Program: **Diploma in Electrical & Electronics Engineering**	
Course Code: **3036**	Course Title: **DC Machines Lab**
Semester : **3**	Credits: **1.5**
Course Category: **Program Core**	
Periods per week: **3 (L:0 T:0 P:3)**	Periods per semester: **45**

Course Objectives:

- To practice hands-on experience with DC machines and able to test machine performances
- To know the faults of a dc machine at breakdown condition.
- To analyze speed control techniques of dc motors and to develop performance characteristics.

Course Prerequisites:

Topic	Course code	Course name	Semester
Basic Knowledge of setting up a connection as per diagram.		Fundamentals of Electrical & Electronics Engineering Lab	2

Course Outcomes:

COn	Description	Duration (Hours)	Cognitive level
CO1	Identify the construction of DC machines and develop magnetic curves.	9	Applying
CO2	Develop the performance characteristics of various types of DC generators**.**	12	Applying
CO3	Apply various speed control techniques in dc motors to plot the speed curve and testing of dc machines.	9	Applying
CO4	Develop the performance characteristics of various types of DC motors.	9	Applying
	Lab Exam	6	

CO-PO Mapping

Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	3			3			
CO2				3			
CO3				3			
CO4				3			

3-Strongly mapped, 2-Moderately mapped, 1-Weakly mapped

Course Outline

Module Outcome	Description	Duration (Hours)	Cognitive Level
CO1	**Identify the construction of DC machines and develop magnetic curves.**		
M1.01	Dismantle and reassemble a DC machine and identify parts.	3	Applying
M1.02	Dismantle and reassemble various types of starters and identify parts.	3	Applying
M1.03	Run a separately excited and self-excited DC generator at rated conditions and plot OCC, and identify critical speed and resistance. Deduce the same for different speeds.	3	Applying
CO2	**Develop the performance characteristics of various types of DC generators**		
M2.01	Plot the efficiency curve of self and separately excited dc generators at rated condition	3	Applying
M2.02	Develop the internal and external characteristics of dc shunt generator at constant speed	3	Applying
M2.03	Plot efficiency curves of dc series generator at different loads.	3	Applying
M2.04	Plot the efficiency curves of DC compound generator at different loads in (i) Long shunt configuration (ii) short shunt configuration	3	Applying
	Lab Exam 1	3	

CO3	**Apply various speed control techniques in dc motors to plot the speed curve and testing of dc machines.**		
M3.01	Choose the field control method to control the speed of the DC shunt motor and plot the field current v/s speed curve.	3	Applying
M3.02	Choose armature control method to control the speed of the DC shunt motor and plot the field current v/s speed curve.	3	Applying
M3.03	Apply Swinburne's test on a DC shunt machine to predetermine its efficiency (when working as a motor and generator).	3	Applying
CO4	**Develop the performance characteristics of various types of DC motors.**		
M4.01	Apply direct loading technique on a DC shunt motor to plot performance curves (torque vs speed, output vs efficiency, speed and input current)	3	Applying
M4.02	Plot the performance characteristics (torque vs speed, output vs efficiency, speed and input current) of a dc series motor by conducting direct load test	3	Applying
M4.03	Apply direct loading test on a DC compound motor and plot performance curves (torque vs speed, output vs efficiency, speed and input current).	3	Applying
	Lab Exam II	3	

Text /Reference:

T/R	Book Title/Author
T1	Laboratory manual for Electrical Machines. D P Kothari, B.S. Umre. Wiley ISBN: 9789389583410
T2	Laboratory Manuel on Electrical Measurements & Electrical Machines, P.O.Kuttappan, Spades publishers
T3	Electrical Technology Volume II by A K Theraja, B L Theraja, S Chand & Co.
R1	JB Gupta. Theory and Performance of Electrical Machines: S. K. Kataria& Sons
R2	K Murugesh Kumar, Dc Machines and Transformers: S Chand & Company

Online Resources:

Sl.No	Website Link
1	https://www.ee.iitb.ac.in/course/~emlab/lab-manual.html
2	Virtual labs:http://vlabs.iitb.ac.in/vlab/labsee.html
3	http://em-coep.vlabs.ac.in
4	http://vem-iitg.vlabs.ac.in
5	www.swayam.gov.in
6	www.nptel.ac.in
7	www,electrical4u.com
8	www.youtube.com