DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

NATIONAL INSTITUTE OF TECHNOLOGY: TIRUCHIRAPPALLI

COURSE OUTLINE			
Course Title	Control Systems – B Section		
Course Code	EEPC20	No. of credits	04
Department	EEE	Faculty	Dr. V. Sankaranarayanan
Pre-requisites course code	MA102, MA205		
Course Co-ordinator(s)	----		
Other Course Teacher(s)/Tutor(s) E-mail		Telephone No.	0431-250-3268
Course Type	☑ Core course		☐ Elective course

COURSE OVERVIEW
This course on control systems involves time domain and frequency domain analysis of system. It also deals with stability analysis and various controller design for a system.
COURSE OBJECTIVE
To equip the students with the fundamental concepts in control systems

COURSE OUTCOMES (COs)

Upon completion of the course, the students will be able to

1. Understand the concept of linear time invariant system
2. Modelling of simple physicalsystems
3. Time-domain analysis
4. Frequency domain analysis
5. Stability of LTI systems
6. Simple controller designtechniques.

Aligned Programme Outcomes (POs)

COs/POs		Course outcomes (Cos)			
		1	2	3	4
Programme Outcomes (POs)	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 TEACHING AND LEARNING ACTIVITIES

Sl.No.	Week	Topic	Mode of delivery
1	2nd week of July , 2017 (10 – 14)	Introduction, historical perspective of control theory	Lecture/ Tutorial C & T/ PPT or any suitable mode
2	3rd week of July , 2017 (17 – 21)	Concept of open loop, closed loop, LTI system, transfer functions	
3	4th week of July , 2017 (24-28)	Modelling of physical systems and its transfer functions	
4	1st week of August, 2017 (1 – 4)	Importance of various signals such as impulse, step and ramp signals	
5	2nd week of August, 2017 (7-11)	Analysis of steady state error for various inputs based on types and order of the systems	
6	3rd week of August, 2017 (14 – 18)	Stability of open-loop and closed-loop system BIBO stability	
7	4th week of August , 2017 (21 – 25)	Routh and Hurwitz conditions for stability	
8	5th week of August, 2017 (28-31)	Introduction to Routh-locus method	
9	1st week of September, 2017 (1-8)	Routh-locus method	
10	2nd week of September,2017 (11-15)	Introduction to frequency response analysis	
11	3rd week of September, 2017 (18 – 22)	Bode-plot	
12	4th week of September, 2017 (25 – 29)	Nyquist plot and Nyquist stability criterion	
13	1stweek of October, 2017 (3-6)	Introduction to controller design	
14	2ndweek of October, 2017 (9-13)	Controller design using time-domain methods	
15	3rdweek of October, 2017 (16,17)	Controller design using frequency-domain methods	

16	4th week of October, 2017 (23-27)	Introduction to PID controller	Lecture/ Tutorial C & T/ PPT or any suitable mode
17	5th week of October, 2017 (30-31)	Introduction to laboratory experiments	
18	1st week of November, 2017 (1-3)	Lab-experiment assessment	
19	2nd week of November, 2017 (6-10)	Mini project assessment	
20	3rd week of November, 2017 (13- 17)	Final assessment	

C & T : Chalk and Talk and PPT : Power Point

COURSE ASSESSMENT METHODS

S.No.	Mode of Assessment	Week/Date	% Weightage
1.	Assessment – 1 (Objective type)	July last week	10
2.	Assessment – 2 (Descriptive type)	August third week	15
3.	Assessment – 3 (Open test)	September second week	15
4.	Assessment – 4 (Tutorial test)	October second week	10
5	Assessment – 5 (Lab and mini project)	November first week	20
6.	Assessment – 6 **Final Assessment**	November last week	30

Note:

1. **Relative grading will be based on the clusters (range) of the total marks (all the Assessments i.e. from 1 to 6, put together for each student) scored for grading by adopting Gap theory / Normalized curve. Letter grades, minimum pass marks and the corresponding grade points will be as per institute norms.**
2. **Suggestion (if any) from Class Committee / Office of the Dean (Academic) on the assessment / grading will be honored with intimation to the students.**

ESSENTIAL READINGS : Textbooks, reference books Website addresses, journals, etc

1. Katsuhiko Ogata, 'Modern Control Engineering', Pearson Education Publishers, 5th Edition, 2010.
2. Nagrath I.J. and Gopal M, 'Control Systems Engineering', New Age International Publications, 5th Edition, 2010.
3. Richard C. Dorf and Robert H. Bishop. 'Modern control systems', Pearson Prentice Hall Publications, 12th Edition, 2010.
4. Gene F. Franklin, J. David Powell and Abbas Emami-Naeini, 'Feedback control of Dynamic Systems', Pearson Education India Publications, 6th Edition, 2008.
5. Benjamin C.Kuo and Farid Golnaraghi, 'Automatic Control Systems', John Wiley & Sons Publications, 8th Edition, 2002.

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

COURSE POLICY (including plagiarism, academic honesty, attendance, etc.)

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.
2. Queries (if required) may be emailed to me / contact me during 4.00 pm to 5.00 pm on Monday and Friday with prior intimation for any clarifications.

ATTENDANCE

1. Those who score less than 75% of marks should ensure 90% of attendance to write the assessment. The attendance percentage is calculated between two subsequent assessments. Minimum 4 internal assessment should be attended to write the final assessment. Those who miss any assessment for genuine reason can write one re-test of any nature.

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 for necessary action.
5. Students who honestly produce ORIGINAL and OUTSTANDING WORK will be REWARDED.

FOR APPROVAL

Course Faculty	CC-Chairperson	HOD
	17/7/2017	20/07/2017