DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING
NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

COURSE PLAN PART-I			
Name of the program and specialization	B.Tech. / Electrical and Electronics Engineering		
Course title	DC MACHINE AND TRANSFORMER LABORATORY		
Course code	EELR11	No. of credits	02
Course code of pre-requisite subject	EELR11-DC MACHINES AND TRANSFORMERS LABORATORY		
Session	July 2023	Section (If, applicable)	III SEM, A
Name of faculty	Dr. K. Sundareswaran	Department	EEE
Email	kse@nitt.edu	Telephone no.	0431 - 2503255
Name of course coordinator(s)			
Email		Telephone no.	
Course type	√ Core course	☐ Elective course	

Syllabus

List of experiments

A basic introduction to the equipment and machines is ought to be done in an introductory class.

- Speed control of dc shunt motor
- Load test on dc shunt motor
- Load test on dc series motor
- Open circuit characteristics of dc shunt generator
- Load test on dc shunt generator
- Load test on dc compound generator
- Open circuit and short circuit test on single phase transformer
- Load test on single phase transformer

Course objective

1. To expose the students to the basic concepts of various types of electrical machines such as DC machine and Transformers and their applications.
2. The students will be exposed to the relevant performance characteristics and the control techniques of such electrical machines.

COURSE OUTCOMES (CO)												
Course Outcomes	**Aligned Programme Outcomes (PO)**											
Upon completion of the course, the students will	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1. Interpret the constructional details of the DC machines and Transformers and also understand the significance of different connections of three-phase transformers.	3	1	1	2	1	1	1	1	3	2	2	3
2. Estimate or test the performance of any DC machine (shunt, series or compound) and single-phase transformer, by conducting suitable experiments and report the results.	3	3	3	3	2	2	2	3	3	3	3	3
3. Experiment and analyze the various speed control and braking techniques for DC motors.	3	3	3	3	2	2	2	3	3	3	3	3
4. Develop simulation models and prototype modules in view of implementing any control technique upon dc motors and single-phase transformers for various applications.	3	3	3	3	3	2	2	3	3	3	3	3

COURSE PLAN PART-II

COURSE OVERVIEW

An Electrical Machine is an electro-mechanical energy converter. It is a device that convert either mechanical energy to electrical energy - generator or electrical energy to mechanical energy- motor. An electrical machine is a dual machine and hence each machine can be used as either generator or a motor. Almost all practical electrical machines convert energy from one form to another through the action of a magnetic field. Electrical machines provide green energy production and hence insight into such machines, their design, and working principles become inevitable for an electrical engineer. Only machines using magnetic fields as medium of energy conversions are considered in this course.

The transformer is an electrical device that transforms AC electrical energy at one voltage level to another volage level, operated at same frequency. Since transformer operate on principle of electromagnetic induction, similar to generator or motor, depending upon the action of magnetic field to accomplish the change of voltage level, they are usually studied together with electrical machines. Moreover, transformer plays a major role play a major in power transfer in large power system. Hence transformer also taught along with the electrical machines.

These three types of electric devices are ubiquitous in modern daily life. Electric motors are used widely in the home run refrigerators, freezers, vacuum cleaners, blenders, air conditioners, fans and many similar appliances. In the workplace, motors provide the motive power for all tools. Of course, generators are necessary to supply the power used by all these motors. Hence as an Electrical Engineer, it is essential to know the operating characteristics and relevant performance parameters of above said electrical machines.

In this course, the discussion is limited to Direct Current operated electrical machines (motors and generators) as well as transformers. Prior to studying about various electro-mechanical systems, it is indispensable to understand about the basics of magnetic circuits and its relevant parameters.

COURSE TEACHING AND LEARNING ACTIVITIES			
Sl. NO.	**Week/Contact hour**	**List of experiments/Activities**	**Mode of delivery**

1	July 31- 4 August 2023 (5 Contact Hours)	Introduction to Course plan details & General introduction	Chalk & talk
2	August 07-11 2023 (5 Contact Hours)	Speed control of dc shunt motor	Hands-on
3	August 14-18, 2023 (5 Contact Hours)	Load test on dc shunt motor	Hands-on/Report submission & viva for completed experiments
4	August 21-25, 2023 (5 Contact Hours)	Load test on dc series motor	Hands-on/Report submission & viva for completed experiments
5	August 28 - 01sep, 2023 (5 Contact Hours)	Open circuit characteristics of dc shunt generator	Hands-on/Report submission & viva for completed experiments
6	September 04 -08, 2023 (5 Contact Hours)	Load test on dc shunt generator	Hands-on/Report submission & viva for completed experiments
7	September 11-15, 2023 (5 Contact Hours)	Load test on dc compound generator	Hands-on/Report submission & viva for completed experiments
8	September 18-22, 2023 (5 Contact Hours)	Open circuit and short circuit test on single phase transformer	Hands-on/Report submission & viva for completed experiments
9	October 03-06, 2023 (2.5 Contact Hours)	Load test on single phase transformer	Hands-on/Report submission & viva for completed experiments
10	October 09-13, 2023 (5 Contact Hours)	Compensation experiment	Hands-on/Report submission & viva
11	October 16-20, 2023 (5 Contact Hours)	Compensation experiment	Hands-on
12	October 25-27, 2023 (2.5 Contact Hours)	Compensation experiment	Hands-on
13	October 30 – November 03 2023 (5 Contact Hours)	Repeat Lab	Hands-on
14	November 06 – 10 2023 (5 Contact Hours)	Assessment 1	Hands-on
15	November 13 –17 2023 (5 Contact Hours)	Final record submission	Hands-on/Report submission & viva

16	November 20 – 24 2023 (5 Contact Hours)	Final assessment	Hands-on/Report submission & viva for completed experiments

COURSE ASSESSMENT METHODS (Shall range from 4 to 6)

Sl. No.	Mode of assessment	Week/Date	Duration	%Weightage
1	Report of all regular experiments	Weekly	5 hrs/Week	60
2	Assessment 1	14th week	60 minutes	10
3	Final assessment	16th week	120 minutes	30

ESSENTIAL READINGS: Textbooks, reference books Website addresses, journals, etc

1. A.E. Fitzgerald and Charles Kingsley, Electric Machinery', Tata McGraw-Hill Education Publications, 6th Edition, 2002.
2. Dr. P.S. Bhimbra, 'Electrical Machinery', Khanna Publications, 7th Edition, 2007.
3. Nagrath, I.J. and Kothari, D.P., 'Electrical Machines', Tata McGraw-Hill Education Private Limited Publishing Company Ltd., 4th Edition, 2010.
4. Vincent Del Toro, 'Electrical Engineering Fundamentals', 2nd Edition. Prentice Hall Publications, 2003.
5. Parker Smith, N.N., 'Parker Smith's Problems in Electrical Engineering, 9ih Edition, CBS Publishers and Distributers, 9th Edition, 2003

COURSE EXIT SURVEY (Mention how the feedback about the course shall be assessed)

- Feedback from the students during class committee meetings
- Anonymous feedback through a questionnaire (Mid and end of the semester)
- End-semester feedback on Course Outcomes

COURSE POLICY

MODE OF CORRESPONDENCE

1. All the students are advised to check their NITT WEBMAIL regularly.
2. All the correspondence (schedule of classes/ schedule of assessment/ course material/ any other information regarding this course) will be done through their webmail only.
3. Queries (if required) to the course teacher shall only be emailed to kse@nitt.edu

COMPENSATION ASSESSMENT POLICY

- Compensation Lab session will be given for the students who are absent from the regular session with prior permission.

ATTENDANCE POLICY (A uniform attendance policy as specified below shall be followed)

- At least 75% attendance in each course is mandatory.
- Students with less than 75% attendance shall be prevented from writing the final assessment and be awarded a 'V' grade.

ACADEMIC DISHONESTY AND PLAGIARISM

- Possessing a mobile phone, carrying bits of paper, talking to other students, or copying from others during an assessment will be treated as punishable dishonesty.

- Zero marks are to be awarded to the offenders. For copying from another student, both students get the same penalty of zero marks.
- The departmental disciplinary committee including the course faculty member, PAC chairperson, and the HOD, members, shall verify the facts of the malpractice and award the punishment if the student is found guilty. The report shall be submitted to the Academic office.
- The above policy against academic dishonesty shall apply to all the programs.

ADDITIONAL INFORMATION

The faculty is available for consultation at times as per the intimation given by the faculty. Queries may also be emailed to the Course Coordinator directly at 407120003@nitt.edu

FOR APPROVAL

DR. K. SUNDARESWARAN **Course Faculty**	**CC-Chairperson**	**DR. M. P. SELVAN** **HOD**