

COURSE CODE: 1151EE103	COURSE TITLE: <b>DC MACHINES &amp; TRANSFORMERS</b>	L	T	P	C
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**COURSE CATEGORY:**

Program Core

**PREAMBLE :**

This course provides an introduction to the basic concepts of rotating machines, DC Machines (Generators and motors), transformers and their testing methods, emphasizing their inter-relations and applications to engineering, and research areas; introduce students to cognitive learning and develops problem solving skills with both theoretical and engineering oriented problems.

**PREREQUISITE COURSES:**

Basic Electrical Engineering

**RELATED COURSES:**

AC Machines, Electrical Machine Design

**COURSE EDUCATIONAL OBJECTIVES :**

The objectives of the course are to make the students,

- Provide the basic concept of DC machines and Transformers.
- Develop the skills of the students in the areas of machines and transformers by identifying the current problem in the industries and bring solutions through research.
- Diagnose the condition of DC machines and Transformers.

**COURSE OUTCOMES :**

Upon the successful completion of the course, students will be able to:

CO Nos	Course Outcomes	Level of learning domain (Based on revised Bloom's taxonomy)
CO1	Understand the principle of electromagnetic energy conversion.	K2
CO2	Explain the performance characteristics of various DC Generators.	K2
CO3	Describe the performance characteristics of various DC Motors.	K2
CO4	Describe the equivalent circuit of transformers and determine its regulation	K2
CO5	Understand the different types of testing methods used to determine the performance characteristics of of DC machines and Transformers.	K2

**CORRELATION OF COs AND POs**

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1			M					L	M			L

CO2	L		M	M				L	M			
CO3			M	L				L	M			
CO4				L				L			M	
CO5	M			H				L	M			
<b>COURSE CONTENT:</b>												
<b>UNIT I</b>	<b>BASIC CONCEPTS OF ROTATING MACHINES</b>										<b>6</b>	
Principles of electromechanical energy conversion – Force and Torque equations in magnetic fields – Energy and Force in single and multiple excited systems – Concept of Co – energy – mmf of distributed windings – Rotating magnetic field –Generated voltage-Torque in Wound rotor machine.												
<b>UNIT II</b>	<b>DC GENERATORS</b>										<b>12</b>	
Constructional details – Principle of Operation – Action of Commutator – Armature windings – lap and wave windings – Simplex and Multiplex windings – use of Laminated Armature – emf equation – Armature Reaction (cross Magnetizing and de-magnetizing AT/Pole) – compensating winding – Commutation – methods of improving Commutation - Methods of excitation – self and separately excited generators -- Parallel operation of dc shunt and compound generators.												
<b>UNIT III</b>	<b>DC MOTORS</b>										<b>9</b>	
Principle of operation – Back emf and torque equation – Characteristics and application of series, shunt and compound motors – starting of dc motors – Types of starters – Speed control of dc shunt and series motors – Braking of dc shunt motor – Protecting devices.												
<b>UNIT IV</b>	<b>TRANSFORMERS</b>										<b>9</b>	
Constructional details of core and shell type transformers- Types of winding- Principle of operation- emf equation- Transformation ratio- Transformer on no-load- Parameters referred to HV/LV windings- Equivalent circuit- Transformer on load- Regulation- Parallel operation of single and three phase transformers- Auto transformer- Three phase transformers – Phasor diagram – Load Sharing of Transformer.												
<b>UNIT V</b>	<b>TESTING OF DC MACHINES AND TRANSFORMERS</b>										<b>9</b>	
Losses and efficiency in DC machines and transformers- Condition for maximum efficiency- Testing of DC machines – Brake test, Swinburne’s test, Sumpner’s test, Retardation Test, Hopkinson’s test – testing of transformers – Polarity test, load test, open circuit and short circuit tests, Tan Delta tests - All day efficiency.												
												<b>TOTAL: 45 PERIODS</b>
<b>TEXTBOOKS:</b>												
<ol style="list-style-type: none"> <li>1. Dr.P.S.Bimbhra,'Electrical Machinery', Khanna Publishers, 7th Edition, 2013</li> <li>2. D.P.Kothari and I.J.Nagrath, 'Electric Machines', Tata McGraw Hill Publishing company Ltd, 2002.</li> </ol>												
<b>REFERENCE BOOKS:</b>												
<ol style="list-style-type: none"> <li>1. A.E.Fitzgerald, Charles Kingsley, Stephen.D.Umans, 'Electric Machinery', and Tata McGraw Hill Publishing company Ltd, 2003.</li> <li>2. J.B.Gupta, 'Theory and performance of Electrical Machines', S.K.Kataria and sons, 2002.</li> </ol>												
<b>ONLINE RESOURCES:</b>												
This course uses exclusively for providing electronic resource, such as lecturer notes, assignment papers, and sample solutions. Students should make appropriate use of this												

recourse.

<http://www.electrical4u.com/electrical-power-transformer-definition-and-types-of-transformer/>  
<http://www.electrical4u.com/alternator-or-synchronous-generator/www.nptel.in>