

GUJARAT TECHNOLOGICAL UNIVERSITY

B. E. SEMESTER: VI

Electrical & Electronics Engineering

Subject Name: **Electrical Machine Design**

Subject Code: **160804**

Teaching Scheme				Evaluation Scheme		
Theory	Tutorial	Practical	Total	University Exam (Theory) (E)	Mid Sem Exam (Theory) (M)	Practical (I)
4	0	2	6	70	30	50

Sr. No	Course Content	Total Hrs.
1.	Introduction: Design of Machines, Factors, limitations, Modern trends.	5
2.	Electrical Machine Design Materials: Conducting, magnetic and insulating materials. Magnetic Circuits: Calculations of mmf for air gap and teeth, real and apparent flux densities, iron losses, field form, leakage flux, specific permanence.	8
3.	Heating and Cooling: Modes of heat dissipation, Temperature gradients, types of enclosures, types of ventilation, conventional and direct cooling, amount of coolants used, Ratings.	8
4.	Design of Transformers: Introduction, Comparison of power transformer & distribution transformer, Constructional details of core and shell type transformers, rating of single phase and three phase transformers, Types of transformer windings, square and stepped core, Optimum design of transformers, Design of core, Yoke and windings for core and shell type transformers, Equivalent circuit parameter from design data, Losses and efficiency calculations, Design of tank and cooling tubes	12
5.	Concepts and Constraints in Design of Rotating Machines: Specific loading, output equation and output co-efficient, effects of variation of linear dimension.	12

	Skeleton Design of Rotating Machines: Calculation of D and L for dc, induction and synchronous machines, length of air gap, design of field coils for dc and synchronous machines, selection of rotor slots of squirrel cage induction motors, design of bars and ends, design of rotor for wound rotor for induction motors, design of commutator and inter poles for dc machines.	
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Laboratory & Assignments:

Computer Aided Design of Electrical Machines:

Analysis and synthesis approaches, design algorithms, introduction to optimization techniques, implementing computer aided design of transformer, three-phase alternator, three-phase induction machines and DC machines.

Different design problems for each machine should be solved with the help of computer programme. The related flow charts for these problems. The flow chart for overall design of the machines.

Text Books:

1. Sawhney, A.K. "A Course in Electrical Machine Design", Dhanpat Rai and Sons, New Delhi
2. Upadhyay, K.G., "Design of Electrical Machine," New Age International Publishers, New Delhi

Reference Books:

1. Mittle, V.N., "Design of Electrical Machines," Standard Publishers Distributors, Delhi.
2. Sen, S.K., "Principles of Electrical Machine Design with Computer Programmes," Oxford and IBH Publishing Co. Pvt Ltd., New Delhi, 1987
3. Pyrhönen Juha, et al "Design of Rotating Electrical Machines," John Wiley & Sons, Ltd., ISBN: 978-0-470-69516-6
4. Vishnu Murthy, K.M., "Computer-Aided Design of Electrical Machines," BS Publications, Hyderabad