

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

COURSE PLAN – PART I			
Name of the programme and specialization	B.Tech. / Electrical and Electronics Engineering		
Course Title	DC MACHINES AND TRANSFORMERS LABORATORY		
Course Code	EELR11	No. of Credits	2
Course Code of Pre-requisite subject(s)	NIL		
Session	July 2019	Section (if, applicable)	B
Name of Faculty	Sundareswaran K	Department	EEE
Email	kse@nitt.edu	Telephone No.	0431-250 3255
Name of Course Coordinator(s) (if, applicable)	NA		
E-mail	NA	Telephone No.	NA
Course Type	<input checked="" type="checkbox"/> Core course <input type="checkbox"/> Elective course		
<b>Syllabus (approved in BoS)</b>			
<b>List of Experiments</b>			
<p>A demonstration of the static and rotational electrical machines (constructional details) is ought to be done in an introductory class.</p> <ul style="list-style-type: none"> <li>• Open circuit and load characteristics of DC shunt/compound generator</li> <li>• Swinburne's test and Speed control of DC shunt motor</li> <li>• Load test on DC shunt motor</li> <li>• Load test on DC series motor</li> <li>• Open circuit and short circuit test on single-phase transformer</li> <li>• Sumpner's test</li> <li>• Parallel operation of single-phase transformer</li> <li>• Electrical braking in DC shunt motor</li> <li>• Three-phase transformer connections</li> </ul> <p>Mini-Project</p>			



<b>COURSE OBJECTIVES</b>	
To expose the students to the basic concepts of various types of electrical machines such as DC Machines and Transformers and their applications. The students will be exposed to the relevant performance characteristics and their control techniques of such electrical machines.	
<b>COURSE OUTCOMES (CO)</b>	
<b>Course Outcomes</b>	<b>Aligned Programme Outcomes (PO)</b>
Upon completion of the course the students would be able to	
1. Interpret the constructional details of the DC machines and Transformers and also understand the significance of different connections of three-phase transformers.	2, 7, 9, 10,12
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.	2, 7, 8, 9, 10, 12
3. Experiment and analyze the various speed control and braking techniques for DC motors.	2, 7, 8, 9, 10, 12
4. Develop simulation models and prototype modules in view of implementing any control technique upon dc motors and single-phase transformers for various applications.	2, 7, 5, 8, 9, 10, 12
<b>COURSE PLAN – PART II</b>	
<b>COURSE OVERVIEW</b>	
<p>An Electrical Machine is an electro-mechanical energy converter. It is a device that converts either mechanical energy to electrical energy - <i>generator</i> or electrical energy to mechanical energy - <i>motor</i>. 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.</p> <p>The <i>transformer</i> is an electrical device that transforms AC electrical energy at one voltage level to another voltage level, operated at same frequency. Since transformers also operate on the principle of electromagnetic induction, similar to generators and motors, depending on the action of magnetic field to accomplish the change in voltage level, they are usually studied together with electrical machines. Moreover transformers play a major role in power transfer in large power systems. Hence transformers are also taught along with the electrical machines. These three types of electric devices are ubiquitous in modern daily life.</p> <p>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.</p> <p>In this laboratory course, the performance of various DC machines and Transformers is tested by conducting standard experiments. In this lab students will get complete exposure to power level circuit connections, various types of analog measuring instruments.</p>	



COURSE TEACHING AND LEARNING ACTIVITIES			
S.No.	Week/Contact Hours	List of experiments/ Activities	Mode of Delivery
1.	4 <sup>th</sup> Week of July (22 <sup>th</sup> to 26 <sup>th</sup> July)	Course plan details General introduction to laboratory at class room	Lecture PPT and C&T
2.	5 <sup>th</sup> Week of July (29 <sup>th</sup> to 2 <sup>nd</sup> Aug.)	Open circuit characteristics of DC shunt generator	Experimentation
3.	2 <sup>nd</sup> Week of August (5 <sup>th</sup> to 9 <sup>th</sup> August)	Load Test on DC shunt motor	Experimentation
4.	3 <sup>rd</sup> Week of August (12 <sup>th</sup> August to 16 <sup>th</sup> August)	Speed control of DC shunt motor	Experimentation
5.	4 <sup>th</sup> Week of August (19 <sup>th</sup> to 23 <sup>th</sup> August)	Open circuit and Short circuit test on Single-phase transformer	Experimentation
6.	5 <sup>th</sup> Week of August (26 <sup>th</sup> to 30 <sup>th</sup> August)	Assessment 1	
7.	1 <sup>st</sup> Week of Sep. (2 <sup>nd</sup> to 6 <sup>th</sup> Sep)	Load characteristics of DC Shunt generator	Experimentation
8.	2 <sup>nd</sup> Week of Sep. (9 <sup>th</sup> to 13 <sup>th</sup> Sep.)	Swinburne's test on DC shunt machine	Experimentation
9.	3 <sup>rd</sup> Week of Sep. (16 <sup>th</sup> to 20 <sup>st</sup> Sep.)	Load test on single phase transformer	Experimentation
10.	4 <sup>th</sup> Week of Sep. (23 <sup>th</sup> to 27 <sup>th</sup> Sep.)	Load test DC series motor	Experimentation
11.	1 <sup>st</sup> Week of October (1 <sup>st</sup> to 4 <sup>th</sup> Oct.)	Load Characteristics of DC Compound generators	Experimentation
12.	2 <sup>nd</sup> Week of October (7 <sup>th</sup> to 11 <sup>th</sup> Oct)	Assessment 2	



13.	3 <sup>rd</sup> Week of October (14 <sup>nd</sup> to 18 <sup>th</sup> Oct)	Parallel operation of transformers <i>and Sumpners's test</i>	Demonstration
14.	4 <sup>th</sup> Week of October (21 <sup>th</sup> Oct. to 25 <sup>th</sup> Oct.)	Comprehensive performance assessment	written & Viva voce
15.	5 <sup>th</sup> Week of October (28 <sup>th</sup> to 1 <sup>st</sup> Nov.)	Compensation Laboratory & Submission of Lab reports	--
16.	1 <sup>st</sup> Week of November (4 <sup>th</sup> Nov. to 8 <sup>th</sup> Nov.)	Final Assessment (End Semester Examination)	Practical Examination

**COURSE ASSESSMENT METHODS (shall range from 4 to 6)**

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Assesment 1 (Evaluation of experimentation, fair record and Viva voce on 1-4 lab sessions)	During regular lab session for 1-4 experiments	4 sessions	20
2	Assesment 2 (Evaluation of experimentation, fair record and Viva voce on 5-9 lab sessions)	During regular lab session for 5-9 experiments	5 sessions	20
3	Comprehensive performance assessment (written and viva voce)	Week 14 (21 <sup>st</sup> Oct. to 25 <sup>th</sup> Oct.)	1 session	10
4	End semester examination	Week 16 (4 <sup>th</sup> Nov. to 8 <sup>th</sup> Nov.)	3 hours	50

**COURSE EXIT SURVEY (mention the ways in which the feedback about the course shall be assessed)**

- Feedback from the students during class committee meetings
- Anonymous feedback through questionnaire (Mid of the semester & 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. All the correspondence (schedule of classes/ schedule of assessment/ course material/ any other information regarding this course) will be done through their webmail only.

**COMPENSATION ASSESSMENT POLICY**

- Compensation Lab session will be given for the students who are absent for 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.**
- **A maximum of 10% shall be allowed under On Duty (OD) category.**
- **Students with less than 65% of attendance shall be prevented from writing the final assessment and shall be awarded 'V' grade.**

**ACADEMIC DISHONESTY & PLAGIARISM**

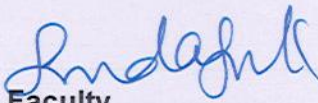
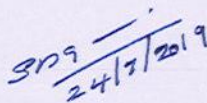
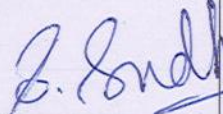
- Possessing a mobile phone, carrying bits of paper, talking to other students, copying from others during an assessment will be treated as punishable dishonesty.
- Zero mark to be awarded for the offenders. For copying from another student, both students get the same penalty of zero mark.
- The departmental disciplinary committee including the course faculty member, PAC chairperson and the HoD, as 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 be applicable for all the programmes.

**ADDITIONAL INFORMATION**

The faculty member is available for consultation during working hours of the institute.

**FOR APPROVAL**

Course Faculty  CC-Chairperson  HOD 





**Guidelines**

- a) The number of assessments for any theory course shall range from 4 to 6.
- b) Every theory course shall have a final assessment on the entire syllabus with at least 30% weightage.
- c) One compensation assessment for absentees in assessments (other than final assessment) is mandatory. Only genuine cases of absence shall be considered.
- d) The passing minimum shall be as per the regulations.

B.Tech. Admitted in				P.G.
2018	2017	2016	2015	
35% or (Class average/2) whichever is greater.		(Peak/3) or (Class Average/2) whichever is lower		40%

- e) Attendance policy and the policy on academic dishonesty & plagiarism by students are uniform for all the courses.
- f) Absolute grading policy shall be incorporated if the number of students per course is less than 10.
- g) Necessary care shall be taken to ensure that the course plan is reasonable and is objective.