PARVATHANENI BRAHMAYYA
SIDDHARTHA COLLEGE OF ARTS & SCIENCE
Autonomous
Siddhartha Nagar, Vijayawada–520010
Re-accredited at 'A+' by the NAAC

Course Code				**23ELMAL232**			
Title of the Course				**Analog Electronics**			
Offered to: (Programme/s)				B.Sc.(H)- Electronics			
L	**4**	**T**	**0**	**P**	**0**	**C**	**3**
Year of Introduction:	**2024-25**			**Semester:**			**3**
Course Category:	Major			**Course Relates to:**	Global		
Year of Revision:	**N/A**			**Percentage:**	**N/A**		
Type of the Course:				Employability			
Crosscutting Issues of the Course :				Professional Ethics			
Pre-requisites, if any				Familiarity with basic electronic components and circuit theory.			

Course Description:

This course provides a comprehensive introduction to analog electronics, covering the fundamental principles, components, and applications of analog circuits. Students will explore the operation of analog devices, circuit design techniques, and real-world applications of analog electronics in various systems. The course emphasizes both theoretical concepts and practical skills, preparing students to design and analyze analog circuits and systems effectively.

Course Aims and Objectives:

S.NO	COURSE OBJECTIVES
1	Understand the basic principles of analog electronics and circuit analysis.
2	Gain proficiency in designing and analyzing analog circuits using fundamental electronic components.
3	Learn to apply analog electronics concepts to real-world applications, including signal processing, amplification, and filtering.
4	Develop skills in using electronic instrumentation and simulation tools for circuit design and testing.
5	Explore advanced topics in analog electronics, including integrated circuits and analog signal processing.

Course Outcomes

At the end of the course, the student will be able to…

CO NO	COURSE OUTCOME	BT L	PO	PS O
CO1	Understand the significance of analog signal processing.	K2	1	1
CO2	Analyze and design basic analog circuits, including amplifiers, filters, and voltage regulators.	K4	1	1
CO3	Understand the characteristics and applications of operational amplifiers	K2	1	1
CO4	Analyze circuits using op-amps for various functions such as amplification, filtering, and signal conditioning.	K4	1	1
CO5	Analyze and implement feedback mechanisms in analog circuits	K4	1	1

For BTL: K1: Remember; K2: Understand; K3: Apply; K4: Analyze; K5: Evaluate; K6: Create

CO-PO MATRIX									
CO NO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	2							2	
CO2	3							3	
CO3	2							2	
CO4	3							3	
CO5	3							3	

Use the codes 3, 2, 1 for High, Moderate and Low correlation Between CO-PO-PSO respectively

Course Structure:

Unit – 1 : Amplifiers: (15Hrs

General principles of small signal amplifiers - Classifications - RC Coupled amplifiers - Gain - Frequency response - Input and output impedance - Transformer coupled class A and Class B amplifier operation and circuits, class c and class –d amplifiers.

Examples/Applications/Case Studies:

- Audio amplification in radios and televisions.
- It provides significant voltage gain and is used in various analog circuits.

Exercises/Projects:

- Study about RC-coupled amplifier
- Determine efficiency of Power amplifiers.

Specific Resources: (web)

(https://www.allaboutcircuits.com/)

Unit – 2 : Feedback Amplifiers (12Hrs)

Feedback concept, feedback connection types –voltage series, voltage shunt current series, current shunt, Effect of negative feedback on Gain stability and bandwidth, Feedback amplifier –phase and frequency considerations.

Examples/Applications/Case Studies:

- Operational amplifiers, Audio Amplifiers.
- Voltage regulators

Exercises/Projects:

- Analyze the Frequency Response
- Determine the Input and Output Voltages

Specific Resources: (web)

(https://www.electronics-tutorials.ws/)

Unit – 3 : Operational Amplifiers: (12Hrs)

Block diagram, ideal characteristics, Voltage follower, virtual ground, voltage regulator, voltage to current convertor, Various offset parameters - Differential gain - CMRR - Slew rate – Bandwidth.

Examples/Applications/Case Studies:

- Audio and instrumentation systems
- Amplification in analog signal processing

Exercises/Projects:

- Determine gain in op-amp
- Determine offset parameters.

Specific Resources: (web)

(https://www.electronics-tutorials.ws/)

Unit – 4 : Op-amp Circuits (12Hrs)

Inverting Amplifier, non- inverting Amplifier, Adder ,Subtract or ,Differential amplifier, Integrator , Differentiator , Comparator, Schmitt trigger, Triangular waveform generators - Active filters.

Examples/Applications/Case Studies:

- Impedance matching
- Signal isolation

Exercises/Projects:

- Draw virtual ground circuits for op-amp
- Study low pass, high pass, band pass filters.

Specific Resources: (web)(https://www.coursera.org/)

Unit – 5 : Oscillators: (12Hrs)

Bark-hausen criterion for oscillation - Hartley, Collpits, Phase shift and Wien bridge oscillators, Crystal oscillator - Condition for oscillation and frequency derivation - Multivibrators:. Monostable, bistable and Astable multivibrators

Examples/Applications/Case Studies:

- Microprocessors and Microcontrollers
- Digital Clocks and Watches

Exercises/Projects:

- Derive gain and frequency for oscillators
- Derive output voltage for multivibrators.

Specific Resources: (web)

https://chatgpt.com/#:~:text=www.electronics%2Dtutorials.ws)

Text Books:

1. James M. Fiore Version 3.2.6, 07 May 2021Operational Amplifiers & Linear Integrated Circuits: Theory and Application, 6th edition, Pearson.

2.**Robert L. Boylestad and Louis Nashelsky ,** 2019**"Electronic Devices and Circuit Theory"** 12th Edition, Pearson**.**

References:

1. RobertL.BoylestadandLouisNashelsky,2019,ElectronicDevicesandCircuitTheory",12th Edition, Pearson
2. **Adel S. Sedra and Kenneth C. Smith ,** 2015**"Microelectronic Circuits"** 7th Edition ,Oxford University Press
3. **Louis E. Frenzel ,** 2008 **"Principles of Electronic Communication Systems"** 4th Edition ,McGraw-Hill Education,

***

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

Model Question Paper

23ELMAL232: Analog Electronics **Maximum Marks:** 70M

Time: 3 Hrs **Pass Minimum:** 28M

SECTION – A

Answer all questions **5 x 4 = 20M**

1. a)Write about Principles of small signal amplifier.**k1**

(or)

b) Write about class-D amplifiers.**k1**

2. a) Discuss about current series feedback.**K2**

(or)

b) Explain about Frequency considerations of Feedback.**k2**

3.a) Explain about voltage to current convertor.**k2**

(or)

b) Discuss about ideal characteristics of op-amp.**k2**

4.a)Discuss briefly about Schmitt trigger**.k2**

(or)

b) Explain about adder circuit and derive it's gain.**k2**

5.a) Explain about collpits oscillator and derive it's frequency.**k2**

(or)

b) Discuss about wien bridge oscillator and derive it's frequency.**k2**

SECTION– B

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

6.(a) Explain about the construction and working ofRC Coupled amplifiers.**k1**

(Or)

(b) Discuss about the working of Transformer coupled class A operationalamplifier.**k1**

7. (a) Explain Effect of negative feedback on Gain stability and bandwidth.**k2**

(Or)

(b) What are types thefeedback and explain about voltage series, voltage shunt current series.**k2**

8.(a) Explain briefly about voltage regulator and block diagram of op-amp.**k1**

(Or)

(b) Discuss about Differential amplifier and derive it's gain.**k1**

9.(a) Explain about inverting and non-inverting amplifiers" Explain a summing amplifier.**k3**

(Or)

(b)Discuss about integrator and differentiator op-amp circuits and derive it's gain. **K3**

10.(a) Discuss briefly about RC-Phase shift oscillator and derive it's Frequency and gain.**k3**

(Or)

(b) Discuss briefly about As table multivibrator and derive it' output voltage.**K3**

***