

EE8T4D	4/4 B.Tech. EIGHTH SEMESTER	
Lecture: 3 periods/week	SPECIAL ELECTRICAL MACHINES	Credits: 3
Tutorial: 1 period /week	Internal assessment: 30 marks	Semester end examination: 70 marks

Course Objective:

The objective of this course is to provide thorough knowledge in the emerging field of special electrical machines. In this course the principle of operation, design aspects and control of different types of special electrical machines will be studied.

Course Outcomes:

Upon completing of the course student shall be

1. Able to understand the principle of operation and power converter for switched reluctance motor and stepper motor
2. Able to understand construction, principle of operation, theory of torque production in brushless DC motor
3. Able to understand construction, principle of operation of linear induction drive for electric traction and permanent magnet motors
4. Able to explain the control aspect of special electrical machines.
5. Able to understand the features of electric motors for traction applications.

UNIT I**Switched Reluctance Motor**

Principle of operation, design of stator and rotor pole arc, power converter for switched reluctance motor.

Stepper Motors

Construction, principle of operation, theory of torque production, hybrid stepping motor, variable reluctance stepping motor.

UNIT II**Brushless DC Motor**

Construction, principle of operation, theory of brushless DC motor as variable speed synchronous motor.

UNIT III**Linear Induction Motor**

Construction, principle of operation, application of linear induction drive for electric traction.

Permanent Magnet Motors

Hysteresis loop, permanent magnet DC Motors, equivalent circuit, electrically commutated DC Motor.

UNIT IV**Control of special machines-I**

Stepper motors (open loop control, closed loop control). Characteristics of stepper motor in open-loop drive. Comparison of open loop and closed loop systems.

Control of special machines-II

Control of switched reluctance motor for fraction type load. Control of brushless dc motor, rotor position sensing and switching logic for brushless dc motor.

UNIT V**Electric Motors for traction drives**

AC motors, DC motors, single sided linear induction motor for traction drives, comparison of AC and DC traction.

Learning Resources**Text Books:**

1. Special electrical Machines by K. Venkata Ratnam, University press, 2009, New Delhi.
2. Brushless Permanent magnet & reluctance motor drives by T. J. E. Miller, Clarendon press, 1989, Oxford.

Reference Book:

A Course in Electrical Technology by J.B.Gupta, S.K.Kataria & Sons, 12th Edition.