

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

COURSE PLAN – PART I			
Course Title	INDUSTRIAL CONTROL ELECTRONICS (M.Tech, Power Electronics)		
Course Code	EE656	No. of Credits	3
Course Code of Pre-requisite subject(s)	Fundamental knowledge about Analog, Digital and Power Electronic circuits.		
Session	Jan 2018	Section (if, applicable)	NA
Name of Faculty	Mr.O.Naga Dutta	Department	EEE
Email	nagad@nitt.edu	Telephone No.	7396531803, 8374910355
Name of Course Coordinator(s) (if, applicable)	NA		
E-mail		Telephone No.	
Course Type	<input checked="" type="checkbox"/> Core course	<input type="checkbox"/> Elective course	
Syllabus (approved in BoS)			
<p>Review of switching regulators and switch mode power supplies, Uninterrupted power supplies- offline and on-line topologies-Analysis of UPS topologies, solid state circuit breakers, solid-state tap changing of transformer.</p> <p>Analog Controllers - Proportional controllers, Proportional – Integral controllers, PID controllers, derivative overrun, integral windup, cascaded control, Feed forward control, Digital control schemes, control algorithms, programmable logic controllers - sensors for high voltage and current applications.</p> <p>Signal conditioners-Instrumentation amplifiers – voltage to current, current to voltage, voltage to frequency, frequency to voltage converters; Isolation circuits – cabling; magnetic and electro static shielding and grounding.</p> <p>Opto-Electronic devices and control , electronic circuits for photo-electric switches-output signals for photo-electric controls; Applications of opto-isolation, interrupter modules and photo sensors; Fibre-optics; Bar code equipment, application of barcode in industry.</p> <p>Stepper motors – types, operation, control and applications; servo motors- types, operation, control and applications – servo motor controllers – servo amplifiers – linear motor applications-selection of servomotor.</p>			
COURSE OBJECTIVES			

This course combines the analog and digital concepts together with power electronics for the design of the controllers. This course gives a comprehensive coverage of various control electronics used in the industries.. Further an overview of types, operation and control of servo motors and stepper motors.

COURSE OUTCOMES (CO)

Course Outcomes	Aligned Programme Outcomes (PO)
1. Understanding the working of various power electronic circuits and components used in industrial applications.	PO1,PO3,PO4,PO6,PO7, PO8, PO9 &PO14.
2. Analyze various analog controllers and signal conditioning circuits.	PO1,PO2,PO3,PO4,PO6, PO7, PO8, PO9 &PO14.
3. Design control circuits for UPS and other industrial applications.	PO1,PO2,PO3,PO4,PO6, PO7, PO8, PO9 &PO14.

COURSE PLAN – PART II

COURSE OVERVIEW

A study on the operating principles of electronic devices and discrete control systems with an introduction to industrial control electronics. Topics will include methods of controlling, protecting and specifying motors and their controls. Components covered will include: circuit breakers, programmable logic controllers and analog controllers, signal conditioners and isolation circuits which emphasis on industrial applications. Thyristors, photosensitive devices, optically coupled devices, and timer control circuits are discussed.

COURSE TEACHING AND LEARNING ACTIVITIES

S.No.	Week/Contact Hours	Topic	Mode of Delivery
1.	Weeks 1 to 2 (contact 6 hours)	Review of switching regulators and switched Mode power supplies	Lecture C&T/PPT
2.	Week 3 (contact 3 hours)	Numerical examples /problem solving	Group work
3.	Weeks 4 to 5 (contact 6 hours)	Uninterrupted Power Supplies and solid state circuit breakers	Lecture C&T/PPT
4.	Weeks 6 to 7 (contact 6 hours)	Analog Controllers	Lecture C&T

5.	Week 8 (contact 3 hours)	Numerical examples /problem solving	Group work
6.	Weeks 9 to 10 (contact 6 hours)	Signal conditioners and Isolation circuits	Lecture C&T
7.	Weeks 11 to 12 (contact 6 hours)	Opto- Electronic Devices and Control	PPT
8.	Weeks 13 (contact 2 hours)	Numerical examples /problem solving	Group work
9.	Weeks 13 to 14 (contact 4 hours)	Stepper and Servo motors operation and control	Lecture C&T
10.	Week 15 (Contact 3 hours)	Stepper and servo motor applications, selection of servo motor.	Seminar talk

COURSE ASSESSMENT METHODS (shall range from 4 to 6)

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Cycle Test 1	Week 6	1 hr	20%
2	Cycle Test 2	Week 13	1 hr	20%
3	Assignment	Week 8		10%
4	PPT work	Week 14	1hr	10%
CPA	Compensation Assessment*	April 3 rd week	1 hr	20%
5	Final Assessment *	April last week	2 hr	40%

*mandatory; refer to guidelines on page 4

COURSE EXIT SURVEY

1. Student's feedback through class committee meetings.
2. Feedback questionnaire from students – twice during the semester.
3. Feedback from students on Course Outcomes at the end of the semester.

COURSE POLICY

MODE OF CORRESPONDENCE (email/ phone etc)

prataporuganti@gmail.com 7396531803, 8374910355

ATTENDANCE

All the students are expected to attend all the contact hours. Anyhow students who fall short of 75% attendance to the contact hours have to appear for compensation test and should score at least 50% marks else they are not eligible to appear the end semester examination.

COMPENSATION ASSESSMENT

Compensation test is applicable for all the candidates who are absent for either CT1, CT2 or both and those who have attendance shortage below 75% only. Only one compensation test will be conducted with all the topics that are covered in both CT1 and CT2.

ACADEMIC HONESTY & PLAGIARISM

No retest will be conducted for those students who are being physically absent for any of the evaluation / assessment methods. Anyhow flexibility is given to the students to fix the date for each mode of evaluation convenient to all the students. In case of emergency, the student may submit compensatory assignments on submission of appropriate documents as proof. Compensatory assignments would be framed according to the time frame available and the assessment task missed by the students.

Relative grading adhering to the instructions from the office of the Dean (Academic) will be adopted for the course. The minimum pass mark for the course is as per regulations of the institute.

In case of any student found guilty indulging in any mal practice, he/she will be awarded no marks in that particular assessment. If found using mobile phones or any other gadgets for any mal-practice during the final written examination, the answer sheet of the student will not be evaluated and will be awarded ZERO marks in the final written examination.

FOR APPROVAL

Course Faculty

Nagadutta
10/1/18

CC-Chairperson

S. Mageshwari HOD
10/1/18 for

SNY
11/1/2018