

22EEHO203		SMPS AND UPS			SEMESTER				
PREREQUISITES		CATEGORY			PEC		Credit		3
Power Electronics		Hours/Week			L	T	P	TH	
					3	0	0	3	
<b>Course Objectives:</b>									
1.	To impart knowledge about modern power electronic converters and their applications in power utility.								
2.	To impart knowledge about Resonant converters and UPS.								
<b>UNIT I</b>	<b>DC-DC CONVERTERS</b>				<b>9</b>	<b>0</b>	<b>0</b>	<b>9</b>	
Introduction to SMPS – Non-isolated DC-DC converters: Cuk, SEPIC topologies, Z-source converter – Zeta converter - Analysis and state space modeling -- Concept of volt-second and charge balance – High gain input-parallel output-series DC-DC converter.									
<b>UNIT II</b>	<b>SWITCHED MODE POWER CONVERTERS</b>				<b>9</b>	<b>0</b>	<b>0</b>	<b>9</b>	
Isolated DC-DC converters: Analysis and state space modelling of fly back, Forward, Push pull, Luo, Half bridge and full bridge converters- control circuits and PWM techniques – Bidirectional DC-DC converters.									
<b>UNIT III</b>	<b>RESONANT CONVERTERS</b>				<b>9</b>	<b>0</b>	<b>0</b>	<b>9</b>	
Introduction- classification- basic concepts- Resonant switch- Load Resonant converters- ZVS , Clamped voltage topologies- DC link inverters with Zero Voltage Switching- Series and parallel Resonant inverters- Voltage control.									
<b>UNIT IV</b>	<b>DC-AC CONVERTERS</b>				<b>9</b>	<b>0</b>	<b>0</b>	<b>9</b>	
Introduction – Multilevel concept – Types of multilevel inverters – Diode-clamped MLI – Flying capacitors MLI – Cascaded MLI – Cascaded MLI – Applications – Switching device currents – DC link capacitor voltage balancing – Features of MLI – Comparisons of MLI.									
<b>UNIT V</b>	<b>POWER CONDITIONERS, UPS, AND FILTERS</b>				<b>9</b>	<b>0</b>	<b>0</b>	<b>9</b>	
Introduction- Power line disturbances- Power conditioners –UPS: offline UPS, Online UPS, Applications – Filters: Voltage filters, Series-parallel resonant filters, filter without series capacitors, filter for PWM VSI, current filter, DC filters – Design of inductor and transformer for power electronic applications – Selection of capacitors.									
<b>Total (45L+0T)= 45 Periods</b>									

<b>Text Books:</b>	
1.	Simon Ang, Alejandro Oliva, "Power-Switching Converters", Third Edition, CRC Press, 2010.
2.	M.H. Rashid – Power Electronics handbook, Elsevier Publication, 2001.
<b>Reference Books:</b>	
1.	Ned Mohan, Tore.M.Undeland, William.P.Robbins, "Power Electronics Converters, Applications and Design", 3 <sup>rd</sup> Edition, John Wiley and Sons, 2006.
2.	M.H. Rashid, "Power Electronics circuits, devices and applications", 3 <sup>rd</sup> Edition, PHI, New Delhi, 2007.
<b>E-References:</b>	
1.	NPTEL Course: Power Electronics, IIT-B.
2.	www.cdeep.iitb.ac.in. (Electrical Engineering)

<b>Course Outcomes:</b>			<b>Bloom's Taxonomy Mapped</b>
Upon completion of this course, the students will be able to:			
CO1	:	Analyze the state space model for DC – DC converters.	L4: Analyzing
CO2	:	Acquire knowledge on switched mode power converters.	L2: Understanding
CO3	:	Outline the PWM techniques for DC-AC converters.	L1: Remembering
CO4	:	Discuss about modern power electronic converters and its applications in electric power utility.	L2: Understanding
CO5	:	Identify the filters and UPS.	L2: Understanding

**COURSE ARTICULATION MATRIX**

<b>COs/ POs</b>	<b>PO 1</b>	<b>PO 2</b>	<b>PO 3</b>	<b>PO 4</b>	<b>PO 5</b>	<b>PO 6</b>	<b>PO 7</b>	<b>PO 8</b>	<b>PO 9</b>	<b>PO 10</b>	<b>PO 11</b>	<b>PO 12</b>	<b>PS O1</b>	<b>PS O2</b>	<b>PS O3</b>
CO1	2	1	2	2			3	2		2		2	2	2	1
CO2	1	1	3	2			3	2		2		2	3	3	2
CO3	2	2	2	3			3	3		2		1	2	2	1
CO4	2	1	1	2			3	2		2		2	2	3	2
CO5	1	1	2	1			3	3		3		1	2	2	1
<b>Avg</b>	1.6	1.2	2	2	0	0	3	2.4	0	2.2	0	1.6	2.2	2.4	1.4

3/2/1-indicates strength of correlation (3- High, 2-Medium, 1- Low)