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Question Paper Code : 50461

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2017
Seventh Semester
Electrical and Electronics Engineering
EE6004 – FLEXIBLE AC TRANSMISSION SYSTEMS
(Regulations 2013)

e : Three Hours

Maximum : 100 Marks

Answer ALL questions

PART – A

(10×2=20 Marks)

- What is the need for FACTS controllers ?
- How is voltage instability identified in the power system ?
- What is the function of phase angle regulator ?
- Write the factors to be considered for designing SVC to regulate mid-point voltage.
- Draw the basic model of TCSC.
- Mention the applications of TCSC.
- What is meant by sub synchronous resonance ?
- State the salient features of STATCOM.
- What is the need for coordination of FACTS controllers ?
- How the voltage profile can be improved by making use of SVC ?

PART – B

(5×16=80 Marks)

- a) What are the objectives of line compensation ? Explain the effect of shunt and series compensation on power transmission capacity of a short symmetrical transmission line. (16)
- (OR)
- b) Draw the phasor diagrams illustrating the concepts of various power-flow control functions by the use of UPFC. Also explain the modeling procedure of UPFC for power-flow studies. (16)

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12. a) Describe the working principle of the two types of Static Var Compensators (SVC) with neat schematic diagrams. (16)
(OR)
- b) Explain in detail about the role of SVC in enhancing the steady state power limit and power system damping. (16)
13. a) Draw and explain the block diagram of the variable reactance model of TCSC and hence derive transient stability and long term stability models. (16)
(OR)
- b) The particulars of a transmission line are $V = 220 \text{ V}$, $f = 60 \text{ Hz}$, $X = 12 \Omega$ and $P_p = 56 \text{ kW}$. The particulars of the TCSC are $\delta = 80^\circ$, $C = 20 \mu\text{F}$ and $L = 0.4 \text{ mH}$. Find :
- The degree of compensation r
 - The compensating capacitance reactance X_{comp}
 - The line current I
 - The reactive power Q_C
 - The delay angle α of the TCSC if the effective capacitive reactance is $X_T = -50 \Omega$ and
 - Plot $X_L(\alpha)$ and $X_T(\alpha)$ against the delay angle α . (16)
14. a) With neat sketches, explain the operating principle and V-I characteristic of Static Synchronous Compensator (STATCOM). (16)
(OR)
- b) Discuss in detail about the modeling of SSSC in load flow and transient stability studies. (16)
15. a) Describe in detail the power flow control co-ordination of FACTS controllers using Genetic Algorithms. (16)
(OR)
- b) Explain the various control attributes for different FACTS controllers. (16)