

GUJARAT TECHNOLOGICAL UNIVERSITY

B. E. SEMESTER: V

DEGREE IN ELECTRICAL ENGINEERING

Subject Name: **ELEMENTS OF ELECTRICAL DESIGN**

Sr. No.	Course content
1.	Fundamental of Magnetic Circuit: Basic principles of magnetic circuits – use of B-H curves in magnetic circuits – Calculations of MMF for air gap and teeth – Real and apparent flux density – Effect of saturation – flux density distribution – calculation of magnetizing current – Field Form – Introduction – carter's fringe curves – flux plotting – air gap flux distribution factor (field form factor) – actual flux distribution factor, Magnetising current calculation, Leakage Reactance calculation for various types of slots, Iron loss calculation concepts.
2.	Design of Electromagnets: Introduction – Types of Electromagnets – Design of Magnet coils – Problems on above topics – Design of small Flat-faced armature type circular magnet – Design of large-faced armature type circular magnet – Design of Horse shoe type magnet – Design of plunger type magnet – Design of magnetic clutches
3.	Design of starters, field regulators & control panels: A.C. and D.C. starters, field regulator and general purpose control panels.
4.	Design of small Transformers and Choke coils: Design of Small single-phase transformers – Design of welding transformers – Design of variable air gap single-phase choke coil Design of variable air gap three-phase choke coil Design of ballast
5.	Estimating Costing for Residential, Commercial & Service Connections (1-ϕ & 3-ϕ): Tenaments , Row houses , Bungalows , Flats , Multi – Storied Buildings ,Internal Wiring Estimation (Length of wire) Commercial Complexes like Offices , Hospitals , Hotels , Theatres . Internal Wiring Estimation (Length of wire) , Lighting Series & Hoardings.
6.	Design consideration of Electrical Installation: Types of load, Electrical Supply Systems, Wiring systems, Load Assessment, Permissible voltage drops & Conductor size calculations, Control panel, Illumination Schemes.
7.	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 : Introduction, No. of phases, Phase spread, concentric winding, Hemitropic winding, Whole

coil winding, Mush winding, Double layer windings, Integral slot lap and wave winding. Fractional slot lap & wave windings. Performance analysis of various windings.

Term work and minimum 5 drawing sheets and sketches shall be based on the above syllabus:

Reference Books:

1. Electrical Estimating & Costing **by N. Alagappan & S. Ekambaram** (TTTTI, Madras) - (Tata mcgrawhill Ltd).
2. Electrical Estimating & Costing **by Surjit Singh** (Dhanpat Rai & sons).
3. Electrical Machine Design **by A. K. Shawney, Dhanpatrai & sons. Pub.**
4. Electrical Design, Estimating & Costing **By K.B.Raina & S.K.Bhattacharya** (TTTTI, Chandigarh) – (Wiley Eastern Ltd.).
5. Electrical Installation, Estimating & Costing **By J.B. Gupta** (S.K.Kataria & Sons).
6. Electrical Machine Design **by R. K. Agrawal.**
7. Electrical Machine Design **by V. N. Mittle, TMH publications.**
8. Electrical Machine Design **by S. K. Sen, Oxferd Publications.**
9. Electrical Machine Design **by Gray A. Macgraw Hill publications.**