



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

**CURRICULUM**

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

Course Code	Course Name	Credit Structure				Marks Distribution			
		L	T	P	C	INT	MID	END	Total

<b>EE 411</b>	<b>Electrical Drives &amp; Control</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>50</b>	<b>50</b>	<b>100</b>	<b>200</b>	
Course Objectives	This course describes the operation, application and control of variable speed drives.	Course Outcomes: Students will be able to	CO1	Able to remember various applications in industrial and domestic areas where use of electric drives are essential.						
	This course familiarizes the operation principles and design of drives for different transient conditions.		CO2	Able to understand types of drive systems based on nature of loads, control objectives, performance and stability.						
	This course introduces strong foundation to asses performance of different industrial drives.		CO3	Able to apply concepts of previously learnt courses such as, electrical machines, Control and power electronics to cater to the need of DC drives for automations in industries.						
	This course illustrates practical viabilities of different electrical drives towards energy efficiency.		CO4	Able to analyse most suitable type and specification of AC motor drive combination for efficient conversion and control of electric power.						
			CO5	Able to understand the critical areas in application levels, and derive typical solutions using special drives						

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
1	CO1	3	3	0	1	0	0	0	0	2	0	0	0	3	0	3
2	CO2	3	3	0	1	0	0	0	0	2	0	0	0	2	0	2
3	CO3	2	3	3	1	2	0	0	0	0	0	0	0	2	3	2
4	CO4	2	2	3	0	2	2	3	0	2	0	0	1	2	3	2
5	CO5	2	2	3	0	2	2	3	0	2	0	0	1	3	3	3

**SYLLABUS**

No.	Content	Hours	COs
I	<b>Fundamentals of Electric Drives</b> Electrical drives and introduction: Electric drives, advantages of electrical drives, parts of electrical drives, choice of electrical drives, status of ac and dc drives, Speed Sensing and current Sensing.	<b>04</b>	<b>CO1</b>
II	<b>Dynamics of Electrical Drives</b> Fundamental torque equation, speed-torque convention and multi quadrant operation, , dynamics of motor load combination, Types of load, load with translational motion, load with rotational motion, load torque that vary with time nature and classification of load torque, measurement of moment of inertia, calculation of acceleration time in transient operation, acceleration time for specific nature of motor and load torque, load equalization, stability of electrical drives. Selection of Motor Power Rating.	<b>07</b>	<b>CO2</b>
III	<b>Power Electronics control of DC drives</b> Review of DC Motors and its performance, starting, braking, controlled rectifier fed DC drives with continuous and discontinuous mode of operation, Supply Harmonics, Power Factor and ripple in motor current, Chopper Controlled DC Drives, Sources current harmonics in chopper, Converter Ratings and closed loop control.	<b>08</b>	<b>CO3</b>
IV	<b>Power Electronics control of AC drives</b> Review of Three phase Induction Motor and its performance, starting, braking, Static Voltage control, Variable Frequency Control (VSI, CSI, Cyclo-converter based), static rotor resistance control and slip power recovery control schemes. Review of Three phase Synchronous Motor and its performance, Self-controlled schemes, Variable frequency control of multiple synchronous motor Drives,	<b>10</b>	<b>CO4</b>
V	<b>Special Drives</b> Fundamentals of operations for Permanent magnet AC motor drives, Brushless DC Motor Drives.	<b>07</b>	<b>CO5</b>
<b>Total Hours</b>		<b>36</b>	

<b>Essential Readings</b>
1. Dubey G.K, "Fundamentals of Electrical Drives", Narosa Publishing House,2017
2. Pillai S.K., "A First Course on Electrical Drives", New Age International,2018

<b>References:</b>
1. De N.K., Sen P.K. "Electric Drives", Prentice Hall of India ,2018
2. Krishnan. R, "Electric Motor Drives: Modeling, Analysis and Control", Prentice Hall of India ,2016
3. Ned Mohan et al, "Power Electronics: Converters, Applications, and Design", John Wiley & Sons. Inc. ,2019
4. Werner Leonhard, "Control of electrical drives", Springer,2015