S.Y.B.Sc. (Electronic Science) 2020
Proposed Syllabus

Sem-III	**Paper-I : Analog Circuit Design(ELE2301)**
Sem-III	**Paper-II: Digital Circuit Design(ELE2302)**
Sem-III	**Paper- III: Practical Course (ELE2303)**

S.Y.B.Sc. Electronic Science -Semester III

Paper -I : Analog Circuit Design (ELE2301)

Objectives:

Course Objectives:

1. To study basic principles of amplifiers and oscillators.
2. To understand the working of various analog circuits.
3. To develop analog circuit design skills.
4. To apply the knowledge of analog circuits in different applications.
5. The primary objective of this course is to understand and implement theadvancedelectronic circuits such as amplifiers etc
6. The primary objective of this course is to understand and implement the advancedelectronic circuits such as amplifiers etc
7. To acquire the basic knowledge of digital logic.

Course Outcomes:

1. To Analyze different biasing circuits and low frequency response of anamplifierusing parameters.
2. To Develop an ability to analyse high frequency transistor model.
3. Explain various multistage and power amplifier configurations.
4. Explain the concept of feedback and its characteristics.
5. Explain the principles of oscillation and design various oscillator circuits.
6. To Analysis various filters and multi-vibrators circuits.
7. To facilitate students in designing a logic circuits .

UNIT- 1: Transistor Amplifiers: **(12)**

General classification of amplifiers with respect to signal amplitude, frequency and configuration: Small signal amplifier

Types of coupling (quantitative analysis): RC coupled, transformer coupled and direct coupled. Multi-stage RC coupled CE amplifier: effect of coupling capacitor and bypass capacitor on frequency response (qualitative approach) and application area.

UNIT-2: Power Amplifiers: **(12)**

Concept of small signal and large signal amplifiers. Comparison with respect to gain, efficiency, and distortion.

Classification of power amplifiers on the basis of conduction: class-A, class-B, class-AB, class-C. Class-A amplifier: resistive load/transformer coupled load, efficiency calculation. Concept of harmonic distortion. Class B Push-pull amplifier: concept, complimentary symmetry class-B push pull amplifier, crossover distortion, class AB push pull amplifier. Concept of thermal run away and use and types of heat sinks.

UNIT 3: Feedback Systems: **(12)**

Concept of negative and positive feedback and Barkhausen criterion. Types of feedback circuits: current shunt, current series, voltage shunt and voltage series, comparison and applications. Effect of negative feedback: on gain ,Bandwidth, input and output impedance, stability of an amplifier.

Positive feedback: Oscillator circuits -Wien bridge , Phase Shift , Hartley , Colpitts , Concept of Crystal oscillator. Design of oscillators for given feedback factor and frequency of oscillation.

UNIT 4: Differential Amplifiers and Operational amplifier applications: **(12)**

Concept and working of differential amplifier. Configurations of differential amplifier: Single ended, double ended. Differential and Common mode gains, Use of constant current source and its effect on CMRR.

Op-amp Applications: Integrator, Differentiator, Voltage to current converter, Current to voltage converter, Bridge amplifier, Instrumentation amplifiers with three op-amp, Precision rectifier,

Recommended Books:

1. Electronic Principles by Malvino A.P TMH
2. Operational amplifiers and linear Integrated Circuits by Gaykawad R. PHP
3. Operational amplifier by Clayton G.B. ELBS
4. Electronic devices and circuits by Millman, Halkias McGrawHill
5. Electronic devices and circuits by Boylestead PHP
6. Principles of Electronics by Meheta V.K. S.Chand and Company
7. Principles of Electronics by B.L.Thereja S.Chand and Company
8. Basic Electronic Devices and Circuits: R.Y. Borse 1st Edition 2012 Adhayan Publishers and distributors, New Delhi.

Course Outcome	Program Outcomes								
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	2	-	1	-	-	-	-	-	-
CO2	-	2	1	-	-	-	-	-	-
CO3	2	1	2	2	-	1	-	-	-
CO4	-	1	-	-	-		-	-	-
CO5	-	-	-	1	-	1	-	-	-
CO6	2	-	1	-	-	-	-	-	-
CO7	1	-	-	1	-	-	-	-	-

Justification for mapping:

PO1: disciplinary knowledge:

CO1: Students will have be understanding of amplifier circuits,importance of biasing techniques and low-frequency response.

CO3:This relates to expanding the knowledge base to cover multistage and power amplifier configurations, providing students with a holistic understanding of amplifier systems and their applications.

CO6: Students will get knowledge about Filters and multivibrators are common components in electronic systems.

CO7: Students will have understand the basic concepts and ideas for Basic gates and their applications.

PO2: Critical Thinking and Problem solving:

CO2: Students will Understanding the high-frequency behavior of transistors requires students to think critically about the impact on overall circuit performance.

CO3:This task prompts students to critically evaluate amplifier configurations, developing problem-solving skills in selecting the most suitable configuration for specific applications.

CO4: Understanding feedback involves critical thinking to evaluate how it influences circuit behavior, leading to problem-solving skills in implementing feedback for desired outcomes.

PO3: Social Competence:

CO1:Analyzing circuits collaboratively encourages students to share insights, ask questions, and fostering social competence in teamwork and communication.

CO2:students to share their understanding, ask for clarification, and collectively explore the complexities of high-frequency transistor behavior, contributing to social competence through shared learning.

CO3: Students Develop social competence through collaborative discussions on multistage and power amplifier configurations, promoting effective communication and teamwork.

CO6**:** will be Exploring the complexities of filter and multi-vibrator circuits in a group setting promotes social competence.

PO4: Research related skills and Scientific temper:

CO2:Analyzing high-frequency transistor models often requires delving into research articles and advanced texts. This approach fosters research-related skills as students learn to navigate and extract information from scientific literature.

CO5: Students will have get Oscillator design involves staying current with research advancements.

CO7: Students Designing logic circuits involves understanding evolving methodologies. Encouraging students to explore current research enhances research-related skills.

PO6: Personal and Professional competence:

CO3**:** Students will be Study on various congratulations in amplifier and it’s using by developing project skills.
CO5: Students will be understanding the concept of oscillators and uses of Oscillator.

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Paper-II: Digital Circuit Design (ELE2302)

Course Objectives:

1. To utilize k-maps in the design of combinational circuits.
2. To understand the design principles of sequential circuits.
3. To study the design and working of various data converters
4. To configure the digital circuits in system interfacing and applications.
5. To acquire the basic knowledge of digital logic levels and application ofknowledge to understand digital electronics circuits.
6. The objective of this course is to provide the fundamental concepts associatedwith the digital logic and circuit design.
7. To prepare students to perform the analysis and design of various digitalelectronic circuits.

Course Outcomes:

1. To Became familiar with the digital signal, k-map logic gates, logical variables, thetruth table, number systems, codes, and their conversion from to others.
2. To Understand the working mechanism and design guidelines of different combinational, sequential circuits and their role in the digital system design.
3. To Understand the fundamental concepts and techniques used in digitalelectronics.
4. To understand the concept of Adder and design various types of Adder.
5. Explain the principles of A to D converter and design various k-map methods.
6. To Analysis various Display and counter circuits.
7. To facilitate students in designing a logic circuits .

UNIT -1: Combinational Circuits: (**12)**

Revision of K maps, Design of code converters: BCD to Seven segments, Binary to Gray, Gray to binary, Half adder, Full adder, Parity generator/Checker, One bit and Two bit Magnitude comparator.

UNIT -2: Sequential Circuits: **12)**

State table, State diagram, excitation table and transition table, Design of counters using state machines: Synchronous, asynchronous, modulo-N and up-down counter, Sequence generator

UNIT -3: Data Converters : **(12)**

Digital to analog converters : Weighted resistive network, R-2R ladder network, DAC accuracy and resolution.

Analog to Digital converters: Simultaneous conversion, Counter type, Tracking method, Successive approximation method, Single slope, Dual slope, ADC accuracy and resolution.

UNIT -4: Digital System interfacing and applications : **(12)**

Digital system interfacing of LED's, Single and multi-digit 7 segment display / driver, Study of Thumb wheel switches, Electromechanical relays.

Applications of counters :- Totalizer, Digital clock, Auto-parking system, Two digit bank token display.

Recommended Books:

1. Digital Fundamentals by Floyd Thomas (Pearson)
2. Digital Circuit design by Morris Mano (PHP)
3. Digital Principles and applications by Malvino Leach (TMH)
4. Modern digital Electronics by R.P.Jain (TMH)

Course Outcome	Program Outcomes								
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	2	-	1	-	-	-	-	-	-
CO2	1	2	1	-	-	-	-	-	-
CO3	2	-	-	1	-	1	-	-	-
CO4	-	1	-	2	-		-	-	-
CO5	1	-	-	1	-	1	-	-	-
CO6	-	2	1	-	-	-	-	-	-
CO7	1	-	2	1	-	-	-	-	-

Justification for mapping:

PO1: disciplinary knowledge:
CO2:To understanding of key concepts in digital electronics, providing students with the necessary knowledge base for more advanced topics and practical applications.
CO2:Students Understanding the inner workings of these circuits is fundamental to digital system design
CO3:students understand the principles and techniques, establishing a solid foundation for more advanced studies and practical applications in digital electronics.
CO5: Students Understanding A to D conversion principles and design methods with k-maps is essential for digital signal processing.
CO7:Students not only understand theoretical concepts but also gain practical skills in designing logic circuits, bridging the gap between theory and application.

PO2: Critical Thinking and Problem solving:
CO2:Understanding the intricacies of combinational and sequential circuits demands critical thinking to analyze their behavior, identify potential issues, and apply problem-solving skills in designing circuits that meet specified criteria.
CO4:Designing various types of adders further engages problem-solving skills, challenging

students to make informed decisions on selecting appropriate architectures, optimizing for speed or power, and ensuring functionality.
CO6: Students will get knowledge for basic digital circuits.And uses of things in designing circuit.

PO3: Social Competence:
CO1:Students, in the process of becoming familiar with diverse digital concepts, engage in discussions, share insights, and work together to solve problems.
CO2: Students understanding the concept of digital system design and knowledge about principle and role of different types of digital system.
CO6: Students will get knowledge about principle of display and types of display and their applications.
CO7: Students will be able for designing various Mini Project skills in Electronics circuit.

PO4: Research related skills and Scientific temper:

CO3: students This will involves grasping foundational principles such as Boolean algebra, logic gates, and digital.
circuits.
CO4: Students will be Understanding adders is crucial in digital electronics; it involves binary addition and designing circuits like half-adders and full-adders.
CO5: Students will have Understanding Analog to Digital converters involves principles of quantization and conversion of continuous signals to discrete digital values. Karnaugh Maps (K-maps) are used for simplifying Boolean expressions
CO7:This requires understanding how display circuits (like 7-segment displays) and counters work in digital systems.
PO6: Personal and Professional competence:
CO3:Student Designing various types of adders, such as half-adders and full-adders, enhances professional competence by demonstrating the ability to apply theoretical knowledge to practical circuit design.
CO6:the analysis of display circuits, such as 7-segment displays, and counter circuits, individuals enhance their ability to troubleshoot, optimize, and design efficient digital system

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Paper- III: Practical Course (ELE2303)

Course Objectives:

1. To make use different basic concepts for building different applications
2. To understand design procedures of different electronic circuit as perrequirement
3. To build experimental setup and test the circuits.
4. To develop skills of analyzing test results of given experiments.
5. To acquire the basic knowledge of digital logic levels and application of knowledge.
6. To understand digital electronics circuits and amplifer.
7. To prepare students to perform the analysis and design of various digital electroniccircuits.

Course Outcomes:

1. Recognize the evolution and history of units andstandards in Measurements.
2. Identify the various parameters that are measurable inelectronic instrumentation.
3. Employ appropriate instruments to measure given sets ofparameters.
4. Practice the construction of testing and measuring set upfor electronic systems.
5. To have a deep understanding about instrumentation concepts which can beapplied to various system.
6. To Relate the usage of various instrumentation standards.
7. To understand the knowledge about various ICs.

List of Practicals (Analog Electronics): Any Four

1. Wein bridge oscillator/Phase shift oscillator
2. Design and build two stage amplifier using transistor
3. Design and build V to I converter using Opamp
4. Design of Low Pass Filter and High Pass Filter using OPAMP IC-741
5. Push pull amplifier
6. Effect of negative feedback on amplifier parameters

List of Practicals (Digital Electronics): Any Four

1. Code conversion using logic gates – binary to gray , gray to binary
2. DAC using R-2R ladder network
3. ADC using IC 0808/IC 7109/IC 741/IC 324
4. Sequence generator for stepper motor
5. 3 bit synchronous counter using flip flops
6. Decimal to BCD encoder using logic gates

Course Outcome	Program Outcomes								
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	1	-	1	-	-	-	-	-	-
CO2	-	2	1	-	-	-	-	-	-
CO3	2	-	-	2	-	1	-	-	-
CO4	-	1	-	1	-		-	-	-
CO5	1	1	1	1	-	1	-	-	-
CO6	-	1	-	-	-	-	-	-	-
CO7	1	-	2	1	-	-	-	-	-

Justification for mapping:

PO1: disciplinary knowledge:

CO1:Students focus on understanding the historical context and various parameters involved in electronic instrumentation, contributing to disciplinary knowledge by providing a comprehensive overview.

CO3:it required the practical application of employing appropriate instruments to measure parameters, ensuring students acquire hands-on experience in the discipline.

CO5:Student get deep understanding of instrumentation concepts, ensuring that students grasp the theoretical foundations applicable to various systems.

CO7: Students get understanding various ICs, aligning with the technological components integral to instrumentation.

PO2: Critical Thinking and Problem solving:

CO2**:** Students understanding various parameters that can be measured in electronic instrumentation, necessitating critical thinking to analyze the significance of each parameter and their functions.

CO4: Students will involves the practical aspect of constructing testing and measuring setups for electronic systems. This requires critical thinking and problem-solving skills to design effective setups that meet specific measurement requirements and constraints.

CO5:Critical thinking is essential to connect theoretical concepts with real-world applications, enabling students to analyze and solve problems in diverse scenarios.

CO6: Students will get Critical thinking is necessary to understand the implications of standards, make informed decisions regarding their application, and ensure compliance in instrumentation practices.

PO3: Social Competence:

CO1**:**involves recognizing the evolution and history of measurement units and standards, students to appreciate the historical context and evolution of measurement practices, fostering discussions and understanding within a social context.

CO2:requires the identification of various parameters in electronic instrumentation, which enhances social competence by preparing students to communicate effectively about complex technical concepts in collaborative settings.
CO5:developing a deep understanding of instrumentation concepts applicable to various systems. Social competence is vital when students engage in discussions, share insights, and collaborate with peers on the application of these concepts to real-world systems.