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

DEPARTMENT OF PHYSICS & ELECTRONICS

SEMESTER – V

SYLLABUS

OF

BSc ELECTRONICS (HONOURS)

BASED ON UNDERGRADUATE CURRICULUM FRAMEWORK (NEP – 2020)

(Effective from Academic Year 2023)

Curriculum Framework for Semester – V

Course	Title	Content		Credit
DSC-8 (Theory)	PHMC551C Mathematical Methods and Quantum Mechanics	U1	Partial Differential Equations	4
		U2	2nd Order Ordinary Differential Equations	
		U3	Foundation of Quantum Mechanics	
		U4	3D problem in QM	
DSC-9 (Theory)	PHMC552C Electrodynamics and Nuclear Physics	U1	Special Techniques in Electrodynamics	4
		U2	Electromagnetic waves	
		U3	Nuclear Emissions	
		U4	Nuclear Structure	
DSC-10 (Laboratory)	PHMC553L Physics and Experiential Lab-V	14 Physics Experiments		4
		Experiential Lab: Hands on experiment.		
Minor-1 (Sub. Specific)	PHMN551C Digital Circuit (Hybrid Mode SWAYAM)	U1	Combinational Circuit	3
		U2	Sequential Circuit	
		U3	Microprocessor 8085	
		U4	Laboratory	1
Minor-2 (Theory + Lab)	ELMN553C Basic Electronics-IV	U1	Network Analysis by Laplace Transformation	2
		U2	Multivibrators, Clock and Timer	
		U3 U4	9 experiments and 3 Projects	2
SEC	PHSE551C Statistical Methods in Physics	U1	Basics of Statistical Methods in Physics	2
		U2	Lab: Statistical Data Analysis and Simulation	
Total Credits				**22**

* DSC: Discipline Specific Core

St. Xavier's College (Autonomous), Ahmedabad

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

DEPARTMENT OF PHYSICS & ELECTRONICS

Minor Course: Basic Electronics-IV

Course Code & Title	Credit Distribution of The Course			Eligibility Criteria	Prerequisite(s) of the Course (if any)
	Cr	Lecture hrs	*Lab hrs*		
ELMN–553C Basic Electronics-IV	4	2Cr	2Cr	10 + 2 from a recognized board	Science Stream Math-Group

Learning Objectives:

LO1	Model and solve real-world electrical network problems using mathematical tools such as Laplace transformations, enhancing their capability in theoretical analysis and practical engineering applications.
LO2	Develop and troubleshoot electronic circuits involving timing, logic control, and waveform generation for use in instrumentation, automation, and digital systems.

Course Outcomes

CO1	Apply Laplace transformation techniques to analyze the transient and steady-state responses of RL, RC, and RLC electrical circuits subjected to various driving functions including exponential and step sinusoidal voltages or currents.
CO2	Design and analyze multivibrator circuits (astable, monostable, bistable) and implement timing, pulse generation, and waveform shaping applications using 555 timers and clock circuits.

Unit 1: Network Analysis by Laplace Transformation

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

Network Analysis using Laplace Transformation: The Laplace transformations, inverse Laplace transformation, important theorems regarding Laplace transformation, application of Laplace transformation in analyzing simple networks, use of partial function expansion in analysis using Laplace transformation, Heaviside's partial function expansion theorem, response of series RL circuit to exponential driving voltage, response of series RC circuit to exponential driving voltage, response of series RLC circuit to exponential driving voltage, response of series RLC circuit to exponential driving current, response of series RL circuit to step sinusoidal voltage, response of series RC circuit to step sinusoidal voltage, response of series RLC circuit to step sinusoidal voltage.

Textbook:
Network Analysis by G K Mithal
Publication: Khanna Publishers
Article: 6.1 to 6.14

Unit 2: Multivibrators, Clock and Timer

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

[A] Multivibrators: Collector coupled Astable multivibrator, Monostable multivibrator, Bistable multivibrator, Schmitt trigger

[B] Clock and 555 Timer: Description of functional diagram, monostable operation, linear ramp generator, frequency divider, astable operation. Clock waveforms, TTL clock, Schmitt Trigger, Monostable with input logic, Pulse Forming Circuit.

Textbook:
Electronic Devices and circuit**, S Salivahanan, N Suresh Kumar:** Article**:** 16.6, 16.8
Publication: McGraw Hill Publication
Digital Principles and applications **Malvino Leach and Saha,** Article**:** 7.1 to 7.7
Publication: McGraw Hill Publication

Reference Books:

- Digital Fundamentals by Floyd and Pearson
- Digital Design by Moris and Mano
- Network Analysis by M.E. Van Valkenburg

Unit 3 & 4: Experiments

Credit of Course: 2 Cr

01	Astable multivibrator using Transistor.
02	Bistable multivibrator using Transistor.
03	Astable multivibrator using IC 555.
04	Monostable multivibrator using IC 555.
05	Current regulator using IC LM 317.
06	Voltage regulator using IC 7905/7910/7915.
07	Laplace Transformation - 1.
08	Laplace Transformation - 2.
09	Monostable multivibrator using IC 74121.
10	Project - 1.
11	Project - 2.
12	Project - 3.