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

DEPARTMENT OF PHYSICS & ELECTRONICS

SEMESTER – V

SYLLABUS

OF

BSc PHYSICS (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	Specia Techniques in Electrodynamics	4
		U2	Electromagnetic waves	
		U3	Nuclear Emissions	
		U4	Nuclear Structure	
DSC-10 (Laboratory)	PHMC553CL 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	4
		U2	Sequential Circuit	
		U3	Microprocessor 8085	
		U4	Laboratory	
Minor-2 (Theory + Lab)	ELMN551C 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 – 5 to be implemented from the Academic Year **2025-26.**

FACULTY OF SCIENCE

DEPARTMENT OF PHYSICS & ELECTRONICS

Minor Course: Digital Circuits

Course Title & Code	Credit Distribution				Marks	Mode Of Delivery	Prerequisite (s)
	Cr	Lectures	Tutorials	Practical			
PHMN551C Digital Circuits	3+1	3	---	1	75 (Theory)	Hybrid (Swayam + Offline Lectures / Tutorials)	Physics Major students can take this course
		30 hrs	15 hrs	30 hrs	25 (Practical)		

LO1	Digital circuits are part of any electronic design today. This also happens to be one of the core subjects for the undergraduate students in Electronics, Electrical, Physics and Computer Engineering.
LO2	The proposed course on digital circuits will cover all the fundamental concepts in digital design.
LO3	The course will start with the representations of numbers – different number systems and conversion between them, representation of integer and real numbers etc.
LO4	This will be followed by combinational and sequential circuit design techniques.
LO5	Microprocessor 8085 will be discussed as a complete digital system example.
LO6	Finally, the student shall get a feel of the course by doing the practical's related to the theory which they shall be studying.

Learning Objectives:

Course Outcomes

CO1	Exposure to the Digital circuits and how it is different from the analog world
CO2	They would be able to design combinational circuits and conduct practical exercise.
CO3	They shall then move on to designing and testing sequential circuits.
CO4	Finally, they shall move to the 8085 Microprocessor system and do programing related to the instruction set of the 8085 Microprocessor.

Theory (45 hours)

Unit 1: Introduction Introduction to Number System, Boolean Algebra

Unit 2: Combinational Circuits
Combinational function minimization – K Map, Boolean identities Logic Gates, Arithmetic,
circuits, Code converters, Multiplexers, Decoders, PLA

Unit 3: Sequential Circuits
Latches and Flip-flops, Counters, Shift Registers, Finite State machines

Unit 4: Microprocessor 8085

Laboratory Experiments: (30 hours)

Lab (30 hours)

01	Half/Full Adder/Subtractor
02	MUX/DEMUX.
03	Study of shift registers and Johnson counter using IC 7495
04	Flip Flops
05	Study of 8:1 multiplexer (74151) and study of1:4 and 1:8 demultiplexer using IC 74155
06	study of 3:8 decoder and design of combinational circuit
07	Design of logic circuit using Karnaugh map (SOP method)
08	Design of combinational logic circuit using multiplexer IC.
09	Binary counter and Decade counter
10	Microprocessor Programming

***List of Experiments*:**

SWAYAM Link: https://onlinecourses.nptel.ac.in/noc24_ee147/preview

Reference Books:

1. Digital Circuits by Morris & Manno,
2. Digital Circuits by Malvino and Leech