GUJARAT TECHNOLOGICAL UNIVERSITY

B.E Semester: 3

Electronics Engineering

Subject Code 131701
Subject Name Electrical Machine

Sr.No	Course Content
1	Transformers: Single Phase Transformer: Working principle, Construction, types, EMF equation, Transformer losses, effect of load, magnetic and resistive leakage, equivalent circuit, transformer testing, regulation of transformer, transformer efficiency, effect of power factor variation on efficiency, auto transformer. Three Phase Transformer: connections, Power supplied by V – V bank, Three – phase to Two-phase conversion, Two – phase to Three – phase conversion, Parallel operation of three – phase transformers, Instrument transformers, Current transformers, Potential transformers
2	Principles of Electromagnetic Energy Conversion: Forces and Torques in Magnetic Field Systems; Singly Excited and Multiply Excited Field Systems; Elementary Concepts of Rotating Machines; Losses and efficiency, ventilation and cooling, machine ratings, leakage and harmonic fluxes
3	Induction Machines: Constructional features of poly-phase induction machines; Stator and Rotating Magnetic Field; Torque production; Slip; Equivalent circuit of a Polyphase Induction Machine; equivalent circuit from test data; Three-phase induction machine performance; Torque-Slip characteristic; Circle diagram; Speed control of Polyphase induction motors, Starting methods for polyphase induction motors; Induction generator, Cogging and crawling; Single-phase induction motors; No-load and Blocked-rotor test; Starting methods for single-phase induction motors; Application
4	Synchronous Machines: Constructional features of synchronous machines; Elementary synchronous machine; Equivalent circuit of a synchronous machine, Voltage regulation; Power – angle and other performance characteristics; Effect of Saliency; Determining reactance by test data; Parallel operation of interconnected synchronous generators; Steady – state stability; Excitation systems; Hunting and damper winding; Applications

5	Direct-Current Machines: Constructional features of DC machines; Elementary DC machine; Methods of excitation of DC machines; Equivalent circuit of DC machine; Commutator action; Armature reaction; Interpoles and compensating windings; Magnetization characteristic of a DC machine; Characteristics of a separately excited DC generator; Self excitation; Characteristic of a DC shunt generator; Characteristic of a DC series generator; Characteristic of a DC compound generator; DC motor characteristics; Control of DC motors; Testing and efficiency; Applications

Reference Books:

1. Electrical machines; Mulukutla S. Sharma, and Mikesh K. Pathak; Cengage Publication
2. A Text of Electrical Technology; B. L. Theraja, and A. K. Theraja; S. Chand Publication