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Punyashlok Ahilyadevi Holkar Solapur University, Solapur

NAAC Accredited-2022
'B++'Grade (CGPA2.96)

Name of the Faculty: Science &Technology

(As per New Education Policy 2020)

Syllabus: Physics

Name of the Course: B. Sc. I (Sem. I &II)

(Syllabus to be implemented from June 2024)

Punyashlok Ahilyadevi Holkar Solapur University, Solapur
Faculty of Science & Technology
Nep 2020 Compliant Curriculum
B. Sc (Physics)
Program Preamble

The Bachelor of Science (BSc) in Physics is a comprehensive and dynamic program designed to provide students with a deep understanding of the fundamental principles of physics, along with the practical skills required to apply this knowledge in various scientific and technological contexts. Aligned with the vision of the National Education Policy (NEP) 2020, the program offers a flexible, multidisciplinary, and learner-centric curriculum that encourages critical thinking, innovation, and holistic development. The BSc Physics program spans four years, with each year offering a progressively advanced curriculum designed to build a strong foundation in physics while allowing for specialization and interdisciplinary learning. The curriculum is structured around several key components:

1. **Major Courses:** These core courses form the backbone of the program, providing in-depth knowledge and understanding of essential physics concepts, theories, and methodologies. Students will engage with topics ranging from classical mechanics, electromagnetism, and thermodynamics to quantum physics, relativity, and modern physics, ensuring a robust and comprehensive education in the discipline.
2. **Minor Courses:** Students have the opportunity to choose minor courses from related or distinct disciplines, promoting an interdisciplinary approach to learning. This flexibility allows students to complement their physics education with insights from fields such as mathematics, computer science, or engineering, enhancing their versatility and broadening their career prospects.
3. **Open Electives/General Electives:** The program encourages intellectual exploration beyond the core discipline by offering a wide range of elective courses. These electives enable students to pursue their interests in diverse subjects, fostering creativity, critical thinking, and a well-rounded educational experience.
4. **Vocational and Skill Enhancement Courses:** Practical skills and technical proficiency are integral to the program, with vocational and skill enhancement courses providing hands-on experience in areas such as computational physics, electronics, and instrumentation. These courses are designed to prepare students for immediate employment and equip them with the tools necessary for career advancement in various scientific and technological fields.
5. **Ability Enhancement Courses (AEC), Indian Knowledge System (IKS), and Value Education Courses (VEC):** In alignment with NEP 2020, the program integrates courses that emphasize the Indian Knowledge System, ethical values, and life skills. These courses foster a deep appreciation for India's rich cultural heritage, while also developing essential communication and ethical decision-making skills that are vital for personal and professional growth.

6. **Field Projects/Internships/Apprenticeships/Community Engagement Projects/On-Job Training:** To bridge the gap between theoretical knowledge and real-world applications, the program includes opportunities for field projects, internships, apprenticeships, and community engagement. These experiences provide students with practical insights, problem-solving abilities, and exposure to professional environments, enhancing their readiness for careers in physics and related fields.
7. **Research Methodology and Research Projects:** Research is a critical component of the BSc Physics program, with students acquiring skills in research methodology, data collection, analysis, and scientific inquiry. By engaging in independent research projects, students are encouraged to develop innovative solutions to complex scientific problems, preparing them for advanced studies and research-oriented careers.

Multiple Entry and Multiple Exit Options

In accordance with the NEP 2020, the BSc Physics program incorporates a Multiple Entry and Multiple Exit framework, offering students the flexibility to enter or exit the program at various stages. This approach ensures that students can tailor their educational journey according to their personal and professional goals, with options to earn certificates, diplomas, or degrees.

- **Year 1:**

Upon completion of the first year, students may exit with a Certificate in Physics.

- **Year 2:**

After two years, students may choose to exit with a Diploma in Physics.

- **Year 3:**

Completion of the third year qualifies students for a BSc Degree in Physics.

- **Year 4:**

The fourth year offers an advanced curriculum with a focus on research, allowing students to graduate with an Honors Degree in Physics.

- **Eligibility for B.Sc Physics:**

i. The candidate passing the higher secondary examination conducted by the Maharashtra State Board of Higher Secondary Education,with science stream MCVC with science subject, D. Pharm., Diploma Engineering, Agriculture Diploma, Diary Diploma shall be allowed to enterupon the B.Sc. I Course.

OR

ii. An examination of any other statutory University or an Examination Body recognized as equivalent there to. Repeater Students will be allowed to take fresh admission to the same class with same subjects or different

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Nep 2020 Compliant Curriculum

B. Sc (Physics)
Program Outcomes (PO)

Students graduating from the Bachelor of Science in Physics program will be able to:

Major Courses:

- **PO1**: Demonstrate in-depth knowledge and understanding of core concepts, theories, and methodologies in the chosen major discipline.
- **PO2**: Apply disciplinary knowledge to solve complex problems, analyze data, and make informed decisions in professional and research contexts.

Minor Courses:

- **PO3**: Acquire complementary knowledge and skills from a related or distinct discipline, enhancing interdisciplinary understanding and versatility.

Open Electives/General Electives:

- **PO4**: Explore diverse subjects beyond the core discipline, fostering a broad-based education and cultivating critical thinking and creativity.

Vocational and Skill Enhancement Courses:

- **PO5**: Gain hands-on experience and technical proficiency in specific vocational areas, preparing for immediate career opportunities.

Ability Enhancement Courses (AEC), Indian Knowledge System (IKS), and Value Education Courses (VEC):

- **PO6**: Understand and appreciate the rich heritage of the Indian Knowledge System, integrating traditional wisdom with modern education.
- **PO7**: Develop ability enhancement skills like communication and life skills along with ethical values, social responsibility, and a strong sense of citizenship, contributing positively to society.

Field Projects/Internship/Apprenticeship/Community Engagement Projects/ On Job Training/ Internship/Apprenticeship:

- **PO8**: Apply theoretical knowledge to real-world situations through field projects, internships, community engagement and On job Training for gaining practical experience and problem-solving skills.
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Research Methodology and Research Project:

- **PO9**: Acquire research skills, including data collection, analysis, and interpretation, fostering a scientific approach to problem-solving to develop independent research projects handling capabilities.

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Faculty of Science & Technology

Nep 2020 Compliant Curriculum

B. Sc (Physics)

Program Specific Outcomes (PSOs)

- **Students graduating from B. Sc (Physics) will able to :**

PSO1: Mastery of Core Physics Concepts: demonstrate understanding of fundamental physics principles, including classical mechanics, quantum mechanics, electromagnetism, thermodynamics, and statistical physics, allowing them to analyze and solve complex physical problems.

PSO2: Experimental and Analytical Skills: demonstrate proficiency in designing and conducting experiments, using modern laboratory equipment, and employing analytical techniques to interpret and present scientific data effectively.

PSO3: Application of Physics in Technology and Research: apply their physics knowledge to develop innovative solutions in technology, engineering, and applied sciences, contributing to research and development in both academic and industrial settings.

Punyashlok Ahilyadevi Holkar Solapur University, Solapur

Faculty of Science and Technology

Three Majors in First Year structure as per NEP-2020 Approved in For AC Meeting on 18/04/2024

4- Year Multidisciplinary UG Program with DSC as a Major (4 -Year Bachelor of Science (Honors)/(Honors with Research)

Level/ Difficulty	Sem.	Faculty			Generic/ Open Elective GE/ OE	Vocational and Skill Enhancement Courses (SEC/VSC)	Ability Enhancement Course (AEC), IKS, VEC	Field Project/ RP/CC/Internship/Apprenticeship/ Community Engagement & Services	Credits	Cumulative Credits
		Major		Minor						
		DSC	DSE							
4.5 100-200	I	DSC1-1 (2+2)#	--		GE1/ OE1(2)	SEC1 (2)	L1-1(2) IKS (2) VEC1(2) (Indian Constitution And Democracy)	--	22	**44 UG Certificate (44)**
		DSC2-1 (2+2)#	--							
		DSC3-1 (2+2)#	--							
	II	DSC1-2 (2+2)#	--		GE2/ OE2(2)	SEC 2 (2)	L1-2(2) VEC2(2) (Environmental Studies)	CC1 (2)	22	
		DSC2-2 (2+2)#	--							
		DSC3-2 (2+2)#	--							
Exit option: Award of UG Certificate in Major with 44 credits and an additional 4 credits core NSQF course/ Internship OR Continue with Major and Minor										
5.0/200	III	DSC1-3 (2+1)	---	DSC2-3 (2+1)	GE3 / OE3(2)	VSC1 (2) (DSC1) VSC2(2) (DSC2)	L2-1 (2)	CC2 (2)	22	**44 UG Diploma (88)**
		DSC1-4 (2+1)	---	DSC-2-4 (2+1)						
	IV	DSC1-5 (2+1)	---	DSC2-5 (2+1)	GE4/ OE4 (2)	VSC3 (2) (DSC1) VSC4(2) (DSC2)	L2 -2(2)	FP1/CEP1(2)	22	
		DSC1-6 (2+1)	--	DSC2-6 (2+1)						
Exit option: Award of UG Diploma in Major with 88 credits and an additional 4 credits core NSQF course/ Internship OR Continue with Major										
5.5/300	V	DSC1-7 (3+2)	DSE1-1 (2+1) or DSE1-2 (2+1)	----	----	VSC3 (2) (Hands on Training related to DSE)	IKS 2 (2) (related to major subject)	--	22	**44 UG degree (132)**
		DSC1-8 (3+2)								
		DSC1-9 (3+2)								
	VI	DSC1-10 (3+2)	DSE1-3 (2+1) or DSE1-4 (2+1)	----	---	VSC4 (2) (Hands on Training related to DSE)		FP2/CEP2/OJT1 (2)	22	
		DSC1-11 (3+2)								
		DSC1-12 (3+2)								
	Total Credits 3 Yrs	**66-8#**	**6**	**12 +8#** 20	**08**	**16**	**16**	**08**	**132**	
Exit option: Award of UG degree in Major with 132 Credits OR Continue with Major										
6.0/400	VII	DSC1-13 (4+2)	DSE1-5 (4+2)	Research Methodology (4)	------	----	---	---	22	**44 UG Honours Degree in Main faculty (176)**
		DSC1-14 (4+2)								
	VIII	DSC1-15 (4+2)	DSE1-6 (4+2)		----	-----	---	OJT/In-house Project/ Internship/ Apprenticeship (4)	22	
		DSC1-16 (4+2)								
	Total 4 Yrs	**90-8#**	**18**	**16+8#**	**08**	**16**	**16**	**12**	**176**	
Award of Bachelor of Science Honors., (B.Sc. Honors.) degree with Major and Minor (176 credits)										

		OR								
6.0/400	VII	DSC1-13 (4) DSC1-14 (4)	DSE1-5 (4)	Research Methodology (4)	------	----	----	Research Project (6)	22	**44 UG Honours with research Degree in Main faculty (176)**
	VIII	DSC1-15 (4+2) DSC1-16 (4+2)	DSE1-6 (4)		----	-----	----	Research Project (6)	22	
	Total 4 Yrs	**86-8#**	**14**	**16+8#**	**08**	**16**	**16**	**20**	**176**	

#Out of the three major courses in the first year, one major (comprising 4 credits for the 1st semester and 4 credits for the 2nd semester) will transition into a minor starting from the second year. Consequently, 8 credits will be reallocated from the major course credit count and added to the minor credit count, thereby meeting the requisite credit criteria for the minor as stipulated in the guidelines.

Level	Sem.	Faculty Major DSC	VSC/ SEC	GE/OE	AEC, IKS, VEC	CC	Total Credits	Cumulative Credits
4.5	I	DSC 1-1 (2+2) DSC 2-1(2+2) DSC 3-1(2+2)	SEC 1 (2)	GE /OE1-(2)	IKS (2) L1-1(2) VEC 1(2) (Constitution of India)	-	22	44
	II	DSC 1-2 (2+2) DSC 2-2(2+2) DSC 3-2(2+2)	SEC 2(2)	GE /OE2-(2)	L1-2 (2) VEC 2(2) (Environmental Studies)	CC 1 (2)	22	

SEM –I

S. No.	Course Type	Course Code	Paper Title	Credit
1.	DSC	DSC 1-1 **(G04-0101)**	Mechanics and Properties of Matter	2
2.	Practical based on DSC1-1	Practical Lab -I **(G04-0101-P)**	Practical Lab – I	2
3.	DSC	DSC 2-1	Other than Physics	2+2
4.	DSC	DSC 3-1	Other than Physics	2+2
5.	SEC	Physics SEC 1 **(G04-SEC-101)**	Maintenance and Repairing of Household Electrical Appliances	2
6.	GE /OE1	Physics - GE /OE1 **(G04-GE-OE-101)**	Energy Resources and Conservation	2
7.	IKS	IKS **IKS-101**	Indian Knowledge System	2
8.	AEC	L1-1 **Eng-101**	English	2
9.	VEC	VEC 1 **ICD-101**	Constitution of India	2
			Total	**22**

SEM II

10.	DSC	DSC 1-2 **(G04-0201)**	Electricity, Magnetism and Basic Electronics	2
11.	Practical based on DSC 1-2	Practical Lab - II **(G04-0201-P)**	Practical Lab - II	2
12.	DSC	DSC 2-2	Other than Physics	2+2
13.	DSC	DSC 3-2	Other than Physics	2+2

14.	GE /OE2	Physics - GE /OE 2 **(G04-GE-OE-201)**	Solar Energy and Solar Technology	2
15.	SEC	Physics-SEC 2 **(G04-SEC-201)**	Information and Communication Technology	2
16.	AEC	L1-2 **Eng-201**	English	2
17.	VEC	VEC 2 **ENG-24**	Environmental science	2
18.	CC1	CC1	Community Engagement & Services	2
			Total	**22**

Abbreviations:

OE: Generic/ Open Electives
VSEC: Vocational Skill and Skill Enhancement Courses
VSC: Vocational Skill Courses
SEC: Skill Enhancement Courses
AEC: Ability Enhancement Courses
OJT: On Job Training
FP: Field projects
CC: Co-curricular Courses
RP: Research Project
IKS: Indian Knowledge System

पुण्यश्लोक अहिल्यादेवी होळकर सोलापूर विद्यापीठ ।। विद्यया संपन्नता ।। NAAC Accredited-2022 'B++' Grade (CGPA-2.96)	**Punyashlok Ahilyadevi Holkar Solapur University, Solapur** **B. Sc. I (Physics) Semester-I** **Vertical: DSC 1-1** **Course Code: G04-0101** **Course Name: Mechanics and Properties of Matter**
• **Teaching Scheme** **Credit: 02, Theory: 30 Periods** **Lectures:02 hours/week**	• **Examination Scheme** **Total Marks :50** **UA:30 Marks, CA: 20 Marks**

Course Preamble

Mechanics and Properties of Matter is one of the core courses in the B. Sc (Physics) curriculum and one of the traditional courses, dating back from the last many centuries. This course provides an in-depth understanding of the fundamental laws of Mechanics and their application to real-world systems. Students will study the Moment of Inertia, Pendulums and Oscillations, Elasticity and Viscosity. By combining theoretical knowledge with numerical treatment, the course aims to develop practical skills in analyzing and optimizing properties of matter for applications.

Course Objectives

•	Learn about the rotational motion and Moment of Inertia of the body and evaluate Moment of Inertia of various bodies.
•	Absorb knowledge about different types of pendulums and evaluate acceleration due to gravity.
•	Gain knowledge about the elasticity of the body and study the elastic properties of the body.
•	Acquire the knowledge of the mechanical properties of fluids and evaluate it.
Unit 1	**Moment of Inertia** **Periods: 5, Weightage: 8 Marks (UA)**
1.1	Review of Moment of Inertia.
1.2	Moment of Inertia of Circular disc.
1.3	Moment of Inertia of Rectangular lamina.
1.4	Moment of Inertia of Fly wheel.

1.5	Problems.
Unit 2	**Pendulums and Oscillations Periods: 5, Weightage: 8 Marks (UA)**
2.1	Introduction.
2.2	Theory of compound pendulum.
2.3	Bar pendulum.
2.4	Kater's pendulum.
2.5	Bifilar pendulum (parallel suspensions of equal lengths).
2.6	Torsional Pendulum.
2.7	Problems.
Unit 3	**Elasticity Periods: 7, Weightage:10 Marks (UA)**
3.1	Review of Elasticity.
3.2	Poisson's ratio of rubber tube (Theory and experimental method).
3.3	Equivalence of shear strain to compression and extension strains.
3.4	Determination of Y of rectangular thin bar loaded at the center.
3.5	Rigidity of a wire by torsional oscillations.
3.6	Problems.
Unit 4	**Surface Tension Periods: 7, Weightage: 11Marks (UA)**
4.1	Review of Surface Tension.
4.2	Angle of contact and wettability.
4.3	Capillary rise method.
4.4	Relation between excess pressure and surface tension.
4.5	Excess pressure inside a liquid drop and soap bubble.
4.6	Jaeger's method to determine Surface Tension.
4.7	Factors affecting Surface Tension.
4.8	Applications of Surface Tension.
4.9	Problems.
Unit 5	**Viscosity Periods: 6, Weightage: 9 Marks (UA)**
5.1	Introduction.
5.2	Newton's law of viscosity.
5.3	Streamline and turbulent flow.
5.4	Critical velocity and Reynolds number.
5.5	Equation of continuity.

5.6	Energy possessed by liquid.
5.7	Poiseuille's equation.
5.8	Bernoulli's theorem and its applications to 1) Venturimeter 2) Automiser
5.9	Factors affecting on viscosity.
5.10	Problems.
Course Outcomes	
On successful completion of this practical course student will be able to:	
•	Understood M. I. of the body and evaluate it.
•	To get knowledge about different types of the pendulums and evaluate acceleration due to gravity.
•	Gain knowledge about the elasticity of body and study the elastic properties of a body.
•	To gain the knowledge about the mechanical properties of fluids.
Reference books	
1.	Properties of matter- D.S. Mathur.
2.	A Text book of properties of matter- N.S. Khare &S. Kumar.
3.	Physics Vol. I –David & Robert Resnick.
4.	University Physics-Mechanics of a particle- Anvar Kamal.
5.	Mechanics Berkeley Physics course, V.1: Charles Kittel, et. Al. 2007, Tata McGraw Hill.
6.	Concepts of Physics: H.C. Varma, Bharati Bhavan Publishers.

	Punyashlok Ahilyadevi Holkar Solapur University, Solapur **B. Sc. I (Physics) Semester-I** **Vertical: Practical Lab -I** **Course Code: G04-0101-P** **Course Name: Physics Practical Lab I**
• **Teaching Scheme** **Credit: 02, Practical: 60 Periods** **Practical :04 hours/week**	• **Examination Scheme** **Total Marks :50** **UA:30 Marks, CA: 20 Marks**

Course Preamble

Mechanics and Properties of Matter is one of the core courses in the B. Sc (Physics) curriculum and one of the traditional courses, dating back from the last many centuries. This course provides an in-depth understanding of the fundamental laws of Mechanics and their application to real-world systems. Students will study the experiments of Moment of Inertia, Pendulums and Oscillations, Elasticity and Viscosity. By combining theoretical knowledge with practical treatment, the course aims to develop practical skills in analyzing and optimizing the properties of different applications.

Course Objectives

•	To develop practical skills in basic and conceptual Physics.
•	To gain practical knowledge by applying the experimental methods to correlate with the theory.
•	To prepare students to determine Moment of Inertia and acceleration due to gravity.
•	To develop students to learn measuring skills in practical.
•	To apply the analytical techniques and graphical analysis to the experimental data

List of Experiments

Sr. No.	**Name of the Practical**
1.	L. C. of various measuring instruments.
2.	Bar pendulum.
3.	Bifilar pendulum.
4.	Torsional pendulum.
5.	Moment of Inertia of disc by annular ring.
6.	Surface Tension by liquid drop method.

7.	Poisson's ratio.
8.	Viscosity by Stoke's method.
9.	Viscosity of water by Poiseuille's method.
10.	Moment of Inertia of a Flywheel.
Course Outcomes	
On successful completion of this practical course student will be able to:	
•	Handle various instruments.
•	Correlate theoretical concepts with experiments.
•	Develop awareness of minimizing errors.
•	Develop basic skills of measurements.
•	Gain knowledge about Surface Tension, Viscosity and Moment of Inertia.
•	Understand the theoretical principles of basic Practical Physics.
Reference Books	
1.	Advanced Practical physics –Nelkon
2.	Practical physics - Rajopadhye and Purohit
3.	Practical Physics – P R Sasi Kumar

	Punyashlok Ahilyadevi Holkar Solapur University, Solapur **B. Sc. I (Physics) Semester-I** **Vertical: Physics - GE/OE-1** **Course Code: G04-GE-OE-101** **Course Name: Energy Resources and Conservation**

• **Teaching Scheme** **Credit: 02, Theory: 30 Periods** **Lectures:02 hours/week**	• **Examination Scheme** **Total Marks :50** **UA:30 Marks, CA: 20 Marks**

	Learning Objectives	
•	To gain a thorough understanding of different energy sources, their attributes, and their contributions to both the global and Indian energy landscapes.	
•	To learn the applications, advantages, and disadvantages of solar energy as a sustainable power source.	
•	To understand concepts of wind energy and biomass energy; their advantages & disadvantages.	
•	Develop a comprehensive understanding of the various aspects, principles, planning, and benefits of energy conservation, along with the types and benefits of co-generation.	
Unit 1	**Conventional Energy Sources**	**Periods: 6, Weightage: 10 Marks (UA)**
1.1	Common Forms of Energy.	
1.2	Energy Chain.	
1.3	Classification of Energy Sources.	
	1.3.1	Primary and Secondary Sources.
	1.3.2	Commercial and Non- commercial Sources.
	1.3.3	Renewable and Non- renewable Sources.
1.4	Conventional Energy Sources.	
	1.4.1	Fossil Fuel Energy (Coal, Oil and Natural Gas).
	1.4.2	Nuclear Energy.
	1.4.3	Solar Energy.
Unit 2	**Solar Energy**	**Periods: 6, Weightage: 9 Marks (UA)**
2.1	Non- conventional Energy Sources (Examples, advantages and disadvantages).	

2.2	Solar Energy - Applications, advantages and disadvantages.
2.3	Solar Cell- Construction, working and characteristics.
2.4	Solar Thermal Energy.
Unit 3	**Wind Energy** **Periods: 6, Weightage: 9 Marks (UA)**
3.1	Introduction.
3.2	Terms used in Wind Energy.
3.3	Horizontal Axis Wind Turbines.
3.4	Advantages and disadvantages of Wind Energy.
Unit 4	**Biomass Energy** **Periods: 6, Weightage: 9 Maks (UA)**
4.1	Introduction (Photosynthesis and Characteristics of Biomass).
4.2	Types of Biomass.
4.3	Biomass Conversion Processes (Direct, Thermo-Chemical and Biochemical Process).
4.4	Advantages and Disadvantages .
Unit 5	**Energy Conservation** **Periods: 6, Weightage: 9 Marks UA)**
5.1	Introduction.
5.2	Various Aspects of Energy Conservation.
5.3	Principles of Energy Conservation.
5.4	Energy Conservation Planning.
5.5	Benefits of Energy Conservation.
5.6	Co-generation -Types and Benefits.
	Learning Outcomes
	After completion of the course, Student should be able to-
•	Understand conventional energy sources like fossil fuels and nuclear energy, including their applications and environmental impacts.
•	Explore non-conventional sources such as solar, wind, and biomass energy, assessing their advantages, limitations, and technological aspects.
•	Discuss energy conservation principles, strategies, and benefits for sustainable development.
•	Analyze the role of solar energy in depth, including solar cell construction, working principles, and applications.
•	Examine wind and biomass energy, focusing on technologies, advantages, and challenges in their utilization.

	Reference Books
1.	Non- Conventional Energy Resources by Ashish Chandra, Khanna publications.
2.	Non-conventional Energy Sources; G. D. Rai Khanna Publishers (6th Edition); Khanna Publishers
3.	Renewable Energy Sources and Emerging Technologies; D.P. Kothari, K.C. Singal, Rakesh Ranjan (3rd Edition); PHI Publishers
4.	Energy Technology; S. Rao, B. B. Parulekar; Khanna Publishers

	Punyashlok Ahilyadevi Holkar Solapur University, Solapur **B. Sc. I (Physics) Semester-I** **Vertical: Physics-SEC1** **Course Code: G04-SEC-101** **Course Name: Maintenance and Repairing of Household Electrical Appliances**
• **Teaching Scheme** **Credit: 02, Practical: 60 Periods** **Practical :04 hours/week**	• **Examination Scheme** **Total Marks :50** **UA:30 Marks, CA: 20 Marks**

Learning Objectives	
•	To identify various electrical components.
•	To understand the measurement of electrical quantities by using Multimeter.
•	Maintenance of electric home appliances.
Sr. No.	**List of Experiments**
1.	Study of various Unit in Electricity.
2.	Identification of electrical components.
3.	Use of multimeter (testing of electronic components).
4.	Fuse checking and fault finding in electric circuits.
5.	Earthing and its significance.
6.	Build and test switch board.
7.	Testing/fault finding in electric fans.
8.	Testing/fault finding in mixer.
9.	Testing/fault finding in electric iron.
10.	Testing/fault finding in table lamps.
11.	Testing/fault finding in induction coil.
12.	Testing/fault finding in UPS and inverter.
13.	To find electric fault or current in board and electric wiring by using tester.

14.	Testing and repairing of electronic choke, LED bulb, LED tubes and LED focus.
15.	Calculation of Electrical Energy Consumption and Billing.
16.	Function of transformer-Checking of faults.
17.	Testing and repairing of electric bell.
Learning Outcomes	
After completion of course students-	
•	Handle various electric home appliances.
•	Able to do maintain the electric home appliances.
•	Ensure student for Self-employment.
•	Enhance student's skill to do self-job.
	Reference Books
1.	Modern Electronic Instrumentation and Measurement Albert D. Helfrick and William David Cooper.
2.	Electrical and Electronic Measurements and Instrumentation A. K. Sawhney.
3.	Basic electrical engineering M. L. Anwani.
4.	Basic electrical engineering Vol. I, II, III, IV. P. P. Shah.
5.	Basic electrical engineering Vol. I, II, III, IV. B. L. Theraja.
6.	Electrical Mechanics V. K. Mehta.
7.	Subodh Vidyutshatra / सुबोध विद्युतशास्त्र Trambak Waghmare.

	Punyashlok Ahilyadevi Holkar Solapur University, Solapur **B. Sc. I (Physics) Semester-II** **Vertical: DSC 1-2** **Course Code: G04-0201** **Course Name: Electricity, Magnetism and Basic Electronics**
• **Teaching Scheme** **Credit: 02, Theory: 30 Periods** **Lectures:02 hours/week**	• **Examination Scheme** **Total Marks :50** **UA:30 Marks, CA: 20 Marks**

Course Preamble	
Electricity, Magnetism and Basic Electronics are the core courses in the Physics curriculum and one of the traditional courses, dating back from the last many centuries. This course provides an in-depth understanding of the fundamental of Electricity, Magnetism and Basic Electronics and their applications to real-world systems. Students will study the Varying Current, A. C. Circuits Ballistic Galvanometer, Electronic devices and Circuits By combining theoretical knowledge with numerical treatment, the course aims to develop practical skills in analyzing and optimizing thermal systems for different applications.	
Learning Objectives	
•	Understand the concept of Varying Current applying the charging and discharging of capacitor and time constant.
•	Understand the concept of AC circuits and different AC bridges.
•	Understand the concepts Magnetostatics and applying then to determine magnetic induction and also understand Ballistic Galvanometer theory and its constants.
•	Understand the rectifiers specially Bridge rectifier with filters and also different wave shaping circuits.
•	Understand BJT include its output characteristics under CE and CB mode with application of transistor amplifier.
Unit 1	**Varying Current** **Periods: 6, Weightage: 9 Marks(UA)**
1.1	Introduction to Varying Current.

1.2	Growth and decay of current in LR circuit.
1.3	Time constant of the LR Circuit.
1.4	Charging and discharging of capacitor through resistor.
1.5	Time constant of the RC Circuit.
1.6	Problems.
Unit 2	**A. C. Circuits** **Periods: 6, Weightage: 10 Marks (UA)**
2.1	Introduction.
2.2	Reactance, Susceptance, Impedance, Admittance and Power factor.
2.3	L-C-R series circuit.
2.4	Series and parallel resonance circuits.
2.5	Sharpness of resonance and quality factor in LCR Series resonance circuit.
2.6	Owen's bridge.
2.7	Problems.
Unit 3	**Ballistic Galvanometer** **Periods: 6, Weightage: 9 Marks (UA)**
3.1	Introduction.
3.2	Ballistic Galvanometer: Construction, Theory and working of Ballistic Galvanometer, Damping in the BG, Constants of BG.
3.3	Problems.
Unit4	**Electronic Circuits** **Periods: 6, Weightage: 9 Marks (UA)**
4.1	Introduction.
4.2	Bridge rectifier with π-filter.
4.3	Clippers and Clampers.
4.4	Zener diode and its application as a voltage regulator.
4.5	Problems.
Unit 5	**Bi-Junction Transistor (BJT)** **Periods : 6, Weightage :9 Marks(UA)**
5.1	Introduction.
5.2	Construction and working of transistor.
5.3	Input-output and transfer characteristics of CE & CB mode.
5.4	Relation between α and β.
5.5	Transistor as amplifier –CE mode.
5.6	Problems.
Course Outcomes	

After completion of course, students will	
•	Explain complex number with J-operator, LCR Circuits.
•	Understand magnetostatics and ballistic galvanometer.
•	Understand electromagnetic induction laws.
•	Explain various electronic components and devices.
•	Explain construction and working of transistor.
Reference books	
1.	Principles of electronics –V. K. Mehta.
2.	Electronics principles -A. P. Malvino.
3.	Basic electronics & linear circuits -Bhargav, Kulshrstha & Gupta.
4.	Electricity and Magnetism–Khare & Shrivastav.
5.	Foundations of electromagnetic theory – Reitz &Milford.
6.	Electronic devices &circuits-Allen Mottershed

पुण्यश्लोक अहिल्यादेवी होळकर सोलापूर विद्यापीठ ॥ विद्यया संपन्नता ॥ NAAC Accredited-2022 'B++' Grade (CGPA-2.96)	**Punyashlok Ahilyadevi Holkar Solapur University, Solapur** **B. Sc. I (Physics) Semester-II** **Vertical: Practical Lab -II** **Course Code : G04-0201-P** **Course Name: Physics Practical Lab II**

• **Teaching Scheme** **Credit: 02, Practical: 60 Periods** **Practical :04 hours/week**	• **Examination Scheme** **Total Marks :50** **UA:30 Marks, CA: 20 Marks**

Course Preamble

Electricity, Magnetism and Basic Electronics are the core courses in the Physics curriculum and one of the traditional courses, dating back from the last many centuries. This course provides an in-depth understanding of the fundamental of Electricity, Magnetism and Basic Electronics and their applications to real-world systems. Students will study the Experiments related to Varying Current, A. C. Circuits Ballistic Galvanometer, Electronic devices and Circuits This will combining theoretical knowledge with practical work, so as to develop practical skills in analyzing and optimizing thermal systems for different applications.

Course Objectives

•	To gain practical knowledge by applying the experimental methods to correlate with the theory.
•	To learn the usage of Multimeter for various measurements.
•	Apply the analytical techniques and graphical analysis to the experimental data.
•	To develop intellectual communication skills and discuss the basic principles of scientific concepts.

List of Experiments

Sr. No.	Name of the Practical
1.	Use of Multimeter for measuring (a) Resistances, (b) AC and DC Voltages, (c) DC Current, and (d) checking electrical fuses.
2.	Color code of resistors and measurement of capacitors; identification of their values.
3.	Frequency of AC mains by magnetic wire.
4.	Frequency of AC mains by non-magnetic wire.

5.	Bridge rectifier and π filter.
6.	Transistor characteristics in Common Emitter mode: determination of β.
7.	Transistor characteristics in Common Base mode: determination of α.
8.	Photo cell (verification of inverse square law).
9.	Zener diode as a voltage regulator (Knee Characteristic curve I – V and comments).
10.	Zener diode as a voltage regulator (Plot voltage resistance graph and comments).
Course Outcomes	
On successful completion of this practical course student will be able to:	
•	Understand the use of Multimeter.
•	Understand the principles of and applications of basic physical properties.
•	Understand concepts learnt in Basic electronics and devices also think beyond curriculum in the field of physics.
•	Understand the Transistor characteristics.
•	Plan to conduct simple experiments and give oral and presentation of the results.
References Books	
1.	B.Sc. Practical Physics C L Arora S. Chand & Co. Ltd., New Delhi (2018).
2.	Practical Physics (With Viva-Voce) Dr. S L Gupta and V Kumar Pragati Prakashan, Meerut (2014).
3.	Practical Physics (4th Edition) G. L. Squires Cambridge University Press (2014).
4.	B.Sc. Practical Physics Harnam Singh and Dr. P.S. Hemne S. Chand & Co. Ltd., New Delhi (2000).

	Punyashlok Ahilyadevi Holkar Solapur University, Solapur **B. Sc. I (Physics) Semester-II** **Vertical: Physics - GE/OE-2** **Course Code : G04-GE-OE-201** **Course Name: Solar Energy and Solar Technology**
• **Teaching Scheme** **Credit: 02, Theory: 30 Periods** **Lectures:02 hours/week**	• **Examination Scheme** **Total Marks :50** **UA:30 Marks, CA: 20 Marks**

Course Objectives	
•	To develop a comprehensive understanding of various energy sources, their characteristics, and their roles in the global and Indian energy landscapes.
•	To cover the principles, functioning and applications of photovoltaic cells and solar PV systems.
•	To analyze the advantages and disadvantages of solar PV systems.
•	To familiarize students with the practical applications of solar energy in areas like heating, electricity generation and cooking.
Unit 1	**Introduction to Sources of energy** **Periods: 5, Weightage: 8 Marks (UA)**
1.1	Introduction.
1.2	Common forms of energy.
1.3	Energy chain.
1.4	Classification of energy sources as primary and secondary sources.
1.5	Renewable and non-renewable sources.
Unit 2	**Solar Radiation Analysis** **Periods: 6, Weightage: 9 Marks (UA)**
2.1	Nature of Sun.
2.2	Solar Radiation.
2.3	Solar Constant.
2.4	Solar Radiation at the Earth's Surface.

2.5	Air Mass.
Unit 3	**Photovoltaic Cell** **Periods: 7, Weightage: 10 Marks (UA)**
3.1	Introduction.
3.2	Photovoltaic effect, generations of photovoltaic cell.
3.3	Working principle of PN junction solar cell.
3.4	Characteristics of solar cell, Efficiency and fill factor of solar cell.
3.5	Applications of solar cell.
Unit 4	**Solar PV system** **Periods: 7, Weightage: 11 Marks UA)**
4.1	Solar PV module and PV arrays.
4.2	Power of solar panel, array and module.
4.3	Solar PV systems.
4.4	Advantages and disadvantages of solar PV systems.
Unit 5	**Applications of Solar Energy** **Periods: 5, Weightage:8 Marks (UA)**
5.1	Solar water heater (Passive and Active).
5.2	Solar furnace.
5.3	Solar dryer.
5.4	Solar cooker.
Course Outcomes	
On successful completion of this course:	
•	Students will be able to classify and differentiate between various forms of energy and energy sources.
•	Students will assess the environmental and ecological impacts of energy use, specifically global warming.
•	Students will explain the principles and functioning of photovoltaic cells, understand their efficiency, and identify their practical applications.
•	Students will analyze the advantages and disadvantages of grid-connected, off-grid, and hybrid solar PV systems.
•	Students will recognize and describe diverse applications of solar energy technologies, including solar water heating, furnaces, dryers, distillation, and cookers.
Reference books	

1.	Non-conventional Energy Resources; Ashish Chandra, Taru Chandra (2nd Edition); Khanna Publishers.
2.	Non-conventional Energy Sources; G. D. Rai Khanna Publishers (6th Edition); Khanna Publishers.
3.	Renewable Energy Sources and Emerging Technologies; D.P. Kothari, K.C. Singal, Rakesh Ranjan (3rd Edition); PHI Publishers.
4.	Energy Technology; S. Rao, B. B. Parulekar; Khanna Publishers.
5.	Renewable Energy Engineering; B. L. Singhal; Tech Knowledge Publications
6.	Solar Energy Utilization; G. D. Rai; Khanna Publishers.
7.	Solar Photovoltaics Fundamentals, Technologies and Applications; Chetan Singh Solanki (3rd Edition); PHI Publishers.

	Punyashlok Ahilyadevi Holkar Solapur University, Solapur **B. Sc.I (Physics) Semester-II** **Vertical: Physics-SEC 2** **Course Code: G04-SEC-201** **Course Name: Information and Communication Technology**
• **Teaching Scheme** **Credit: 02, Practical: 60 Periods** **Practical :04 hours/week**	• **Examination Scheme** **Total Marks :50** **UA:30 Marks, CA: 20 Marks**

Learning Objectives	
•	Equip students with skills to create, edit, and format professional documents using Microsoft Word.
•	Enable students to manage and analyse data, apply formulae, and create graphs in Microsoft Excel.
•	Train students to design effective presentations with multimedia elements in Microsoft PowerPoint.
•	Teach students to efficiently use email, LinkedIn, and Google Meeting for professional communication.
Sr. No	**List of Experiments**
A	**MS Word**
1.	To create word document.
2.	To create resume using MS word.
3.	To draw design/diagram using shapes.
4.	To write and customize an equation using MS word.
5.	To create and save word file as PDF.
B	**MS Excel**
1.	To create excel workbook.
2.	To use of formulae for: a) Sum, b) Average, c) square root, d) Trigonometry
3.	To plot a graph: a) Line, b) Bar, c) Pie.
4.	To create and format excel file as: a. Filter, b) Sort, c) Conditional formatting, d) Text to column.

C	MS Power point
1.	To create ppt.
2.	To insert media in ppt: a) Clip art, b) Picture, c) Video, d) Animation, e) GIF
3.	To draw a diagram/design- schematics.
D	**Communication tools**
1.	To create and compose email.
2.	To create account on outlook.
3.	To create account on LinkedIn.
4.	To create and schedule google meeting.
Learning Outcomes	
After completion of the course, Student should be able to-	
•	Create professional documents, resumes, and diagrams in Microsoft Word.
•	Perform data analysis, apply formulas, and create various graphs in Microsoft Excel.
•	Design dynamic presentations with multimedia and custom diagrams in Microsoft PowerPoint.
•	Efficiently manage email, LinkedIn profiles, and schedule Google Meetings for effective communication.
Reference Books	
1.	Advanced MS-Office by Sudhanshu Maurya.
2.	Microsoft First look 2007 office system by Katerine Murray.
3.	Mastering MS-Office by Gloriya Kardile and Sonali Kadwadkar.
4.	Computer Fundamentals & Office Applications by Dr. MCRHRD Institute of Telangana

पुण्यश्लोक अहिल्यादेवी होळकर सोलापूर विद्यापीठ ।। विद्यया संपन्नता ।। NAAC Accredited-2022 'B++' Grade (CGPA-2.96)	**Punyashlok Ahilyadevi Holkar Solapur University, Solapur** **Faculty of Science & Technology.** **Nature of Question Paper** **B. Sc. / B.C.A (Part- I) w.e.f. AY 2024-25** **University Assessment (UA)**

Time: Total Marks: 30

Instructions

1) All Questions are compulsory.

2) Figure to right indicate full marks.

Q.1	Choose correct alternative. (MCQ)	6 Marks
1)	a) b) c) d)	
2)		
3)		
4)		
5)		
6)		
Q.2.	Answer the following. (Any three)	6 Marks
A)		
B)		
C)		
D)		
E)		
Q.3.	Answer the following (Any two).	6 Marks
A)		
B)		
C		

Q.4.	Answer the following (Any two).	6 Marks
A)		
B)		
C)		
Q.5.	Answer the following (Any one).	6 Marks
A)		
B)		

पुण्यश्लोक अहिल्यादेवी होळकर सोलापूर विद्यापीठ ।। विद्यया संपन्नता ।। NAAC Accredited-2022 'B++' Grade (CGPA-2.96)	**Punyashlok Ahilyadevi Holkar Solapur University, Solapur** **Faculty of Science & Technology.** **Nature of Question Paper** **B. Sc. / B.C.A (Part- I) w.e.f. AY 2024-25** **College Assessment (CA)**

Time: Total Marks: 20

- **Internal Evaluation System for 20 Marks**
  - Choose any two of the following
  - Home Assignment / Unit Test / Tutorial /Seminar

- **Pattern of Examination:**
  - External Evaluation + Internal Evaluation
  - 30 Marks + 20 Marks = 50 Marks
- **Passing Criteria:**
  - Written Exam – 12 out of 30
  - Continuous Assessment (CA) – 08 out of 20
