Title of the Paper: Analog Circuits and Communication

Offered to: B.Sc (MECs)-ELET01   **Course Type:** Core (TH)

Year of Introduction: 2021-22   **Year of Revision:**   **Percentage of Revision:**

Semester: III   **Credits:** 3

Hours Taught: 60 hrs. Per Semester   **Max. Time:** 3 Hours

Course Prerequisites: Basic Electronics & Integrated circuits

Course Objectives:

1. To understand the concepts, working principles and key applications of linear integrated circuits.

2. To perform analysis of circuits based on linear integrated circuits.

3. To design circuits and systems for particular applications using linear integrated circuits**.**

4. To introduce students to various modulation and demodulation techniques of analog communication.

5. To analyze different parameters of analog communication techniques.

Course Outcomes: At the end of this course, students should be able to:

C01: Analyze important types of integrated circuits.
C02: Demonstrate the ability to design practical circuits that perform the desired operation.
C03: Select the appropriate integrated circuit modules to build a given application.
C04: Use of different modulation and demodulation techniques used in analog communication.
C05: Identify and solve basic communication problems.
C06: Analyze transmitters and receiver circuits.

Syllabus

Course Details:

Unit	Learning Units	Lecture Hours
I	**OPERATIONAL AMPLIFIERS**: Definition, Characteristics of Op-Amp, Block diagram of opamp, inverting, non-inverting, virtual ground, summing amplifier, subtractor, voltage follower, opamp parameters, voltage to current convertor, integrator, differentiator, differential amplifier, Logarithmic amplifier	12
II	**OP-AMP CIRCUITS**: Voltage regulator, Comparator, Instrumentation amplifier, Schmitt trigger, Sine wave generator, Square wave generator - Astable Multivibrator, Triangular wave generator, Active filters (Basics) - Low pass, High pass, Band pass filters. IC - 555 –functional block diagram.	10
III	**MODULATION:** Need for modulation, Types of Modulation, **Amplitude modulation** – frequency spectrum of AM, representation of AM, power relations in the AM wave. **Generation of AM** – Transistor modulators, **Detection of AM** – Diode detector.	12
IV	**FREQUENCY MODULATION:** Theory of FM, Frequency deviation and carrier swing, modulation index, deviation ratio, percent modulation, Mathematical representation of FM, frequency spectrum and bandwidth of FM wave. **Generation of FM** – Reactance modulator. **Detection of FM** – FM demodulation. Phase Locked Loop (PLL).	14
V	**RADIO BROADCASTING AND RECEPTION:** Spectrum of electromagnetic waves, Radio broadcasting and reception – Block Diagram, AM Transmitter & Super heterodyne AM receiver, FM Transmitter & Super heterodyne FM receiver. Differences between AM and FM.	12

Text Books:

1. Op Amp and Linear Integrated Circuits By Ramakant Gaykwad
2. Linear Integrated Circuits By Roy Choudary
3. Unified Electronics Vol II – J.P. Agarwal and Amit Agarwal.
4. Electronic Communications - George Kennedy
5. Antennas and Wave Propagation – G.S.N.Raju – PHI
6. Principles of communication system –Herbert Taub & D.L.Schilling

Reference Books:

1. Jacob Millan ,Micro Electronics,McGraw Hill.
2. Mithal G K, Electronic Devices and Circuits Thana Publishers.
3. Allan Motter shead ,Electronic Devices and Circuits – An Introduction-Prentice Hall
4. Electronic Communications – Roody & Colen
5. Communication Systems – Hayken --- 4th Edition
6. Modern digital and analog communication system –B.P. Lathi

Course Delivery method: Face-to-face

Course has focused on: Foundation and **S**kill Development

Websites of Interest:

https://www.synopsys.com/, https://www.tutorialspoint.com/

Co-curricular Activities: Assignments, PPT's, Mini-projects.

Title of the Paper : Analog Circuits and Communication LAB

Offered to: B.Sc (M.ECs,) –ELEP01   **Course Type:** Core (P)

Year of Introduction: 2021-22   **Year of Revision:**   **Percentage of Revision:**

        Semester: III   **Credits: 1**

Course Outcomes:

C01: Analyze important types of integrated circuits.

C02: Demonstrate the ability to design practical circuits that perform the desired operation.

C03: Select the appropriate integrated circuit modules to build a given application.

C04: Use of different modulation and demodulation techniques used in analog communication.

LAB LIST:

1. Op-Amp as inverting and non-inverting

2. Op-Amp Voltage follower and current follower.

3. Op-Amp as integrator and differentiator

4. Op-Amp as adder & subtractor

5. Op-Amp as voltage to current converter

6. Op-Amp as square wave generator

7. AM Modulation and Demodulation.

8. FM Modulation and Demodulation

9. Pre-emphasis and De-emphasis.

10. PM Modulation and Demodulation.

LAB MANUAL: SUPPPLIED BY DEPARTMENT.

Lab experiments are to be done on breadboard and simulation software (using Multisim) and output values are to be compared and justified for variation.

P.B.SIDDHARTHA COLLEGE OF ARTS & SCIENCE, VIJAYAWADA – 10

Model Question Paper

TITLE: Analog Circuits and Communication

Course Code: ELET32   **Maximum Marks:** 75M

Time: 3 Hrs   **Pass Minimum:** 30M

SECTION – A

Answer any *five* of the following: **5 x 5 = 25M**

1. Compare basic and ideal Op-Amps.
2. Explain logarithmic amplifier.
3. Explain zero cross detecting circuit.
4. Discuss need for modulation.
5. Write about power relations of AM wave.
6. Compare NBFM and WBFM.
7. Define frequency deviation, carrier swing and modulation index.
8. Difference between AM and FM wave

SECTION – B

Answer the following: **5 x 10 = 50M**

9. (a) Explain inverting and non-inverting amplifiers" Explain a summing amplifier.

(Or)

(b) Explain integrator and differentiator op-amp circuits.

10. (a) Explain the generation and demodulation of triangular wave form generator

(Or)

(b) Discuss the functional block diagram of IC-555 & mention one example.

11. (a) Explain the generation and demodulation of AM wave.

(Or)

(b) Describe mathematical representation and frequency spectrum of AM wave.

12. (a) Describe mathematical representation and frequency spectrum of FM wave.

(Or)

(b) Explain generation of FM using FET reactance modulator.

13. (a) Discuss briefly about super hetrodyne receiver of AM wave.

(Or)

(b) Draw the block diagram of FM transmitter and explain each block.