



THIRD-YEAR OF BACHELOR OF SCIENCE MAJOR PHYSICS REVISED SYLLABUS ACCORDING TO CBCS NEP2020

COURSE TITLE: SOLID STATE PHYSICS
SEMESTER-V
W.E.F. 2025-2026

Recommended by the Board of Studies in PHYSICS
And
Approved by the Academic Council
Devrukh Shikshan Prasarak Mandal's
Nya. Tatyasaheb Athalye Arts, Ved. S. R. Sapre Commerce, and
Vid. Dadasaheb Pitre Science College (Autonomous), Devrukh.
Tal.Sangmeshwar, Dist. Ratnagiri-415804, Maharashtra, India

Academic Council Item No: 02/2025

Name of the Implementing Institute	:	Nya. Tatyasaheb Athalye Arts, Ved. S. R. Sapre Commerce, and Vid. Dadasaheb Pitre Science College (Autonomous), Devrukh. Tal. Sangmeshwar, Dist. Ratnagiri-415804,
Name of the Parent University	:	University of Mumbai
Name of the Programme	:	Bachelor of Science
Name of the Department	:	Physics
Name of the Class	:	Third Year
Semester	:	Five
Paper	:	I
No. of Credits	:	02
Title of the Course	:	Solid state Physics
Course Code	:	S301 PHT
Name of the Vertical in adherence to NEP 2020	:	Major
Eligibility for Admission	:	Any student admitted to Third year of B. Sc, degree programme in adherence to Rules and Regulations of the University of Mumbai and Government of Maharashtra
Passing Marks	:	40%
Mode of Assessment	:	Formative and Summative
Level	:	5.5
Pattern of Marks Distribution for SEE and CIA	:	60:40
Status	:	NEP-CBCS
To be implemented from Academic Year	:	2025-2026
Ordinances /Regulations (if any)		

Nya. Tatyasaheb Athalye Arts, Ved. S. R. Sapre Commerce and Vid. Dadasaheb Pitre Science College, Devrukh (An Autonomous College Affiliated with University of Mumbai)

**Syllabus for Third Year of Bachelor of Science in Physics
(With effect from the academic year 2025-2026)**

Semester-V

Course Title: Solid state Physics

Paper No – Physics Paper – I

No. of Credits – 02

Type of Vertical: Major

Course Code: S301PHT

After successful completion of this course students will be able to

Course Learning Outcome No.	Course Learning Outcome
CLO-01	Apply fundamental concepts such as Brillouin zones and wave functions in a band to understand electron motion in solids.
CLO-02	Explain the behavior of electrons and holes in intrinsic and extrinsic semiconductors, including carrier concentration and conductivity.
CLO-03	Understand the concepts of Superconductivity such as critical magnetic field and Meissner effect ect.
CLO-04	Demonstrate quantitative problem-solving skills in all the topics covered

**Syllabus for Third Year of Bachelor of Science in Physics
(With effect from the academic year 2023-2024)**

Semester-V

Course Title: Solid state Physics

Paper No.– Physics Paper – I

No. of Credits – 02

Type of Vertical: Major

Course Code: S301PHT

COURSE CONTENT			
Module	Content	Credits	No. of Lectures
1	Electrical properties of metals Quantum theory of free electrons, The Fermi distribution function, Density of energy states and Fermi energy, Mean energy of electron gas at 0 K. Ref.: SOP: chapter 6 – V, XV, XVI, XVIII. Elementary Band theory of solids The Kronig- Penney model (Omitted derivation), Brillouin zones, Number of wave functions in a band, Concept of effective mass, Distinction between metals, insulators and intrinsic semiconductors. Ref.: SOP: chapter 6 – XXXVI, XXXVII, XXXVIII, XXXIX, XXXX, XXXXI. Theory of Semiconductor Electrons and Holes in an Intrinsic Semiconductor, Classification of semiconductor. Carrier concentrations in an intrinsic semiconductor. Conductivity of a Semiconductor. Fermi level in extrinsic semiconductors, Hall Effect Ref.: MS : Chapter 4 – 1 to 10	01	15
2	Semiconductor-diode Characteristics Qualitative theory of the p-n junction, The p-n junction as a diode, Band structure of an open-circuit p-n junction, The Volt-Ampere characteristics, The temperature dependence of p-n characteristics. Ref.: MS : Chapter 5– 1 to 8	01	15

	Superconductivity: Experimental Survey, Occurrence of, Critical Temperature. Critical magnetic field. Meissner effect. Type I and type II Superconductors, London's Equation and Penetration Depth. Isotope effect. Applications of Superconductors in Technology. Ref.: MAW: Chapter 17- 1 to 4,7 to 9 and SOP: chapter 8-XIII		
	Total	02	30

References:

1. SOP: Solid State Physics: S. O. Pillai, New Age International, 6th Ed.
2. MAW: Solid State Physics (Structure and Properties of material) 3rd Ed: M.A. Wahab
3. MS: Electronic Devices and Circuits: Millman, Halkias & Satyabrata Jit. (3rd Ed.) Tata McGraw Hill

Additional references

1. Introduction to Solid State Physics - Charles Kittel, 7th Ed. John Wiley & Sons.
2. Semiconductor Devices: Physics and Technology, 2nd Ed. John Wiley & Sons
3. RV: Solid state Physics: R.K. Puri and V. K. Babbar, S Chand Publication

Access to the Course

The course is available for all the students admitted for Bachelor of Science.

Methods of Assessment

The assessment pattern would be 60:40, 60% for Semester End Examination (SEE) and 40% for Continuous Internal Assessment (CIA). The structure of the SEE and CIA would be as recommended by the Board of Studies and approved by the Board of Examination and the Academic Council of the college.

Pattern of Evaluation

The Examination/Evaluation pattern shall be framed by the Board of Examination with its final approval from the Academic Council of the College.