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

## DEPARTMENT OF PHYSICS & ELECTRONICS

**SEMESTER – II**

**SYLLABUS**

**OF**

**BSc ELECTRONICS (HONOURS)**

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

**(Effective from Academic Year 2023)**

## Curriculum Framework for Semester – II

| 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 | ELMN221C Basic Electronics-II | U1 | Network Theorem and Filters | 4 |
| | | U2 | General amplifier characteristics | |
| | | 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–II** to be implemented from the Academic Year **2025-26.**

## DEPARTMENT OF PHYSICS & ELECTRONICS

## Minor Course: Basics Electronics-II

| Course Code & Title | Credit Distribution of The Course | | | | Eligibility Criteria | Prerequisite(s) of the Course (if any) |
|---|---|---|---|---|---|---|
| | Cr | Lecture | Lab | Activity/Case study analysis | | |
| ELMN221C **Basic Electronics-II** | 4 | 2Cr | 2Cr | | 10 + 2 from a recognized board | Science Stream |

### Learning Objectives (LO)

| | |
|---|---|
| LO1 | Understand and apply various network theorems to simplify complex electrical circuits and analyze their behavior under different input conditions. |
| LO2 | Analyze the behavior of RC filters and amplifiers under sinusoidal and non-sinusoidal signals, including their frequency response, efficiency, and distortion characteristics. |

(Electronics Laboratory)

| | |
|---|---|
| LO1 | Develop hands-on skills to implement and verify fundamental network theorems, analog filters, amplifiers, and logic circuits using breadboards and soldering techniques. |
| LO2 | Understand and analyze the behavior of analog and digital circuits through practical experiments, including signal filtering, amplification, and logic gate applications. |

### Course Outcomes (CO)

| | |
|---|---|
| CO 1 | Students will be able to simplify and solve electrical circuits using network theorems such as Thevenin's, Norton's, superposition, and maximum power transfer theorems. |
| CO 2 | Students will be able to characterize and evaluate the performance of RC filters and amplifiers, including calculation of gain, bandwidth, harmonic distortion, and interpretation of phase and frequency response. |

(Electronics Laboratory)

| | |
|---|---|
| CO 1 | Students will be able to design, construct, and experimentally validate electrical and electronic circuits based on theoretical principles such as Thevenin's theorem, RC filtering, and CE amplifier response. |
| CO 2 | Students will demonstrate the ability to implement and troubleshoot digital circuits, including logic gates and code conversion (binary, gray, BCD), and understand their applications. |

## Unit 1: Network Theorem and Filters

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

**[A] Network Theorem:**

Reduction of complicated network, conversion between T and π sections, bridge T network, the lattice network, superposition theorem, the reciprocity theorem, Thevenin's theorem, Norton theorem, maximum power transfer theorem, compensation theorem.

**[B] Filters:**

High pass R C circuit (for sinusoidal and square wave i/p), High pass RC circuit as differentiator, Low pass R C circuit (for sinusoidal and square wave i/p), Low pass RC circuit as a integrator

**Textbook:**
**Network, Lines and Field by John D Ryder**
**Publication:**
**Articles:** 1.4, 1.5, 1.6, 1.7, 1.8, 1.9, 1.10, 1.11, 1.12, 1.13,

## Unit 2: General Amplifier Characteristics

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

Concept of amplification, amplifier notation, current, voltage and power gain, amplifier input resistance and output resistance, maximum power transfer, conversion efficiency, classes of amplifier, harmonic distortion , three point method of calculating distortion, Measurement of harmonic distortion, other type of amplifier distortion Decibels, other equation for decibel computation, zero decibel reference level, use of a voltmeter as a decibel indicator, voltmeter range correction factor, frequency response, amplifier band width, phase relationship in amplifier, square wave testing.

**Textbook:**
**Electronic Devices and Circuits by Allen Mottershead**
**Publication: PHI**
**Article:** 7.1 to 7.12, 7.15, 7.16, 8.1 to 8.5, 8.7, 8.8, 8.10, 8.11

**Reference Books:**

- Electronic Devices and Circuit Theory by Boylestead and Namensky.
- Electronic Principles by Melvino and Bates

## Unit 3&4: Electronics Lab - I

**Credit of Course: 2 Cr**

| | |
|---|---|
| 1 | To verify the Thevenin's theorem. |
| 2 | To verify the maximum power transfer theorem. |
| 3 | To verify the superposition theorem. |
| 4 | Conversion of a given network in to T- network and π- network. |
| 5 | Common Base Transistor I/P and O/P characteristics. |
| 6 | Common Emitter Transistor I/P and O/P characteristics. |
| 7 | Common Collector Transistor I/P and O/P characteristics. |
| 8 | RC high pass filter (Soldering and Bread Board). |
| 9 | RC low pass filter (Soldering and Bread Board). |
| 10 | To design and verify band pass filter. |
| 11 | Study of two, three and four input Ex-OR gate. Ex-OR gate as a parity checker and inverter. |
| 12 | To study load characteristics and ripple factor of Bridge rectifier. |
| 13 | I-V characteristics of a photodiode. |
| 14 | Project |