

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

<b>COURSE PLAN – PART I</b>					
<b>Course Title</b>	Control Systems Engineering				
<b>Course Code</b>	EEMI12/EEOE18	<b>No. of Credits</b>	03		
<b>Department</b>	Electrical and Electronics Engineering	<b>Faculty</b>	Dr. Shelas Sathyan		
<b>Session:</b>	July 2019	<b>Section:</b>	-		
<b>Pre-requisite Course</b>	-				
<b>Course Coordinator</b>	--				
<b>E-mail</b>	shelassathyan@nitt.edu	<b>Telephone No.</b>	9561450634		
<b>Course Type</b>	<b>Minor</b>				
<b>SYLLABUS (APPROVED BY BOS)</b>					
Modelling of physical systems - Time-domain specifications - Generalized error series – various test signals and its importance- Routh-Hurwitz stability criterion - Root Locus Technique: Definitions - Root locus diagram - Rules to construct root loci - Effect of polezero additions on the root loci - Frequency domain analysis: Bode plot - Polar plot - Nyquist plot - phase-margin - gain margin – Nyquist stability criterion - Controller design: Design of P, PI, PID, lag, lead, lead-lag compensator design.					
<b>ESSENTIAL READINGS : Textbooks, reference books, Website addresses, journals, etc</b>					
1) Katsuhiko Ogata, ‘Modern Control Engineering’, Pearson Education 2) Nagrath and Gopal, ‘Control Systems Engineering’, New Age International 3) Benjamin C Kuo and Farid Golnaraghi, ‘Automatic Control Systems’, John Wiley and Sons 4) M. Gopal, ‘Control Systems’, Tata McGrawHill					
<b><u>COURSE OBJECTIVES</u></b>					
To equip students with fundamentals of control systems					
<b><u>COURSE OUTCOMES (CO)</u></b>					
<b>Course Outcomes</b>	<b>Aligned Programme Outcomes (PO)</b>				
The students will be able to 1) understand the concepts of closed	<b>COs/POs</b>	<b>Course Outcomes (COs)</b>			
	<b>POs</b>	1	2	3	4



loop control systems 2) analyze the stability of closed loop control systems 3) apply the techniques to any electrical systems 4) design the classical controllers for electrical systems.	1	M	H	L	M
	2	M	H	L	M
	3	M	H	L	M
	4	M	H	L	M
	5	M	H	L	M
	6	M	H	L	M
	7	M	H	L	M
	8	M	H	L	M
	9	M	H	L	M
	10	M	H	L	M
	11	M	H	L	M
	12	M	H	L	M
	13	M	H	L	M
	14	M	H	L	M

### COURSE PLAN – PART II

#### COURSE OVERVIEW

This is a basic course on control systems involving time domain, frequency domain and stability analyses of systems along with their controller design.

#### COURSE TEACHING AND LEARNING ACTIVITIES

S. No.	Week	Topic	Mode of Delivery
1.	4 <sup>th</sup> Week of July (3hrs)	Introduction to Control Systems with Examples	PPT/Chalk & Talk
2.	5 <sup>th</sup> Week of July (2hrs)	Modeling of Physical Systems	PPT/Chalk & Talk
3.	1 <sup>st</sup> Week of August (1 hrs)	Generalized Error Series and Test Signals & Intro to Time Domain Analysis	PPT/Chalk & Talk
4.	2 <sup>nd</sup> Week of August (2hrs)	Generalized Error Series and Test Signals & Intro to Time Domain Analysis	PPT/Chalk & Talk
5.	3 <sup>rd</sup> Week of August (2hrs)	Generalized Error Series and Test Signals & Intro to Time Domain Analysis	PPT/Chalk & Talk
6.	4 <sup>th</sup> Week of August (3hrs)	Routh Hurwitz Stability Criterion	PPT/Chalk & Talk
7.	5 <sup>th</sup> Week of August (3hrs)	Routh Hurwitz Stability Criterion	PPT/Chalk & Talk



8.	1st Week of Sept (3hrs)	Routh Hurwitz Stability	PPT/Chalk & Talk
9.	5 <sup>th</sup> Week of August (3hrs)	Root Locus Technique + <b><i>Class Test-1</i></b>	PPT/Chalk & Talk
10.	1 <sup>st</sup> Week of Sept (3hrs)	Root Locus Technique	PPT/Chalk & Talk
11.	2 <sup>nd</sup> Week of Sept (2hrs)	Intro to Frequency Domain Analysis and Bode Plot	PPT/Chalk & Talk
12.	3 <sup>rd</sup> Week of Sept (3hrs)	Intro to Frequency Domain Analysis and Bode Plot	PPT/Chalk & Talk
13.	4 <sup>th</sup> Week of Sept (3hrs)	Polar/Nyquist plot + <b><i>Class Test-2</i></b>	PPT/Chalk & Talk
14.	1 <sup>st</sup> Week of October (2hrs)	Polar/Nyquist plot	PPT/Chalk & Talk
15.	2 <sup>nd</sup> Week of October (2hrs)	Intro to Controller and Compensator Designs	PPT/Chalk & Talk
16.	3 <sup>rd</sup> Week of October (3hrs)	Compensator Designs Continued – Lead-Lag	PPT/Chalk & Talk
17.	4 <sup>th</sup> Week of October (3hrs)	Numerical Solving/Tutorial	PPT/Chalk & Talk
18.	5 <sup>th</sup> Week of October (2hrs)	Numerical Solving/Tutorial + <b><i>Quiz</i></b>	PPT/Chalk & Talk
19.	1 <sup>nd</sup> Week of November (3hrs)	Compensation Test + <b><i>Assignment</i></b>	
20.	3rd Week of November (2hrs)	<b><i>End Sem Exam</i></b>	



## **COURSE ASSESSMENT METHODS**

<b>S. No.</b>	<b>Mode of Assessment</b>	<b>Week/Date</b>	<b>Duration</b>	<b>% Weightage</b>
1.	Class Test-1	5th Week of August	1 hour	20%
2.	Class Test-2	4th Week of Sept	1 hour	20%
3.	Assignment	1 <sup>st</sup> Week of November		10%
4.	Quiz	5th Week of October	1 hour	10%
5.	End Semester Examination	3rd Week of November	2 hour	40%
6.	Compensation test (Full Portions)	2 <sup>nd</sup> Week of November	1 hours	20%

## **COURSE EXIT SURVEY**

1. Students feedback through class committee meetings
2. Feedback from students on the course outcomes shall be obtained at the end of the course

## **COURSE POLICY**

**COMPENSATION ASSESSMENT:** Attending all the assessments are mandatory for every student. If any student fails to attend the assessment due to genuine reason like medical emergency, the student may be permitted to appear the compensation assessment (CPA) on submission of appropriate documents as proof. The compensation assessment (CPA) will cover full syllabus. CPA is not considered as an improvement test. Minimum attendance to appear for compensation is 80%.

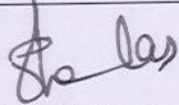
**ATTENDANCE POLICY:** All the students are expected to attend all the contact hours. Students should maintain 75% minimum physical attendance by the end of the course to attend the end semester examination. Students with less than 65% of attendance shall be prevented from writing the final assessment and shall be awarded 'V' Grade and will have to REDO the course. A maximum of 10% attendance shall be allowed under On Duty (OD) category. OD is allowed only for the students having minimum attendance of 65%.

**ACADEMIC HONESTY & PLAGIARISM:** In case of any student found guilty indulging in any mal practice, the student will be awarded no marks in that assessment. If found using mobile phones or any other gadgets for mal-practice during the examination, the answer sheet of the student will not be evaluated and will be awarded ZERO marks.

**MODE OF COMMUNICATION:** The Faculty is available for consultation during the time intimated to the students then and there. For correspondence, please contact [shelassathyan@nitt.edu](mailto:shelassathyan@nitt.edu).



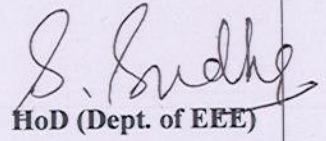
**FOR APPROVAL**



**[Dr. Shelas Sathyan, AP/EEE]  
Course Faculty**



**Course Coordinator**



**HoD (Dept. of EEE)**