GANPAT UNIVERSITY
M.TECH SEM-I ELECTRICAL ENGINEERING
REGULAR EXAMINATION JAN-2013
3EE106:-FLEXIBLE AC TRANSMISSION SYSTEMS

Time: 3 Hours   Total Marks:-70

Instructions: - 1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

SECTION-I

Q-1 (a) What is reactive power? When sinusoidal A.C supply is applied to the circuit contains reactive element, prove from the first principle that it (reactive power) oscillates with double the supply frequency. [06]

(b) Prove that mid point compensation can almost double the power transmission capacity of a transmission line [06]

OR

Q-1 (a) Discuss the advantages of FACTS devices (Flexible AC transmission devices) over the conventional controllers [05]

(b) Give Comparison of various SVC's. [07]

Q- 2 Explain the working of Six Pulse converter used in FACTS devices. Draw the circuit diagram and discuss the various current and voltage waveforms in detail. [11]

OR

Q-2 (a) Discuss principle of operation and V-I characteristics of STATCOM using suitable power circuit diagram. [06]

(b) Explain the modifications required to be made in load flow study when SVC is connected in the power system at a particular bus. Also discuss how SVC is modeled for load flow study. [05]

Q-3 (a) Derive the expression for real and reactive power flow (P_{12} and Q_{12}) through a transmission line having reactance X when sending end and receiving end voltages are given. [06]

(b) What are the limiting factors (constraints) for real and reactive power transmission through EHVAC transmission systems? Discuss each one of them in details. [06]

SECTION-II

Q-4 (a) Discuss the application of TCSC for transient stability enhancement. [06]

(b) What is voltage stability? Explain How TCSC is useful for enhancement of voltage stability limit in the highly stressed power system using P delta/Q delta curve? [06]

OR

Q-4 (a) Explain the construction and working of Unified Power Flow Controller (UPFC). [06]

(b) Discuss the application of IPFC in power Systems [06]

Q- 5 (a) Explain the construction and working of IPFC. [05]

(b) Discuss the application of UPFC in power system steady state stability enhancement [06]

OR

Q-5 (a) Discuss the application of SSSC as a reactive power controller. Draw and discuss the necessary control circuit. [06]

(b) Compare the working of TCSC with SSSC [05]

Q-6 (a) Discuss the impedance versus firing angle delay characteristics of TCSC Write the expression for $X_{TCSC(\alpha)}$ and Discuss the various regions of the reactance versus firing angle (alpha) graph. (alpha is the firing delay angle measured from the Vc peak) [06]

(b) Discuss the role of SVC as a voltage controller [06]

Best of Luck