

PSN COLLEGE OF ENGINEERING AND TECHNOLOGY
(An Autonomous Institution Recognized by AICTE, New Delhi and Affiliated to Anna
University, Chennai)
Accredited with A+ Grade by NAAC. An ISO 9001:2015 Certified Institution
Melathediyoor, Tirunelveli – 627 152

Department of Electrical and Electronics Engineering



Minimum Study Material

ANALOG ELECTRONICS CIRCUITS

Degree/Branch: **B.E. Electrical and Electronics Engineering**

Semester: **03**

Subject Code/Title: **EE630201 ANALOG ELECTRONICS CIRCUITS**

Regulation: 2022

Academic Year: **2024 - 2025**

Prepared By

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152

DEPARTMENT OF ELECTRICAL ENGINEERING



Year & Sem	: II & III	Branch	: B.E. Electrical Engineering
Course Code	: EE630201	Course Name	: ANALOG ELECTRONICS CIRCUITS
Regulation	: 2022	Academic Year	: 2024 – 2025 (Odd Sem)

Course Outcomes (COs): At the end of the course, the student will be able to

CO1:	Design BJT and biasing scheme for transistor circuits
CO2:	Model JFET and MOSFET amplifier circuits
CO3:	Design multistage amplifiers with appropriate specifications for electronic circuit applications
CO4:	: Design & analyze oscillator circuits using BJT
CO5:	Choose an Operational amplifier (OPAMP) for specific applications including waveform generation.

Q. No.	UNIT- 1 PART-A	Marks	CO	BL
1	What is a transistor? What are the types?	02	CO1	2
2	Define BJT	02	CO1	1
3	Why BJT is a current controlled device?	02	CO1	2
4	What is operating point?	02	CO1	1

5	What do you understand by thermal runaway?	02	CO1	1
6	What is meant by biasing a transistor?	02	CO1	2
7	What are the various methods used for transistor biasing? Which one is popular?	02	CO1	2
8	What is the basic difference between bias compensation and stabilization?	02	CO1	3
9	Sketch the symbol of various types of BJT?	02	CO1	2
10	What are the types of bias compensation techniques?	02	CO1	3
11	List out the various configurations of BJT?	02	CO1	2
12	Define the term doping?	02	CO1	1
13	Mention few applications of BJT?	02	CO1	1
14	What is meant by depletion region?	02	CO1	2
15	Compare NPN and PNP transistor?	02	CO1	3

BL – Bloom's Level (1- Remembering, 2- Understanding, 3 – Applying, 4 – Analysing, 5 – Evaluating, 6 - Creating); **CO** – Course Outcome;

Q. No.		Part – B	Marks	CO	BL
1	Define different current and output characteristics of BJT in CB, CE, and CC	Explain about the types, construction and working of Bipolar Junction Transistor (BJT) in CB, CE, and CC	02	CO1	CO1
2	What are the factors affecting the stability of Q point.	Explain the factors affecting the stability of Q point.	02	CO2	CO2
3	State the important features of FET	Describe the various compensation techniques used in BJT	02	CO2	CO2
4	Differentiate JFET and MOSFET	Explain with suitable circuit of voltage divider bias of BJT with its derivation	02	CO2	CO2
5	Sketch the constructions of types of JFET	Explain about the working of bias compensation technique using diode	02	CO2	CO2
6	What is MOSFET? Name its types?	Elaborate the working of bias compensation technique using a thermistor	02	CO2	CO2
7	Compare JFET and MOSFET	Describe the expression for self bias in BJT with its derivation	02	CO2	CO2
8	Mention operating modes of MOSFET	Derive the expression for collector to base bias in BJT with its derivation	02	CO2	CO2
9	What is channel length modulation?		02	CO2	3
10	Differentiate FET and BJT (any two)?		02	CO2	2
11	Draw the symbols of various types of MOSFET		02	CO2	2
12	What is the different biasing of JFET?		02	CO2	1
13	List out the various configurations of FET?		02	CO2	2
14	Compare N channel and P channel JFET?		02	CO2	2
15	Draw the symbols of various types of JFET?		02	CO2	1
Q. No.		Part – B	Marks	CO	BL
1	Describe the construction, and working of the Junction Field-effect transistor (JFET) with a diagram				
2	Explain in detail the construction, and working of the Metal Oxide Semiconductor Field effect (MOSFET) transistor with a diagram.		13	CO2	2
3	Explain FET as an Amplifier and Switch		13	CO2	2
4	Compare the various parameters of BJT and FET transistors.		13	CO2	2
5	Discuss voltage division bias for JFET		13	CO2	3
6	Describe voltage division bias for MOSFET		13	CO2	2
7	Explain the low-frequency model of FET.		13	CO2	2

8	Explain the high-frequency model of FET.	13	CO2	2
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Q. No.	Q. No.	Part – C	Marks	CO	Marks	CO
	PART-A	Design the small signal model of FET with suitable diagrams.			15	CO
1	What are the Applications of Power Amplifier?	Describe CS and CD amplifiers	02	CO3	15 2	CO
2	Mention the features of Power Amplifier		02	CO3	2	
3	List out the Classification of Power Amplifier?		02	CO3	1	
4	What are the advantages of Class B Power Amplifier?		02	CO3	2	
5	Compare small signal and large signal amplifier		02	CO3	4	
6	State the position of Q point for Class A, B and C amplifiers		02	CO3	2	
7	Define the conversion efficiency of power amplifier		02	CO3	4	
8	Difference between power transistor and small signal transistor		02	CO3	2	
9	Write the Efficiency value of class A, B, C and AB amplifiers		02	CO3	3	
10	Define positive and negative feedback		02	CO3	4	
11	What type of feedback is used in Oscillator and Amplifier?		02	CO3	2	
12	Mention the classification of Feedback Amplifier		02	CO3	1	
13	List out the three types of network that are connected in feedback		02	CO3	2	
14	Define feedback factor		02	CO3	3	
15	Write the expression for gain of voltage amplifier with feedback		02	CO3	2	

Q. No.	PART – B	Marks	CO	BL
1	Explain with a diagram Class B power amplifier.	13	CO3	2
2	Differentiate direct, RC, and transformer-coupled amplifiers.	13	CO3	2
3	Elaborate Class AB power amplifier.	13	CO3	2
4	Describe feedback amplifiers	13	CO3	3
5	Describe the Class A power amplifier with a neat sketch.	13	CO3	5
6	Discuss about Class C power amplifier with a diagram.	13	CO3	2
7	Write about conversion efficiency in power amplifiers.	13	CO3	3
8	Detail about distortion in amplifiers.	13	CO3	3

Q. No.	Q. No.	Part – C	Marks	CO	Marks	CO
	PART-A	Explain with a diagram various types of basic feedback topologies and their properties.			15	CO
1	Define Oscillator.	Discuss the effect of positive and negative feedback.	02	CO4	15 1	CO
2	State Barkhausen's criterion for an oscillator.		02	CO4	3	
3	Mention the classification of oscillators.		02	CO4	1	
4	Compare oscillator and Amplifier.		02	CO4	1	
5	Mention any two high frequency LC oscillators		02	CO4	2	
6	State the frequency of RC phase shift oscillator.		02	CO4	2	
7	What are the advantages of RC phase shift oscillator?		02	CO4	3	
8	What is the expression for the frequency of oscillations of Wein bridge oscillator?		02	CO4	2	

	Q.No.	PART – B (02 x 13 = 26 Marks)	Marks	CO	BL
Q. No.		PART – B	Marks	CO	BL
1	1	Explain the Barkhausen's criterion in detail.	13	CO5	CO4
2	2	Explain the working of the RC phase shift oscillator with a diagram.	13	CO5	CO4
3	3	Discuss the Hartley oscillator with a diagram.	13	CO5	CO4
4	4	Explain in details of Integrator circuit using Op Amp	13	CO5	CO4
5	5	Derive the Expression for Differentiator using Op Amp	13	CO3	CO4
6	6	What are the applications of Op Amp? Explain any one	13	CO5	CO4
7	7	Detail the Crystal oscillator with the necessary diagram.	13	CO5	CO4
8	8	Explain about instrumentation amplifier using Op Amp in detail	13	CO5	CO4
9	9	Discuss the working of the Colpitts oscillator with a neat sketch.	13	CO5	CO4
		Explain about Half wave precision rectifier	13	CO5	CO4
		Differentiate RC and LC oscillators.	13	CO5	CO4
		Discuss about the Logarithmic Amplifier using Op Amp	13	CO5	CO3
10		What are the advantages of colpitts oscillator?	02	CO4	3
11		What are the essential blocks of a transistor oscillator?	02	CO4	2
12		Mention the various applications of Hartley oscillator	02	CO4	3
13		What is crystal oscillator?	02	CO4	2
14		Define Piezo-electric effect	02	CO4	3
15		State the frequency range of RC and LC oscillators	02	CO4	2
16		Mention the applications of Crystal oscillator	02	CO4	2

Q. No.	Q. No.	Part – C	Marks	CO	BL
Q. No.	1	Explain and derive the frequency of oscillation of any one type of RC oscillator.	15	CO5	CO2
2	2	Discuss and derive the frequency of oscillation of any one type of LC oscillator.	15	CO5	CO2
3	3	What is Op Amp?	2	CO5	1
4	4	Draw the symbol of Op Amp	2	CO5	2
5	5	Define CMRR	2	CO5	2
6	6	What is Slew rate?	2	CO5	3
7	7	Mention the ideal Characteristics of Op Amp?	2	CO5	2
8	8	What is inverting amplifier?	2	CO5	2
9	9	What is instrumentation amplifier?	2	CO5	2
10	10	State the important features of instrumentation amplifier?	2	CO5	2
11	11	What are the Applications of Differentiator?	2	CO5	2
12	12	What is Non inverting Amplifier?	2	CO5	1
13	13	Draw the Pin Details of Op Amp?	2	CO5	1
14	14	Write the Output Voltage Expression for Integrator and Differentiator?	2	CO5	2
15	15	What are the Advantages of Op Amp?	2	CO5	1
16	16	What is Integrator?	2	CO5	2
17	17	What is Logarithmic Amplifier?	2	CO5	2

Q. No.	Q. No.	Part – C	Marks	CO	BL
1	1	Discuss the working of inverting and non-inverting amplifiers.	15	CO5	CO2

2	Elaborate the applications of the operational amplifiers in detail	15	CO
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