DIRECTORATE OF TECHNICAL EDUCATION

DIPLOMA IN ELECTRICAL AND ELECTRONICS ENGINEERING

III YEAR

M SCHEME

V SEMESTER

2015 – 2016 onwards

ELECTRICAL MACHINE DESIGN

CURRICULUM DEVELOPMENT CENTRE

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TAMIL NADU

M-SCHEME

Course Name : Diploma in Electrical and Electronics Engineering

Subject Code : 3**3073**

Semester : V Semester

Subject Title : **ELECTRICAL MACHINE DESIGN (ELECTIVE THEORY – 1)**

TEACHING AND SCHEME OF EXAMINATION

No. of weeks per Semester : 16

Subject	Instruction		Examination		
	Hours / Week	Hours / Semester	Assessment marks		
			Internal	Board Examination	Total
ELECTRICAL MACHINE DESIGN (ELECTIVE THEORY – 1)	5	80	25	75	100

TOPICS AND ALLOCATION OF TIME

UNIT	TOPIC	TIME (Hours)
I	Electrical Machine Design – Basic Consideration	12
II	Magnetic Circuit Calculations	12
III	Design of Transformer	14
IV	Design of dc machines	14
V	Design of ac machines	16
	Tests and Revisions for above Units	12
	Total	**80**

RATIONALE

Through out the country there are many electrical industries and manufacturing different kinds of electrical machines like transformers, DC generators, DC motors, AC motors, and alternators. Their rating starts from hundreds of WATTS / VA to few KW / KVA or even in MW / MVA. These Industries have R&D center, Diploma or Graduate engineers as R&D engineers for product development. Hence it is necessary to include electrical machine design as one of the subject at diploma level courses.

OBJECTIVES

To understand

- Static and Rotating Electrical Machine specifications, materials, losses and effects of temperature rise.
- Magnetic force, magnetic force gap, teeth and leakage flux in static and rotating electrical machines.
- Designing of single phase, three phase transformer, core and coil.
- Designing of dc machines.
- Designing of 3phase induction motor and 3phase synchronous machines.

33073 ELECTRICAL MACHINE DESIGN (ELECTIVE THEORY – 1)

DETAILED SYLLABUS

Contents : Theory

Unit	Name of the Topic	Hours	Marks
I	**Electrical Machine Design – Basic Consideration** Design definition – Design consideration – limitation – constructional elements of Transformers and rotating machines – constructional materials of electrical machines – conducting magnetic and insulating materials standard specification – general design process – main dimensions of rotating machines – electrical and magnetic losses – temperature – rise – class of duty – limits of temperature rise.	12	15
II	**Magnetic Circuit Calculations** Magnetic circuits of DC machines, round rotation AC machines, salient poles AC machines and Transformer - Specific magnetic and electrical loading – Factor influencing the specific and magnetic loading – Magnetic leakages – magnetering curves – calculation of magnetizing force for the air gap of rotating machines and for teeth – leakage flux – leakage reactance – armature slot leakage reactance	12	15
III	**Design of Transformer** Important considerations – core and shell types – distribution transformers and power transformers – core section – clearance – yoke section – main dimension – single phase core type transformers – three phase core type transformer – output coefficient - voltage per turn – specific magnetic and electric loading of transformer – Winding design – cross over, helix, disc helix.	14	15
IV	**Design of dc machines** Important design consideration – number of poles – advantages of large number of poles - air gap – armature slot – current density – field system – commutator – design of large dc motor. Specific magnetic and electric loading of dc machines.	14	15
V	**Design of ac machines** AC machine design consideration – power equation – separation of diameter and length – problems. Three phase induction motor – important design consideration – standard frames and stampings – gap length – flux density – current density – power factor – efficiency – slot combination – winding - design of 3 phase induction motors. Three phase	16	15

	synchronous machines – important design consideration – radial gap length – stator slot – stator coil – rotor construction – design of 3 phase synchronous machines.		

TEXT BOOK

Title	Author(s)	Publishers	Edition
Course in electrical machine design	A.K.Sawhney	Dhanrai publishing company	

REFERENCE BOOKS

Sl.No	Title	Author(s)	Publishers	Edition
1	principles of Electrical Machine Design	S.K.Sen	Oxford & IBH	
2	Principles of Electrical Machine Design	R.K.Agarwal	S.K.Kataria & Sons	
3	Design of Electrical Machine	Mittle V.N	Standard Book – House	
4	Electrical Machine Design	A.Nagoor Kani	RBA Publications	
5	Electrical Machine Design	C.Eswarlal	Sonaversity	
6	Performance and Design of AC Machine	M.G.Say	CBS Publisher & Distributor	