SRM UNIVERSITY

Faculty of Engineering and Technology

DEPARTMENT OF ICE

Course Code : ICO308

Course Title : Modern Control Systems

Year& Semester : VI semester

Course Duration : Even Semester

Location : Tech Park

Faculty Details:

Name of the staff	Section	Office	Office Hours	Mail ID
Mrs.R.Bakiya lakshmi	ICE	Tech park	12.30 - 1.00pm	bakiyalakshmi.r@ktr.srmuniv.ac.in

Required Text Books:

1. Katsuhiko Ogata, *Modern Control Engineering*, second edition Prentice Hall of India Private Ltd, NewDelhi, 2010
2. Nagrath I J and M Gopal, *Control Systems Engineering*, I edition , Wiley and sons, 2011
3. Nagoor kani. Advanced Control Theory,RBA publication,2010

Web Resource:

- http://en.wikipedia.org/wiki/Control_engineering
- http://en.wikibooks.org/wiki/Control_Systems
- http://en.wikipedia.org/wiki/Control_theory

Prerequisite : Control Systems

Objective:

1. To understand the fundamentals of Control Systems.
2. To design the Compensators.
3. To Design P,PI,PID Controllers using time and frequency domain method.
4. To learn the concepts of Non linearities

Tentative test details and portions:

Cycle Test - I: 05.02.14 Unit I & II

Cycle Test –II: 05.03.14 Unit III & IV

Model Exam: 15.04.14 All five units

Assessment details

Cycletest-1	10
Cycle test -2	10
Model exam	20
Surprise test 1	5
Attendence	5
Total	50

Outcomes

Students who have successfully completed this course

Course outcome	Program outcome
• Basic Linear Systems. • Basic Nonlinearities.	**a:** To gain a working knowledge of the basic linear system design techniques in control systems in order to enable students to deal with real-life applications. b. To gain a working knowledge of the basic nonlinearities in control systems in order to enable students to deal with real-life applications.

Detailed Session Plan

Day	Name of the topics	Reference
DAY 1	**UNIT1**: Introduction to design	Nagrath I J and M Gopal
DAY 2	Effect of adding a pole and zero to a system	Nagrath I J and M Gopal
DAY 3	Compensating networks types	Nagrath I J and M Gopal
DAY 4	Cascade and feedback	Nagrath I J and M Gopal
DAY 5	Design of cascade lead	Nagrath I J and M Gopal
DAY 6	Design of cascade lag compensation	Nagrath I J and M Gopal
DAY 7	Design of cascade lag compensation in time domain	Nagrath I J and M Gopal

DAY 8	Problems of lag Compensator	Nagoorkani
DAY 9	Problems of lead compensator	Nagoorkani
DAY 10	Design of cascade lead in frequency domain	Nagoorkani
DAY 11	Problems on Lag-Lead Compensator	Nagoorkani
DAY 12	P controller design	Nagoorkani
DAY 13	PI controller design	Nagoorkani
DAY 14	PD controller design	Nagoorkani
DAY 15	P controller design Problems	Nagoorkani
DAY 16	PI controller design Problems	Nagoorkani
DAY 17	PD controller design Problems	Nagoorkani
DAY 18	PID controller design Problems	Nagoorkani
DAY 19	PID controller design problems	Nagoorkani
DAY 20	Surprise test 1	
DAY 21	Discussion of 2 marks	
DAY 22	Unit2: Sampled data control systems	Nagoorkani
DAY 23	Functional elements-sampling process	Nagoorkani
DAY 24	Z-transforms- properties – inverse ztransforms-	Nagoorkani
DAY 25	ZOH and First order Hold process	Nagoorkani
DAY 26	Pulse transfer functions - step response	Nagoorkani
DAY 27	Stability analysis-Jury's stability test & Discussion of 2 marks.	Nagoorkani
DAY 28	Unit 3: Concepts of State, State variable and State space model	Katsuhiko Ogata
DAY 29	SSR of linear continuous time systems using physical variables	Katsuhiko Ogata
DAY 30	SSR of linear continuous time systems using phase variables and canonical variables	Katsuhiko Ogata
DAY 31	Diagonalization and SSR of Discrete time systems	Katsuhiko Ogata
DAY 32	Solution of state equations- computation of STM & Discussion of 2 marks	Katsuhiko Ogata
DAY 33	Unit4: Concepts of Controllability and Observability	Katsuhiko Ogata
DAY 34	LTIV systems -pole placement by state feedback	Katsuhiko Ogata
DAY 35	Surprise test 2.	Katsuhiko Ogata
DAY 36	Ackerman's Formula-Observers-full order and reduced order.	Katsuhiko Ogata
DAY 37	Discussion of 2 marks	
DAY 38	Unit 5: Non-linear systems-properties	Nagoorkani
DAY 39	Common physical non-linearities-dead zone, relay,Saturation	Nagoorkani
DAY 40	Phase plane method-singular points	Nagoorkani
DAY 41	Phase trajectories	Nagoorkani
DAY 42	Stability analysis by Describing function method	Nagoorkani
DAY 43	Liapunov's stability criterion.	Nagoorkani
DAY 44	Discussion of 2 marks	

DAY 45	Revision	