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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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	Explain about the types, construction and working of Bipolar Junction Transistor with its diagram	15	CO1	2
2	Explain the input and output characteristics of BJT in CB, CE, and CC configuration	15	CO1	2
3	Discuss the two popular compensation techniques used in BJT	15	CO2	3
4	Explain with suitable circuit of voltage divider bias of BJT with its derivation	13	CO2	2
5	Explain about the working of bias compensation technique using diode	13	CO2	2
6	Elaborate the working of bias compensation technique using a thermistor	13	CO2	2
7	Describe the expression for self bias in BJT with its derivation	13	CO2	2
8	Derive the expression for collector to base bias in BJT with its derivation	13	CO2	2

Q. No.	UNIT – 2 PART-A	Marks	CO	BL
1	Define drift current	02	CO1	2
2	What is FET and write the types of FET?	02	CO2	2
3	State the important features of FET	02	CO2	3
4	Differentiate JFET and MOSFET	02	CO2	2
5	Sketch the constructions of types of JFET	02	CO2	2
6	What is MOSFET? Name its types?	02	CO2	1
7	Compare JFET and MOSFET	02	CO2	2
8	Mention operating modes of MOSFET	02	CO2	1
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

Q. No.	UNIT – 3 PART-A	Part – C	Marks	CO	Marks	BL	CO
		1 Design the small signal model of FET with suitable diagrams.			15		CO
1	What are the Applications of Power Amplifier?	2 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.	UNIT – 4 PART-A	Part – C	Marks	CO	Marks	BL	CO
		1 Explain with a diagram various types of basic feedback topologies and their properties.			15		CO
1	Define Oscillator.	2 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
1	Explain Difference Amplifier using Op Amp	13	CO5	2
2	Discuss about the Summing amplifier using Op Amp	13	CO5	3
3	Explain in details of Integrator circuit using Op Amp	13	CO5	2
4	Derive the Expression for Differentiator using Op Amp	13	CO3	3
5	What are the applications of Op Amp? Explain any one	13	CO5	2
6	Explain about instrumentation amplifier using Op Amp in detail	13	CO5	2
7	Explain about Half wave precision rectifier	13	CO5	3
8	Discuss about the Logarithmic Amplifier using Op Amp	13	CO5	3

Q. No.	PART – B	Marks	CO	BL
1	Explain the Bark Hausen's criterion in detail.	13	CO4	3
2	Explain the working of RC phase shift oscillator with a diagram.	13	CO4	2
3	Discuss the Hartley oscillator with a diagram.	13	CO4	3
4	Explain the working of the Wien bridge oscillator with a diagram.	13	CO4	2
5	Describe the working of the RC phase shift oscillator.	13	CO4	2
6	Detail the Crystal oscillator with the necessary diagram.	13	CO4	2
7	Discuss the working of the Colpitts oscillator with a neat sketch.	13	CO4	2
8	Differentiate RC and LC oscillators.	13	CO4	3
9	What are the advantages of colpitts oscillator?	02	CO4	3
10	What are the essential blocks of a transistor oscillator?	02	CO4	2
11	Mention the various applications of Hartley oscillator	02	CO4	3
12	What is crystal oscillator?	02	CO4	2
13	Define Piezo-electric effect	02	CO4	3
14	State the frequency range of RC and LC oscillators	02	CO4	2
15	Mention the applications of Crystal oscillator	02	CO4	2

Q. No.	Part – C	Marks	CO
1	Explain and derive the frequency of oscillation of any one type of RC oscillator?	15	CO
2	Discuss and derive the frequency of oscillation of any one type of LC oscillator.	15	CO

Q.No.	PART-A (08 x 02 = 16 Marks)	Marks	CO	BL
1	What is Op Amp?	2	CO5	1
2	Draw the symbol of Op Amp	2	CO5	2
3	Define CMRR	2	CO5	2
4	What is Slew rate?	2	CO5	3
5	Mention the ideal Characteristics of Op Amp?	2	CO5	2
6	What is inverting amplifier?	2	CO5	2
7	What is instrumentation amplifier?	2	CO5	2
8	State the important features of instrumentation amplifier?	2	CO5	2
9	What are the Applications of Differentiator?	2	CO5	2
10	What is Non inverting Amplifier?	2	CO5	1
11	Draw the Pin Details of Op Amp?	2	CO5	1
12	Write the Output Voltage Expression for Integrator and Differentiator?	2	CO5	2
13	What are the Advantages of Op Amp?	2	CO5	1
14	What is Integrator?	2	CO5	2
15	What is Logarithmic Amplifier?	2	CO5	2

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

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