

EE6T2	3/4 B.Tech. SIXTH SEMESTER	
Lecture: 3 periods/week	ELECTRICAL MACHINE DESIGN	Credits: 3
Tutorial: 1 period /week		Internal assessment: 30 marks
		Semester end examination: 70 marks

Course Objective:

To develop knowledge on principles of designing static and rotating machines. Students will be able to understand the fundamental concepts of design and study the design of various types of electrical machines.

Course Outcomes:

Upon completing the course, students is able to

1. Understand the design of various parts of DC machines and solve the problems of design
2. Understand the design concepts of transformers and know about how to design the parts.
3. Understand the design concepts of synchronous machines and solve the problems related to design.
4. Understands the importance of design of machines based on their applications.

UNIT I**DESIGN OF DC MACHINES**

Basic concept of design, limitation in design, standardization, modern trends in design and manufacturing techniques, calculation of total mmf and magnetizing current. Specific permeance and leakage reactance - output equation, choice of specific loading and choice of number of poles, design of main dimensions of DC machines, design of armature slot dimensions, commutator and brushes, magnetic circuit, estimation of ampere turns, design of yoke and poles, main and inter poles, field windings, shunt, series and interpoles.

UNIT II**DESIGN OF SINGLE PHASE TRANSFORMERS**

Output equation for single phase, choice of specific loadings, expression for volts/turn, determination of main dimensions of the core, types of windings and estimation of number of turns and conductor cross sectional area of primary and secondary windings, estimation of no load current, expression for leakage reactance and voltage regulation.

UNIT III**DESIGN OF THREE PHASE TRANSFORMERS**

Output equation for three phasetransformers, choice of specific loadings, expression for volts/turn, determination of main dimensions of the core, types of windings and estimation of number turns and conductor cross sectional area of primary and secondary windings, estimation of no load current, expression for leakage reactance and voltage regulation. Design of tank and cooling tubes (round and rectangular).

UNIT IV**DESIGN OF INDUCTION MOTORS**

Output equation, choice of specific loadings, main dimensions of three phase induction motor, stator winding design, choice of length of the air gap, estimation of number of slots for the squirrel cage rotor, design of rotor bars and end ring, design of slip ring induction motor, estimation of no load current and leakage reactance, circle diagram.

UNIT V**DESIGN OF SYNCHRONOUS MACHINES**

Output equation, choice of specific loadings, short circuit ratio, design of main dimensions, armature slots and windings, slot details for the stator of salient and non-salient pole synchronous machines. Design of rotor of salient pole synchronous machines, magnetic circuits, dimensions of the pole body, design of the field winding, and design of rotor of non-salient pole machine, introduction to computer aided design.

Learning Resources**Text Books:**

1. A course in Electrical Machine Design by A.K. Sawhney, Dhanpatt Rai & Sons.
2. Design of Electrical Machines by V.N. Mittle, Standard publishers distributors, 2005.

Reference Books:

1. Performance and Design of AC machines by M.G. Say, CBS publishers and Distributors Pvt. Ltd.
2. Performance and Design of DC machines by Clayton and Hancock, BPB publishers.