Appendix - C

GOPALAN COLLEGE OF ENGINEERING AND MANAGEMENT

Department of Electronics & Communication Engineering

Academic Year: **2016-17** Semester**: EVEN**

COURSE PLAN

Semester: **IV** Subject Code& Name: **15EC43 & Control System**

Name of Subject Teacher: **DEEPA A**

Name of Subject Expert (Reviewer): **KAVTHA M V**

For the Period: From: 1-02-17 to 19-11-16

Details of Book to be referred:

Text Books	T1:J.Nagarath and M.Gopal, " Control Systems Engineering", New Age International (P) Limited, Publishers, Fifth edition-2005, ISBN: 81-224-2008-7.
Reference Books	R1. "Modern Control Engineering," K.Ogata, Pearson Education Asia/PHI, 4th Edition, 2002. ISBN 978-81-203-4010-7. R2. "Automatic Control Systems", Benjamin C. Kuo, John Wiley India Pvt. Ltd., 8th Edition, 2008. R3. "Feedback and Control System," Joseph J Distefano III et al., Schaum's Outlines,TMH, 2nd Edition 2007.

Lecture NO	Topic Planned	Practical Applications & Brief objectives	Book referred with Pg No.	Planned Date	Executed Date	Deviation Reasons thereof	How Made Good / Reciprocate arrangement	Remarks by HOD
1.	**MODULE-1** Introduction to the subject	**Objective:** Know the basic features, configurations and application of	T1	06.02.17				
2.	Introduction and types of control systems		T1 2-3	07.02.17				

3.	Effect of feedback systems	control systems, terminologies and definitions for the control systems. Learn how to find a mathematical model of electrical, mechanical and electromechanical systems. Find the transfer function via Masons' rule. **Application:** Gear trains, electrical machines. **OUTCOME:** Able to understand the physical systems and mechanical systems. Find the overall transfer function from the block diagram and signal flow graph.	T1 5-6	08.02.17				
4.	Differential equation of physical systems- mechanical systems		T1 24-26	09.02.17				
5.	Problems on transfer function		T1	10.02.17				
6.	Problems on transfer function		T1	13.02.17				
7.	Problems on transfer function		T1	14.02.17				
8.	Differential equations of Rotational systems, Equivalent Analogous systems		T1 27-32	15.02.17				
9.	Problems on translational systems		T1	20.02.17				
10.	Problems on translational systems		T1	22.02.17				
11.	Problems on rotational systems		T1	23.02.17				
12.	Problems on rotational systems		T1	27.02.17				
13.	Block diagram reduction rules		T1 54-55	27.02.17				
14.	Problems on block diagram reduction rules		T1 58-59	01.03.17				
15.	Problems on block diagram reduction rules		T1	02.03.17				
16.	Problems on block diagram reduction rules		T1	03.03.17				
17.	Rules for drawing signal flow graph		T1 62-64	04.03.17				

18.	Problems on signal flow graph		T1	06.03.17				
19.	Problems on signal flow graph		T1	06.03.17				
20.	Revision / Unit Test			08.03.17				
21.	**MODULE-2** Introduction, Standard test signals	**Objective:** Know how to find time response from the transfer function. Analyze the stability of a system from the transfer function. **Application:** Linearization, filtering, sensor applications. **OUTCOME:** Able to Describe quantitatively the transient response of first and second order systems	T1 194-196	13.03.17				
22.	Unit step response of First Systems.		T1 197-198	13.03.17				
23.	Unit step response of First Systems.		T1 198-199	15.03.17				
24.	Unit step response of Second order Systems.		T1 199-200	16.03.17				
25.	Unit step response of Second order Systems.		T1 200-204	17.03.17				
26.	Steady state analysis(static error coefficient method)		T1 210-212	20.03.17				
27.	Steady state analysis(Dynamic error coefficient method)		T1 213-215	20.03.17				
28.	Numerical problems		T1	22.03.17				
29.	Transient response analysis-first order system		T1 204	23.03.17				
30.	Transient response analysis-second order system		T1 205-207	27.03.17				
31.	Transient response specifications(rise time ,peak time , delay time)		T1 211	27.03.17				
32.	Transient response specifications(peak		T1 212	30.03.17				

	overshoot , settling time) Introduction to PI, PD and PID Controllers (excluding design).							
33.	**MODULE-3** Introduction, Introduction about stability	**Objective:** Analyze the stability of a system from the transfer function. Analyze the stability and transient response using root locus techniques. **Application:** Designing relative stability,find out polynomial coefficients **OUTCOME:** Able to Understand and determine the stability using the Routh-Hurwitz technique, Use root-locus design to meet stability and to find the transient response.	T1 270	31.03.17				
34.	Routh's stability criterion		T1 278-280	03.04.17				
35.	Special cases for Routh's stability criterion		T1 281-283	03.04.17				
36.	Numerical problems		T1	05.04.17				
37.	Numerical problems		T1	06.04.17				
38.	Root locus introduction		T1 298	07.04.17				
39.	Basic concept of root locus		T1 299-302	10.04.17				
40.	Rules for construction of root locus		T1 302-303	10.04.17				
41.	Continued for rules for construction of root locus		T1 304-305	12.04.17				
42.	Numerical problems		T1	13.04.17				
43.	Revision/Unit test		T1	20.04.17				
44.	**Module-4** Introduction,	**Objective:** Analyze the stability of a system from the transfer function.	T1 346-347	21.04.17				
45.	Co-relation between time domain and frequency domain for second order		T1 347-352	24.04.17				

	system	**Application:** Bode plots are very useful in electronics for determining to stability of op-amps and transistors and is essentially a plot of phase against frequency compared with gain against frequency **OUTCOME:** Able to find the digital responses from the transfer function and Draw the block diagram from the dynamic equation and represent the time.						
46.	Numerical problem		T1	24.04.17				
47.	Bode plots : Basic concepts		T1 355-358	26.04.17				
48.	Bode plots of standard factors of G(jw)H(jw)		T1 359-360	27.04.17				
49.	Continued Bode plots of standard factors o G(jw)H(jw)		T1 361-367	28.04.17				
50.	Numerical problems		T1	02.05.17				
51.	Calculation of GM and PM from bode plot		T1 367-371	03.05.17				
52.	Numerical problems		T1	04.05.17				
53.	Introduction to Polar Plots,		T1 352-353	05.05.17				
54.	Mathematical preliminaries		T1 378-381	06.05.17				
55.	Nyquist stability criterion		T1 381-383	08.05.17				
56.	Numerical problems		T1 383-388	08.05.17				
57.	Introduction to lead, lag and lead-lag compensating networks		R1 330-332	10.05.17				
58.	Revision/test			10.05.17				
59.	**Module-5** Introduction, Spectrum	**Objective:** Analyze the	T1 514-518	11.05.17				

	Analysis of Sampling process	communication system with state space equations. **Application:** Image processing, power electronics applications **OUTCOME:** Able to know the Concept of state, State variables and state models of electrical systems and solution for state equations.						
60.	Signal Reconstruction, Difference equations.		T1 519-521	12.05.17				
61.	Concept of State, State variables & State model		T1 519-521	18.05.17				
62.	State variables & State model		T1 571-573	19.05.17				
63.	State model for Linear Continuous time systems		T1 574-580	22.05.17				
64.	State model for Linear Discrete time systems		T1 596-599	22.05.17				
65.	Diaganolisation		T1 599-601	23.05.17				
66.	Revision & QP solving			24.05.17				
67.	Revision & QP solving			25.05.17				
68.	Revision & QP solving			26.05.17				
69.	Revision & QP solving			29.05.17				
70.	Revision & QP solving			29.05.17				
71.	Revision & QP solving			30.05.17				
72.	Revision & QP solving			01.06.17				
73.	Revision & QP solving			02.06.17				
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Prepared By:_____ (Faculty) Date & Sign_____

Reviewed by:_____ (Sub. expert) Date & Sign_____

Approved by: _____ (HOD) Date & Sign _____

Approved by: _____ (Principal/ Acad. Co) Date & Sign _____