DC MACHINES LABORATORY

III Semester: EEE

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AEE104	**Core**	-	-	3	2	30	70	100

Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 42	Total Classes: 42

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. OBJECTIVES:

The course should enable the students to:

I The elementary experimental and modeling 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:

After successful completion of the course, students should be able to:

CO 1 **Formulate** and then analyze the working of any electrical machine to using Understand mathematical model under loaded and unloaded conditions. .

CO 2 **Interpret** the load sharing capabilities and reliability of DC generators using   Apply parallel operation under various loading conditions.

CO 3 **Apply** magnetization characteristics of dc shunt generator for necessary to do   Apply mechanical work in a proper way.

CO 4 **Demonstrate** the starting and speed control of various DC motors for necessary to Understand do mechanical work in a proper way of DC motors.

CO 5 **Estimate** the core losses of DC shunt machines for dividing the set losses.   Apply

CO 6 **Apply** digital simulation techniques for speed control methods and load test of DC   Apply motors.

IV. SYLLABUS:

LIST OF EXPERIMENTS

Expt. 1	OPEN CIRCUIT CHARACTERISTICS OF DC SHUNT GENERATOR

Magnetization characteristics of DC shunt generator.

Expt. 2	LOAD TEST ON DC SHUNT GENERATOR

Determination of efficiency by load test in DC shunt generator.

Expt. 3	LOAD TEST ON DC SERIES GENERATOR

Determination of efficiency by load test on DC series generator.

Expt. 4	LOAD TEST ON DC COMPOUND GENERATOR
Determination of efficiency by load test on DC compound generator**.**	
Expt. 5	HOPKINSON'S TEST
Study the performance characteristics of two identical DC shunts machines.	
Expt. 6	FIELD'S TEST
Study the performance characteristics of two identical D series machines.	
Expt. 7	SWINBURNE'S TEST AND SPEED CONTROL OF DC SHUNT MOTOR
Predetermine the efficiency and study the characteristics of DC shunt machine with different speed control techniques**.**	
Expt. 8	BRAKE TEST ON DC COMPOUND MOTOR
Study the performance characteristics of DC compound motor.	
Expt. 9	BRAKE TEST ON DC SHUNT MOTOR
Study the performance characteristics of DC shunt motor by brake test.	
Expt. 10	RETARDATION TEST
Study the performance characteristics by using retardation test on DC shunt motor.	
Expt. 11	SEPARATION OF LOSSES IN DC SHUNT MOTOR
Study the method used for separation of losses in DC shunt motor.	
Expt. 12	MAGNETIZATION CHARACTERISTICS OF DC SHUNT GENERATOR
Study the magnetization characteristics of DC shunt generator using digital simulation.	
Expt. 13	LOAD TEST ON DC SHUNT GENERATOR USING DIGITAL SIMULATION
Perform the load test on DC shunt generator using digital simulation.	
Expt. 14	SPEED CONTROL OF DC SHUNT MOTOR USING LabVIEW
Verify the speed control techniques of DC motor using LabVIEW.	

Reference Books:

P S Bimbhra, "Electrical Machines", Khanna Publishers, 2nd Edition, 2008.
1. M G Say, E O Taylor, "Direct Current Machines", Longman Higher Education, 1st Edition, 1985.
2. Hughes, "Electrical Technology", Prentice Hall, 10th Edition, 2015.
3. Nesimi Ertugrul, "LabVIEW for Electric Circuits, Machines, Drives, and Laboratories", Prentice Hall, 1st Edition, 2002.
4. Gupta, Gupta & John, "Virtual Instrumentation Using LabVIEW", Tata McGraw-Hill, 1st Edition, 2005.

Web References:

1. https://www.ee.iitkgp.ac.in
2. https://www.citchennai.edu.in
3. https://www.iare.ac.in

Course Home Page:

SOFTWARE AND HARDWARE REQUIREMENTS FOR A BATCH OF 36 STUDENTS:

SOFTWARE: MATLAB R2015a and LabVIEW

HARDWARE: Desktop Computers (04 nos)

LIST OF EQUIPMENT REQUIRED FOR A BATCH OF 36 STUDENTS

S. No	Name of the Equipment	Range
1	DC Shunt Motor-Generator Set	3 KW
2	DC Shunt motor-DC Series generator	3 KW
3	DC Series motor-DC Series generator	3 KW
4	Resistive load	4 A
5	DC shunt Motor-DC Compound Generator	3 KW
6	DC Shunt Motor Set	5 HP
7	DC Compound Motor	5 HP
8	Ammeter	0-2A MC
9	Ammeter	0-10 / 20A MC
10	Voltmeter	0-150 / 300V MC
11	Rheostats	300 ohms / 2A
12	Rheostats	370 ohms / 1.7A
13	Rheostats	50ohms / 5A
14	Tachometers	0-9999 RPM