



**National Institute of Technology Meghalaya**  
An Institute of National Importance

**CURRICULUM**

Programme	<b>Bachelor of Technology in Electronics and Communication Engineering</b>	Year of Regulation	<b>2018-19</b>
Department	Electronics and Communication Engineering	Semester	<b>IV</b>

Course Code	Course Name	Credit Structure				Marks Distribution			
		L	T	P	C	INT	MID	END	Total
<b>EC 210</b>	<b>POWER ELECTRONICS</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>50</b>	<b>50</b>	<b>100</b>	<b>200</b>

Course Objectives	Course Outcomes	Course Outcomes	
		CO1	CO2
To describe power electronics concepts and mechanisms related to the design of modern convertors.	Course Outcomes	CO1	Ability to identify the properties of power semiconductors device
To apply this understanding to new power electronics circuits design problems.		CO2	Ability to understand the basic concepts of power electronics such as DC/AC-DC/AC converter (rectifier, choppers, inverter & cyclo-converter)
To evaluate various design alternatives and make a compelling quantitative and/or qualitative argument for which applications these convertors are utilized.		CO3	Ability to define and calculate efficiency of the various convertors

No.	COs	Mapping with Program Outcomes (POs)												Mapping with PSOs			
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
1	CO1	2	3	2	-	-	-	-	-	-	-	-	-	3	1	-	-
2	CO2	3	3	2	-	-	-	-	-	-	-	-	-	3	1	-	-
3	CO3	3	2	3	-	-	-	-	-	-	-	-	-	3	1	-	-

**SYLLABUS**

No.	Content	Hours	COs
I	<b>Introduction to Power Device:</b> Power Electronics Scope and Applications, Interdisciplinary Nature of Power Electronics, Types of power electronics circuits, Introduction to power electronic devices like Thyristor (SCR), Power BJT, Power MOSFET, GTO, IGBT, Thyristor. Characteristics, GaN HEMT, LDMOS, Super-Junction (Cool MOS), Methods of triggering and commutation.	<b>10</b>	<b>CO1</b>
II	<b>Phase Controlled Rectifiers / AC-DC Converter:</b> Principle of phase control, half wave and full wave rectifiers with R, R-L, R-L-E load, triggering scheme, Effect of source impedance on the performance or the convertors.	<b>05</b>	<b>CO2, CO3</b>
III	<b>Choppers / DC-DC Converter:</b> Basic principle of chopper operation, Different methods of classification, Control strategies Duty Ratio Control and Frequency Control, Types of idealized chopper circuit, Thyristor Chopper Circuits.	<b>07</b>	<b>CO2, CO3</b>
IV	<b>Inverters / DC-AC Converter:</b> Voltage Source Inverter (VSI)- Single phase voltage source inverters, Half bridge inverters, full bridge inverters, Voltage control in single phase inverters, Pulse Width Modulated (PWM) inverters- single pulse, multiple pulse, and sinusoidal pulse modulation. Current Source Inverter (CSI), Series and parallel inverter.	<b>07</b>	<b>CO2, CO3</b>
V	<b>Cyclo-converter / AC-AC Converter:</b> Principle of AC Voltage Controllers Integral Cycle Control and Phase Control, Types of AC voltage controllers, Principle of operation of cyclo-converters, circulating and non-circulating mode of operation.	<b>07</b>	<b>CO2, CO3</b>
Total Hours		<b>36</b>	

**Essential Readings**

1. M. H Rashid, "Power Electronics Circuits, Devices, and Applications", Prentice-Hall of India Pvt. Ltd., 2004.
2. L. Umanand, "Power Electronics Essential and Applications", Wiley India, 2009.
3. P. S. Bimbhra, "Power Electronics", Khanna Publishers, 2003.

**Supplementary Readings**

1. M. D. Singh and K. B. Khanchandani, "Power Electronics", Tata McGraw-Hill Publishing Co. Ltd., 2008.
2. M. Ned and T. M. Undeland, "Power Electronics Converters Applications and Design", John Willey Inc., 2007.
3. V. R. Moorthi, "Power Electronics Devices, Circuits and Applications", Oxford University Press, 2005.