

COURSE CODE: 1151EE112	COURSE TITLE: ELECTRICAL MACHINE DESIGN	L	T	P	C
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COURSE CATEGORY:

Program Core

PREAMBLE :

This course Electrical machine design, provides an introduction to the design of various DC and AC Machines and gives a general idea to the computer aided design of Electrical machines.

PREREQUISITE COURSES:

AC Machines

RELATED COURSES:

Special Electrical Machines

COURSE EDUCATIONAL OBJECTIVES :

The objectives of the course are to make the students,

- To expose the students to the concept of design of various types of electrical machines

COURSE OUTCOMES :

Upon the successful completion of the course, students will be able to:

CO Nos.	Course Outcomes	Level of learning domain (Based on revised Bloom's taxonomy)
CO1	Exhibit the study of mmf calculation and thermal rating of various types of electrical machines.	K1
CO2	Design armature and field systems for D.C machines.	K2
CO3	Creatively apply knowledge to design core, yoke, windings and cooling systems of transformers.	K2
CO4	Construct the design of stator and rotor of induction machines.	K3
CO5	Design stator and rotor of synchronous machines and study their thermal behavior.	K3

CORRELATION OF COs AND POs

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	L	H					M	H			
CO2	H	L	H					M	H			
CO3		M						M	M			
CO4	M		L					L	M			
CO5	H	L	M					L	L			

COURSE CONTENT:		
UNIT I	INTRODUCTION	9
Standard specification for frame size, conductors and insulation of electrical apparatus, concept of magnetic circuit, M.M.F of electrical machines, Real and Apparent flux density, Gap contraction factor, Thermal rating of electrical apparatus – Performance prediction from thermal rating, heat flow, heating and cooling, temperature rise, turbo-alternator.		
UNIT II	A.C MACHINES	9
Constructional details of DC machine, Output equation, Choice of poles, Design of field system, Design of armature, Design of commutator and brush, Armature reactions.		
UNIT III	TRANSFORMERS	9
Constructional features - Output equation, output rating of single phase and three phase, optimum design, Design of core, design of winding, Calculation of circuit parameters - No load current – losses – efficiency, equivalent leakage reactance, per unit regulation, design of tank and cooling tubes. Temperature rise.		
UNIT IV	DESIGN OF SYNCHRONOUS MACHINES	9
Constructional details - Output equation - Choice of specific loadings - Design of squirrel cage rotor, design of slip ring rotor, design of end rings, Calculation of circuit parameters - No load current, circle diagram.		
UNIT V	INDUCTION MACHINES	9
Construction details, runaway speed, output equations, choice of loading, design of salient pole machine, short circuit ratio, armature design, armature parameters, estimation of air gap length, design of damper winding, determination of full load field MMF, design of field winding, and introduction to computer aided design.		
TOTAL: 45 PERIODS		
TEXT BOOKS:		
<ol style="list-style-type: none"> 1. Mittle V.M. and Mittl E.A, Design of Electrical Machines, standard publishers Distribution, Fourth edition, 1996 2. Sawhney, A.K. A course in Electrical Machine Design, DhanpatRai& sons, 1993 		
REFERENCE BOOKS:		
<ol style="list-style-type: none"> 1. Rai, H.M. Electrical Machine Design, Sathiya Prakashan Publications, Third edition, 1992. 2. Say M.G., The Performance & Design of Alternating current Machines Isaac Pitman & sons Ltd., London 1995. 3. Clayton, A.E., Performance & Design of Direct current Machines, English Language Book society & Sri Isaac Pitman & sons Ltd., London 1995 		