

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

COURSE OUTLINE			
Course Title	Electrical and Control Systems Engineering		
Course Code	PRPC19	No. of Credits	03
Department	Production Engineering (Section 'A' and 'B')	Faculty	Dr. P. RAJA
Pre-requisites Course Code	EEIR11		
Course Coordinator(s) (if, applicable)	Not Applicable		
Other Course Teacher(s)/Tutor(s) E-mail	--	Telephone No.	0431-250 3264 9942680653
Course Type	<input checked="" type="checkbox"/> Core course	<input type="checkbox"/> Elective course	

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 20th 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/practicing 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 requirement, 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 engages the selection of various motors suitable for various industrial applications. Finally this course introduces time domain and frequency domain mathematical modeling of a given system, related stability analysis. This entire course mainly focuses on design level concepts mainly needed for industry environment.

COURSE OBJECTIVES

- To provide the key concepts about Transformers, DC and AC motors and thereby able to choose the appropriate drives for various applications.
- To equip students to understand and apply the basic concepts of mathematic modeling of given system and stability analysis of the same system in time and frequency domain.

COURSE OUTCOMES (CO)

Course Outcomes	Aligned Programme Outcomes (PO)
Upon completion of the course the students would be able to	
1. Analyze the performance of DC Motors and Transformers under various operating conditions using their various characteristics	1,4,5,7,9,10 & 12
2. Describe different types AC motors and their characteristics	1,3,4,5,7,9,10 & 12
3. Select appropriate drive for any industrial application	1,2,3,4,5,7,8, 9,10,11&12
4. Analyze the given system in terms for stability aspect in frequency and time domains.	1,2,3,4,5,7,8, 9,10,&12

COURSE TEACHING AND LEARNING ACTIVITIES			
S.No.	Week	Topic	Mode of Delivery
1	1 st Week of January (4 th to 6 th January) (3 Contact Hours)	Course plan details Diagnostic Test (Objective Type) Basics of Transformer	Discussion, Interactive Session Lecture L&T
2	2 nd Week of January (9 th to 13 th January) (3 Contact Hours)	Equivalent circuit, Regulation Losses and Efficiency of two winding transformer	Lecture C&T
3	2 nd Week of January (9 th to 13 th January)	Laboratory Session - I	Practical Demonstration
4	3 rd Week of January (16 th to 20 th January) (3 Contact Hours)	DC Motors: Types and Characteristics	Lecture C&T
5	4 th Week of January (23 rd to 27 th January) (2 Contact Hours)	DC Motor: Starting and Speed Control Applications Assessment I	Lecture C&T Objective Type
6	4 th Week of January (23 rd to 27 th January)	Laboratory Session - II	Practical Demonstration
7	5 th Week of January (30 th Jan to 3 rd Feb) (3 Contact Hours)	Alternator-Fundamentals and EMF equation Regulation by synchronous impedance method	Lecture C&T
8	2 nd Week of February (6 th to 10 th February) (3 Contact Hours)	Synchronous Motor : Starting and Applications Compensation Assessment I	Lecture C&T and PPT Written Test
9	3 rd Week of February (13 th to 17 th February) (2 Contact Hours)	Three-phase induction motor: Principle and Types	Lecture C&T and PPT
10	4 th Week of February (20 th to 24 th February) (3 Contact Hours)	Three-phase induction motor: Torque-speed Characteristics	Lecture C&T
11	5 th Week of February (27 th Feb to 3 rd March) (3 Contact Hours)	Three-phase induction motor: Starting and Speed Control	Lecture C&T and PPT
12	5 th Week of February (27 th Feb to 3 rd March)	Laboratory Session - III	Practical Demonstration
13	2 nd Week of March (6 th to 10 th March) (3 Contact Hours)	Single-phase induction motors and Universal Motors Assessment II	Lecture C&T and PPT Objective Type Test

14	3 rd Week of March (13 th to 17 th March) (2 Contact Hours)	Electric Drives for various industrial applications	Lecture C&T and PPT
15	4 th Week of March (20 th to 24 th March) (3 Contact Hours)	Electric Drives for various industrial applications Compensation Assessment II	Lecture C&T Written Test
16	5 th Week of March (27 th to 31 st March) (3 Contact Hours)	Control System- open loop and closed loop systems- transfer function	Lecture C&T
17	5 th Week of March (27 th to 31 st March)	Laboratory Session - IV	Practical Demonstration
18	1 st Week of April (3 rd to 7 th April) (2 Contact Hours)	Time response of second order system Frequency response method - Bode plot Assessment IV	Lecture C&T Group Task - II
19	2 nd Week of April (10 th to 14 th April.) (2 Contact Hours)	Concept of stability - application of Routh criterion for simple systems Assessment V	Lecture C&T Group Task - III
20	3 rd Week of April (17 th to 21 st April) (3 Contact Hours)	Compensation Assessment III	Written Test
21	4 th Week of April (24 th to 28 th April)	ASSESSMENT VI	Descriptive Written Exam

C&T : Chalk and Talk

PPT : Power Point

COURSE ASSESSMENT METHODS

Asst. No.	Mode of Assessment	Week/Date	Duration	% Weightage
I	Objective Type Test I	4 th Week of January	30 Minutes	10
II	Objective Type Test II	1 st Week of March	60 Minutes	20
III	Minute Paper	Surprise (Two Times)	10 mints. (each time)	10
IV	Group Task II	1 st Week of April	Online submission	05
V	Group Task III	2 nd Week of April	60 minutes	15
VI	Descriptive Type Examination (End Semester)	4 th Week of April	120 Minutes	40

Compensation Assessment I and II are for Assessment I and II respectively. Compensation Assessment III is for Assessments IV and V. For further details go through the Courser policy.

ESSENTIAL READINGS : Textbooks, Reference Books Website addresses, journals, etc.

1. Theraja B L, Theraja A K, Textbook of Electrical Technology, S Chand publisher, 23rd Edition, 2007.
2. Edward Hughes, Electrical and Electronic Technology, Pearsor Publishers, 10th Edition, 2012.
3. Dubey G K, Fundamentals of Electric Drives, Narosa Book Distributors, 2nd Edition, 2012.
4. I J Nagrath and M Gopal, Control Systems Engineering, New Age Publishers, 4th Edition, 2009.

COURSE EXIT SURVEY (mention the ways in which the feedback about the course is assessed and indicate the attainment also)

- 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 (including plagiarism, academic honesty, attendance, etc.)

CORRESPONDENCE

1. All the students are advised to check their email given by them 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 (if required) to the course teacher shall only be emailed to prod.ecsnitt@gmail.com

ATTENDANCE

1. Attendance will be taken by the faculty in all the contact hours.
2. Maintaining overall 75 % of minimum attendance is one of the essential eligible criteria to attend the Assessment VI.
3. A Student who neither maintain minimum 75% of attendance in the mentioned contact hours nor maintain overall 60 % of minimum assessment mark (out of assessments I, II, III, IV and V) will have to RE DO the course.

ASSESSMENT

1. Attending all the assessments is **MANADATORY** for every student.
2. If a student is not able to attend the continuous assessments (CAs) I and II due to genuine reason and/or with prior permission, student is permitted to attend the compensation assessment (CPA) I and II respectively with % weightage equal to respective CAs.
3. There is **NO COMPENSATION** Assessment for Assessment III.
4. If a student is not able to attend any one or both the IV and V due to genuine reason and/or with prior permission, student is permitted to attend the compensation assessment III with % weightage of 20 marks. However the % of weightage considered for the calculation of the CA will be according to the number of missed assessments (IV and V).

5. A Student who either maintains minimum 75% of attendance in the mentioned contact hours or maintains overall 60 % of minimum assessment mark (out of assessments I, II, III, IV and V) is eligible to attend the Assessment VI.
6. Final grading will be based on the Academic regulation.

ACADEMIC HONESTY & PLAGIARISM


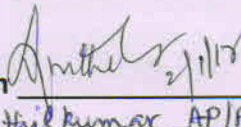
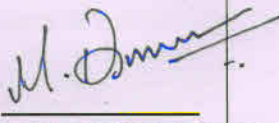
1. All the students are expected to be genuine during the course work. Taking of information by means of copying simulations, assignments, looking or attempting to look at another student's paper or bringing and using study material in any form for copying during any assessments is considered dishonest.
2. Tendering of information such as giving one's program, simulation work, assignments to another student to use or copy is also considered dishonest.
3. Preventing or hampering other students from pursuing their academic activities is also considered as academic dishonesty.
4. Any evidence of such academic dishonesty will result in the loss of marks on that assessment. Additionally, the names of those students so penalized will be reported to the class committee chairperson and HoD of the concerned department.
5. Students who honestly producing ORIGINAL and OUTSTANDING WORK will be REWARDED.

ADDITIONAL COURSE INFORMATION

The faculty is available for consultation at times as per the intimation given by the faculty.

Queries may also be emailed to the faculty directly at gmail.com

FOR APPROVAL

Course Faculty  02/01/2017
 CC-Chairperson  2/1/17
 HOD 
 (Dr. V. Senthil Kumar, AP/PROD) PRODUCTION ENGR.