# ST. XAVIER'S COLLEGE (AUTONOMOUS), AHMEDABAD-9
# FACULTY OF SCIENCE

## DEPARTMENT OF PHYSICS & ELECTRONICS

**SEMESTER – I**

**SYLLABUS**

**OF**

**BSc ELECTRONICS (HONOURS)**

**BASED ON UNDERGRADUATE CURRICULUM FRAMEWORK**
**(NEP – 2020)**

**(Effective from Academic Year 2023)**

## Curriculum Framework for Semester – I

| Course | Title | Content | | Credit |
|---|---|---|---|---|
| DSC-1 | ELMC111C Fundamental of Electronics-I | U1 | Number Systems and Codes | 4 |
| | | U2 | Boolean Algebra | |
| | | U3 | Diodes and their Applications | |
| | | U4 | General Amplifier Characteristics | |
| DSC-2 | ELMC112L Electronics and Experiential Lab-I | 14 Experiments | | 4 |
| | | Experiential Lab: Hands on experiment. | | |
| Minor | ELMN111C Basic Electronics-I | U1 | Number Systems and Codes | 4 |
| | | U2 | Diodes and their Applications | |
| | | U3 | 14 Experiments | |
| | | U4 | | |
| MDC | How Things Works | U1 | Basics of Electricity and Household Electric Systems | 4 |
| | | U2 | Common Electronic Gadgets and How They Work | |
| | | U3 | Mechanical Appliances and Simple Machines | |
| | | U4 | Laboratory | |
| SEC | ELSE11C Electronics Design using C Programming | U1 | C Language Programming | 2 |
| | | U2 | Electronics Designing Using C Programming | |
| AEC | Ability Enhancement Course | | (To be offered by the concerned subject Department) | 2 |
| VAC | Value Added Course | | (To be chosen from a basket of courses) | 2 |
| **Total Credits** | | | | **22** |

* DSC: Discipline Specific Core

# St. Xavier's College (Autonomous), Ahmedabad

**Syllabus of Semester–I** to be implemented from the Academic Year **2025-26.**

## DEPARTMENT OF PHYSICS & ELECTRONICS

## Minor Course: Basics Electronics-I

| Course Code & Title | Credit Distribution of The Course | | | | Eligibility Criteria | Prerequisite(s) of the Course (if any) |
|---|---|---|---|---|---|---|
| | Cr | Lecture | Lab | Activity/Case study analysis | | |
| ELMN111C **Basic Electronics-I** | 4 | 2Cr | 2Cr | | 10 + 2 from a recognized board | Science Stream |

### Learning Objectives (LO)

| | |
|---|---|
| LO1 | Understand various number systems and binary codes, perform interconversions, and apply binary arithmetic including error detection and correction techniques. |
| LO2 | Understand the behavior and applications of diodes in various clipping, clamping, and voltage multiplier circuits, and explore the operation of special-purpose diodes. |

(Electronics Laboratory)

| | |
|---|---|
| LO1 | To enable students to test active and passive electronic components and operate standard laboratory instruments such as CROs, multimeters, and power supplies for analyzing analog circuits like rectifiers, voltage multipliers, LED setups, clipping/clamping circuits, and Wien bridge oscillators. |
| LO2 | To enable students to construct digital logic circuits and perform code conversions (Binary ↔ Gray) using diode and IC-based circuits, and to verify their correct operation through practical experimentation. |

### Course Outcomes (CO)

| | |
|---|---|
| CO 1 | Identify and test basic electronic components and effectively use standard laboratory instruments to implement and analyze analog circuits such as rectifiers (with and without filters) and special electronic devices. |
| CO 2 | Design, implement, and verify digital logic circuits and code converters, and evaluate their performance for various applications. |

(Electronics Laboratory)

| | |
|---|---|
| CO 1 | Students will be able to conceive, plan, and implement a scientific model or circuit based on a selected concept in physics or electronics, integrating creativity with technical knowledge. |
| CO 2 | Students will be able to demonstrate and present their working model, effectively communicating the underlying principles, execution process, and potential applications, while evaluating the challenges faced during development. |

## Unit 1: Number Systems and Codes

**Credit of Course: 1 Cr** **Lecture 12 Hrs** **Tutorial 3Hrs**

Introduction, number system, inter conversion of number, signed binary number, floating point representation of number, binary arithmetic, complement binary arithmetic, arithmetic overflow, codes (BCD, 2-4-2-1 code, 4-bit BCD and 5-bit BCD, Biquinary code, excess 3, grey code, 7-segment code, alpha numeric codes, error detecting, error correcting code, hamming code.

**Textbook:**
**Digital electronics By G. K. Kharate**
**Publication:** Oxford University Press
**Article:** 2.1 to 2.9

## Unit 2: Diodes and their Applications

**Credit of Course: 1 Cr** **Lecture 12 Hrs** **Tutorial 3Hrs**

Load line analysis of a diode circuit, clipping circuit, positive and negative clipper, biased clipper clipper, some other biased clipper, combination clipper, two level slicer, clamping circuit, biased clampers, practical clamper circuits, application of clamping circuits, voltage multiplier, voltage doublers, voltage Tripler and quadrupler.
**Special purpose diodes**: varactor diode, varactor diode specifications and applications, LED, LED voltage drop and current, LED applications, multicolour LEDs, LCDs, photodiodes, photoconductive cells, photo voltaic cells, LASER diodes and applications.

**Textbook:**

- **Electronic Devices and Circuits by Allen Mottershead**
  **Publication: PHI**
  **Article:** 2.1
- **A textbook of electronic circuits R. S. Sedha**
  **Publication: S. Chand**
  **Article:** 6.1 to 6.14., 7.12 to 7.14, 7.21 to 7.24, 7.27 to 7.31, 7.33 to 7.35-7.25

**Reference Books:**

- Digital Fundamentals by Floyd and Pearson
- Digital Design by Moris and Mano
- Digital Principles by Malvino and Leach, McGraw Hill Publication
- Electronic Devices and Circuit By Boylestead and Namensky.Electronic Principles By Malvino and Bates

## Unit 3&4: Electronics Lab - I

**Credit of Course: 2 Cr**

| | |
|---|---|
| 1 | Identification and testing of electronic active and passive components. |
| 2 | To familiarize with various laboratory instruments. |
| 3 | To study load characteristics, internal resistance and ripple factor of a half wave rectifier (with and without “C” filter) |
| 4 | Study of AND, OR, NOT, NOR, NAND and EX-OR gates using IC7400. |
| 5 | To Convert grey to Binary and Binary to grey using diode clamping. |
| 6 | Clamping Using diode. |
| 7 | BCD to seven segments. |
| 8 | To determine dielectric constant of given material. |
| 9 | To study voltage doubler circuit. |
| 10 | To study voltage multiplier circuit. |
| 11 | I-V Characteristics of different colored LED. |
| 12 | To study load characteristics, internal resistance and ripple factor of a full wave rectifier. |
| 13 | Clipping using diode |
| 14 | To study Wein bridge as a frequency selective network. |