



# SWARNANDHRA COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous)

Accredited by NBA, AICTE, NEW DELHI • Accredited by NAAC with "A" Grade – 3.32/4.00 CGPA

Recognized by UGC Under Sections 2(f) & 12 (B) of UGC Act 1956

Approved by AICTE, New Delhi, Permanent Affiliated to JNTU K, Kakinada

Seetharampuram, NARSAPUR-534 280, W.G-Dist., Andhra Pradesh

## Department of Electrical and Electronics Engineering

### TEACHING PLAN

Course Code	Course Title	Semester	Branches	Contact Periods/ Week	Academic Year	Date of Commencement of Semester
23EE4T04	Control Systems	B.Tech / IV	ECE	6	2024-2025	16/12/2024
<b>Course Outcomes:</b> After successful completion of this course, students should be able to:						
1	Classify control systems and represent in various models (K2)					
2	Apply standard test signals to a system to determine their characteristics (K3).					
3	Make use of stability concepts to obtain the desired characteristics (K3)					
4	Determine the characteristics of a linear control system using various time and frequency domain tools (K5)					
5	Design Lag, Lead, Lag-Lead compensators to improve system performance (K6)					
Unit	Outcome/ Bloom's Level	Topics No.	Topics/ Activity	TextBook / Reference	Contact Hour	Delivery Method/ LMS
I	CO1: Classify control systems and represent in various models (K2)	<b>1. INTRODUCTION</b>				
		1.1	Introduction to control systems	T1,R1	1	PPT
		1.2	Open Loop and Closed Loop control systems and their differences	T1,R1	1	PPT
		1.3	Examples of control systems	T1,R1	1	PPT
		1.4	Feedback Characteristics	T1,R1	1	Chalk & Talk
		1.5	Mathematical modeling of control systems	T1,R1	1	Chalk & Talk
		1.6	Differential equation and transfer function of electrical networks	T1,R1	1	Chalk & Talk
		1.7	Problem solving	T1,R1	1	Chalk & Talk
		1.8	Translational Rotational systems	T1,R1	1	Chalk & Talk
		1.9	Problem solving	T1,R1	1	Chalk & Talk
		1.10	Mechanical Rotational systems	T1,R1	1	Chalk & Talk
		1.11	Problem solving	T1,R1	1	Chalk & Talk
Content beyond syllabus (if need)						
<b>Total</b>					11	
II	CO2: Apply	<b>2.TRANSFER FUNCTION REPRESENTATION &amp; TIME RESPONSE</b>				



# SWARNANDHRA

## COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous)

Accredited by NBA, AICTE, NEW DELHI • Accredited by NAAC with "A" Grade – 3.32/4.00 CGPA

Recognized by UGC Under Sections 2(f) & 12 (B) of UGC Act 1956

Approved by AICTE, New Delhi, Permanent Affiliated to JNTU K, Kakinada

Seetharampuram, NARSAPUR-534 280, W.G-Dist., Andhra Pradesh

standard test signals to a system to determine their characteristics (K3).	<b>ANALYSIS</b>				
	2.1	Introduction to Servo motor.	T1,R2	1	PPT
	2.2	Transfer Function of AC Servo motor	T1,R2	1	PPT
	2.3	Transfer Function of armature controlled DC Servo motor	T1,R2	1	PPT
	2.4	Transfer Function of field controlled DC Servo motor	T1,R2	1	PPT
	2.5	Problem solving	T1,R2	1	PPT
	2.6	Synchros	T1,R2	1	PPT
	2.7	Block Diagram Reduction Techniques,	T1,R2	1	Chalk & Talk
	2.8	Problem solving	T1,R2	1	Chalk & Talk
	2.9	Representation by Signal Flow Graph	T1,R2	1	Chalk & Talk
	2.10	Reduction Using Mason's Gain Formula	T1,R2	1	Chalk & Talk
	2.11	Problem solving	T1,R2	1	Chalk & Talk
	2.12	Standard test signals and Time response of first order systems	T1,R2	1	Chalk & Talk
	2.13	Characteristic Equation of Feedback control systems	T1,R2	1	Chalk & Talk
	2.14	Transient response of second order systems	T1,R2	2	Chalk & Talk
	2.15	Time domain specifications	T1,R2	1	Chalk & Talk
	2.16	Steady state errors and error constants	T1,R2	1	Chalk & Talk
2.17	Problem solving	T1,R2	1	Chalk & Talk	
Content beyond syllabus (if need)					
Mini Project (if possible)					
<b>Total</b>				18	
III	CO3: Make use of stability concepts to obtain the desired characteristics (K3)	<b>3. STABILITY ANALYSIS IN S-DOMAIN</b>			
3.1		The concept of stability	T3,R1	1	Chalk & Talk
3.2		Routh's stability criterion	T3,R1	2	Chalk & Talk
3.3		qualitative stability and conditional stability	T3,R1	1	Chalk & Talk
3.4	limitations of Routh's stability	T3,R1	1	PPT	





# SWARNANDHRA

## COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous)

Accredited by NBA, AICTE, NEW DELHI • Accredited by NAAC with "A" Grade – 3.32/4.00 CGPA

Recognized by UGC Under Sections 2(f) & 12 (B) of UGC Act 1956

Approved by AICTE, New Delhi, Permanent Affiliated to JNTU K, Kakinada

Seetharampuram, NARSAPUR-534 280, W.G-Dist., Andhra Pradesh

		3.5	Problem solving	T3,R1	1	Chalk & Talk
		3.6	The root locus concept	T3,R1	1	Chalk & Talk
		3.7	construction of root loci	T3,R1	2	Chalk & Talk
		3.8	effects of adding poles and zeros to G(s) H(s) on the root loci.	T3,R1	1	Chalk & Talk
		3.9	Problem solving.	T3,R1	2	Chalk & Talk
Content beyond syllabus (if need)						
<b>Total</b>					12	
IV	CO4: Determine the characteristics of a linear control system using various time and frequency domain tools (K5)	4. FREQUENCY RESPONSE ANALYSIS				
		4.1	Introduction	T2,R1, R2	1	Chalk & Talk
		4.2	Correlation between time and frequency response	T2,R1, R2	1	PPT
		4.3	Bode plot	T2,R1, R2	2	Chalk & Talk
		4.4	Polar plot	T2,R1, R2	2	Chalk & Talk
		4.5	Nyquist Stability Criterion	T2,R1, R2	2	Chalk & Talk
Content beyond syllabus (if need)						
<b>Total</b>					8	
V	CO5: Design Lag, Lead, Lag-Lead compensators to improve system performance (K6).	5. CLASSICAL CONTROL DESIGN TECHNIQUES				
		5.1	Introduction to compensators	T2,R1, R2	1	Chalk & Talk
		5.2	Design of Lag Compensators	T2,R1, R2	1	PPT
		5.3	Design of Lead Compensators	T2,R1, R2	1	PPT
		5.4	Lag-Lead Compensators	T2,R1, R2	1	Chalk & Talk
		5.5	PID Controllers	T2,R1, R2	1	Chalk & Talk
		5.6	Concepts of State, State Variables and State Model	T1,T2, R1	2	Chalk & Talk
		5.7	State Space Representation of Transfer Function	T1,T2, R1	2	PPT
		5.8	derivation of state models from block diagrams	T1,T2, R1	2	Chalk & Talk
		5.9	Diagnolisation	T1,T2, R1	2	Chalk & Talk
	5.10	State Transitions Matrix and Its Properties	T1,T2, R1	1	Chalk & Talk	

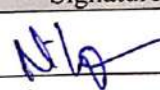
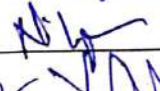
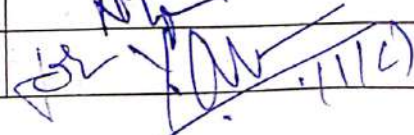


# SWARNANDHRA COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous)

Accredited by NBA, AICTE, NEW DELHI - Accredited by NAAC with "A" Grade - 3.32/4.00 CGPA  
Recognized by UGC Under Sections 2(f) & 12 (B) of UGC Act 1956  
Approved by AICTE, New Delhi, Permanent Affiliated to JNTU K, Kakinada

Seethampuram, NARSAPUR-534 280, W.G-Dist., Andhra Pradesh

		5.11	Problem solving	T1,T2, R1	1	Stud. Seminars
		5.12	Concept of Controllability and Observability.	T1,T2, R1	1	Chalk & Talk
		5.13	Problem solving	T1,T2, R1	1	Smart Board
Content beyond syllabus (if need)						
					<b>Total</b>	17
					<b>Cumulative Proposed Periods</b>	
						66
<b>Text Books:</b>						
S. No.	Author, Book Title, Edition, Publisher, Year of Publication					
1	Kotuhiko Ogata, Modern Control Engineering, 5 <sup>th</sup> edition, Pearson, 2009					
2	Benjamin C.Kuo, Automatic control systems, First edition, McGraw Hill Education, 2018					
<b>Reference Books:</b>						
S. No	Authors, Book Title, Edition, Publisher, Year of Publication					
1	M.Gopal, Control Systems principles and design, 4th Edition, Tata McGraw Hill education Pvt Ltd, 2012					
2	Manik Dhanesh N, Control Systems, 1 <sup>st</sup> edition, Cengage publications, 2012					
3	I.J.Nagarath and M.Gopal, Control Systems Engineering, 6th Edition, Newage International Publications, 2017.					
4	A. NagoorKani, Control Systems, 5 <sup>th</sup> edition, CBS Publications, 2020					
5	A.Anand Kumar, Control Systems Engineering, standard edition, CBS, 2014					
<b>Web Details:</b>						
1	<a href="https://www.youtube.com/watch?v=xWw7z5QzYgE">https://www.youtube.com/watch?v=xWw7z5QzYgE</a>					
2	<a href="https://www.youtube.com/watch?v=MIVkzOiFvhl">https://www.youtube.com/watch?v=MIVkzOiFvhl</a>					
3	<a href="https://youtu.be/4cMHfTsPz3M?list=PLgwJf8NK-2e78NzXFirvPmyRzH_JE53tW">https://youtu.be/4cMHfTsPz3M?list=PLgwJf8NK-2e78NzXFirvPmyRzH_JE53tW</a>					
4	<a href="https://www.youtube.com/watch?v=xWw7z5QzYgE">https://www.youtube.com/watch?v=xWw7z5QzYgE</a>					
5	<a href="https://www.youtube.com/watch?v=M8hx5kpSveM">https://www.youtube.com/watch?v=M8hx5kpSveM</a>					
6	<a href="https://www.youtube.com/watch?v=64zZ-mDhdtk">https://www.youtube.com/watch?v=64zZ-mDhdtk</a>					
		Name		Signature with Date		
i.	Course Coordinator	Mrs.N.Lavanya				
ii.	Module Coordinator	Mrs.N.Lavanya				
iii.	Programme Coordinator	Mr.A.Satyanarayana				

  
Principal