Course Number and Name

BEE501 &Control Systems

Credits and Contact Hours

4&60

Course Coordinator's Name

Dr.V.Jayalakshmi

Text Books and References

Text Books:

- 1. Katsuhiko Ogata, "Modern Control Engineering" 5th Edition, Prentice Hall of India Private Ltd., New Delhi, 2012.
- Nagrath I J and Gopal.M., "Control Systems Engineering", 5th Edition, New Age International (P) Ltd, Publishers 2012.

References:

- 1. M. Gopal, "Control Systems: Principles and Design", 3rd Edition, McGraw, Hill, 2014
- 2. Benjamin C Kuo, "Automatic Control system", Prentice Hall of India Private Ltd., New Delhi 2012.
- 3. R.C. Dorf and R.H. Bishop, "Modern Control Systems", 12thEdition, Prentice, Hall, 2010.
- 4. http://www.mathworks.com/access/helpdesk/help/toolbox/control/
- 5 http://nptel.ac.in/courses/108101037

Course Description

To provide an introduction to the analysis of linear control systems. This will permit to exploit time domain and frequency domain tools

Prerequisites							Co-requisites						
Engg Matl	g Mathematics-I, Engg Mathematics –III Nil												
and Electrical Network Analysis and Synthesis													
required, elective, or selected elective (as per Table 5-1)													
					Red	quired							
Course Outcomes (COs)													
CO1: Understand the concept of control system, Electrical analogy of mechanical systems and													
the use of transfer function models for the analysis of physical systems.													
CO2: Understand, define different time domain specification parameters													
CO3: Gain knowledge in various frequency response analysis													
CO4: Understand the methods to analyze the stability of systems design of compensators.													
CO5: Understand the concept of state variable analysis and modeling of the system by the													
State variable technique.													
-													
Student Outcomes (SOs) from Criterion 3 covered by this Course													
COs/SOs	а	b	с	d	e	f	g	h	i	j	k	1	
CO1	Μ	Η	Μ	Η	Μ					L	L	М	

CO2	Н	Н	М	Н	Н					L	L	М
CO3	Н	М	М	Н	Н					L	L	М
CO4	Н	М	М	Н	Н					L	L	М
CO5	Н	М	М	Н	Н					L	L	М
List of Topics Covered												

List of Topics Covered

UNIT I SYSTEMS AND THEIR REPRESENTATION

Basic elements in control systems – Open and closed loop systems – Electrical analogy of mechanical systems – Transfer function – Synchros – AC and DC servomotors – Block diagram reduction techniques – Signal flow graphs.

UNITII TIME RESPONSE ANALYSIS

Test signals – step response of first order and second order systems – time domain specifications – response with P, PI, PID controller – type and order of a system – steady state error and generalized error coefficients.

UNIT III FREQUENCY RESPONSE ANALYSIS

Frequency domain specifications – estimation of the specification for a second order system – Bode plot – polar plot — closed loop response from open loop response

UNIT IV STABILITY AND COMPENSATOR DESIGN

Definition – characteristics equation – Routh Hurwitz criterian – Nyquist stability criterion – gain margin and phase margin – root locus – compensator design using bode plot-matlab basics for control systems.

UNIT V STATE VARIABLE ANALYSIS

Concept of state variables – State models for linear and time invariant Systems – Solution of state and output equation in controllable canonical form – Concepts of controllability and observability– Effect of state feedback.

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