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

Autonomous

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

Semester	Paper Code	Title of Paper	No. of Credits
I	CSEL1101	Circuit Theory and network Analysis	2
	CSEL1102	Fundamentals of Digital Electronics	2
	CSEL1103	Practical	2

SYLLABUS (CBCS) FOR F. Y. B. Sc. Computer Science
(w.e. from June, 2019)

Academic Year 2019-2020

Class : F.Y. B. Sc.(Comp. Sci.) (Semester- I)
Paper Code: CSEL1101
Paper : I Title of Paper : **Circuit Theory and network Analysis -I**
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 elementary electronic circuits and applications.
4. To understand network theorems and their use in circuit analysis.
5. To develop analog circuit design skill.
6. To know the AC circuits and related terminologies.
7. To motivate them to work on different mini projects.

Course Outcomes :

CO1: To study basic electronic components and their applications in different areas.
CO2: Capability to understand the working principle of the electronic device and their applications.
CO3: Identify active and passive components.
CO4: To understand basic circuit theory.
CO5: To evaluate mesh and nodal analysis of AC and DC circuit.
CO6: Getting the fundamental knowledge of fundamental devices.
C07: To perform the conversions among the different number systems.

Unit 1: Basic Components and Combination Circuits: (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, Connectors, Switches, Fuses, Relays, Batteries. Concept of Ideal voltage and current with AC and DC sources, Impedance, Series and parallel circuit of resistor, capacitor and inductor.

Unit 2: Circuits Analysis and Network Theorems (12L)

Network terminology, Ohms law, voltage and current dividers, Kirchhoff's Laws (KCL, KVL), Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum power transfer theorem, numerical problems related to all theorems, Charging-discharging of capacitor, LCR series resonant circuit with DC response.

Unit 3: AC Circuits (12L)

Introduction to AC Circuits: Sinusoidal voltage and current and their rms, peak to peak and average values, voltage current relationship. Passive Filter: Low Pass, High Pass, Band Pass and Band Reject (Designing, Construction, working principle, Frequency Response, Quality factor, Bandwidth and Application. Introduction to semiconductor devices: Types of semiconductor material, its formation and conduction.

Text/ Reference Books:

1. Basic Electronics: Bernard Grob, McGraw Hill Publication, 8th Revised Edition,2010

2. Electronic Principles: Albert Malvino, David J Bates, McGraw Hill 7th Edition. 2012
3. Principals of Electronics: V.K. Mehta, S.Chand and and Co.
4. A text book of electrical technology: B.L.Theraja, S.Chand and Co.

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

PO justification:

PO1: Computer Knowledge:
CO2: Understanding the working principles of electronic devices, which may include semiconductor devices, contributes directly to computer knowledge as these principles are foundational to the functioning of computers and related technologies.
CO4: Basic circuit theory is fundamental to understanding the functioning of electronic systems, including computers. This provides a basis for understanding the flow of signals and currents in computer circuits.
CO6: Fundamental devices, such as transistors and diodes, are integral to the operation of electronic circuits, including those in computers. Knowledge of these devices enhances computer knowledge by providing insights into the foundational components of computer systems.
CO7: Performing conversions among different number systems is a fundamental skill that underlies computer programming and digital systems.

PO2: Design/ Development of a solution:
CO2: Understanding the working principles of electronic devices is essential for designing solutions that involve the integration of these devices. The knowledge of how these devices work enables the creation of effective solutions tailored to specific applications.
CO3: Identifying active and passive components is a fundamental step in designing electronic circuits and systems. This knowledge is essential for making informed decisions during the design process, contributing to the overall design and development of solutions.
CO4: Understanding basic circuit theory is crucial for designing solutions involving electronic circuits. It provides the necessary theoretical foundation for designing and analyzing circuits, ensuring the development of effective solutions.
CO6: Fundamental knowledge of electronic devices is essential for designing solutions that incorporate these devices. This knowledge forms the basis for making informed design choices and optimizing the performance of electronic systems.
CO7: Performing conversions among different number systems is a skill that is valuable in the design process, especially in the context of digital systems. This capability contributes to the overall design and development of solutions in electronic and computer systems.

PO3: Modern tool usage:
CO3: Identification of active and passive components often involves the use of modern tools for testing and measurement. This contributes to the modern tool usage outcome as students utilize tools to identify and characterize electronic components.
CO4: Understanding basic circuit theory involves the application of modern tools such as circuit simulation software and analysis tools. Students develop proficiency in using these tools to understand and analyze circuit behavior, contributing to the modern tool usage outcome.
CO6: Acquiring fundamental knowledge of electronic devices is complemented by using modern tools for device characterization, simulation, and analysis. This contributes to the modern tool usage outcome as students integrate theoretical knowledge with practical tool-based applications.
CO7: Performing conversions among different number systems often involves the use of software tools. Proficiency in utilizing these tools for numerical conversions aligns with the modern tool usage outcome as students apply them to perform complex numerical operations.

PO4: Ethics:
Ethical considerations are critical in technology and computer science fields. When performing conversions among different number systems, there may be ethical implications related to data representation, security, and privacy.

PO5: Environmental Sustainability:
CO1: Understanding the materials used in electronic components and their life cycle can contribute to more sustainable manufacturing processes. Knowledge of environmentally friendly materials and disposal methods may be integrated into this study.
CO4: Knowledge of efficient circuit design can contribute to the development of electronic devices with lower power consumption, reducing energy usage and environmental impact.
CO5: Efficient analysis and design of circuits can lead to the development of energy-efficient electronic systems, contributing to environmental sustainability.

PO6: Individual and teamwork:
CO1: Studying electronic components often involves collaborative learning, discussions, and practical work. The application of knowledge in different areas may require teamwork, to the development of individual and teamwork skills.
CO6: Gaining fundamental knowledge of electronic devices can be facilitated through individual study as well as collaborative activities. This contributes to the development of both individual and teamwork skills.
CO7: Performing conversions among different number systems may involve individual exercises and collaborative learning activities. This contributes to the development of teamwork skills, especially in tasks that require coordination.

PO7: Innovation, Employability and Entrepreneurial skill:
CO2: Students have capability to understand working principles and applications of electronic devices promotes innovation by enabling individuals to think critically and creatively. This understanding also enhances employability by making individuals versatile in applying their knowledge to various contexts.
CO3: Students identify active and passive components contributes to employability by providing practical skills applicable in different industries. Additionally, this skill is relevant for entrepreneurial endeavors, as it forms a basis for designing and building electronic systems.
CO6: Fundamental knowledge of electronic devices is crucial for innovation, as it forms the basis for creating new technologies. Employability is enhanced as individuals possess foundational skills in electronics. Entrepreneurial skills can be nurtured by leveraging this knowledge for new product ideas.
CO7: Performing conversions among different number systems is a practical skill that enhances employability in fields requiring digital systems understanding. It also contributes to entrepreneurial skills as individuals can apply this knowledge to create and innovate in digital contexts.

SYLLABUS (CBCS) FOR F. Y. B. Sc. Computer Science
(w.e. from June, 2019)

Academic Year 2019-2020

Class : F.Y. B. Sc.(Comp. Sci.) (Semester- I)
Paper Code: CSEL1102
Paper : II Title of Paper : **Fundamentals of Digital Electronics**
Credit : 2 No. of lectures: 36

Course Objectives:

1. To provide the fundamental concept associated with the digital logic and circuit design.
2. To introduce the basic concept and law involved in the Boolean algebra and logic families and digitalcircuits.
3. To familiarize with the different number systems, logic gates and combinational circuits utilized indifferent digital circuits and systems.
4. This course will help in design and analysis of the digital circuit and systems.
5. To prepare students to perform the analysis and design of various digital electronic circuit.
6. To acquire the basic knowledge of digital logic levels.
7. To understand digital electronic circuits.

Course Outcomes :

CO1: To become familiar with the digital signal, positive and negative logic, Boolean algebra, basicgates, number systems and their conversions form to other.
CO2: To learn the minimization techniques to simplify the hardware requirements of digital circuits.
CO3: To design and apply real time digital systems.
CO4: To understand the working mechanism and design guidelines of different combinational,sequential circuits.
CO5: To understand role in the digital system design.
C06 : To become able to know various types of components .
CO7: To understand the different logic families involved in the digital systems.

Unit I : Number Systems and Logic Gates (8L)

Introduction to decimal, Octal, Binary and hexadecimal number systems, interconversions of number systems , BCD, Excess-3 and Gray codes and their inter conversions, Alphanumeric representation using ASCII code. Positive and Negative Logic, Basic Logic gates (NOT, OR, AND) & derived gates (NAND, NOR),EX-OR , EX-NOR gates (Symbol and truth table), Study of Gate ICs (7408, 7432, 7404,7400,7402,7486).

Unit II : Boolean Algebra and Karnaugh maps (14L)

Boolean algebra rules and Boolean laws: Commutative, Associative, Distributive, AND, OR and Inversion laws, De Morgan’s theorem, inter conversion of Universal gates . Min terms, Max terms , Boolean expression in SOP and POS form, conversion of SOP / POS expression to its standard SOP/POS form, Simplifications of Logic equations using Boolean algebra rules and Karnaugh map (2,3, 4 variables) , Ex-OR gate as parity checker and generator.

Unit III : Arithmetic and Combinational Circuits (14L)

Rules of binary addition and subtraction, subtraction using 1’s and 2’s complements, half adder, full adder, Half subtractor, Full subtractor, 4 bit parallel adder, Universal adder / subtractor, Digital comparator, Introduction to ALU. Multiplexer (2:1, 4:1), Demultiplexer (1:2, 1:4) and their applications, Code converters

- Decimal to binary, Hexadecimal to binary, BCD to decimal, Encoder & Decoder, Priority Encoder , BCD to Seven Segment Decoder.

Text/ Reference Books:

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

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

PO Justification:

PO1: Computer Knowledge:

CO2: Students able to learn minimization techniques which is a practical application of computer knowledge, specifically in optimizing hardware resources in digital circuits.

CO4: Understanding the working mechanism and design guidelines of different circuits involves in-depth knowledge of digital systems.

CO7: Understanding different logic families is part of computer knowledge, as it involves knowledge about the various technologies and methodologies used in digital systems.

PO2: Design/Development of a solution:

CO2: Learning minimization techniques is directly related to the design and development of efficient digital circuits. This skill is crucial in the process of creating optimized solutions for hardware requirements.

CO3: Designing and applying real-time digital systems involves the practical application of design principles. This leads to the design and development of solutions, in the context of real-time systems.

CO4: Understanding the working mechanism and design guidelines of various circuits is essential for the effective design of digital solutions. This knowledge contributes directly to the design and development of digital systems.

CO7: Understanding different logic families is essential in the design and development of digital solutions, as it influences the selection and implementation of logical components.

PO3: Modern tool usage:

CO3: Designing and applying real-time digital systems often requires the use of simulation tools, modeling software, and other digital design tools.

CO4: Understanding the working mechanism of digital circuits and following design guidelines involves the use of modern simulation and analysis tools.

CO7: Understanding different logic families often involves the use of simulation and analysis tools to compare and contrast their performance. Students utilizing such tools aligns with the modern tool usage outcome.

PO4: Ethics:

Different logic families have distinct characteristics, including power consumption and performance. Ethical considerations involve choosing logic families that align with energy efficiency goals and considering the environmental impact of manufacturing and disposal.

PO5: Environmental Sustainability:

CO3: Designing real-time digital systems involves optimizing performance and energy consumption. Implementing energy-efficient designs aligns with environmental sustainability goals by reducing the overall ecological footprint of digital systems.

CO5: Understanding one's role in digital system design includes considering the environmental impact of design decisions. Promoting awareness of sustainability during the design process is crucial for responsible engineering practices.
CO6: Knowledge of various components includes understanding their environmental implications, such as energy efficiency and recyclability. Choosing components with lower environmental impact aligns with sustainability goals.

PO6: Individual and Teamwork:

CO1: Understanding digital fundamentals involves both individual learning and collaboration in a team setting. Students may work together to explore concepts, share insights, and collectively solve problems, enhancing both individual skills and teamwork.
CO6: Knowledge of various components may involve individual research and learning, but practical applications, such as selecting components for a system, often require teamwork. Understanding the strengths and weaknesses of different components enhances both individual knowledge and collaborative decision-making.
CO7: Understanding different logic families involves individual study and may also require teamwork when applying this knowledge to practical scenarios. Collaborating on projects that involve the selection and implementation of logic families enhances both individual expertise and collective problem-solving abilities.

PO7: Innovation, Employability and Entrepreneurial skill:

CO1: Understanding the fundamentals of digital signals, logic, and number systems forms the basis for innovation. Familiarity with these concepts enhances employability by providing a strong foundation for tackling digital system challenges and contributes to entrepreneurial skills by fostering creative problem-solving.
CO2: Learning minimization techniques is an innovative approach to streamline digital circuit design. This skill enhances employability by making individuals valuable contributors to efficient hardware design, and it cultivates entrepreneurial skills by fostering the ability to optimize and innovate in digital systems.
CO3: Designing real-time digital systems requires innovation to meet performance requirements. This competency enhances employability by providing practical design experience and entrepreneurial skills by encouraging individuals to think creatively in applying digital systems to real-world scenarios.
CO6: Knowledge of various components allows individuals to innovate in component selection for digital systems. This competency enhances employability by providing a diverse skill set and cultivates entrepreneurial skills by enabling individuals to make informed decisions in component choices.
CO7: Understanding different logic families involves innovation in selecting the most suitable logic for a given application. This knowledge enhances employability by making individuals proficient in logic family selection and cultivates entrepreneurial skills by encouraging critical thinking in choosing the most innovative solutions.