



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

DC MACHINES LABORATORY								
III Semester: EEE								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
AEEE08	Core	L	T	P	C	CIA	SEE	Total
		0	0	2	1	40	60	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 36			Total Classes: 36			
Prerequisite:								

I. COURSE OVERVIEW:

This laboratory course is to meet the requirements of practical work meant for basic operation, analysis and design of electrical machines. It provides hands-on experience by examining the electrical and mechanical characteristics of various DC machines. Analyze the characteristics of DC machines and separate the various losses in electrical machines by conducting different tests.

II. COURSES OBJECTIVES:

The students will try to learn

- I. The elementary experimental and modelling skills for handling problems with electrical machines in the industries and domestic applications to excel in professional career.
- II. The operation of DC Machines and its role in power transmission and distribution
- III. The intuitive knowledge needed to test and analyze the performance leading to design of electric machines by conducting various tests and calculate the performance parameters.

III. COURSE OUTCOMES:

At the end of the course students should be able to:

- CO1 Analyze the performance characteristics of dc machine under various loading conditions
- CO2 Determine the critical field resistance and speed of dc shunt generator characteristics using open circuit characteristics.
- CO3 Examine the performance of DC shunt machine with different speed control techniques and predetermine the efficiency.
- CO4 Estimate and separate the core losses in dc machine by conducting a suitable test.
- CO5 Examine the performance and speed control of dc machines using simulation tools.
- CO6 Determine load test on dc compound generator by conducting Load test.

COURSE CONTENT:

EXERCISE-1: OPEN CIRCUIT CHARACTERISTICS OF DC SHUNT GENERATOR

Develop the circuit for analyzing the characteristics of DC shunt generator

EXERCISE -2: LOAD TEST ON DC SHUNT GENERATOR

Design the DC shunt generator circuit under full, 3/4th, half and 1/4th load conditions for analyzing the performance of the machine

EXERCISE -3: LOAD TEST ON DC SERIES GENERATOR

Design the DC series generator circuit under full, 3/4th, half and 1/4th load conditions for analyzing the performance of the machine

EXERCISE -4: LOAD TEST ON DC COMPOUND GENERATOR

Design the DC compound generator circuit under full, 3/4th, half and 1/4th load conditions for analyzing the performance of the machine.

EXERCISE -5: HOPKINSON'S TEST

Develop a method of testing for two identical dc shunt machines which are mechanically coupled and also electrically connected in parallel.

EXERCISE -6: FIELD'S TEST

Develop a method of testing for two similar dc series machines depend on the accuracy with which the motor input and generator output are measured.

EXERCISE -7: SWINBURNE'S TEST AND SPEED CONTROL CHARACTERISTICS OF A DC SHUNT MOTOR

Design the suitable test under no load conditions to measure no load losses in DC shunt machines and speed control of DC shunt motor.

EXERCISE -8: BRAKE TEST ON DC COMPOUND MOTOR

Develop the circuit for conducting brake test on DC compound motor

EXERCISE -9: BRAKE TEST ON DC SHUNT MOTOR

Develop the circuit for conducting brake test on DC shunt motor.

EXERCISE -10: RETARDATION TEST

Develop the test for separating the mechanical losses of the DC shunt machine

EXERCISE -11: SEPARATION OF LOSSES IN DC SHUNT MOTOR

Design the circuit for separating the iron losses in DC shunt motor

EXERCISE -12: MAGNETIZATION CHARACTERISTICS OF DC SHUNT GENERATOR USING DIGITAL SIMULATION

Develop the circuit for analyzing the magnetization characteristics of DC shunt generator using MATLAB.

EXERCISE -13: LOAD TEST ON DC SHUNT GENERATOR USING DIGITAL SIMULATION

Design the DC shunt generator circuit under full, 3/4th, half and 1/4th load conditions for analyzing the performance of the machine using MATLAB

EXERCISE -14: SPEED CONTROL OF DC SHUNT MOTOR USING DIGITAL SIMULATION

Design the suitable test for speed control of DC shunt motor using MATAB.

V. TEXTBOOKS:

1. P. S. Bimbhra, "Electrical Machinery", Khanna Publishers, 2011.
2. I.J. Nagrath and D. P. Kothari, "Electric Machines", McGraw Hill Education, 2010.

VI. REFERENCEBOOKS:

1. Prithwiraj Purkait, Indrayudh Bandyopadhyay, "Electrical Machines", Oxford, 2017.
2. M. G. Say, "Performance and design of AC machines", CBS Publishers, 2002.
3. A. E. Fitzgerald and C. Kingsley, "Electric Machinery", New York, McGraw Hill Education, 2013.
4. A. E. Clayton and N. N. Hancock, "Performance and design of DC machines", CBS Publishers, 2004.

VII. ELECTRONICSRESOURCES:

1. <https://nptel.dc.in/courses/108102146>
2. <https://nptel.dc.in/courses/108105131>

VIII. MATERIALS ONLINE

1. Course Outline Description
2. Lab Manual