

PEL6D001 SPECIAL ELECTROMECHANICAL DEVICES (HONOR)|(4-0-0)

MODULE- I

University Portion (80%):[12 HOURS]

STEPPER MOTOR(6 hours)

Variable Reluctance (VR) Stepper Motor, Permanent Magnet Stepper Motor, Hybrid Stepper Motor (HSM), Windings in Stepper Motor, Torque Equation, Characteristics of Stepper Motor, Open Loop Control of Stepper Motor, Closed Loop Control of Stepper Motor, Comparison of Stepper Motor, Application of Stepper Motor

Ch.1.1 to 1.9, Ch. 1.11, Ch. 1.12

SWITCHED RELUCTANCE MOTOR (SRM) (5 hours)

Construction, Principle of Working, Basics of SRM Analysis, Constraints on Pole Arc and Tooth Arc, Torque equation and Characteristics, Power Converter Circuits, Control of SRM, Rotor Position Sensor, Current Regulators

Ch.2.1 to 2.9

College/Institute Portion (20%): (1 hour)

Microprocessor-Based Control of Stepper Motor and SRM [Ch. 1.10, Ch.2.10] Or related advanced topics as decided by the concerned faculty teaching the subject.

MODULE- II

University Portion (80%):

[10 HOURS]

PERMANENT MAGNET DC (PMDC) MOTOR AND BRUSHLESS PERMANENT DC (BLDC) MOTOR (9hours)

Permanent Magnet DC (PMDC) Motors: Construction, Principle of Working, Torque Equation and Equivalent Circuit, Performance Characteristics, Moving Coil (MC) Motors, Printed Circuit (PC) Motors, Shell Type PMDC Motors, Disc Motors

Ch. 3.1 (3.1.1 to 3.1.8)

Brushless Permanent Dc (BLDC) Motors: Classification of BLDC Motors, Construction, Electronic Commutation, Principle of Operation, Type of BLDC Motor, Control of BLDC Motor, Microprocessor Based Control of BLDC Motor, DSP Based Control of BLDC Motor, Sensor less Control of BLDC Motor, Comparison of Conventional DC Motor and BLDC Motor, Application of BLDC Motor

Ch. 3.2 (3.2.1 to 3.2.4, 3.2.6 to 3.2.12)

College/Institute Portion (20%) (1 hours)

BLDC Square Wave Motors, [Ch.3.2.5] Or related advanced topics as decided by the concerned faculty teaching the subject.

MODULE- III

University Portion (80%):

[8 HOURS]

PERMANENT MAGNET SYNCHRONOUS MOTOR (PMSM) (4 hours)

Construction, Principle of Operation, EMF Equation of PMSM, Torque Equation, Phasor Diagram, Circle Diagram of PMSM, Comparison of Conventional and PM Synchronous Motor, Application of PMSM

Ch. 4.1 to 4.7, 4.9

SYNCHRONOUS RELUCTANCE MOTOR (SRM) (2hours)

SYNCHRONOUS RELUCTANCE MOTOR (SYRM) (5 HOURS)

Construction of SyRM, Working of SyRM, Phasor Diagram and Torque Equation of SyRM
Control of SyRM, Advantages of SyRM, Applications of SyRM Ch. 5.1 to 5.6

College/Institute Portion (20%): (1 hour)

Control of PMSM: Vector Control of PMSM, Self Control of PMSM, Sensor Control of PMSM, [Ch. 4.8(4.8.1 to 4.8.3)] Or related advanced topics as decided by the concerned faculty teaching the subject.

MODULE- IV

University Portion (80%):

[10 HOURS]

LINEAR ELECTRIC MACHINES (9 hours)

Linear Induction Motor (LIM): Construction of LIM, Thrust equation of LIM, Performance Equation Based on Current Sheet Concept, Goodness Factor, Equivalent Circuit of LIM, Characteristic of LIM, Certain Design Aspects of LIM, Control of LIM.

Linear Synchronous Motor (LSM): Type and Construction of LSM, Thrust equation of LSM, Control of LSM, Application of LSM.

DC Linear Motor (DCLM): Type and Construction of DCLM, Persistent Current Tubular Electromagnetic Launcher, Induction Tubular EML, DC Pulsed Flat Series EML, DC Tubular Series EML.

Ch. 8.1(8.1.1 to 8.1.8), Ch. 8.2(8.2.1 to 8.1.4), Ch. 8.3(8.3.1 to 8.3.6)

College/Institute Portion (20%): (1 hour)

Linear Reluctance Motor (LRM): Construction, Working and Features of LRM
Operation of LRM with AC and DC Supply [Ch. 8.4:8.4.1 to 8.4.3] Or related advanced topics as decided by the concerned faculty teaching the subject.

Text Book:

1. *Special Electric Machines – E.G.JANARDANAN – PHI Learning Pvt. Ltd,*

Reference Book(s):

2. *Special Electric Machines –K. VENKATARATNAM- Universities Press Pvt. Ltd.*
3. *Electromechanical System and Devices- Sergey E. Lyshevski-CRC Press*
4. *Linear Motion Electromagnetic Devices- I.Boldea, S.A. Nasar-Taylor and Francis*