

**FLEXIBLE AC TRANSMISSION SYSTEMS**

(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 70

**PART – A**

(Compulsory Question)

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- 1 Answer the following: (10 X 02 = 20 Marks)
- What are the control attributes for various FACTS controllers?
  - List out the merits of transmission line interconnections.
  - In general, the self-commutating converters are preferred over line commutating converters used for FACTS controllers. Why?
  - How power flow can be reversed in Voltage-sourced converters?
  - Comment on the physical size, response time and real power exchange of STATCOM in contrast to the SVC.
  - What is the effect of system voltage on the compensating current and capacitive var output of voltage source shunt controller compared to variable impedance type shunt controller?
  - Give the applications of fixed and controlled series compensation.
  - Define Sub synchronous resonance.
  - Discuss the arrangement of back-to-back converters of UPFC and IPFC used for compensation of power system network.
  - What are the similarities and the applications of UPFC and IPFC?

**PART – B**

(Answer all five units, 5 X 10 = 50 Marks)

**UNIT – I**

- 2 (a) On what factors does the power flow in an A.C. power transmission network depend?  
 (b) Explain the conventional means of controlling the power system. What are their limitations and how they can be overcome in Flexible A.C. Transmission system? Explain in detail.

**OR**

- 3 (a) List out the factors influencing the power flow in a A.C. power transmission network. Give the relative importance of each.  
 (b) With a neat schematic diagram, explain the basic types of FACTS controllers in brief.

**UNIT – II**

- 4 (a) Compare and contrast voltage source converter with current source converter.  
 (b) Explain the significance of pulse width modulation scheme for the control of power electronic converters.

**OR**

- 5 (a) Give the relative advantages and disadvantages of 12-, 24- and 48 - pulse operation of converters.  
 (b) Explain the concept of Voltage Source and Current Source Converters. Suggest the applications of each.

**UNIT – III**

- 6 (a) With the aid of power angle curves, prove that the SVC can enhance the transient stability of a power system.  
 (b) Compare STATCOM with SVC.

**OR**

- 7 (a) What are the objectives of shunt compensation?  
 (b) Explain the control scheme and characteristics of Static VAR generators, SVC and STATCOM, for the control of terminal voltage in proportion to their line current.

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**UNIT – IV**

- 8 (a) Explain the basic principle of TCSC and its modes of operation.  
(b) Analyze the capability of TCSC in damping the power oscillations in a power system.

**OR**

- 9 (a) Explain the control scheme and V-I characteristics of TSSC.  
(b) Comment on the Control range and Rating of SSSC.

**UNIT – V**

- 10 Explain the principle of operation and control capabilities of UPFC.

**OR**

- 11 (a) Write a brief note on IPFC.  
(b) An UPFC is a combination of STATCOM and SSSC capable of controlling the real power flow in a transmission line by regulating the phase angle of voltages between two ends of a transmission line.

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