GUJARAT TECHNOLOGICAL UNIVERSITY

Diploma in Power Electronics Engineering

Semester: 3

Subject Code
Subject Name ELECTRICAL MACHINES-I

Sr. No.	Course content
1.	**ENERGY CONVERSION PRINCIPLES** 1.1 Law of conservation of energy 1.2 Role of electrical energy and uses 1.3 electro-mechanical energy conversion principles 1.4 condition of production of e.m.f. 1.5 rotor action 1.6 unified theory 1.7 singly excited and doubly excited field system
2.	**D.C. GENERATOR** 2.1 Principle of working, construction and types. 2.2 Materials used for different parts. 2.3 Simple lap and wave winding. 2.4 Armature reaction & commutation. 2.5 Performance characteristic of different types of Generator. 2.6 Losses & efficiency.
3.	**D.C. MOTOR** 3.1 Principle of working and types. 3.2 Back e.m.f. 3.3 voltage and torque equation 3.4 Performance characteristics of D.C. motor. 3.5 Speed control of D.C. motor, including electronic control. 3.6 Necessity of starter, shunt and series motor starter 3.6 Losses & efficiency. 3.7 Testing, brake test, Swinburn test, field test. 3.7 Applications of D.C. motors.
4.	**SINGLE PHASE TRANSFORMER** 4.1 Principle of working, construction and types. 4.2 Materials used in different parts of transformer. 4.3 E.M.F. equation and transformation ratio. 4.4 No load and on load vector diagrams. 4.5 Voltage drop in transformer. 4.6 Equivalent circuit. 4.7 O.C. & S.C. test

	4.8 Regulation of transformer 4.9 Losses & efficiency 4.10 Sumpner test. 4.11 Parallel operation. 4.12 Auto transformer. 4.13 Basic procedure and steps for design of single phase transformer.
5.	**POLY PHASE TRANSFORMER** 5.1 Construction and types of connection of 3-phase transformer. 5.2 Comparison of a bank of 3 No. single phase transformer and three phase transformer. 5.3 Parallel operation of 3-phase transformer. 5.4 Accessories of transformer. 5.5 Cooling of transformer.

LABORATORY EXPERIMENTS :

1. Maintain constant voltage of D.C. generator at different load conditions.
2. Obtain External & Internal characteristic of D.C. compound generator.
3. Control the speed of D.C. shunt motor.
4. Control the speed of D.C. series motor.
5. Perform Swinburn's test of D.C. machine.
6. Perform O.C.& S.C. test of single phase transformer.
7. Perform Load test on single phase transformer.
8. Operate two single phase transformer in parallel having.
9. Perform Sumpner's test on single phase transformer.
10. Perform heat run test of single phase transformer.
11. Prepare a report on transformer accessories and cooling methods of a substation.

Reference Books:

1. Electrical Technology - By B.L. Theraja
2. Electrical Technology - By S.L. Uppal.
3. Performance & Design of D.C Machine - By Clayton.
4. Element of Electrical Machines - By Despande.
5. Electrical Technology - By H. Cotton
6. Electrical Machine - 1 - By J.B. Gupta
7. Electrical Machines by Bhattacharya ura