



# 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  
Seethampuram, 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
20EE5T02	Power Electronics	B.Tech V	EEE	6	2024-2025	05/06/2024

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

1	Illustrate the characteristics of SCR, Power-MOSFET and Power-IGBT
2	Understand the operation of Single phase Converters
3	Analyze the operation of three-phase converters and AC-AC Converters.
4	Learn the basic concepts of operation of dc-dc converters in steady state in continuous and discontinuous mode
5	Analyze the operation of Single and three Phase inverter

Unit	Outcome/ Bloom's Level	Topics No.	Topics/ Activity	TextBook / Reference	Contact Hour	Delivery Method/ LMS
I	CO1: Compare the characteristics of various power semiconductor devices.	1.INTRODUCTION				
		1.1	Basic Theory of Operation of SCR	T1,R1	1	Chalk & Talk
		1.2	Static Characteristics of SCR	T1,R1	1	Chalk & Talk
		1.3	Two Transistors analogy of SCR	T1,R1	1	Chalk & Talk
		1.4	Turnon and Turnoff Methods of SCR	T1,R1	1	PPT
		1.5	Dynamic & Gate Characteristics of SCR	T1,R1	1	PPT
		1.6	Series Operation of SCR	T1,R1	1	PPT
		1.7	Parallel Operation of SCR	T1,R1	1	PPT
		1.8	Snubber circuit.	T1,R1	1	PPT
		1.9	Characteristics of Power MOSFET	T1,R1	1	PPT
		1.10	Characteristics of Power IGBT	T1,R1	1	PPT
		1.11	Problem solving	T1,R1	1	PPT
		1.12	Problem solving	T1,R1	1	PPT
Content beyond syllabus (if need)						
<b>Total</b>					<b>12</b>	
II	<b>SINGLE PHASE AC-DC CONVERTERS</b>					



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CO2: Explain the operation of 1-Phase converters	2.1	Single Phase half wave controlled rectifiers with R load	T1,R2	1	Chalk & Talk
	2.2	Single Phase half wave controlled rectifiers with RL load	T1,R2	1	Chalk & Talk
	2.3	Single Phase half wave controlled rectifiers with RL load with free wheeling diode	T1,R2	1	Chalk & Talk
	2.4	Problem solving	T1,R2	1	Chalk & Talk
	2.5	Single Phase fullycontrolled bridge converter with R load	T1,R2	1	Chalk & Talk
	2.6	Single Phase fullycontrolled bridge converter with RL load	T1,R2	1	Chalk & Talk
	2.7	Effect of source inductance in 1-phase fullycontrolled bridge rectifier with continuous conduction	T1,R2	1	Chalk & Talk
	2.8	Problem solving	T1,R2	1	Chalk & Talk
	2.9	Single Phasesemi Converter with hRload	T1,R2	1	Chalk & Talk
	2.10	Single Phasesemi Converter with hRLload	T1,R2	1	Chalk & Talk
	2.11	Harmonic Analysis	T1,R2	1	Chalk & Talk
	2.12	Single Phase Dual Converters	T1,R2	1	Chalk & Talk
	2.13	Problem solving	T1,R2	1	Chalk & Talk
	2.14	Problem solving	T1,R2	1	Chalk & Talk
Content beyond syllabus (if need)		Single Phase half wave controlled rectifiers with RLE load	T1,R2	1	Chalk & Talk
<b>Total</b>				16	
<b>III</b>	<b>CO3:</b> Analyze the operation of 3-Phase converters & AC-AC Converters	<b>3. THREE PHASE AC-DC CONVERTERS &amp; AC-AC CONVERTERS</b>			
	3.1	Three Phase half wave Rectifier with R load	T2,R1	1	Chalk & Talk
	3.2	Three Phase half wave Rectifier with RL load	T2,R1	1	Chalk & Talk
	3.3	Three Phase fully controlled rectifier with	T2,R1	1	Chalk & Talk





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			R load			
		3.4	Three Phase fully controlled rectifier with RL load	T2,R1	1	PPT
		3.5	Three Phase semi converter with R load	T2,R1	1	Chalk & Talk
		3.6	Three Phase semi converter with RL load	T2,R1	1	Chalk & Talk
		3.7	Harmonic Analysis	T2,R1	1	Chalk & Talk
		3.8	Three Phase Dual Converters	T1,R1	1	Chalk & Talk
		3.9	Problem solving	T1,R1	1	Chalk & Talk
		3.10	Principle of phase control, integral cycle control	T2,R1	1	PPT
		3.11	Single phase AC voltage controller with R load	T2,R1	1	PPT
		3.12	Single phase AC voltage controller RL load	T2,R1	1	PPT
		3.13	Principle of cycloconverter	T2,R1	1	PPT
		3.14	Single phase Step-up cycloconverter	T2,R1	1	PPT
		3.15	Single phase Step-down cycloconverter	T2,R1	1	PPT
		3.16	Problem solving	T2,R1	1	PPT
	Content beyond syllabus (if need)		Three Phase half wave Rectifier with RLE load	T2,R1	1	PPT
			<b>Total</b>		17	
IV	CO4: Explain the operation of DC-DC converters	<b>4. DC-DC CONVERTERS</b>				
		4.1	Operation of Basic Chopper & Classification	T2,R1	1	Chalk & Talk
		4.2	Analysis of Buck converter in Continuous Conduction Mode and Discontinuous Conduction Modes along with equations	T2,R1	2	PPT
		4.3	Analysis of Boost converter in Continuous Conduction Mode and Discontinuous Conduction Modes along with equations	T2,R1	2	PPT



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		4.4	Analysis of Buck-Boostconverters in Continuous Conduction Mode and Discontinuous Conduction Modes along with equations	T2,R1	2	Chalk & Talk
		4.5	Problem solving	T1,R2	2	Chalk & Talk
Content beyond syllabus (if need)						
<b>Total</b>					<b>9</b>	
<b>V</b>	<b>CO5:</b> Explain the working of inverters and Different modulation techniques of PWM inverters	<b>5. DC-AC CONVERTERS</b>				
		5.1	Introduction & Classification of inverters	T2,R1	3	Chalk & Talk
		5.2	SinglePhasehalfbridgewithRload	T2,R1	2	PPT
		5.3	SinglePhasehalfbridge with RLloads	T2,R1	2	Chalk & Talk
		5.4	SinglePhasefullbridgeinverterswithRload	T2,R1	1	Chalk & Talk
		5.5	SinglePhaseandfullbridgeinverterswithRLloads	T2,R1	1	Stud. Seminars
		5.6	ThreePhasesquarewaveinverters120° conduction modes of operation	T2,R1	1	Chalk & Talk
		5.7	ThreePhasesquarewaveinverters180° conduction modes of operation	T2,R1	1	PPT
		5.8	PWM inverters	T2,R1	1	PPT
		5.9	Sinusoidal Pulse Width Modulation	T2,R1	1	PPT
		5.10	CurrentSourceInverter	T2,R1	1	PPT
		5.11	Problem solving	T2,R1	1	Chalk & Talk
Content beyond syllabus (if need)						
<b>Total</b>					<b>15</b>	
<b>Cumulative Proposed Periods</b>					<b>69</b>	
<b>Text Books:</b>						
S. No.	Author, Book Title, Edition, Publisher, Year of Publication					
1	Muhammad H.Rashid ,Power Electronics Devices ,Circuits and Applications ,Fourth Edition, Pearson,2017					
2	L. Umanand , Power Electronics: Essentials &Applications, standard edition, Wiley Pvt.Limited, India,2009					
<b>Reference Books:</b>						
S. No	Authors, Book Title, Edition, Publisher, Year of Publication					





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1	Mandal, Power Electronics-standard edition, McGraw Hill Education, 2017
2	P.S. Bhimbra, Power Electronics, standard edition, Khanna Publishers, 2018
3	Muhammad H. Rashid, Power Electronics, fourth edition, Pearson, 2017
4	Nedmohan, Tore M. Undeland, Robbins, Power Electronics: converters, applications & design, third edition, Wiley, 2007 India Pvt. Ltd.
5	L. Umanand, Power Electronics: Essentials & Applications, standard edition, Wiley Pvt. Limited, 2009.

#### Web Details:

1	<a href="https://www.youtube.com/watch?v=djbJm-xWo2w&amp;t=183s">https://www.youtube.com/watch?v=djbJm-xWo2w&amp;t=183s</a>
2	<a href="https://www.youtube.com/watch?v=kI-TmerCvDE&amp;t=35s">https://www.youtube.com/watch?v=kI-TmerCvDE&amp;t=35s</a>
3	<a href="https://www.youtube.com/watch?list=PLp6ek2hDcoND7i5-DAD9mPmYF1Wg6ROdO&amp;v=pwjrtIjkGak">https://www.youtube.com/watch?list=PLp6ek2hDcoND7i5-DAD9mPmYF1Wg6ROdO&amp;v=pwjrtIjkGak</a>
4	<a href="https://www.youtube.com/watch?v=WuOq_k3jj2A">https://www.youtube.com/watch?v=WuOq_k3jj2A</a>
5	<a href="https://www.youtube.com/watch?v=aPY3NYaNSpc&amp;list=PLTv19Zbw92D-OLuFP_u6xDeJobKxPe176">https://www.youtube.com/watch?v=aPY3NYaNSpc&amp;list=PLTv19Zbw92D-OLuFP_u6xDeJobKxPe176</a>
6	<a href="https://www.youtube.com/watch?v=9Xmo_cKHtmw&amp;list=PLs5_Rtf2P2r7CiI8XOcYx9pOeuU7XsnJO">https://www.youtube.com/watch?v=9Xmo_cKHtmw&amp;list=PLs5_Rtf2P2r7CiI8XOcYx9pOeuU7XsnJO</a>

		Name	Signature with Date
i.	Course Coordinator	Mrs. N. Lavanya	
ii.	Module Coordinator	Mr. B. Subrahmanyam	
iii.	Programme Coordinator	Dr. M. Sridhar	

Principal