

MOHAMMED SATHAK A J COLLEGE OF ENGINEERING

Siruseri IT park, OMR, Chennai - 603103

LESSON PLAN							
Department of Electronics and Communication Engineering				Engineering			
Name of the Subject	Linear Integrated Circuits			Regulation	2017		
Subject Code	EC8453			Year / Sem	II/IV		
Academic Year	2021-2022			Batch	2020-2024		
Course Objectives							
To introduce the basic building blocks of linear integrated circuits							
To learn the linear and non-linear applications of operational amplifiers							
To understand the theory and applications of analog multipliers and PLL							
To learn the theory of ADC and DAC							
To know the concepts of waveform generation and introduce some special function ICs							
Course Outcomes							
CO1:Design linear and non linear applications of op – amps.							
CO2:Design applications using analog multiplier							
CO3:Design applications using analog multiplies PLL							
CO4:Design ADC and DAC using OP – AMPS							
CO5:Generate waveforms using OP – AMP Circuits and Analyze special function ICs							
Lesson Plan							
Sl. No.	Topic(s)	T / R* Book	Periods Required	Mode of Teaching (BB / PPT / NPTEL / MOOC /	Blooms Level (L1-L6)	CO	PO
UNIT I BASICS OF OPERATIONAL AMPLIFIERS							
1	Current mirror and current	T1	1	BB	L2	CO1	PO1-PO3
2	Voltage sources, Voltage	T1	1	BB	L2	CO1	PO1-PO3
3	Basic information about op-amps	T1	1	BB	L1	CO1	PO1-PO2,PO12
4	Internal circuit diagrams of IC 741,	T1	1	BB	L2	CO1	PO1-PO2
5	DC performance characteristics,	T1	1	BB	L2	CO2	PO1-PO2,PO4
6	AC performance characteristics	T1	1	BB	L2	CO2	PO1-PO2,PO4
7	slew rate, Open and closed loop configurations	T1	1	BB	L3	CO1	PO1-PO3
8	JFET Operational Amplifiers – LF155	R1	1	BB	L2	CO1	PO1-PO3
9	JFET Operational Amplifiers – TL082	R1	1	BB	L2	CO1	PO1-PO3
Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any				Assignments on JFET Op Amps			
Evaluation method :Assignment							
UNIT II APPLICATIONS OF OPERATIONAL AMPLIFIERS							
13	Voltage follower,Sign Changer, Scale Changer, Phase Shift	T1	1	BB	L2	CO1	PO1-PO4,PO12
14	V-to-I converters, I-to-V converters,List of some	T1	1	BB	L2	CO1	PO1-PO4
15	Adder ,Subtractor, Combined effect,Tutorial,	T1	1	BB	L4	CO1	PO1-PO4,PO5,PO6
16	Instrumentation amplifier using a transducer stage	T1	1	PPT	L4	CO1	PO1-PO4,PO5,PO6
17	Integrator and Practical Integrator, Differentiator and	T1	1	BB	L4	CO1	PO1-PO4
18	Comparators and various applications of Comparators	T1	1	BB	L2	CO1	PO1-PO3,PO6,PO12
19	Schmitt trigger and Precision rectifiers, Logarithmic	T1	1	BB	L2	CO1	PO1-PO4
20	Antilogarithmic amplifier, Peak detector, Applications of	T1	1	BB	L3	CO1	PO1-PO3
21	Clamper –applications. Introduction & types of active	T1	1	BB	L4	CO1	PO1-PO4,PO5,PO12
Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any : MCQ							
Evaluation method : MCQ							
UNIT III ANALOG MULTIPLIER AND PLL							
25	Analog Multiplier using Emitter Coupled Transistor Pair	R7	1	BB	L3	CO2	PO1-PO3
26	Gilbert Multiplier cell - Variable transconductance	R7	1	PPT	L2	CO2	PO1-PO3
27	Analog multiplier ICs and their applications	R7	1	BB	L3	CO2	PO1-PO3,PO4,PO12
28	Introduction to PLL, Different blocks of a PLL, IC	R7	1	BB	L2	CO3	PO1-PO3,PO4,PO5,P
29	Types of Phase Detector, Voltage Controlled Oscillator	R7	1	BB	L2	CO3	PO1-PO3
30	Derivation of Lock-in-range and Capture range	R7	1	BB	L3	CO3	PO1-PO3
31	Closed loop analysis,IC565, Monolithic 566	R7	1	BB	L3	CO3	PO1-PO3
32	Various applications of PLL-FM detector, AM detection,	R7	1	BB	L4	CO3	PO1-PO4,PO5,PO12
33	Frequency synthesizing	R7	1	BB	L2	CO3	PO1-PO4
Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any :Assignment							
Evaluation method :Assignment							
UNIT IV ANALOG TO DIGITAL AND DIGITAL TO ANALOG CONVERTERS							
37	Introduction to analog & digital data converters and the need	T1	1	BB	L1	CO4	PO1-PO3,PO12
38	Specifications of D/A converters, 4 bit Weighted resistor type	T1	1	BB	L2	CO4	PO1-PO3
39	R-2R ladder type of D/A converter, Voltage & Current mode	T1	1	BB	L3	CO4	PO1-PO3
40	High speed sample-and-hold circuits, Over-sampling A/D	T1	1	BB	L2	CO4	PO1-PO3,PO4
41	A/D converters, Specifications, Types of A/D converters	T1	1	BB	L2	CO4	PO1-PO3,PO6,PO12
42	Flash type converter, Successive Approximation type converter	T1	1	BB	L4	CO4	PO1-PO4,PO5
43	A/D Converter using Voltage-to-Time Conversion	R1	1	BB	L3	CO4	PO1-PO3
44	Single Slope type and Dual Slope type A/D Converter	R1	1	PPT	L3	CO4	PO1-PO3
45	Oversampling A/D converters, Comparison of all converters,	R1	1	BB	L2	CO4	PO1-PO3,PO12
Suggested Activity: Assignment / Case Studies / Tuorials/ Quiz / Mini Projects / Model Developed/others Planned if any :Assignment							
Evaluation method :Assignment							
UNIT V WAVEFORM GENERATORS AND SPECIAL FUNCTION ICS							
49	Sine wave generators/oscillator circuits using diodes &	T1	1	BB	L2	CO5	PO1-PO3
50	Introduction to Timer IC555- circuit aspect	T1	1	BB	L4	CO5	PO1-PO4,PO12
51	Introduction to & types of Multivibrators, Design of Astable	T1	1	BB	L4	CO5	PO1-PO4,PO5
52	Triangular wave generator, Saw-tooth wave generator	T1	1	PPT	L3	CO5	PO1-PO3
53	ICL8038 function generator,Opto-couplers and fibre optic IC	R1	1	PPT	L3	CO5	PO1-PO3
54	IC Voltage regulators - Three terminal fixed and adjustable	T1	1	BB	L4	CO5	PO1-PO4,PO6
55	Monolithic switching regulator	R1	1	BB	L3	CO5	PO1-PO3
56	Switched capacitor filter IC MF10,Frequency to Voltage and	R1	1	BB	L3	CO5	PO1-PO4
57	Audio and Video amplifier IC Isolation Amplifier Onto	R1	1	PPT	L3	CO5	PO1-PO3

Content Beyond the Syllabus Planned														
1	Design of Variable Regulated Power Supply Using LM317													
Text Books														
1	D.Roy Choudhry, Shail Jain, —Linear Integrated CircuitsI, New Age International Pvt. Ltd., 2018, Fifth Edition. (Unit I – V)													
2	Sergio Franco, —Design with Operational Amplifiers and Analog Integrated CircuitsI, 4th Edition, Tata Mc Graw-Hill, 2016 (Unit I – V)													
Reference Books														
1	S.Salivahanan & V.S. Kanchana Bhaskaran, —Linear Integrated CircuitsI, TMH,2nd Edition, 4 th Reprint, 2016.													
2	Ramakant A. Gayakwad, —OP-AMP and Linear ICsI, 4th Edition, Prentice Hall / Pearson Education, 2015.													
Website / URL References														
1	https://nptel.ac.in/courses/117/107/117107094/													
2	https://onlinecourses.nptel.ac.in/noc21_ee31/preview													
Blooms Level														
Level 1 (L1) : Remembering			Lower Order Thinking	Fixed Hour Exams	Level 4 (L4) : Analysing				Higher Order Thinking	Projects / Mini Projects				
Level 2 (L2) : Understanding					Level 5 (L5) : Evaluating									
Level 3 (L3) : Applying					Level 6 (L6) : Creating									
Mapping syllabus with Bloom's Taxonomy LOT and HOT														
Unit No	Unit Name			L1	L2	L3	L4	L5	L6	LOT	HOT	Total		
Unit 1	BASICS OF OPERATIONAL AMPLIFIERS			1	8	0	0	0	0	9	0	9		
Unit 2	AMPLIFIERS			0	4	5	0	0	0	9	0	9		
Unit 3	ANALOG MULTIPLIER AND PLL			0	6	3	0	0	0	9	0	9		
Unit 4	ANALOG TO DIGITAL AND DIGITAL			0	6	3	0	0	0	9	0	9		
Unit 5	WAVEFORM GENERATORS AND			0	0	7	2	0	0	7	2	9		
Total				1	24	18	2	0	0	43	2	45		
Total Percentage				2.2222222	53.333333	40	4.4444444	0	0	95.555556	4.4444444	100		
CO PO Mapping														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	2	1	1	1	-	-	-	-	1	1	1	
CO2	3	3	2	1	1	-	-	-	-	-	2	2	1	
CO3	3	2	2	1	1	-	-	-	-	-	1	1	1	
CO4	3	2	1	1	1	1	-	-	-	-	1	1	1	
CO5	3	3	2	2	2	1	-	-	-	-	1	2	1	
Avg	3	2.4	1.8	1.2	1.2	0.6	0	0	0	0	1.2	1.4	1	
Justification for CO-PO mapping														
CO1	High correlation for PO1 and medium for PO2 is given as CO2 can be used to apply engineering knowledge to identify formulate and provide solutions													
CO2	High correlation for PO1 ,PO2 and medium for PO3 is given as CO2 can be used to apply engineering knowledge to identify formulate and provide solutions in different types													
CO3	High correlation for PO1 and medium for PO2 is given as CO2 can be used to apply engineering knowledge to identify formulate and provide solutions													
CO4	High correlation for PO1 and medium for PO2 is given as CO2 can be used to apply engineering knowledge to identify formulate and provide solutions													
CO5	High correlation for PO1 ,PO2 and medium for PO3 is given as CO2 can be used to apply engineering knowledge to identify formulate and provide solutions													
3	High level			2			Moderate level			1			Low level	
Name & Sign of Faculty Incharge : M.kamarajan														
Name & Sign of Subject Expert :														
Head of the Department : Dr.M.Sivakumar														
Format No :231														