Course code	Course Name	L-T-P-Credits	Year of Introduction
EE214	**ELECTRICAL TECHNOLOGY AND INSTRUMENTATION**	3-0-0-3	2016

Prerequisites: Nil

Course Objectives:

- To impart understanding of the basic working principles of DC and AC machines.
- To impart understanding of the basic principles of instrumentation and its applications.

Syllabus:

DC Generator- Load Characteristics; DC Motors- Speed & Torque, Performance Characteristics; 3ph Induction Motors-Torque Equation, Characteristics; Alternators- Construction; Regulation-Transformers, Regulation Efficiency; Instrumentation- Calibration, Errors; Transducer Classification.

Expected Outcome:

Upon successful completion of the course, the student will be able to:
  i.   Understand the basic working principle, construction, types, performance characteristics and applications of DC generators, DC motors and induction motors.
 ii.   Understand the basic working principle, construction, types, EMF equation, voltage regulation, EMF, MMF methods to determine the voltage regulation of alternators.
iii.   Understand the basic working principle, construction, types, equivalent circuit, losses, efficiency, regulation and applications of transformers and predetermine their efficiency by conducting OC and SC.
 iv.   Understand the basic principles of instrumentation, measurement standards and types of errors in instruments and measurements and its applications.

Text Books:

- Dr. P. S. Bimbra; Electrical Machinery; Khanna Publishers.
- J. B. Gupta; Theory and principles of Electrical Machines; S. K.Kataria and Sons Tex.

Reference Books:

- A.K.Sawhney; Electrical and Electronic Measurements and Instrumentation; DhanpatRai.
- Alexander Langsdorf A. S.; Theory of AC Machinery; Mc-Graw Hill.
- James.W.Dally, William.F. Riley, Kenneth G. McConnell; Instrumentation for Engineering Measurement.
- Say M.G.; Performance and Design of AC Machines; ELBS.
- William D. Cooper, A.D. Helfrick; Electronic Instrumentation and Measurement Techniques; Prentice Hall.

	Course Plan		

Module	Content	Hours	Sem. Exam Marks
I	**D.C. Generator:** O.C.C. ; Condition for Self Excitation; Field Critical Resistance; Critical Speed; Load Characteristics of	7	15%

	Generators; *Losses*; Power Flow Diagram; Efficiency, Condition for Maximum Efficiency; *Applications*.		
II	**D.C. Motors:** Back EMF; Speed and Torque Equation; Starting, Testing of D.C. Motors, Brake Test; Swinburne's Test; Performance and operating characteristics of Shunt, Series and Compound Motors; *Applications.*	7	15%
FIRST INTERNAL EXAM			
III	**Three Phase Induction Motor**: Production of Rotating Magnetic Field; Torque Equation; Torque Slip Characteristics, Equivalent Circuit; *Application.* Single Phase Induction Motor: Different Types; *Application.*	7	15%
IV	**Alternators**: *Construction Details*, Type; EMF Equation (Winding Factor need not be derived); Synchronous Impedance; Regulation by EMF and MMF Method.	7	15%
SECOND INTERNAL EXAM			
V	**Transformer**: *Construction, Working*, *Types*, EMF Equation, No Load Current; Equivalent Circuit; Phasor Diagram, Regulation, Efficiency, Determination of Regulation and Efficiency from O.C. and S.C. tests; *Cooling of Transformer*; Applications.	7	20%
VI	**Introduction to Instrumentation and its Applications:** Classification of Instruments; Standards and Calibration; Errors in Instruments and Measurements; Classification of Transducers; Strain Gauges; *L.V.D.T. (Linear Variable Differential Transformer)*, Mc.Leod Gauge, Pirani Gauge, Hot-wire Anemometers; Constant Temperature and Constant Current Methods.	7	20%
END SEMESTER EXAM			

QUESTION PAPER PATTERN:

PART A

- Answer all 8 questions of 3 marks each.
- 1 question each from modules I to IV and 2 questions each from modules V & VI.

PART B

- Answer any 2 full questions out of 3 for each module.
- Each question from module I to IV carries 6 marks.
- Each question from module V & VI carries 7 marks.
- Each full question can have maximum of 4 sub questions, if needed.