VALLIAMMAI ENGINEERING COLLEGE

SRM Nagar, Kattankulathur – 603 203.

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

Question Bank

Programme: **ME**
Subject: **PS7202 FLEXIBLE AC TRANSMISSION SYSTEMS**
Semester / Branch / Section : **II-Power Systems Engineering-**

Unit – I

Part – A

1. What is real power?
2. Define reactive power.
3. Define power factor.
4. What is the significance of power factor?
5. List the objectives of reactive power compensation.
6. List the fictional requirements of reactive power compensators.
7. What are the conventional control mechanisms for voltage control?
8. List the main technical requirements of static converters.
9. What are the needs of FACTS controller in modern power system?
10. What are the factors which limit loading capability?
11. Write the list of FACTS devices to control the line power flows.
12. Define FACTS.
13. What is TCR?
14. Draw the basic circuit of TCR.
15. What is TSC?
16. Draw the basic circuit of TSC.
17. What is TCSC?
18. Draw the basic circuit of TCSC.
19. What is SSSC?
20. Draw the basic circuit of SSSC.

Part – B

1. Explain with a neat sketch the various types of conventional control Mechanism of Voltage in Electrical Transmission Network.
2. Explain with necessary diagrams the analysis of uncompensated transmission line.
3. Explain the various basic types of FACTS controllers in detail.
4. Explain the role of FACTS devices in reactive power compensation.
5. Derive the expression for active as well as reactive power flow in a lossless transmission line? Draw necessaryphasor diagram.
6. By using power angle curve explain how by changing the value of line impedance the maximum amount of active power flow will change?
7. Explain and differentiate the effect of series and shunt compensation at mid-point of the line.
8. Explain the reactive power compensation at the sending, midpoint and receiving ends of the transmission lines.
9. Explain the working and characteristic of Thyristor Switched Series Capacitor.
10. Briefly describe the way by which the transient stability is enhanced due to static VAR compensator.

Unit – II

Part – A

1. What is SVC?
2. What are the two types of SVC?
3. What are the factors to be considered for designing SVC to regulate mid-point voltage?
4. Draw the configuration of SVC model.
5. What is load compensation?
6. What is system compensation?
7. What is series compensation?
8. What is shunt compensation?
9. Draw the characteristics of SVC.
10. List the characteristics of SVC.
11. List the objectives of SVC.
12. Draw the V-I characteristics of SVC.
13. Draw the V-Q characteristics of SVC.
14. List the advantages of TSC-TCR type SVC over FC-TCR type SVC.
15. Define STATCOM.
16. Draw the basic circuit of STATCOM.
17. Draw the V-I characteristics of STATCOM.
18. Draw the V-Q characteristics of STATCOM.
19. Define UPFC
20. Draw the basic circuit of UPFC.

PART – B

1. Illustrate the modelling of SVC for stability analysis.
2. Explain the transient stability enhancement of SMIB system using SVC.
3. How is shunt compensation classified? Explain in detail.
4. Compare and contrast STATCOM and SVC.
5. Explain SVC with respect to the following aspects.
    i. Diagram
    ii. Operation
    iii. V-I characteristics
6. Explain about the performance of SVC in controlling voltage in a power system.
7. Explain the operation of STATCOM with an aid of block diagram.
8. Discuss in detail about SVC-SVC interaction.
9. Explain the basic operating principle and the control capability of UPFC.
10. With a neat sketch, explain the operation of two different configuration of SVC.

Unit – III

Part – A

1. What is TCSC?
2. What is GCSC?
3. Differentiate GCSC and TCSC.
4. Draw the equivalent circuit of TCSC for two modes.
5. What is the need for variable-series compensation?
6. List the advantages of TCSC.
7. What are the advantages of GCSC?
8. What are TCSC losses?
9. Define constant angle control of TCSC.
10. What are the factors to be considered in the placement of TCSC?
11. Draw the V-I capability characteristics of single module TCSC.
12. Draw the X-I capability characteristics of single module TCSC.
13. List the various modes of operation of TCSC.
14. List the various limits which define the capability characteristics of TCSC.
15. Draw the V-I capability characteristics of multi module TCSC.
16. Draw the X-I capability characteristics of multi module TCSC.
17. List the applications of TCSC.
18. List the advantages of GCSC.
19. Draw the basic block diagram of open loop control of TCSC.
20. Draw the basic block diagram of close loop control of TCSC.

Part – B

1. Demonstrate the analysis of TCSC with neat sketch.
2. Illustrate the modelling of GCSC for load flow studies.
3. Explain in detail the phenomenon of sub synchronous resonance (SSR) with an example.
4. Explain why present transmission system with capacitive series compensation in prone to SSR.
5. With help of power angle curve explain how transient stability is improved with the series controllers.
6. Draw V-I characteristics and losses for TCSC.
7. With a neat block diagram explain the closed loop control of TCSC.
8. Explain with a neat sketch the various modes of operation of TCSC.
9. Explain how the system damping is enhanced with the help of TCSC.
10. Illustrate the modelling of TCSC for load flow studies.

Unit – IV

Part – A

1. What is STATCOM?
2. List the functions of STATCOM.
3. Draw the V-I characteristics of STATCOM.
4. List the various applications of STATCOM.
5. What is SSSC?
6. Draw the basic control scheme of SSSC.
7. List the various functions of SSSC.
8. Draw the block diagram of SSSC.
9. What are the applications of SSSC?
10. Differentiate STATCOM and SSSC.
11. What is UPFC?
12. Draw the basic block diagram of UPFC.
13. List the applications of UPFC.
14. What is IPFC?
15. Differentiate clearly between an UPFC and IPFC.
16. Give the objectives of NGH-SSR damping scheme.
17. Draw the phasor diagram illustrating the power flow control capabilities of UPFC.
18. State the salient features of UPFC.
19. Write the significance of sub synchronous resonance.
20. Draw the basic block diagram of IPFC.

Part – B

1. Demonstrate the modelling of STATCOM and mention some applications.
2. Explain in detail with a neat sketch the operation of STATCOM.
3. Draw and explain the principle of operation of SSSC.
4. Explain the modelling of SSSC for power flow studies.
5. Explain the modelling of SSSC for transient stability studies
6. Explain, modelling of UPFC for power flow studies.
7. Explain the modelling of UPFC for transient stability studies
8. Compare different FACTS controllers used in AC system.
9. Explain, modelling of IPFC for power flow studies.
10. Explain the modelling of IPFC for transient stability studies

Unit – V

Part – A

1. What is meant by FACTS controller interaction?
2. Define the term coordination.
3. List the possible combinations of FACTS controllers on interactions between them in ac system.
4. Classify the various control interactions of FACTS controllers based on the frequency ranges.
5. What is local mode oscillation in the AC system?
6. What is inter-area mode oscillation in the AC system?
7. What do you mean by sub synchronous resonance interactions?
8. List the methods used to analyse the SVC-SVC interactions.
9. What is EMTP?
10. What is the use of EMTP in the study of SVC-SVC interaction?
11. Define static synchronous generator.
12. What are the benefits of FACTS controllers used in the AC system?
13. What are the causes for SSR interactions?
14. What do you understand by controller interactions?
15. Write any three factors to test the effectiveness of SVC.
16. Write any two locations in which the SVCs are placed in the transmission system.
17. What is SVC-TCSC interaction?
18. Explain TCSC-TCSC interaction.
19. List the basic procedure for the design of controller.
20. List various methods of coordination of multiple controllers using non-linear control techniques.

Part – B

1. Explain in detail about SVC-SVC interaction
2. Explain about coordination of multiple controllers using linear control techniques.
3. Describe the coordination procedure of multiple controllers using Genetic Algorithm.
4. By means of a block diagram explain the simulation of a generalised IPFC which can be operated as a STATCOM, SSSC, UPFC or IPFC.
5. Explain in detail various control interactions between the different controllers used in the AC system.
6. Draw and explain about the interactions between SVCs in the ac power system without series compensation.
7. Draw and explain about the interactions between SVCs in the ac power system with series compensation.
8. Draw and explain about the high frequency interactions between SVCs in the ac power system.
9. Draw and explain the effect of electrical coupling and short circuit levels during SVC-SVC interactions in the ac system.
10. Draw and explain about the additional coordination features of SVC in the ac power system.