

1.	Title of the course	Electrical Machines
2.	Course number	EE302L
3.	Structure of credits	3-1-0-4
4.	Offered to	UG
5.	New course/modification to	Modification To EE3103/8
6.	To be offered by	Department of Electrical Engineering
7.	To take effect from	July 2022
8.	Prerequisite	Nil
9.	Course Objective(s): To emphasize on the principles and analysis of electromechanical energy conversion and Transformers. To get an insight into the constructional details, principle of operation, analysis, and basic control of various classes of electric machinery such as generators, motors and transformers.	
10.	Course Content: Magnetic circuits and induction: magnetic circuits and materials, magnetically induced EMF and force, hysteresis and Eddy current losses; Transformers: single-phase transformer, transformer on no load, ideal transformer, practical transformer, equivalent circuits, transformer losses, transformer testing, efficiency and voltage regulation, three phase transformers; Principles of electromechanical energy conversion and basics concepts of rotating machines: energy in magnetic systems, generated EMFs, armature windings, dynamical equations of electromechanical systems; DC machines: DC generators, commutation, methods of excitation, characteristics of DC generators and motors, starting and speed control of DC motors; Induction machines: construction, flux and MMF waves, equivalent circuit, speed-torque characteristics and testing, cogging and crawling, induction generators; Synchronous machines: basic synchronous machine model, synchronous reactance, armature reaction, synchronizing to infinite bus bars, operating characteristics, power flow equations, salient pole machines, parallel operation, hunting, synchronous motors, V and inverted V curves, starting of synchronous motors. The theoretical concepts will be supplemented using numerical examples and computer simulations.	
11.	Textbook(s): 1. Kothari D P and Nagrath U, <i>Electric Machines</i> , McGraw Hill (2006).	
12.	Reference(s): 1. Chapman J, <i>Electric Machinery Fundamentals</i> , McGraw Hill (2005). 2. Flitzgard A E, Kingsley C J and Umans S D, <i>Electric Machinery</i> , McGraw Hill (1983).	