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 2018	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	[x] Core course	[ ] Elective course	

Syllabus (approved in BoS)

List of Experiments

A demonstration of the static and rotational electrical machines (constructional details) is ought to be done in an introductory class.

- Open circuit and load characteristics of DC shunt/compound generator
- Swinburne's test and Speed control of DC shunt motor
- Load test on DC shunt motor
- Load test on DC series motor
- Open circuit and short circuit test on single-phase transformer
- Sumpner's test
- Parallel operation of single-phase transformer
- Electrical braking in DC shunt motor
- Three-phase transformer connections

Mini-Project

COURSE OBJECTIVES

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.

COURSE OUTCOMES (CO)

Course Outcomes	Aligned Programme Outcomes (PO)
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**

COURSE PLAN – PART II

COURSE OVERVIEW

An Electrical Machine is an electro-mechanical energy converter. It is a device that converts either mechanical energy to electrical energy - *generator* or electrical energy to mechnaical 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 electical 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 *transfomer* is an electrical device that transfoms 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 filed to accomplish the change in voltage level, they are usually studied together with electrical machines. Morevover 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.

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 performace parameters of above said electrical machines.

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.

COURSE TEACHING AND LEARNING ACTIVITIES			
S.No.	**Week/Contact Hours**	**List of experiments/ Activities**	**Mode of Delivery**
1.	2nd Week of July (9th to 13th July)	Course plan details General introduction to laboratory at class room	Lecture PPT and C&T
2.	3rd Week of July (16th to 20th July)	Open circuit characteristics of DC shunt generator	Experimentation
3.	4th Week of July (23rd to 27th July)	Load characteristics of DC Shunt generator	Experimentation
4.	1st Week of August (30th July to 3rd August)	Load Characteristics of DC Compound generators	Experimentation
5.	2nd Week of August (6th to 10th August)	Speed control of DC shunt motor	Experimentation
6.	3rd Week of August (20th to 24th August)	Load Test on DC shunt motor	Experimentation
7.	4th Week of August (13th to 17th August)	Assessment 1	
8.	5th Week of August (27th to 31st August)	Load test DC series motor	Experimentation
9.	1st Week of Sep. (3rd to 7th Sep)	Open circuit and Short circuit test on Single-phase transformer	Experimentation
10.	2nd Week of Sep. (10th to 14th Sep.)	Swinburne's test on DC shunt machine	Experimentation
11.	3rd Week of Sep. (17th to 21st Sep.)	Load test on single phase transformer	Experimentation
12.	4th Week of Sep. (24th to 28th Sep.)	Assessment 2	

13.	1st Week of October (1st to 5th Oct.)	Parallel operation of transformers *and Sumpners's test*	Demonstration
14.	3rd Week of October (15th to 19th Oct)	Comprehensive performance assessment	written & Viva voce
15.	4th Week of October (22nd to 26th Oct)	Compensation Laboratory & Submission of Lab reports	--
16.	5th Week of October (29th Oct. to 2nd 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 1-5 lab sessions)	During regular lab session for 1-5 experiments	5 sessions	20
2	Assesment 2 (Evaluation of experimentation, fair record and Viva voce on 6-9 lab sessions)	During regular lab session for 6-9 experiments	4 sessions	20
3	Comprehensive performance assessment (written and viva voce)	Week 14 (1st to 5th Oct.)	1 session	10
4	End semester examination	Week 16 (29th Oct. to 2nd 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** _____