

GANPAT UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY	
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Programme		Bachelor of Technology				Branch/Spec.		Electrical Engineering	
Semester		V				Version		1.0.0.1	
Effective from Academic Year			2024-2025			Effective for the batch Admitted in			July 2022
Course code		2EE51PE1	Course Name			Elements of Electrical Design			
Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	0	4	Theory	40	60	100
Hours	3	0	2	0	5	Practical	30	20	50

Pre-requisites:

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Course Outcomes:

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

CO1	Understand the basic concepts of magnetic circuit.
CO2	Design the basics of electrical starter and field regulators.
CO3	Understand the design of different types of small transformers, electromagnets and choke coils.
CO4	Develop the winding diagrams for AC and DC machines.
CO5	Design the Electrical installation for residential & commercial buildings.

Theory syllabus

Unit	Content	Hrs
1	General Design Aspects: Concept of magnetic circuits, Use of B-H curves in magnetic circuits, Calculations of MMF, Real and apparent flux density, Effect of saturation, Flux density distribution, Calculation of magnetizing current, Field form, Flux plotting, Air gap flux distribution factor, Actual flux distribution factor, Magnetizing current calculation, Leakage reactance calculation for various types of slots, Iron loss calculation, Examples related to above topics.	10
2	Design of Electromagnets: Introduction, Types of Electromagnets, Design of magnet coils, Design of flat faced armature type circular electromagnet, Design of horse shoe type magnet, Design of plunger type magnet, Design of magnetic clutches.	07
3	Design of Starters, Field regulators & Control panels: A.C. and D.C. starters, Field regulator and general purpose control panels.	05
4	Design of small Transformers: Design of Small single-phase transformers, Design of welding transformers.	05
5	Design of Choke coils: Design of variable air gap single-phase choke coil, Design of variable air gap three-phase choke coil.	05
6	Design of Armature Windings: DC windings: Simplex & Duplex windings; Lap & Wave windings, Applications, Basic terms related to armature windings; Dummy coils, Equalizer connections, Split coils. AC windings : Definitions, Concentric winding, No. of phase & phase spread, Mush winding, Double layer winding, Integral slot lap & wave winding, fractional slot winding, Software based design approach of Armature winding.	07
7	Design consideration of Electrical Installation: Types of load, Electrical supply systems, Wiring systems, Load assessment, Permissible voltage drops & conductor size calculations, Wiring diagram, Schematic diagram, Electrical design for residential & commercial buildings.	06

Practical contents

Practicals, assignments and tutorials are based on above syllabus.

Text Books

1.	A. K. Sawhney, “Electrical Machine Design”, Dhanpatrai & sons. Pub.
2.	K. B. Raina & S. K. Bhattacharya, “Electrical Design, Estimating & Costing”, New Age International Publication

Reference Books

1.	N. Alagappan & S. Ekambaram, “Electrical estimating & costing “, Tata McGraw hill Ltd.
2.	Surjit Singh, “Electrical Estimating & Costing”, Dhanpat Rai & sons.
3.	S. K. Sen, “Electrical Machine Design”, Oxford Publications
4.	Miller, T.J.E., “Brushless permanent magnet and reluctance motor drives”, Oxford.
5.	Say M. G, “The performance and design of alternating current machines”, CBS Publishers.

ICT/MOOCs

1.	https://nptel.ac.in/content/storage2/nptel_data3/html/mhrd/ict/text/117108124/lec16.pdf
2.	https://nptel.ac.in/content/storage2/courses/108105053/pdf/L-35(TB)(ET)%20((EE)NPTEL).pdf
3.	https://nptel.ac.in/courses/108/108/108108076/

Mapping of CO and PO

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO ₁	PSO ₂	PSO ₃
CO1	3	2	2	1	1	1	0	0	1	0	1	1	1	1	1
CO2	3	3	3	2	1	1	0	0	1	0	1	1	0	2	0
CO3	3	3	3	2	2	1	0	0	2	0	1	1	3	1	1
CO4	3	3	3	1	1	0	0	0	2	0	1	1	0	2	0
CO5	3	3	3	2	2	2	0	0	3	0	1	2	0	3	1