



SWARNANDHRA
COLLEGE OF ENGINEERING & TECHNOLOGY
 (Autonomous)

Accredited by NBA, AICTE, NEW DELHI • Accredited by NAAC with "A" Grade – 3.32/4.00 CGPA
 Recognized by UGC Under Sections 2(f) & 12 (B) of UGC Act 1956
 Approved by AICTE, New Delhi, Permanent Affiliated to JNTU K, Kakinada
 Seetharampuram, NARSAPUR-534 280, W.G-Dist., Andhra Pradesh

Department of Electrical and Electronics Engineering

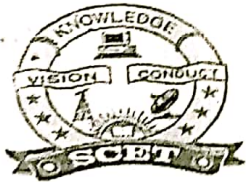
TEACHING PLAN

Course Code	Course Title	Semester	Branches	Contact Periods/Week	Academic Year	Date of Commencement of Semester
16EE7E02	FLEXIBLE ALTERNATING CURRENT TRANSMISSION SYSTEMS (R16)	VII	Electrical and Electronics Engineering	6	2021-2022	04-10-2021

Course Outcomes: After successful completion of this course, students should be able to:

- 1 Explain the power flow control and its parameters in transmission system by using FACTS
- 2 Classify the concepts and operation of voltage source converter and current source converter
- 3 Analyze different shunt compensation technique for power system stability problem
- 4 illustrate the operating characteristics and performance of shunt controllers for various power system stability problems

Unit	Outcome/ Bloom's Level	Topics No.	Topics/ Activity	Text Book/ Reference	Contact Hour	Delivery Method/ LMS
UNIT-1. INTRODUCTION TO FACTS						
I	COURSE OUTCOME-1: Explain the power flow control and its parameters in transmission system by using FACTS	1.1	Introduction to FACTS	T1, T2, R1	1	Canvas, Ppt Chalk & Talk
		1.2	Power flow in an AC system	T1, T2, R1	1	Canvas, Ppt Chalk & Talk
		1.3	Loading capability limits	T1, T2, R1	1	Canvas, Ppt Chalk & Talk
		1.4	Dynamic stability considerations	T1, T2, R1	1	Canvas, Ppt Chalk & Talk
		1.5	Importance of controllable parameters	T1, T2, R1	1	Canvas, Ppt Chalk & Talk
		1.6	Basic types of FACTS controllers series & shunt controllers	T1, T2, R1	1	Canvas, Ppt Chalk & Talk
		1.7	Combined series-series & comined series-shunt controller	T1, T2, R1	1	Canvas, Ppt Chalk & Talk
		1.8	Benefits from FACTS controller	T1, T2, R1	1	Canvas, Ppt
		1.9	Requirements & characteristics of high power devices	T1, T2, R1	1	Chalk & Talk
		1.10	Voltage and current rating	T1, T2, R1	1	Canvas, Ppt Chalk & Talk
		1.11	Loses and speed of switching	T1, T2, R1	1	Canvas, Ppt Chalk & Talk
		1.12	Parameters trade-off devices	T1, T2, R1	1	Canvas, Ppt Chalk & Talk



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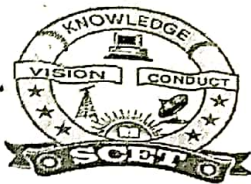
Content beyond syllabus (if need)		Comparison between HVDC and FACTS				
Mini Project (if possible)				12		
		Total				
UNIT-II VOLTAGE SOURCE AND CURRENT SOURCE CONVERTORS						
II	COURSE OUTCOME-II: Classify the concepts and operation of voltage source converter and current source convertor	2.1	Concept of voltage source converter (VSC)	T1, T2, R1	1	Chalk & Talk, PPT
		2.2	Single phase bridge converts(CSC)	T1, T2, R1	1	Chalk & Talk, PPT
		2.3	Square wave voltage harmonics dor a bridge convertor	T1, T2, R1	1	Chalk & Talk, PPT
		2.4	Three phase full bridge convertor	T1, T2, R1	1	Chalk & Talk, PPT
		2.5	.concept of current source covertor	T1, T2, R1	1	Chalk & Talk, PPT
		2.6	Three phase current source covertor	T1, T2, R1	1	Chalk & Talk, PPT
		2.7	thyristor based convertor with gate turn-on	T1, T2, R1	1	Chalk & Talk, PPT
		2.8	thyristor based convertor with gate turn-off	T1, T2, R1	1	Chalk & Talk, PPT
		2.9	Invertor operation with AC curret harmonics	T1, T2, R1	1	Chalk & Talk, PPT
		2.10	Comparison of VSC & CSC	T1, T2, R1	1	Chalk & Talk, PPT
Content beyond syllabus (if need) :						
Mini Project (if possible)				10		
UNIT-III SHUNT COMPENSATORS-I						
III	COURSE OUTCOME-III: Analyze different shunt compensation technique for power system stability problem	3.1	Introduction to shunt compensation	T1, T2,R1	1	Chalk & Talk, PPT
		3.2	Objectives of shunt compensation	T1, T2,R1	1	Chalk & Talk, PPT
		3.3	Mid point voltage regulation for line segmentation	T1, T2,R1	1	Chalk & Talk, PPT
		3.4	End of line voltage support to prevent voltage instability	T1, T2,R1	1	Chalk & Talk, PPT
		3.5	Improvement of transient stability	T1,T2,R1	1	Chalk & Talk, PPT
		3.6	Power oscillation damping	T1, T2, R1	1	Chalk & Talk, PPT
		3.7	Methods of controllable VAR generation	T1, T2, R1	1	Chalk & Talk, PPT
		3.8	Variable impedance type VAR generation	T1, T2, R1	1	Chalk & Talk, PPT
		3.9	.thyristor controlled	T1, T2,	1	Chalk & Talk,



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		reactor (TCR)	RI		PPT
	3.10	Thyristor switched reactor (TSR)	T1, T2, RI	1	Chalk & Talk, PPT
Hybrid VAR generators					
Content beyond syllabus (if need) :					
Mini Project (if possible)					
Total				10	
UNIT IV- SHUNT COMPENSATOR -II					
IV	COURSE OUTCOME III Analyze different shunt compensation technique for power system stability problem	4.1	Thyristor switched capacitor (TSC)	T1, T2, RI	1 Chalk & Talk, PPT
		4.2	TSC-TCR	T1, T2, RI	1 Chalk & Talk, PPT
		4.3	Static VAR compensator	T1, T2, RI	1 Chalk & Talk, PPT
		4.4	Static compensator	T1, T2, RI	1 Chalk & Talk, PPT
		4.5	A, B, C, D Constants	T1, T2, RI	1 Chalk & Talk, PPT
		4.5	The regulation and slope	T1, T2, RI	1 Chalk & Talk, PPT
		4.6	Transfer function & dynamic performance	T1, T2, RI	1 Chalk & Talk, PPT
		4.7	Transient stability enhancement	T1, T2, RI	1 Chalk & Talk, PPT
		4.8	Power oscillation damping	T1, T2, RI	1 Chalk & Talk, PPT
		4.9	Operating point control	T1, T2, RI	1 Chalk & Talk, PPT
		4.10	Summary of compensation control	T1, T2, RI	1 Chalk & Talk, PPT
4.11	Overview of fourth unit	T1, T2, RI	1 PPT		
Content beyond syllabus (if need)					
Mini Project (if possible)					
Total				11	
UNIT-V SERIES COMPENSATOR					
V	COURSE OUTCOME-IV: illustrate the operating characteristics and performance of shunt controllers for various power system stability problems	5.1	Static series compensation	T1, T2, RI	1 Chalk & Talk, PPT
		5.2	Concept of series capacitive compensation	T1, T2, RI	1 Chalk & Talk, PPT
		5.3	Improvement of transient stability	T1, T2, RI	1 Chalk & Talk, PPT
		5.4	Power oscillation damping	T1, T2, RI	1 Chalk & Talk, PPT
		5.5	Functional requirements	T1, T2, RI	1 Chalk & Talk, PPT
		5.6	G To Thyristor controlled series capacitor	T1, T2, RI	1 Chalk & Talk, PPT
		5.7	Thyristor switched series capacitor (TSSC)	T1, T2, RI	1 Chalk & Talk, PPT



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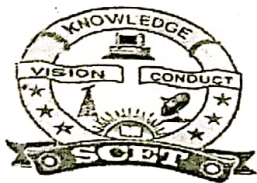
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		5.8	Thyristor controlled series capacitor (TCSC)	T1, T2, R1	1	Chalk & Talk, PPT
		5.9	Comparison between STACOM & SVC	T1, T2, R1	1	Chalk & Talk, PPT
Content beyond syllabus (if need)			Static synchronous series compensator			
Mini Project (if possible)			-			
					Total	9
UNIT-VI COMBINED CONTROLLER						
VI	COURSE OUTCOME-IV: illustrate the operating characteristics and performance of shunt controllers for various power system stability problems	6.1	Introduction to combined controllers	T1, T2, R1	1	Chalk & Talk, PPT
		6.2	Schematic and basic operating principles of UPFC	T1, T2, R1	1	Chalk & Talk, PPT
		6.3	Conventional transmission control capabilities	T1, T2, R1	1	Chalk & Talk, PPT
		6.4	Schematic & basic operating principles of IPFC	T1, T2, R1	1	Chalk & Talk, PPT
		6.5	Characteristics of IPFC	T1, T2, R1	1	Chalk & Talk, PPT
		6.6	Applications of IPFC on transmission lines	T1, T2, R1	1	Chalk & Talk, PPT
		6.7	Basic control scheme for IPFC	T1, T2, R1	1	Chalk & Talk, PPT
Content beyond syllabus (if need)			Hybrid arrangement -UPFC with a phase shifting transformer			
Mini Project (if possible)			-			
					Total	7
					Cumulative Proposed Periods	64
Text Books:						
S. No	Authors, Book Title, Edition, Publisher, Year of Publication					
1.	Marain G.Hingo rani & Laszlo gyugyi, "understading FACTS", IEEE PRESS Indian edition, standard publications,2001.					
2.	Yong hve song & allan T Johns "flexible AC transmission systems (FACTS)", IEEE, london					
Reference Books:						
S. No	Authors, Book Title, Edition, Publisher, Year of Publication					
1.	K.R Padiyar,"FACTS controller in power transmission & distribution , " 2 nd edition , new age publications,2010					
2.	R . mohan mathur & Rajiv k. varma," thyristor based FACTS controller of electrical transmission systems, 2 nd edition ,wiley publications,2012					
Web Details:						
1.	https://books.google.co.in/books?id=8fipDQAAQBAJ&printsec=frontcover&dq=power+system&hl=en&sa=X&ved=0ahUKEwjP_PrWhoHqAhUhyzgGHZHMCAwQ6AEIMDAB#v=onepage&q=power%20system&f=false					
2.	https://books.google.co.in/books?id=yitXG-osRAYC&printsec=frontcover&dq=power+system&hl=en&sa=X&ved=0ahUKEwjP_PrWhoHqAhUhyzgGHZHMCAwQ6AEIajAI					
3.	https://books.google.co.in/books?id=DnyzDwAAQBAJ&printsec=frontcover&dq=power+system&hl=en&sa=X&ved=0ahUKEwidoo2Fh4HqAhWcwzGHEiiDQk4ChDoAQg9MAM					




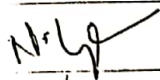
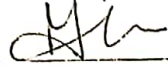

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	Name	Signature with Date
i. Course Coordinator	Mr. P. Yanna Reddy	
	Mrs. N. Lavanya	
ii. Module Coordinator	Mr. V. Madhu	
iii. Programme Coordinator	Mr. A. Satyanarayana	


Principal