Course Number And Name

BEE015 & Electrical Special Machines

Credits And Contact Hours

3 & 45

Course Coordinator's Name

Mrs.V.Sumathi

Text Books And References

Text Books:

1. T.J.E. Miller, 'Brushless Permanent Magnet And Reluctance Motor Drives', Clarendon Press, Oxford, 1989.
2. T. Kenjo, 'Stepping Motors And Their Microprocessor Controls', Clarendon Press London, 1984.
3. Venkataraman,"Special Electrical Machines".

References:

1. R. Krishnan, 'Switched Reluctance Motor Drives – Modeling, Simulation, Analysis, Design And Application', CRC Press, New York, 2001.
2. P.P. Aearnley, 'Stepping Motors – A Guide To Motor

Course Description

The Student Gains Detailed Skills Related To The Subject Of Special Type Of Electrical Machines.

Prerequisites	Co-Requisites
Electrical Machines I&II	Nil

Required, Elective, Or Selected Elective (As Per Table 5-1)

Required

Course Outcomes (Cos)

CO1: Construction, Principle Of Operation And Performance Of Synchronous Reluctance Motors.

CO2: Construction, Principle Of Operation, Control And Performance Of Stepping Motors.

CO3: Construction, Principle Of Operation, Control And Performance Of Switched Reluctance Motors.

CO4: Construction, Principle Of Operation, Control And Performance Of Permanent Magnet Brushless D.C. Motors.

CO5: Construction, Principle Of Operation And Performance Of Permanent Magnet Synchronous Motors.

Student Outcomes (Sos) From Criterion 3 Covered By This Course

COS/POS	a	b	c	d	e	f	g	h	i	j	k	l
CO1	M				M		M			M	L	M
CO2			L									L

CO3	M			L	M		M					
CO4	H	M								M		
CO5			M		M					L	M	M

List Of Topics Covered

UNIT I SYNCHRONOUS RELUCTANCE MOTORS 9

Constructional Features – Types – Axial And Radial Flux Motors – Operating Principles – Variable Reluctance And Hybrid Motors – Voltage And Torque Equations - Phasor Diagram - Characteristics.

UNIT II STEPPING MOTORS 9

Constructional Features – Principle Of Operation – Variable Reluctance Motor – Hybrid Motor – Single And Multi Stack Configurations – Torque Equations – Modes Of Excitations – Characteristics – Drive Circuits – Microprocessor Control Of Stepping Motors – Closed Loop Control.

UNIT III SWITCHED RELUCTANCE MOTORS 9

Constructional Features – Rotary And Linear Srms - Principle Of Operation – Torque Production – Steady State Performance Prediction- Analytical Method -Power Converters And Their Controllers – Methods Of Rotor Position Sensing – Senseless Operation –Closed Loop Control Of SRM - Characteristics.

UNIT IV PERMANENT MAGNET BRUSHLESS D.C. MOTORS 9

Constructional Features Of PMBLDC Motor - Permanent Magnet Materials – Magnetic Characteristics –Principle Of Operation – Types – Magnetic Circuit Analysis – EMF And Torque Equations –Commutation - Power Converters – Motor Characteristics And Control.

UNIT V PERMANENT MAGNET SYNCHRONOUS MOTORS 9

Principle Of Operation – Ideal PMSM – EMF And Torque Equations – Armature Reaction MMF – Synchronous Reactance – Sine Wave Motor With Practical Windings – Phasor Diagram – Torque/Speed Characteristics - Power Controllers - Converter Volt-Ampere Requirements.