

THE KAVERY ENGINEERING COLLEGE
(An Autonomous Institution)

M.E DEGREE END SEMESTER THEORY EXAMINATIONS, NOV /DEC 2024

Third Semester

Power Systems Engineering

PS4351 - HVDC and FACTS

Regulations - 2021

Duration : 3 Hrs

Maximum : 100 Marks

PART - A (ANSWER ALL QUESTIONS) (Marks 10*2=20)

<i>Q.No</i>	<i>Questions</i>	<i>BLT</i>	<i>CO</i>	<i>Marks</i>
1.	List the factors that decide the loading on the transmission line.	RE	1	2
2.	Summarize any two disadvantages of DC transmission.	UN	1	2
3.	List the voltage regulators used in SVC control block.	RE	2	2
4.	Outline the factors to be considered in the placement of TCSC.	UN	2	2
5.	Define the term pulse number in converters.	RE	3	2
6.	What is the purpose of power oscillation damping controller?	RE	3	2
7.	Classify the components of STATCOM.	UN	4	2
8.	Show the basic block diagram of UPFC.	RE	4	2
9.	List the advantages of multilevel converters.	RE	5	2
10.	Infer the reasons for using higher level control.	UN	5	2

PART - B (ANSWER ALL QUESTIONS) (Marks 5*13 = 65)

<i>Q.No</i>	<i>Questions</i>	<i>BLT</i>	<i>CO</i>	<i>Marks</i>
11.	a i Compare fixed series compensation and fixed shunt compensation.	UN	1	7
	ii Develop the layout of HVDC system.	AP	1	6
	Or			
	b i Explain the need for FACTS controllers.	UN	1	7
	ii Model the mono polar asymmetric and symmetric HVDC systems.	AP	1	6
12.	a Show that with SVC transient stability margin can be improved by enhancing synchronizing torque. Derive the required equations.	UN	2	13
	Or			
	b Explain the different modes of operation of TCSC. Draw the VI and XI characteristics curves for single module TCSC.	UN	2	13
13.	a Analyze the relation between the DC output voltage and AC line voltage (RMS) and rating of the converter transformer with Gratz's converter circuit.	AN	3	13
	Or			
	b Examine the modelling of LCC HVDC system and controllers, transformer derating and core saturation instability.	AN	3	13

14.	a	Examine the basic operating principle and the control capability of STATCOM.	AN	4	13
		Or			
	b	Analyze the modelling of UPFC for power flow and transient stability studies.	AN	4	13
15.	a	Develop the current control and arm balancing control in VSC based control system.	AP	5	13
		Or			
	b	Build the control and protection of MMC -HVDC under AC and DC network fault contingency.	AP	5	13

*PART – C (Marks 1*15 = 15)*

<i>Q.No</i>		<i>Questions</i>	<i>BLT</i>	<i>CO</i>	<i>Marks</i>
16.	a i	Compare the bipolar and homopolar HVDC systems with suitable diagrams.	AN	1	8
	ii	Examine the modelling of SSSC for power flow and transient stability studies.	AN	4	7
		Or			
	b i	Examine the modelling of TCSC for power flow and stability studies.	AN	2	8
	ii	Analyze the concepts of power oscillation damping controller.	AN	3	7