GUJARAT TECHNOLOGICAL UNIVERSITY
B. E. SEMESTER: V
MECHATRONICS ENGINEERING

Subject Name: **Electro Mechanical Energy Conversion**
Subject Code: **152001**

Teaching Scheme				Evaluation Scheme		
Theory	**Tutorial**	**Practical**	**Total**	**University Exam (Theory) (E)**	**Mid Sem Exam (Theory) (M)**	**Practical (I)**
3	0	2	5	70	30	50

Sr. No.	Course content
1	**Review of Principles and Terminology of Electrostatics and Electromagnetics:** Coulomb's law, Electric field intensity, Gauss's law, Electric flux and flux density, Dielectric materials and capacitance, Biot-Savart's law, Ampere's law, Magnetic flux and flux density, Self inductance and Mutual inductance, Properties of magnetic materials.
2	**Electromagnetic Induction:** Faraday's and Lenz's law, Generated and induced emf.
3	**Direct current Excitation of Ferromagnetic Structures:** Magnetization, Hysteresis and hysteresis loop, Methods of analysis of ferromagnetic circuits, Fringing and leakage effects of air gap.
4	**Alternating Current Excitation of Ferromagnetic Structures:** Eddy current, eddy current and hysteresis losses, Equivalent circuits of iron core reactors, Flux splitting and shading rings.
5	**Energy Conversion in Singly Excited Systems:** Force of attraction between magnetized surfaces, Working of solenoids, Plungers and contactors, Reluctance motor.
6	**Energy Conversion in Doubly Excited Systems:** Relatively stationary magnetic fields, Energy conversion in DC, Induction and synchronous machines and linear machines (rotating industrial machines).
7	**Energy Conversion in Small Electrical Machines:** Reluctance motors, Hysteresis motors, Single phase induction machines.

Reference Books:

1. Elements of Electromagnetics, Mathews N.O.Sadiku, Oxford University Press.
2. Concept of Physics Part-II, H C Verma, Bharti Vhavan Publishers and Distributors.
3. Electromechanical Energy Conversion, Vembu Gaurishankar, McGraw Hill.
4. Electrical Machines, Nagrath and Kothari, McGraw Hill.