using SSSC.
b) Draw the circuit for TCSC. Explain the working of TCSC in 'voltage compensation mode' and 'impedance compensation mode' using relevant V-I characteristics. (6,4)
- V. a) Discuss about the analysis of uncompensated transmission lines for its various limiting parameters. Hence formulate the role of FACTS devices in solving them.
b) How are variable impedance type FACTS controllers different from voltage-source FACTS controllers? (7,3)

P.T.O.

(2)

- VI. a) What is TCS? Explain its working. Also explain with the conditions to obtain transient free switching of TSC.
b) Explain the working of FC-TCR using V-I characteristics. (7,3)
- VII. a) Explain the control scheme of UPFC for its successful operation using varying dc link voltage.
b) Elaborate the internal control of SSSC using a control scheme. (2x5)
- VIII. Compare:
a) UPFC with SSSC
b) STATCOM with SVC (2x5)

x-x-x