Exam.Code:1019
Sub. Code: 7484

2063
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. (a) How is TSR different from TCR ? (2)
(b) What is the importance of storage in case of converter-based FACTS devices? (2)
(c) What is meant by variable impedance type series compensator? (2)
(d) Explain the concept of a Voltage Regulator. (2)
(e) Explain how UPFC is superior to other FACTS devices. (2)

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) What is UPFC? Draw a neat diagram and elaborate its basic principle of operation. (4)
(b) Explain the operation of UPFC to obtain simultaneous control of voltage, impedance and angle and simultaneous control with help of appropriate diagram. (6)

IV. (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)

V. (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)

VI. (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)

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VII. (a) Draw the internal control scheme for TSSC and explain its working. (5)
(b) Draw and explain internal control scheme for IPFC. (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