Reg.No.:												

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 80004

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – NOV. / DEC. 2024

Seventh Semester

Electrical and Electronics Engineering

U19EEV15 – FLEXIBLE AC TRANSMISSION SYSTEMS

(Regulation 2019)

Time: Three Hours | Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	What are the opportunities opened up by FACTS controllers in power system for enhancing the usable capacity of existing transmission lines?	2	K2	CO1
2.	Infer the various factors that limit the loading capacity of a transmission line.	2	K2	CO1
3.	Illustrate the basic implementation approach of ideal reactive compensation by line segmentation in a two-machine system. Also plot the associated phasor diagram.	2	K2	CO2
4.	Classify the methods employed in power grids for achieving controllable VAR generation.	2	K4	CO2
5.	Analyze the limitations of shunt compensation that could be overcome by series compensation.	2	K4	CO3
6.	What are the different variable impedance type of series compensators?	2	K1	CO3
7.	Interpret the concept and basic implementation method of a voltage regulator in power system.	2	K2	CO4
8.	List the applications of static phase angle regulators in power system.	2	K1	CO4
9.	What are the merits of converter-based shunt compensation over impedance type compensation.	2	K1	CO5
10.	Identify the causes of sub synchronous resonance in a power system.	2	K3	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.			Questions	Marks	KL	CO
11.	a)		Explain various controllable parameters in a power grid network. Also explain the possibilities of power flow control in AC transmission system.	13	K2	CO1
			(OR)			
	b)	i.	Infer the method of power flow control by voltage injection with necessary equations and phasor diagrams.	8	K2	CO1
		ii.	Classify the FACTs devices used in India & abroad and draw their symbols.	5	K2	
12.	a)	i.	Explain the operation of TCR type VAR generator. Plot the amplitude variation of fundamental component of TCR current with delay angle.	8	K2	CO2
		ii.	Infer the operation of TSC and its operating constraints with necessary circuit diagram.	5	K2	
			(OR)			
	b)	i.	Analyze the need of shunt compensation and explain the basic principle with neat diagram.	8	K4	CO2
		ii.	Compare the characteristic parameters of TCR & TSC.	5	K4	
13.	a)		Infer the operation of TSSC & TSSC. With relevant diagrams, discuss the attainable V-I characteristics of TSSC when operated in voltage control mode and reactance control mode.	13	K2	CO3
			(OR)			
	b)		Explain the operation of SSSC & GCSC. With necessary diagrams, explain the capability of SSSC in providing real power compensation.	13	K2	CO3
14.	a)		Explain the operation of delay angle-controlled thyristor tap changer when supplying a purely inductive load, with relevant diagrams.	13	K2	CO4
			(OR)			
	b)		Explain in detail the application of phase angle regulators in damping power system oscillation and improving transient stability of a power system.	13	K2	CO4
15.	a)		Illustrate the implementation and operation of UPFC using back-to-back voltage source converters with necessary diagrams.	13	K2	CO5
			(OR)			
	b)		Explain the operation of UPFC with controlled series compensators and controlled phase angle regulators with necessary illustrations.	13	K2	CO5

PART – C

(1 x 15 = 15 Marks)

Q.No.		Questions	Marks	KL	CO
16.	a)	With necessary diagrams and mathematical models, identify the capability of UPFC to control real and reactive power flow in a transmission line. Also discuss the control regions of attainable active and reactive power demand.	15	K3	CO5
		(OR)			
	b)	Explain the basic operating principle and characteristics of IPFC. Illustrate the variation of receiving end active and reactive power as a function of injected compensating voltage.	15	K3	CO5