

Course code	Course Name	L-T-P-Credits	Year of Introduction
EE312	Electrical and Electronics Engineering	3-0-0-3	2016
Prerequisite : Nil			
Course Objective			
<ul style="list-style-type: none"> To give exposure to the working of Electrical Machines that function as prime movers in industrial systems/machine-tools. To make aware on factors affecting the choice of motor for a given application To introduce power electronics which form the essential part of modern drives 			
Syllabus			
Transformers, Induction motors, Direct current machines, Control system motors, Factors affecting the choice of motor, Power Electronics			
Expected Outcome			
The students will be able to			
<ol style="list-style-type: none"> know about electrical machines that form part of various industrial systems understand the working of electric machine driven industrial systems and machine tools in a better way. 			
Text Book:			
Hughes, Edward, et al. " <i>Hughes electrical and electronic technology</i> ". Pearson education, 2008.			
References:			
<ol style="list-style-type: none"> Gross, Charles A. "<i>Electric machines</i>". CRC press, 2006. Vithayathil, Joseph. "<i>Power electronics principles and applications</i>". Tata McGraw-Hill Education, 1995. Venkataratnam, K. "<i>Special electrical machines</i>". Universities Press, 2009. Mohan, Ned, and Tore M. Undeland. "<i>Power electronics: converters, applications, and design</i>". John Wiley & Sons, 2007. Guru, Bhag S., and Hüseyin R. Hiziroglu. "<i>Electric machinery and transformers</i>", Oxford University Press, 2001. 			
Course Plan			
Module	Contents	Hours	End Sem. exam marks
I	Transformers-Operating principle, ideal and practical transformers, EMF equation, No load phasor diagram, equivalent circuit, phasor diagram of a transformer on load. Approximate equivalent circuit of transformer and its simplification. Voltage regulation, efficiency, condition for maximum efficiency, transformer tests.	9	15%
II	Three phase Induction motors- principle of action, frequency of rotor emf and current. Factors determining the torque. Torque-slip curve, comparison of slip ring and cage rotors. Single phase induction motors-capacitor run induction motor, split phase motors, shaded pole motors.	6	15%
First Internal Exam			

III	Direct current machines-general arrangement of a dc machine, calculation of e.m.f. generated in an armature winding, armature reaction, commutation. Armature and field connections. A dc machine as generator or motor. Speed of a motor, speed characteristics of shunt, series and compound motors. Torque characteristics of shunt, series and compound motors.	8	15%
IV	Control system motors-Motors for regulators, RPC system requirements, Geneva cam, stepper motor, variable reluctance motor, hybrid stepping motor, drive circuits.	6	15%
Second Internal Exam			
V	Motor selection-Factors affecting the selection motors-speed, power rating and duty cycles, load torques. The motor and its environment.	4	20%
VI	Power electronics- introduction to power electronics, thyristor circuits, limitations to thyristor operation, thyristors in practice, The fully controlled a.c./d.c. converter, ac/dc inversion. Switching devices in inverters.	9	20%
End Semester Exam			

Question Paper Pattern

Maximum marks: 100

Time: 3 hours

The question paper shall consist of three parts

Part A

4 questions uniformly covering modules I and II. Each question carries 10 marks
Students will have to answer any three questions out of 4 (3X10 marks =30 marks)

Part B

4 questions uniformly covering modules III and IV. Each question carries 10 marks
Students will have to answer any three questions out of 4 (3X10 marks =30 marks)

Part C

6 questions uniformly covering modules V and VI. Each question carries 10 marks
Students will have to answer any four questions out of 6 (4X10 marks =40 marks)

Note: In all parts, each question can have a maximum of four sub questions, if needed.