GUJARAT TECHNOLOGICAL UNIVERSITY
B.E. SEMESTER : VIII
ELECTRICAL ENGINEERING

Subject Name: **ELECTRICAL MACHINE DESIGN II**

Sr. No.	Course Contents	Total Hrs
1.	**Induction motor design:** Output equation, choice of specific scheme, separation of D & L, peripheral Stator winding design, Calculation of no. of turns per phase, conductor's area shape of the stator slots, factors to be considered while deciding no of stator slots, Area of stator slots, stator winding resistance, stator teeth design, depth of the stator core, examples related to above topics, Length of the air gap. Rotor design A. Squirrel cage rotor – selection of no. of rotor slots, harmonic induction torque. Harmonic synchronous torque, vibration and noise, voltage ripples, rules for selecting no. of rotor slots, Methods for reducing harmonic torque, design of rotor bars and slots, calculation of rotor bar current, area of rotor bars, shape of rotor slots, examples, Design of end rings, Calculation of end rings current, cross-sectional area of end rings. B. Design of wound rotor - calculation of number of rotor slots, no. of turns, cross-sectional area of rotor conductors, types of rotor windings, check for rotor tooth density, design of rotor core, examples Estimation of operating characteristics- no load current calculation, short circuit current calculation, stator and rotor resistance and reactance calculation, examples, circle diagram, Dispersion coefficient – effect on maximum output power factor Performance calculation Design aspects for large size machine, high voltage m/c, High speed m/c, algorithm and flow chart Design of submersible motors	16
2.	**Design of single phase induction motor** Types of motors, Design of main dimensions, design of stator, Design of rotor, calculation of operating characteristic (rotor resistance, stator resistance, iron loss, friction and windage loss etc, Design of auxiliary winding, starting torque, circle diagram, design of capacitance for maximum torque	10
3.	**Synchronous machine design** Introduction, output equations, Main dimension, SCR, effect of SCR on machine performance Length of air gap and shape of pole face Armature design, Armature winding (Single layer and double layer), number of armature slots, slots dimension, length of mean turns, calculation of armature resistance and reactance Design of rotor , Design of magnetic circuit, Open circuit characteristic Determination of full load field MMF, Design of field winding Determination of direct and Quadrature axis synchronous reactance Short circuit characteristics, Performance evaluation Design of Turbo alternators, Main dimension, Length of air gap, Stator & Rotor design Algorithms and Flow chart Design consideration for low speed alternators and vertically operated alternator	16

Term work:
1. Design of 3 phase I.M
2. Drawing sheet of 3 phase I.M with circle dia
3. Drawing and description of syn. M/c components
4. Design of syn. m/c
5. Tutorials of single phase I.M and Submersible pumps

Books:
1. A Course in electrical machine design – A. K. Sawhey, Dhanpat Rai and Sons
2. Electrical machine design – R. K. Agrawal, S.K. Kataria & Sons
3. Design of Electrical machines – V. N. Mittle, Standard Publishers Distributors