National Institute of Technology Meghalaya

An Institute of National Importance

CURRICULUM

Programme	**Bachelor of Technology in Electrical and Electronics Engineering**	Year of Regulation	**2018-19**
Department	**Electrical Engineering**	Semester	**VII**

Course Code	Course Name	Credit Structure				Marks Distribution			
		L	T	P	C	INT	MID	END	Total
EE 419	**Special Electrical Machines**	**3**	**0**	**0**	**3**	**50**	**50**	**100**	**200**

Course Objectives

- This course provides thorough knowledge in the emerging field of special electrical machines.
- This course explains principle of operation, design aspects and control of different types of special electrical machines.
- This course generates awareness about industrial applications and possibility of performing projects on special electrical applications.

Course Outcomes: Students will be able to

CO1	Able to know about construction features and method of operation of stepper motor and design procedure of drive amplifier and transistor logic for stepper motor.
CO2	Able to understand the fundamentals, construction details and classification of switched reluctance motors
CO3	Able to analyse and apply the fundamentals of control for the transient analysis of brushless dc motor
CO4	Able to know about the basic principles and classification of servo motors
CO5	Able to understand fundamentals, construction details and classification of linear induction machines.

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**	**2**	**0**	**1**	**0**	**0**	**0**	**0**	**2**	**0**	**0**	**0**	**3**	**1**	**3**
2	CO2	**3**	**3**	**0**	**1**	**0**	**0**	**0**	**0**	**3**	**0**	**0**	**0**	**2**	**0**	**2**
3	CO3	**2**	**3**	**3**	**1**	**2**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**2**	**3**	**2**
4	CO4	**2**	**1**	**3**	**2**	**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	**Stepper Motor** Introduction, Types, Hybrid stepper motor- construction, principle of operation, two phases energized at a time, conditions for operation, different configurations, VR Stepper motor- single stack and multi stack, Drive systems and circuit for open loop and Closed loop control of stepping motor, Dynamic characteristics, Single phase stepper Motor, Expression of voltage, current and torque for stepper motor and criteria for synchronization.	**10**	**CO1**
II	**Switched Reluctance Motor** Constructional features, principle of operation, Design Aspects and profile of the SRM, Torque equation, Power converters and rotor sensing mechanism, expression of torque and torque-speed characteristics.	**7**	**CO2**
III	**Brushless DC Motor** Construction, operation, sensing and switching logic scheme, Drive and power circuit, Theoretical analysis and performance prediction, transient Analysis.	**7**	**CO3**
IV	**Servo motors** Types of servomotors, construction, operating principle and application.	**6**	**CO4**
V	**Linear Induction Motor** Construction and principle of operation of Linear Induction Motor, Approximate calculation of the force on rotor.	**6**	**CO5**
	Total Hours	**36**	

Essential Readings

1. K. Venkataratnam, “Special Electrical Machines”, University Press, 2017
2. A. E. Fitzgerald, Charles Kingsley, Stephen D. Umans,” Electrical Machinery”, McGraw Hill.,2018

References:

1. T. J. E Miller, “Brushless Permanent Magnet and Reluctance Motor Drives”, Clarendon Press, Oxford. , 2016
2. T. Kenjo and S. Nagamori, “Permanent Magnet and Brushless DC Motors”, Clarendon Press, Oxford, 2016
3. T. Kenjo, “Stepping Motors and their Microprocessor Control”, Clarendon Press, Oxford, 2015
4. R. Krishnan, “Switched Reluctance Motor Drives, Modelling, Simulation, Analysis, Design and applications”, CRC press, 2016