

2021
M.E. Electrical Engineering (Power System)
Third Semester
EE-8303: Flexible AC Transmission Systems (FACTS)

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt any five questions in all, including Question No. 1 which is compulsory.

x-x-x

- I. Answer the following:-
 - a) What are the benefits attained by FACTS controllers?
 - b) What is the importance of storage in case of converter-based FACTS devices?
 - c) What is meant by variable impedance type series compensator?
 - d) Explain the concept of a Voltage Regulator.
 - e) Explain how UPFC is superior to other FACTS devices. (5x2)

- II.
 - a) Draw the diagram for TCR and its V-I char. Show how continuous control in line current can be obtained using TCR.
 - 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. (2x5)

- III.
 - a) What is UPFC? Draw a neat diagram and elaborate its basic principle of operation.
 - b) Explain the operation of UPFC to obtain simultaneous control of voltage, impedance and angle with help of appropriate diagram.
 - c) What are the problems associated with interconnected power systems in terms of power flow and stability issues. (3,4,3)

- IV.
 - a) What is the basic principle of working of the Static Series Compensator? Explain its capability to provide Real Power Compensation.
 - b) Draw and explain External Control Scheme for Series Reactive Compensators. (6,4)

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(2)

- V. a) Explain in detail how shunt compensation can be used to have reactive power control and improve transient stability of power systems.
- 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. (4,6)
- VI. a) Draw a neat circuit diagram of a thyristor tap changer circuit and explain its working for RL Load. Also draw the waveform for the output voltage.
- b) Considering a simple two-machine model for a power system, explain the process of Power Flow Control as obtained by Phase Angle Regulator. (2x5)

x-x-x