



# NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

## DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE PLAN – PART I			
Name of the programme and specialization	B.TECH. and PRODUCTION ENGINEERING		
Course Title	Electrical and Control Systems (Theory and Lab)		
Course Code	PRPC19	No. of Credits	3
Course Code of Pre-requisite subject(s)	EEIR11		
Session	JAN 2020	Section (if, applicable)	A&B
Name of Faculty	Mr. KARTHICK KUMAR S A	Department	ELECTRICAL AND ELECTRONICS ENGINEERING
Official Email	karthicksa@nitt.edu	Telephone No.	8124441507
Name of Course Coordinator(s) (if, applicable)			
Official E-mail		Telephone No.	
Course Type (please tick appropriately)	<input checked="" type="checkbox"/> Core course	<input type="checkbox"/> Elective course	
<b>Syllabus (approved in BoS)</b>			
<p><b>Theory:</b>            DC machines - Characteristics - Starting and speed control of DC motors. Transformers: (Single phase only)- equivalent circuit and regulation - losses and efficiency - auto transformer.</p> <p>Alternators - EMF equation - regulation by synchronous impedance method - Synchronous motors starting and applications.</p> <p>Three - phase induction motor - Cage and slip ring motors -torque slip characteristics –starting and speed control of induction motors - single phase induction motors and universal motors.</p> <p>Electric drive for general factory, textile mill - pump, blowers, hoists, traction etc. - group and individual drives - Construction and working of dynamometer type watt meters and induction type energy meters.</p> <p>Control System – open loop and closed loop systems- transfer function - time response of second order system - frequency response method - polar plot. Concept of stability - application of routh criterion for simple systems.</p> <p>Laboratory Experiments:            Experiments based on Electrical Machines and Electronics</p>			



**COURSE OBJECTIVES**

1. To apply concepts of electrical drives and control systems to various industrial applications.
2. To test various electrical and electronic devices like generators, motors, semiconductor diodes, rectifiers and logic gates.

**MAPPING OF COs with POs**

Course Outcomes	Programme Outcomes (PO)
1. Understand the concepts of transformer and DC machines	1,2,3,6,10,12
2. Understand open and closed system	1,2,3,6,10,12
3. Conduct exercises to learn DC motor	1,2,3,6,8,9,10,12
4. Conduct experiments for understanding VI characteristics of diodes	1,2,6,8,9,10,12
5. Conduct experiments to learn about Logic Gates	1,2,6,8,9,10,12

**COURSE PLAN – PART II**

**COURSE OVERVIEW**

The pervasive presence of electrical and electronic appliances/devices in all aspects of engineering design and analysis is one of the manifestations of the engineering revolution that has characterized the second half of 20<sup>th</sup> Century. Every aspect of engineering practice, and even of everyday life, has been affected in some way or another by Electrical and Electronic devices and instruments. Hence any engineering graduate/practice engineer, from mechanical, production, chemical, nuclear, civil and biomedical engineering should have an irrespective of the discipline of study should have an exposure on the field of Electrical, Electronic and computer engineering to communicate effectively within the interdisciplinary team in which they are going to work/practice.

To align with the above said instrument, this course is designed for production engineering students such a way that it covers various control techniques and testing for electrical motors used in various industries. The other part of the syllabus. The other part of the syllabus engages the selection of various motors suitable for various industrial applications. Finally this course introduces time domain and frequency domain mathematical modelling of a given system, related stability analysis. This entire course mainly focuses on testing level concepts needed for industry environment.

**COURSE TEACHING AND LEARNING ACTIVITIES**

S.No.	Week/Contact Hours	Topic	Mode of Delivery
1.	Week 1 Three contact hours 6 <sup>th</sup> January to 10 <sup>th</sup> January	Introduction, basic concepts of electrical machines, DC Machines- Characteristics	Chalk & Talk / PPT
2.	Week 2 Two contact hours 13 <sup>th</sup> January to 17 <sup>th</sup> January	Starting and speed control of DC motors.	Chalk & Talk / PPT



3.	Week 3 Three contact hours 20 <sup>th</sup> January to 24 <sup>th</sup> January	Transformers: (Single phase only)- equivalent circuit and regulation - losses and efficiency	Chalk & Talk / PPT
4.	Week 4 Three contact hours 27 <sup>th</sup> January to 31 <sup>st</sup> January	Auto transformer, Alternators - EMF equation	Chalk & Talk / PPT
5.	Week 5 Three contact hours 3 <sup>rd</sup> February to 7 <sup>th</sup> February	Regulation by synchronous impedance method - Synchronous motors starting and applications.	Chalk & Talk / PPT
6.	Week 6 Three contact hours 10 <sup>th</sup> February to 14 <sup>th</sup> February	Synchronous motors starting and applications.	Chalk & Talk / PPT
7.	Week 7 Three contact hours 17 <sup>th</sup> February to 21 <sup>st</sup> February	<b>First Assessment</b> , Three - phase induction motor- Cage and slip ring motors	Chalk & Talk / PPT
8.	Week 8 Three contact hours 24 <sup>th</sup> February to 28 <sup>th</sup> February	torque slip characteristics –starting and speed control of induction motors	Chalk & Talk / PPT
9.	Week 9 Three contact hours 2 <sup>nd</sup> March to 6 <sup>th</sup> March	Single phase induction motors and universal motors.	Chalk & Talk / PPT
10.	Week 10 Two contact hours 11 <sup>th</sup> March to 12 <sup>th</sup> March	Construction and working of dynamometer type watt meters and induction type energy meters.	Chalk & Talk / PPT
11.	Week 11 Three contact hours 16 <sup>th</sup> March to 20 <sup>th</sup> March	Construction and working of induction type energy meters, Control System – open loop and closed loop systems	Chalk & Talk / PPT
12.	Week 12 Three contact hours 23 <sup>rd</sup> March to 27 <sup>th</sup> March	Transfer function - time response of second order system, <b>Second Assessment</b>	Chalk & Talk / PPT
13.	Week 13 Three contact hours 30 <sup>th</sup> March to 03 <sup>rd</sup> April	Frequency response method, polar plot	Chalk & Talk / PPT
14.	Week 14 Two contact hours 7 <sup>th</sup> April to 09 <sup>th</sup> April	Concept of stability - application of routh criterion for simple systems.	Chalk & Talk / PPT
15.	Week 15 Three contact hours 13 <sup>th</sup> April to 17 <sup>th</sup> April	Electric drive for general factory, textile mill - pump, blowers, hoists, traction etc.	Chalk & Talk / PPT



16.	Week 16 Three contact hours 20 <sup>th</sup> April to 24 <sup>th</sup> April	<b>Compensation Assessment</b> , group and individual drives	Chalk & Talk / PPT
15.	Week 1-6 6 <sup>th</sup> January to 14 <sup>th</sup> February	<i>Laboratory Session I</i>	<b>Practical Demonstration</b>
16.	Week 7-10 17 <sup>th</sup> February to 12 <sup>th</sup> March	<i>Laboratory Session II</i>	<b>Practical Demonstration</b>
17.	Week 11-14 16 <sup>th</sup> March to 09 <sup>th</sup> April	<i>Laboratory Session III</i>	<b>Practical Demonstration</b>
18.	Week 15-16 13 <sup>th</sup> April to 13 <sup>th</sup> April	<i>Laboratory Session IV</i>	<b>Practical Demonstration</b>

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

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	First Assessment – First Class Test (MCQ Based)	Week 7 17 <sup>th</sup> February to 21 <sup>st</sup> February	45 Minutes	15
2	Second Assessment – Second Class Test (MCQ Based)	Week 12 23 <sup>rd</sup> March to 27 <sup>th</sup> March	45 Minutes	15
3	Assignment/ Surprise Test/ Attendance/ Seminar /	Throughout Semester		15
4	Continous Session Assessment (For Laboratory Experiments)	Throughout Semester		25
CPA	Compensation Assessment*	Week 17 20 <sup>th</sup> April to 24 <sup>th</sup> April	45 Minutes	15
5	Final Assessment *	27 <sup>th</sup> April to 13 <sup>th</sup> May	One and Half Hour	30

**\*mandatory; refer to guidelines on page 6.**

**ESSENTIAL READINGS: Textbooks, Reference books, website address, journals,etc**

1. Theraja, B.L., Electrical Technology, Vol. 1 and 2, S.Chand and Co. Ltd, 23rd and 24th Edition, 2009.
2. I J Nagrath and Gopal M, "Control Systems Engineering", New Age Publishers, 4<sup>th</sup> Edition, 2009
3. D P Kothari and I J Nagrath, "Electric Machines", 4<sup>th</sup> Editon, McGraw Hill Education (India) Private Limited, 2010
4. Boylestead, Electronics Devices and Integrated Circuits, PHI Publishers, 2008.
5. Dubey G K, Fundametnals of Electric Drives, Narosa Book Distributors, 2<sup>nd</sup> Edition, 2012.
6. Edward Hughes, "Electrical and Electronic Technology", Pearson Publications, 10<sup>th</sup> Edition, 2012

**COURSE EXIT SURVEY**

1. Feedback from the students during class committee meetings



2. Anonymous feedback through questionnaire (Mid of the semester & End of the semester)
3. End semester feedback on course outcomes

**COURSE POLICY**

1. Attending all the assessments mandatory for every student
2. One compensation assessment will be conducted for those students who are being physically absent for the assessment 1 and/or 2, only for the valid reason. No compensation test for other assessments.
3. At any case CPA will not be considered as an improvement test.
4. Relative grading will be adopted for the course.

**MODE OF CORRESPONDENCE (email/ phone etc.)**

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.
2. Queries to the course teacher shall only be emailed sakarthickkumar@gmail.com

**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, IF ANY**

**FOR APPROVAL**

Course Faculty

*Srinivasan*

CC- Chairperson

*Dr. V. Sathash Kumar*

HOD

*[Signature]*



**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.