

## Control Systems Engineering Lab

<b>Course Code</b>	19EE3552	<b>Year</b>	III	<b>Semester</b>	I
<b>Course Category</b>	Program Core	<b>Branch</b>	EEE	<b>Course Type</b>	Lab
<b>Credits</b>	1.5	<b>L-T-P</b>	0-0-3	<b>Prerequisites</b>	NIL
<b>Continuous Internal Evaluation:</b>	25	<b>Semester End Evaluation:</b>	50	<b>Total Marks:</b>	75

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<b>Course Outcomes</b>	
Upon successful completion of the course, the student will be able to	
<b>CO1</b>	<b>Analyze</b> the performance characteristics and working of Magnetic amplifier, DC & AC servo motors and synchros. <b>(L4)</b>
<b>CO2</b>	<b>Determine</b> the transfer functions of DC Motor and DC generator and acquire compensating networks <b>(L3)</b>
<b>CO3</b>	<b>Demonstrate</b> the time response analysis and performance of PID controllers <b>(L3)</b>
<b>CO4</b>	<b>Compute/Operate</b> programmes in MATLAB software and PLC programming which will help them in doing their projects. <b>(L2 &amp; L3)</b>

<b>Mapping of course outcomes with Program outcomes (CO/ PO/PSO Matrix)</b>														
Note: 1- Weak correlation 2-Medium correlation 3-Strong correlation														
* - Average value indicates course correlation strength with mapped PO														
COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3												3	1
CO2	3	3											3	1
CO3	3	3	3	2		1							3	1
CO4	3	3		3	3							2	3	2

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<b>Syllabus</b>		
Expt. No.	Contents	Mapped CO
<b>PART-A (Any Eight Experiments)</b>		
1	Time response of Second order system	CO3
2	Characteristics of Synchros	CO1
3	Effect of P, PD, PI, PID Controller on a second order systems	CO3
4	Transfer function of DC motor	CO2
5	Temperature controller using PID	CO3
6	Characteristics of magnetic amplifiers	CO1
7	Programmable logic controller – Study and verification of truth tables of logic gates	CO4
8	Characteristics of AC servo motor	CO1
9	Characteristics of DC servo motor	CO1
10	Transfer function of DC generator	CO2
11	Lag and lead compensation – Magnitude and phase plot	CO2
<b>PART-B (Any Two Experiments)</b>		
1	Bode Plot, Root locus, Nyquist Plots for the transfer functions of systems using MATLAB.	CO4 CO2
2	Controllability and Observability test using MAT LAB.	CO4

3	State space model for classical transfer function and vice versa using MATLAB – Verification.	CO4
4	Stability of a mechanical translating system using MATLAB Simulink.	CO4
5	Block diagram representation of field controlled DC servo Motor using MATLAB Simulink.	CO4
6	Time response of first order systems for standard test signals using MATLAB	CO4 CO3

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<b>Learning Resources</b>	
<b>Text Books</b>	
<ol style="list-style-type: none"> <li>1. Control Systems by Nagoor Kani, RBA Publications, 2<sup>nd</sup> edition 2017.</li> <li>2. MATLAB and its Tool Books user's manual and – Mathworks, USA.</li> <li>3. Programmable Logic Controllers-Programming Method and Applications –JR.Hackworth &amp; F.DHackworth Jr. –Pearson, 2004</li> </ol>	