Anekant Education Society's
Tuljaram Chaturchand College of Arts, Science and Commerce, Baramati

Autonomous

Course Structure For F. Y. B. Sc. Electronic Science

Semester	Paper Code	Title of Paper	No. of Credits
I	ELE1101	Basic Circuit Elements and Theorems	2
	ELE1102	Logic Gates and Arithmetic Circuits	2
Annual	ELE1203	Practical	4

SYLLABUS (CBCS) FOR F. Y. B. Sc. STATISTICS (w.e. from June, 2019)
Academic Year 2019-2020

Class : F.Y. B. Sc. (Semester- I)
Paper Code: ELE1101
Paper : I **Title of Paper: Basic Circuit Elements and Theorems**
Credit : 2 **No. of lectures: 36**

Course Objectives:

1. To get familiar with basic circuit elements and passive components.
2. To understand DC circuit theorems and their use in circuit analysis.
3. To study characteristic features of semiconductor components.
4. To study elementary electronic circuits and application.
5. To study the various type of Filter circuits.

Course Outcome:

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

1. To identify different parameters, specifications of passive components used in electronics.
2. Capability to understand the working principles of their electronic devices and their application.
3. To develop an understandings of the fundamental law and elements of electronic circuits.
4. Compare DC, AC signals & circuit application.
5. To understand the working principles of the electronics devices and their applications.
6. To solve problem based on network theorems.

Unit 1: Passive Components (12L)

Study of basic circuit elements and passive components (with special reference to working principle, circuit symbols, types, specifications and applications): Resistor, Capacitor, Inductor, Transformer, Cables, Switches, Fuses, Batteries.

Unit 2: Semiconductor Diodes and Circuits (12L)

Study of semiconductor active components (with reference to symbol, working principle, I-V characteristics, parameters, specifications, applications): p-n junction diode, zener diode, varactor diode, light emitting diode, photo diode.

Clipper and clamper circuits, Rectifiers (half and full wave), Zener regulator, Block diagram of power supply,

Unit 3: Basic Electrical Circuits and Circuit Theorems (12L)

Concept of Ideal Voltage and Current source, internal resistance, dc sources(voltage/current) and sinusoidal ac source(amplitude, frequency, phase angle), Network terminology, series and parallel circuits of resistors, capacitors and inductors, Ohms law, Kirchhoff's Laws (KCL, KVL), Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem (problems), Charging-discharging of capacitor, RC low pass and high pass filter

Text/ Reference Books:

1. Electronic Principles : Albert Malvino, David J Bates, McGraw Hill 7th Edition. 2012
2. Principles of Electronics: V.K. Mehta, S.Chand and Co.
3. A text book of electrical technology: B.L.Theraja, S.Chand and Co.
4. Basic Electronics and Linear Circuits: Bhargava N.N., Kulshreshtha D.C., Gupta S.C., Tata McGraw Hill.

Mapping of Program Outcomes with Course Outcomes

Weightage: 1=Weak or low relation, 2=Moderate or partial relation, 3=Strong or direct relation

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9
CO1	3	2	-	-	-	1	-	-	3
CO2	3	2	2	-	-	2	-	-	2
CO3	3	3	1	-	1	-	-	1	3
CO4	2	2	1	-	-	1	-	-	2
CO5	3	2	-	-	-	1	-	-	3
CO6	3	3	-	-	-	-	-	-	3
CO7	-	-	-	-	-	-	-	-	-

Justification of Mapping

PO1-Disciplinary Knowledge:

CO1- Identification of different parameters and specifications of passive components in electronics aligns closely with the comprehensive knowledge of disciplines in a graduate program. This involves a strong theoretical understanding of electronic components.
CO2 - The capability to understand the working principles of electronic devices and their applications requires a comprehensive knowledge of the relevant disciplines within the graduate program. This links theoretical understanding with practical application.
CO3 - Developing an understanding of the fundamental laws and elements of electronic circuits is integral to the broader knowledge base expected from a graduate program. This demonstrates a strong theoretical foundation.
CO4- Comparing DC and AC signals and their circuit applications involves a combination of theoretical and practical knowledge, moderately related to the comprehensive understanding of the disciplines within the graduate program.
CO5- Understanding the working principles of electronic devices and their applications is directly aligned with the comprehensive knowledge expected from a graduate program. This involves both theoretical and practical aspects.
CO6- Solving problems based on network theorems is moderately related to the comprehensive knowledge of the disciplines within the graduate program. It involves applying theoretical knowledge to real-world problem solving.

PO2-Critical Thinking and Problem solving:

CO1-Identification of different parameters and specifications of passive components in electronics aligns closely with the comprehensive knowledge of disciplines in a graduate program. This involves a strong theoretical understanding of electronic components.
CO2- The capability to understand the working principles of electronic devices and their applications requires a comprehensive knowledge of the relevant disciplines within the graduate program. This links theoretical understanding with practical application.
CO3- Developing an understanding of the fundamental laws and elements of electronic circuits is integral to the broader knowledge base expected from a graduate program. This demonstrates a strong theoretical foundation.
CO4- Comparing DC and AC signals and their circuit applications involves a combination of theoretical and practical knowledge, moderately related to the comprehensive understanding of the disciplines within the graduate program.
CO5- Understanding the working principles of electronic devices and their applications is directly aligned with the comprehensive knowledge expected from a graduate program. This involves both theoretical and practical aspects.
CO6- Solving problems based on network theorems are moderately related to the comprehensive knowledge of the disciplines within the graduate program. It involves applying theoretical knowledge to real-world problem solving.

PO3-Social competence:

CO2- Understanding the working principles of electronic devices and their applications requires strong analytical skills and problem-solving abilities, aligning well with the emphasis on critical thinking.
CO3- Developing an understanding of the fundamental laws and elements of electronic circuits involves a mix of theoretical knowledge and analytical skills, making it moderately related to critical thinking and problem-solving in PO2.
CO4- Comparing DC and AC signals and their circuit applications requires some level of analysis, linking it moderately to critical thinking and problem-solving skills emphasized.

PO5-Trans-disciplinary knowledge:

CO3- Developing an understanding of the fundamental laws and elements of electronic circuits is primarily focused on the electronics discipline, but it can be integrated into broader perspectives to a certain extent.

PO6-Personal and professional competence:

CO1-Identifying parameters and specifications of passive components in electronics involves

technical knowledge, and to some extent, collaboration in a team setting, resulting in a moderate relationship with personal and professional competence.
CO2- Understanding the working principles of electronic devices requires technical skills, which can contribute to both independent work and collaborative efforts within a team, resulting in a moderate relationship with personal and professional competence.
CO4- Comparing DC and AC signals and their circuit applications may involve collaborative discussions and teamwork, contributing to a moderate relationship with personal and professional competence.
CO5- Understanding the working principles of electronic devices and their applications can contribute to both independent work and collaborative efforts within a team, resulting in a moderate relationship with personal and professional competence.

PO8-Environment and Sustainability:

CO3- Developing an understanding of the fundamental laws and elements of electronic circuits is more focused on technical knowledge within the electronics discipline, resulting in a partial relationship with the impact on societal and environmental contexts.

PO9- Self-directed and Life-long learning:

CO1- Identifying parameters and specifications of passive components in electronics requires technical knowledge and the ability to engage in independent learning, resulting in a moderate relationship with self-directed and life-long learning.

CO2- Understanding the working principles of electronic devices involves technical knowledge, and the ability to engage in independent learning contributes to a moderate relationship with self-directed and life-long learning.

CO3- Developing an understanding of the fundamental laws and elements of electronic circuits involves independent learning and is moderately related to the self-directed and life-long learning emphasized.

CO4- Comparing DC and AC signals and their circuit applications requires technical knowledge and the potential for independent learning, resulting in a moderate relationship with self-directed and life-long learning.

CO5- Understanding the working principles of electronic devices and their applications involves technical knowledge, and the ability to engage in independent learning contributes to a moderate relationship with self-directed and life-long learning.

CO6- Solving problems based on network theorems requires independent learning and problem-solving skills, strongly related to the self-directed and life-long learning emphasized.

Class : F.Y. B. Sc. (Semester- I)
Paper Code: ELE1102
Paper : II **Title of Paper: Logic Gates and Arithmetic Circuits**
Credit : 2 **No. of lectures: 36**

Course Objectives:

1. To know about different number systems and codes.
2. To understand logic gates and truth tables.
3. To understand Boolean Laws and k map techniques.
4. To understand different arithmetic circuits.
5. To develop skill to build digital circuits.
6. To learn basics techniques to design digital circuits.
7. To learn fundamental concepts used in design of digital system.

Course Outcome:

1. To solve problems based on interconversion of number systems.
2. To reduce expressions using Boolean Laws.
3. To reduce expressions using k-map in SOP and POS forms.
4. To familiarize with the applications of arithmetic circuits.
5. To develop skill to build digital circuits.
6. To learn basic techniques to design digital circuits and fundamental concepts using in design of digital system.

Unit 1: Number Systems and Logic Gates (12L)

Introduction to decimal, Binary and hexadecimal number systems and their inter conversions, BCD, Excess-3 and Gray codes

Positive and Negative Logic, Study Of Basic Logic gates (NOT, AND, OR) & derived gates (NAND, NOR, EX-OR) using Symbol, Boolean Equations and truth table

Unit 2: Boolean Algebra and Karnaugh maps (12L)

Boolean algebra rules and Boolean laws: Commutative, Associative, Distributive, AND, OR and Inversion laws, De Morgan's theorem, Universal gates. Simplifications of Logic equations using Boolean algebra rules and Karnaugh map (up to 4 variables).

Unit 3: Arithmetic Circuits (12L)

Rules of binary addition and subtraction, subtraction using 1's and 2's complements, half adder, full adder, Half subtractor, Four bit parallel adder, Basic Block diagram of Computer, Introduction to CPU

Text/ Reference Books:

1. Digital Principles and Applications: Malvino Leach, Tata McGraw-Hill.
2. Digital Fundamentals: Floyd T.M., Jain R.P., Pearson Education

Mapping of Program Outcomes with Course Outcomes

Weightage: 1=Weak or low relation, 2=Moderate or partial relation, 3=Strong or direct relation

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CO2	3	3	2	-	-	2	-	-	2
CO3	2	3	2	-	1	-	-	1	3
CO4	2	2	1	-	-	1	-	-	1
CO5	3	2	-	-	-	1	-	-	2
CO6	3	3	-	-	-	-	-	-	2
CO7	-	-	-	-	-	-	-	-	-

Justification Of Mapping

PO1-Disciplinary Knowledge:

CO1- It involves problem-solving using the interconversion of number systems, which contributes to a comprehensive knowledge of the disciplines in a graduate program, but the connection may not be as strong.

CO2- It involves reducing expressions using Boolean Laws, which demonstrates a strong theoretical understanding generated from the specific graduate program in the area of work.

CO3- It involves reducing expressions using k-map in SOP and POS forms, contributing to both theoretical and practical understanding within the graduate program.

CO4- It involves familiarizing with the applications of arithmetic circuits, contributing to a practical understanding of the disciplines in the graduate program.

CO5- It involves developing skills to build digital circuits, which contributes to practical understanding within the graduate program.

CO6- It involves learning basic techniques to design digital circuits and fundamental concepts used in the design of digital systems, demonstrating a strong theoretical understanding within the specific graduate program.

PO2-Critical Thinking and Problem solving:

CO1-Student will able to as solving problems based on the interconversion of number systems requires some level of critical thinking and problem-solving skills.

CO2- As reducing expressions using Boolean Laws involves analysis, inference, and problem-solving, aligning well with the skills of critical thinking.

CO3- As reducing expressions using k-map in SOP and POS forms requires a systematic approach, analysis, and problem-solving skills, demonstrating critical thinking abilities.

CO4- Familiarizing with the applications of arithmetic circuits involves some level of problem-solving and critical thinking.

CO5- To developing skills to build digital circuits requires problem-solving abilities and critical thinking to ensure the circuits function correctly.

CO6- As learning basic techniques to design digital circuits and fundamental concepts in the design of digital systems involves critical thinking and problem-solving skills.

PO3- Social competence:

CO2- Students will apply their knowledge as reducing expressions using Boolean Laws is more focused on technical skills, but the ability to explain solutions effectively may involve social competence.

CO3-Reducing expressions using k-map in SOP and POS forms requires effective communication of solutions, demonstrating social competence.

CO4- Student will be familiarizing with the applications of arithmetic circuits is more technical, but discussing these applications may require some level of social competence.

PO5- Trans-disciplinary knowledge:

CO3- Students will apply their knowledge as reducing expressions using k-map in SOP and POS forms may require integration of different disciplines to address complex problems.

PO6- Personal and professional competence:

CO1- Students will apply their knowledge solving problems based on interconversion of number systems may involve both independent work and collaboration within a team to meet defined objectives.
CO2- As reducing expressions using Boolean Laws may require collaboration and teamwork for solving complex problems.
CO4-Familiarizing with the applications of arithmetic circuits may require both independent work and collaboration across interdisciplinary fields.
CO5- Student will developing skills to build digital circuits often involves collaborative work, demonstrating interpersonal relationships and teamwork.

PO8- Environment and Sustainability:

CO3- As reducing expressions using k-map in SOP and POS forms is primarily a technical skill, and its connection to environmental and sustainability aspects may be indirect.

PO9- Self-directed and Life-long learning:

CO1- Students will apply their knowledge solving problems based on interconversion of number systems may contribute to the development of problem-solving skills, a key aspect of self-directed and life-long learning.
CO2- Reducing expressions using Boolean Laws involves logical reasoning and problem-solving skills, which are relevant to self-directed learning.
CO3- As reducing expressions using k-map in SOP and POS forms requires analytical skills that can contribute to independent learning.
CO4- Student will familiarizing with the applications of arithmetic circuits is more focused on practical knowledge, but it may contribute to a foundation for self-directed learning.
CO5- Student will developing skills to build digital circuits is a hands-on activity that encourages self-directed learning and skill development.
CO6- As learning basic techniques to design digital circuits and fundamental concepts involves understanding foundational principles, which can contribute to self-directed learning.