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

Course Code				**23ELMAP232**			
Title of the Course				**Analog Electronics lab**			
Offered to: (Programme/s)				B.Sc. HONS Electronics			
L	**0**	**T**	**0**	**P**	**2**	**C**	**1**
Year of Introduction:		**2024-25**		**Semester:**		**3**	
Course Category:		Major		**Course Relates to:**		Global	
Year of Revision:				**Percentage:**			
Type of the Course:				Skill development			
Crosscutting Issues of the Course :							
Pre-requisites, if any				Familiarity with basic electronic components			

Course Description:
The Analog Electronics Lab focuses on understanding and applying the principles of analog circuits. Students will engage in hands-on experiments involving passive components (resistors, capacitors, inductors) and active components (diodes, transistors). Key activities include designing and analyzing filters, amplifiers, and oscillators. Using tools like oscilloscopes and multimeters, students will measure and interpret voltage, current, and frequency responses. The lab emphasizes practical skills in circuit construction, signal analysis, and troubleshooting. By the end of the course, students will have a solid foundation in analog electronics, essential for fields such as signal processing and communication systems.

Course Aims and Objectives:

S. NO	**COURSE OBJECTIVES**
1	Understand the characteristics and functions of passive components (resistors, capacitors, inductors) and active components (diodes, transistors).
2	Design and analyze basic analog circuits, including filters, amplifiers, and oscillators
3	Use test equipment such as oscilloscopes, signal generators, and multimeters to measure and analyze circuit performance.
4	Understand the frequency response and stability of analog circuits.
5	Gain experience in signal processing and amplification techniques relevant to communication systems and other applications.

Course Outcomes

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

CO NO	COURSE OUTCOME	BTL	PO	PSO
CO1	Design and analyze analog circuits such as RC and RL filters, amplifiers, and oscillators, demonstrating the ability to create functional analog systems.	**K4**	**2**	**1**
CO2	Analyze the behavior of analog circuits, focusing on signal analysis, frequency response, and circuit stability.,	**K4**	**2**	**1**
CO3	Develop the ability to read and create accurate circuit diagrams and schematics for analog electronic systems.	**K5**	**2**	**1**
CO4	Enhance skills in identifying and resolving issues in analog circuits through systematic testing and analysis..	**K5**	**2**	**1**
CO5	Apply theoretical concepts learned in lectures to practical lab experiments, bridging the gap between theory and hands-on implementation.	**K3**	**2**	**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		**2**						**2**	
CO5		**3**						**3**	

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

Course Structure

This lab list covers the key areas of a Digital Electronics lab course, providing hands-on practice with using Bread board and Analog IC’s and multimeter.

1. Voltage Series Feedback

Objective: Study voltage series feedback, where a portion of the output voltage is fed back to the input.

- **Components:** Operational amplifier (op-amp) or transistor amplifier.
- **Circuit Design:** Construct a voltage series feedback amplifier circuit.
- **Testing:** Measure gain and stability, and observe the feedback effect on bandwidth.

Activity: Build and test a voltage series feedback amplifier. Analyze the impact on gain and bandwidth.

2. Voltage Shunt Feedback

Objective: Learn about voltage shunt feedback, where the feedback is taken from the output voltage and applied in parallel with the input.

- **Components:** Operational amplifier (op-amp) or transistor amplifier.
- **Circuit Design:** Construct a voltage shunt feedback amplifier circuit.
- **Testing:** Measure gain, stability, and bandwidth.

Activity: Build and test a voltage shunt feedback amplifier. Observe the feedback effect on gain and bandwidth.

3.Current Series Feedback

Objective: Explore current series feedback, where a portion of the output current is fed back to the input in series.

- **Components:** Operational amplifier (op-amp) or transistor amplifier.
- **Circuit Design:** Construct a current series feedback amplifier circuit.
- **Testing:** Measure gain, stability, and bandwidth.

Activity: Build and test a current series feedback amplifier. Analyze the effect on gain and bandwidth.

4. Voltage Regulator

Objective: Study voltage regulators and their role in maintaining a stable output voltage.

- **Components:** Voltage regulator IC (e.g., 7805 for +5V, 7812 for +12V).
- **Circuit Design:** Construct a voltage regulator circuit.
- **Testing:** Measure the output voltage and verify its stability under varying load conditions.

Activity: Build and test a voltage regulator circuit. Verify the output voltage against the specified regulation.

5. Voltage to Current Converter

Objective: Learn about the voltage-to-current converter and its application.

- **Components:** Operational amplifier, resistors.
- **Circuit Design:** Construct a voltage-to-current converter circuit.
- **Testing:** Apply a known input voltage and measure the resulting output current.

Activity: Build and test a voltage-to-current converter. Verify the current output based on the input voltage and circuit design.

6. Inverting Amplifier

Objective: Study the inverting amplifier configuration and its characteristics.

- **Components:** Operational amplifier, resistors.
- **Circuit Design:** Construct an inverting amplifier circuit.
- **Testing:** Measure gain, input and output voltages.
- **Gain Calculation:** Gain = - (R_f / R_in), where R_f is the feedback resistor and R_in is the input resistor.

Activity: Build and test an inverting amplifier. Verify the gain and input-output relationship.

7. Non-Inverting Amplifier

Objective: Learn about the non-inverting amplifier configuration.

- **Components:** Operational amplifier, resistors.
- **Circuit Design:** Construct a non-inverting amplifier circuit.
- **Testing:** Measure gain, input and output voltages.
- **Gain Calculation:** Gain = 1 + (R_f / R_in), where R_f is the feedback resistor and R_in is the resistor from input to ground.

Activity: Build and test a non-inverting amplifier. Compare its performance with the inverting amplifier.

8. Adder (Summing Amplifier)

Objective: Understand the summing amplifier configuration for adding multiple input signals.

- **Components:** Operational amplifier, resistors.
- **Circuit Design:** Construct an adder circuit to sum two or more input signals.
- **Testing:** Measure the output voltage as a sum of the inputs.
- **Gain Calculation:** Output = - (V1 * (R_f / R1) + V2 * (R_f / R2) + ...), where V1, V2, etc., are input voltages.

Activity: Build and test an adder circuit. Verify the addition of multiple signals.

9. Subtractor (Differential Amplifier)

Objective: Study the differential amplifier configuration for subtracting one signal from another.

- **Components:** Operational amplifier, resistors.
- **Circuit Design:** Construct a subtractor circuit.
- **Testing:** Measure the output voltage as the difference between the input signals.
- **Gain Calculation:** Output = (R_f / R1) * (V2 - V1), where V1 and V2 are input voltages.

Activity: Build and test a subtractor circuit. Observe and record the difference between input signals.

10. Integrator

Objective: Learn about the integrator configuration, which performs mathematical integration.

- **Components:** Operational amplifier, resistor, capacitor.
- **Circuit Design:** Construct an integrator circuit.

- **Testing:** Apply a square wave input and measure the output waveform, which should be a triangle wave.

Activity: Build and test an integrator circuit. Verify its response to a square wave input.

11. Differentiator

Objective: Study the differentiator configuration, which performs mathematical differentiation.

- **Components:** Operational amplifier, resistor, capacitor.
- **Circuit Design:** Construct a differentiator circuit.
- **Testing:** Apply a triangular wave input and measure the output waveform, which should be a square wave.

Activity: Build and test a differentiator circuit. Verify its response to a triangular wave input.

Lab Manual:
Supplied by the Department

References:

1. [Reference 1 - Author(s), Year of Publication, Title, Edition, Publisher]
2. [Reference 2 - Author(s), Year of Publication, Title, Edition, Publisher]

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LAB EXAMINATION PATTERN

23ELMAP232: Analog Electronics lab

Semester: III MAX Marks:35M Time:3Hrs

(A) SEE Evaluation Procedure

1. For Aim, Apparatus, circuit diagram, Flow chart	**5M**
2.For Observation table, formulas, Program	**5M**
3. Experiment Procedure and Execution	**10M**
4.Output of Experiment	10M
5. Practical Record	**2M**
6. Viva voce	**3M**

(B) CONTINUOUS ASSESMENT(Internal) 15 MARKS

15 marks for the continuous assessment (Day to day work in the laboratory shall be evaluated for 15 marks by the concerned laboratory teacher based on the regularity/ record/viva). Laboratory teachers are mandated to ensure that every student completes 80%-90% of the lab assessments.

TOTAL: (A)+(B) = 50 MARKS