BVM ENGINEERING COLLEGE [AN AUTONOMOUS INSTITUTION]

2EC12: CONTROL SYSTEMS LABORATORY
CREDITS - 1 (LTP:0,0,1)

Course Objective:
To explore the fundamentals of systems and control. To focus on (1) Understanding and predicting system behavior (2) Design and analysis of closed loop control systems and (3) System stability prediction.

Teaching and Assessment Scheme:

Teaching Scheme (Hours per week)			Credits	Assessment Scheme				Total Marks
				Theory Marks		Practical Marks		
L	T	P	C	ESE	CE	ESE	CE	100
0	0	2	1	00	00	40	60	

List of Experiments:

(a) Experiments using Trainer Kits

Unit No.	Name of Experiment
1.	To study about open loop control system: OP-AMP as comparator.
2.	To study about closed loop control system: OP-AMP as inverting amplifier
3.	To study about Type-0 control system and also find steady state error.
4.	To study about Type-1 control system and also find steady state error.
5.	To study about Type-2 control system and also find steady state error.
6.	To study about P control system.
7.	To study about PI control system.
8.	To study about PD control system.
9.	To study about PID control system.

(b) Experiments using Matlab Simulation :

Unit No.	Name of Experiment
1.	To study about open loop control system in Simulink using Matlab.
2.	To study about closed loop control system in Simulink using Matlab.
3.	To determine pole-zero configuration of transfer function of system and implementation of block diagram reduction of system in Matlab.
4.	To find out steady state error of Type-0, Type-1 and Type-2 control system in Matlab.
5.	To obtain correlation between transfer function and state space of mechanical system using Matlab.
6.	To simplify the complex block diagram in Simulink using Matlab.
7.	To find the impulse and step response of first order system using Matlab.

8. To find step response of second order system using Matlab.
9. To study about P control system and implement the same in Simulink using Matlab.
10. To study about PI control system in Simulink using Matlab.
11. To study about PD control system in Simulink using Matlab.
12. To study about PID control system in Simulink using Matlab.
13. To find root locus, bode-plot and Niquist-plot of system using Matlab.

List of References:

1. Richard C. Drof and Robert H. Bishop, "*Modern Control System*", Pearson Education, 11th Edition, 2008.
2. Katsuhiko Ogata, "*Modern Control Engineering*",Prentice Hall of India, 5thEdition,2010.
3. Benjamin C.Kuo & Farid Golnaraghi, "*Automatic Control Systems*", John Wiley & Sons, 8thEdition, 20,0,2.
4. Nagrath and Gopal, "*Control Systems Engineering*", New Age Publication, 5thEdition, 2007.

Course Outcomes (COs):

By learning this course student will be able to …

1. Demonstrate an understanding of the fundamentals of feedback control systems.
2. Understand systems theory to complex real world problems in order to obtain models that are expressed using differential equations, transfer functions, and state space equations.
3. Predict system behavior based on the mathematical model of that system where the model may be expressed in time or frequency domain.
4. Analyze the absolute stability of a closed-loop control system.
5. Apply Root-Locus, Bode-Plot and Niquist-Plot techniques to analyze and design control systems.
6. Design controllers using classical PID methods.