

GUJARAT TECHNOLOGICAL UNIVERSITY

B.E Semester: 3

Mechanical Engineering

Subject Code 131901

Subject Name Electrical Machines and Electronics

Sr.No	Course content
1.	Generating equipments: Classification, 2 wire DC generators, working principle of generator, construction of DC Machines, open circuit characteristic, external characteristic and internal characteristic of DC generator.
2.	DC Motors: construction, Types, Principle of operation, torque equation, losses and efficiency, speed torque characteristics of shunt, series and compound motor, D.C. shunt motor starter , speed control of D.C. shunt and series motors.
3.	3-Phase induction motor: Construction, production of rotating magnetic field, principle of operation, speed and slip, rotor current , relation between rotor copper loss and rotor input, torque of an induction motor, torque slip curve, Losses and Efficiency, starters for 3 phase induction motor, speed control.
4.	Single phase induction motor: Production of magnetic field, comparison between three phase & single phase Induction motors, starting of single phase induction motor by capacitor and shaded pole motor, Universal motors.
5.	Alternator: Introduction, construction, details, exciters, alternator operation on load, voltage regulation, losses & efficiency, parallel operation of alternators, synchronizing procedure of alternators, cooling of alternators.
6.	Transformers: General aspects, Basic definition, working principle of transformer, Types of transformers, Transformer construction: core/ shell/ spiral transformers, Transformers windings terminals, tapping, bushing, transformers cooling, oil conservators and breather, 3-phase transformer, Instrument transformers.
7.	Supply systems: Electric Supply system, typical A.C power supply system, comparison of D.C and A.C transmission, Advantages of high transmission voltage, various systems of power transmission, and comparison of conductor material in overhead system, economic choice of transmission voltage.

8.	Tariffs and Power Factor Improvement: Types of Tariffs, Energy bill calculations, disadvantages of low power factor, causes of low power factor, power factor improvement, calculation of power factor correction, importance of power factor improvement, most economical power factor
9.	Substation: Classification of substations, comparison of indoor and out door substations, Transformer substation, pole mounted substations, underground substations, symbols for equipments in substations, Equipment in a transformer substation, bus bar arrangements in substations, key diagram of 66/11 kV substation, key diagram of 11 kv/400 V indoor substation
10.	Diode, Transistor and OPAMP Circuits: Half wave rectifier circuits, Full wave rectifier, Full wave bridge rectifier, Three phase bridge rectifier, Common Emitter amplifier, Multistage amplifier, Symbol and pin diagram of IC 741 OPAMP, OPAMP circuits – Inverting, Non-inverting, Differential, Comparator
11.	Logic Gates and Boolean algebra: Basic logic circuits: Logic gates (AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR and their truth tables), Laws of Boolean algebra, De-Morgan's theorem
12.	Introduction to 8085 microprocessor: Architecture of 8085 microprocessor, Pin diagram, Data transfer instructions, Arithmetic instructions, I/O interfacing

Reference Books:

1. A Text book of Power Plant Engineering by R. K Rajput, Laxmi publications
2. Principles of power systems by V.K. Mehta, S.Chand publication, 4th edition
3. Electrical Technology- Vol. II, by B.L.Theraja
4. Industrial Electronics by Bishwanath Paul -PHI Publication