CBCS Syllabus as per NEP 2020 for F. Y. B.Sc. Electronics
(2023 Pattern)

Name of the Programme : B.Sc. (Computer Science) Electronics

Programme Code : USCS

Class : F. Y. B.Sc.

Semester : II

Course Type : Minor (Theory)

Course Code : COS-161-MN (EL)

Course Title : Basic Electronics

No. of Credits : 02

No. of Teaching Hours : 60

Course Objectives:

1. To get familiar with basic circuit elements and passive components.
2. To understand network theorems and their use in circuit analysis.
3. To study elementary electronic circuits and applications.
4. To understand various number systems and their conversions.
5. To develop skill to build digital circuits.
6. To develop analog circuit design skills.
7. To learn basic techniques to design digital circuits and fundamental concepts used in design of digital system.

Course Outcomes:

By the end of the course, students will be able to:

CO1: To study basic electronic components and their applications in different areas.

CO2: Capability to understand the working principles of the electronic devices and their applications.

CO3: To develop an understandings of the fundamental laws and elements of electronic circuits.

CO4: Apply the knowledge of network theorems and simplify the network using reduction techniques.

CO5: To perform the conversions among different number systems.

CO6: Identify different types of logic gates along with their ICs and also verify their truth tables.

CO7: Derive basic logic gates, adder and subtractor using universal gates.

Topics and Learning Points

Unit 1: Study of Basic Components: (10L)

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. Series and parallel circuit of resistor, capacitor and inductor.

Unit 2: Circuits Analysis and Network Theorems: (10L)

Concept of Ideal voltage and current with ACand DC sources, Internal resistance, DC source and AC source (amplitude, frequency, peak value, peak to peak value, RMS value). 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,

Unit 3: Number Systems and Logic Gates: (10L)

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). Rules of binary addition and subtraction, subtraction using 1's and 2's complements.

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. Digital Electronics: Jain R.P., Tata McGraw Hill
4. Digital Principles and Applications: Malvino Leach, Tata McGraw-Hill.

Course Outcome	Program Outcomes						
	PO1	PO2	PO3	PO4	PO5	PO6	PO7
CO1	2	1	-	-	3	2	-
CO2	-	2	-	-	2	3	1
CO3	-	3	-	3	-	-	2
CO4	-	1	-	2	-	1	3
CO5	1	-	3	2	2	-	-
CO6	2	3	3	-	-	2	-
CO7	3	3	2	-	-	3	2

Justification of Mapping

PO1: Computer knowledge:

CO1: Basic electronic components are the building blocks of computer hardware. Understanding these components is crucial for students to grasp computer architecture and design.

CO6: Logic gates are building blocks of digital circuits, and understanding them is crucial for designing and troubleshooting computer systems.

CO7: Understanding how to derive circuits using universal gates is pertinent to designing and optimizing logic circuits in computer systems.

PO2: Design/ development of a solution:

CO1: Understanding the applications of electronic components is crucial for designing practical and effective electronic solutions.

CO2: The capability to apply working principles ensures the effective integration of electronic devices into practical solutions.

CO3: A solid understanding of circuit laws is essential for the successful design of electronic circuits.

CO4: The application of these techniques is essential for designing networks that meet specific performance requirements.

CO6: Identifying and understanding logic gates is fundamental to the design of digital systems and logical solutions.

CO7: Deriving circuits using universal gates demonstrates the capability to design efficient and flexible logical solutions.

PO3: Modern tool usage:

CO5: Modern tools, such as computer-based calculators or software, can enhance the speed and accuracy of performing number system conversions, providing students with practical skills in tool-assisted calculations.

CO6: Simulation tools can aid students in visualizing the behavior of logic gates and verifying truth tables, promoting a deeper understanding of digital logic.

CO7: Utilizing modern tools for circuit design and simulation enables students to validate their theoretical Knowledge through practical implementation, enhancing their understanding of digital circuitry.

PO4: Ethics:

CO3: Ethical considerations in circuit design ensure that electronic circuits prioritize safety, reliability, and contribute positively to society.

CO4: Ethical network design ensures fair access, protects user privacy, and addresses security concerns in electronic communication systems.

CO5: Ethical considerations in number system conversions are essential to address privacy concerns, maintain data integrity, and promote responsible data handling practices.

PO5: Environmental Sustainability:

CO1: Understanding and selecting components with lower environmental impact contributes to sustainable practices in electronics.

CO2: Knowledge of energy-efficient devices is crucial for designing environmentally sustainable electronic systems.
CO5: Choosing sustainable data representation methods is important for minimizing environmental impact in computing.

PO6: Individual and teamwork:
CO1: Collaborative study sessions and projects promote teamwork, communication, and the sharing of diverse perspectives in understanding basic electronic components and their applications.
CO2: Group discussions allow students to learn from each other, fostering a deeper understanding of electronic device principles through shared insights and perspectives.
CO4: Collaborative problem-solving enhances teamwork skills and allows students to apply network theorems in a shared learning environment.
CO6: Collaborative activities enhance teamwork and provide a platform for collective learning and verification of logic gate principles.
CO7: Group projects requiring the derivation of circuits promote teamwork, critical thinking, and a shared understanding of complex logic concepts.

PO7: Innovation, Employability and Entrepreneurial skill:
CO2: Understanding the working principles of electronic devices is a foundation for creating innovative solutions and products, enhancing employability and entrepreneurial potential.
CO3: The application of fundamental laws in innovative ways prepares students for creative problem-solving and entrepreneurial ventures.
CO4: Employing network theorems in innovative ways contributes to problem-solving skills and entrepreneurial thinking.
CO7: Deriving circuits using universal gates encourages creative problem-solving and supports an entrepreneurial mindset.