

Shree Warana Vibhag Shikshan Mandal's

**WARANA UNIVERSITY,
WARANANAGAR**

(A State Public University established under Section 3 (6) of MPUA, 2016)

॥ विद्या सर्वस्य भूषणम् ॥



Warana University

Established: 2025

**Syllabus For
Bachelor of Science-B. Sc. in Physics**

**UNDER
Faculty of Science**

B. Sc. Part - I (Semester - I and II)

STRUCTURE AND SYLLABUS IN ACCORDANCE WITH

NATIONAL EDUCATION POLICY - 2020

HAVING CHOICE BASED CREDIT SYSTEM

WITH MULTIPLE ENTRY AND MULTIPLE EXIT OPTIONS

(TO BE IMPLEMENTED FROM ACADEMIC YEAR 2025-26 ONWARDS)

(Subject to the modifications to be made from time to time)

SEQUENCE OF CONTENT

in the Syllabus document

Sr. No.	Title	Remark
1.	Cover page	
2.	Index	
3.	Preamble	
4.	General objectives	
5.	Program outcomes	
6.	PSOs	
7.	Eligibility	
8.	Duration	
9.	Medium of instruction	
10.	MEME instructions	The matter will be provided by Dean S&T
11.	Scheme of teaching and examination	
12.	Course structure B.Sc.-I	DSC, OE,VSE ... structure
13.	Course structure subject specific	With course code, title of paper, and title of OE practical offered
14.	Note on OE courses	The students of science should select the open elective subject from the OE basket provided by faculty of Arts and Humanities or faculty of Commerce and Management. The details of OE courses available are provided in the prospectus and posted on Institutional Website.
15.	Syllabus for Sem-I	Sequence of details should be Paper-I Cos, Syllabus and Reference books (Keep Modules in table format, with Hrs allotted, Title of paper should be supplemented with course code, no. of credits, Hrs allotted and total marks)
16.	Follow same for all DSC Papers, practical and OE in Semester-I	
17.	Followed by content of Sem-II	
18.	Ques paper nature for theory, practical and OE	Prepare OBE matrix table with mapping of COs and POs

1. Preamble:

The National Education Policy (NEP) 2020 envisions a holistic, flexible, and multidisciplinary approach to higher education, aiming to nurture critical thinking, creativity, and practical skills in students. Physics, as a fundamental science, plays a vital role in shaping scientific understanding and technological progress. The B.Sc. Physics (First Year) syllabus is designed to build strong conceptual foundations, introduce experimental methods, and connect theory with real-world applications.

This syllabus emphasizes conceptual clarity, problem-solving ability, and experimental competence, while also encouraging curiosity-driven learning. Core topics in mechanics, waves, optics, electricity, magnetism, and thermodynamics are introduced in a gradual and coherent manner, ensuring both breadth and depth of understanding. Laboratory courses are integrated to provide hands-on experience and to strengthen the relationship between observation, theory, and analysis.

Aligned with NEP 2020, the program encourages multidisciplinary exposure, skill development, and flexibility of choice, preparing students not only for higher studies in Physics but also for careers in research, technology, education, and allied fields. The syllabus promotes the values of scientific temper, ethical responsibility, and lifelong learning, enabling students to contribute meaningfully to society in an era of rapid scientific and technological advancement.

2. General Objectives of the Program

1. To provide a strong foundation in the fundamental principles of physics.
2. To train students in experimental methods and precise measurement techniques.
3. To develop skills in handling scientific instruments and modern laboratory tools.
4. To encourage logical reasoning, problem-solving, and analytical thinking.
5. To introduce the use of mathematics and computation in understanding physical systems.
6. To emphasize data analysis and statistical methods for reliable interpretation of results.
7. To connect theoretical knowledge with applications in technology and everyday life.
8. To foster curiosity, scientific temper, and ethical responsibility among students.
9. To prepare students for advanced studies, research, and interdisciplinary fields.
10. To equip graduates with knowledge and skills relevant to academia, industry, and innovation.

3. Programme Learning Outcomes (POs)

PO-1:- Students will gain fundamental knowledge of physics which will help them with PG Studies and Research.

PO-2:- Students will be able to know good laboratory practices and lab safety.

PO-3:- To make the learner proficient in analyzing the various observations and chemical phenomena presented to him during the course.

PO-4:- Students will be able to apply the fundamental knowledge to address crosscutting issues such as sustainable development.

PO-5:- Students will be able to solve various problems by identifying the essential parts of a problem, formulating a strategy for solving the problem, applying appropriate techniques to arrive at a solution, testing the precision and accuracy of the solution and interpreting the results.

PO-6:- Students will be able to communicate effectively, i.e., articulate, comprehend and write effective reports, make effective presentations and documentation and express the subject through technical writing and oral presentation.

4. Programme Specific Outcomes (PSOs)

PSO 1: Identifying and describing physical systems with their professional knowledge.

PSO 2: Getting knowledge of general physics like sound, wave, friction, forces and laws of motion and use of mathematics.

PSO 3: Getting knowing about the light and its importance in life, its characteristics, properties and use in various instruments.

PSO 4: Learning about concepts of nuclear physics and nuclear energies and importance of their use for mankind.

5. Eligibility

- i. Duration of Examination for 60 marks- 2 Hours
- ii. Duration of Examination for 30 marks- 1 Hours
- iii. Duration of Practical Examination for 50 marks- 2 Hours

6. Duration**7. Medium of instruction****8. MEME instructions**

9. Scheme of teaching and examination

B.Sc. Programme Structure for Level 4.5 of B.Sc.-I Semester I														
Teaching Scheme						Examination Scheme								
Sr. No.	Theory (TH) & Practical (P)					Semester-end Examination (SEE)			Internal Assessment (IA)			Practical		
	Course Type	No. of Lectures	Practical	Hours	Credits	Paper Hours	Max	Min	Internal	Max	Min	Paper Hours	Max	Min
1.	DSC-I	4	1	4+4	6	1	30	12	Assignment	20	8	2	50	20
2.	DSC-I	4	1	4+4	6	1	30	12		20	8	2	50	20
3.	DSC-I	4	1	4+4	6	1	30	12		20	8	2	50	20
4.	OE-I	-	1	4	2	-	-	-		-	-	2	50	20
5.	VEC	-	-	-	-	-	-	-		-	-	-	-	-
6.	IKS (Generic)	2	-	2	2	2	50	20		-	-	-	-	-
Total					22	[DSC (60 X 3) + IKS 50] Total SEE = 230			DSC (40X3) Total IA = 120			Practical. = 50X4 Total Practical. = 200		
Total Semester –I = 550														

B.Sc. Programme Structure for Level 4.5 of B.Sc.-I Semester II														
Teaching Scheme						Examination Scheme								
Sr. No.	Theory (TH) & Practical (P)					Semester-end Examination (SEE)			Internal Assessment (IA)			Practical		
	Course Type	No. of Lectures	Practical	Hours	Credits	Paper Hours	Max	Min	Internal	Max	Min	Paper Hours	Max	Min
1.	DSC-II	4	1	4+4	6	1	30	12	Assignment	20	8	2	50	20
2.	DSC-II	4	1	4+4	6	1	30	12		20	8	2	50	20
3.	DSC-II	4	1	4+4	6	1	30	12		20	8	2	50	20
4.	OE-II	-	1	4	2	-	-	-		-	-	2	50	20
5.	VEC-I	2	-	2	2	2	50	20		-	-	-	-	-
6.	IKS (Generic)	-	-	-	-	-	-	-		-	-	-	-	-
Total					22	[DSC (60 X 3) + VEC 50] Total SEE = 230			DSC (40X3) Total IA = 120			Practical. = 50X4 Total Practical. = 200		
Total Semester –I = 550														

10. Course structure B.Sc.-I

COURSE CATEGORY	ABBREVIATION (Only 2 Letters)	DESCRIPTION	Sem. I Credit	Sem. II Credit
DSC	DSC (DS)	Discipline Specific Course	6x3=18	6x3=18
OE	OE(OE)	Open Elective	2x1=02	2x1=02
SEC	SEC (SE)	Skill Enhancement Course	----	-----
AEC/IKS/VEC	AEC(AE)	Ability Enhancement Course	-----	-----
	IKS(IK)	Indian Knowledge System (Generic)	2x1=02	-----
	VEC(VE)	Value Education Course	-----	2x1=02
CC/CEP	CC (CC)	Co-curricular Course		-----
	CEP(CE)	Community Engagement Project	-----	-----
			22	22
			Total 44	

11. Course structure subject specific**A-1) B.Sc.-I: SEMESTER-I (TOTAL CREDITS-22) : (Note: Put ‘—’ wherever ‘Not Applicable’)**

COURSECATEGORY		COURSENAME	COURSECODE	CREDITS
DSC	DS-I	Introduction to Mechanics	2502USPHMJ101	2
DSC	DS-I	Electricity and Magnetism I	2502USPHMJ102	2
DSC	DS-I	Practical Laboratory	2502USPHMJ103	2
OE	OE-I	Household Electrical and Electronic Appliances -I	2502USPHOE101	2
SEC	SE-I	-----		--
AEC	AE-I	-----		--
IKS (Generic)	IK	Introduction to Indian Knowledge System	2502USGEIK101	2
CC	CC	-----		
CREDITS FOR B.Sc.-I, SEM-I:				10

A-2) B.Sc.-I: SEMESTER-II (TOTAL CREDITS-22) : (Note : Put ‘—’ wherever ‘Not Applicable’)

COURSECATEGORY		COURSENAME	COURSECODE	CREDITS
DSC	DS-II	Properties of Matter	2502USPHMJ201	2
DSC	DS-II	Electricity and Magnetism II	2502USPHMJ202	2
DSC	DS-II	Laboratory Practical	2502USPHMJ203	2
OE	OE-II	Household Electrical and Electronic Appliances - II	2502USPHOE201	2
SEC	SE-II	----	-----	---
AEC	AE-II	----	-----	---
VEC	VE	Democracy, Election and Constitution	2502USDEVE201	2
CEP	CE	----		---
CREDITS FOR B.Sc.-I, SEM-II:				10

Warana University, Warananagar
Bachelor of Science
Credit Framework
First-Year (B. Sc. I-Physics)

Level	Sem.	Subject-1 (Physics)	Subject-2	Subject-3	IDC/MDC/OE/GE	SEC	AEC, VEC, IKS			OJT, FP, CEP, CC, RP			Total Credits
		DSC	DSC	DSC	OE	SEC	AEC	VEC	IKS	CC	FP/OJT	RP/ Dissert.	
4.5	I	IM-101 Paper-I Introduction to Mechanics (2 Cr)	DSC-I (2 Cr)	DSC-I (2 Cr)	PHOEPR-101 Practical Paper-I Household Electrical and Electronic Appliances -I (2 Cr)	--	--	--	IKS-I (2 Cr) Introduction to IKS	--	--	--	--
		EM-102 Paper-II Electricity and Magnetism I (2 Cr)	DSC-II (2 Cr)	DSC-II (2 Cr)		--	--	--		--	--		
		PRPH-103 Practical Paper-I (2 Cr)	DSC-P-I (2 Cr)	DSC-P-I (2 Cr)		--	--	--		--	--		
	Credits	4(T)+2(P)=6	4(T)+2(P)=6	4(T)+2(P)=6	2 (P)=2	--	--	--	2(T)	--	--	--	22
II	PMPH-201 Paper-III Properties of Matter (2 Cr)	DSC-III (2 Cr)	DSC-I (2 Cr)	PHOEPR-201 Practical Paper-II Household Electrical and Electronic Appliances - II (2 Cr)	--	--	VEC-I (2 Cr) Democracy, Election and Constitution	--	--	--	--	--	--
	EMPH-202 Paper-IV Electricity and Magnetism II (2 Cr)	DSC-IV (2 Cr)	DSC-II (2 Cr)		--	--		--	--	--			
	PRPH-203 Practical Paper-II (2 Cr)	DSC-P-II (2 Cr)	DSC-P-II (2 Cr)		--	--		--	--	--			
Credits	4(T)+2(P)=6	4(T)+2(P)=6	4(T)+2(P)=6	2 (P)=2	--	--	2(T)	--	--	--	--	22	
Total Credits		12	12	12	4	--	--	2	2	--	--	--	44
Exit Option: Award of UG Certificate in Major with 44 Credits and an additional 4 credits core NSQF course/ Internship/Skill Courses OR Continue													

12. Note on OE courses

The students of science should select the open elective subject from the OE basket provided by faculty of Arts and Humanities or faculty of Commerce and Management. The details of OE courses available are provided in the prospectus and posted on Institutional Website.

B. Sc. I (NEP-2.0) Semester I, PAPER-I IM-101 Introduction to Mechanics (Theory Credits-02, 30 hours. Marks- 50)

Expected Course outcomes
Students are able to understand and identify scalar and vector physical quantities in mechanics.
Students are able to understand and apply vector algebraic methods to elementary exercises in mechanics.
Students are able to understand and apply basic concepts of rotational motion.
In general, students are capable of correlating the above concepts and methods in mechanics to both theoretical and experimental domains revealing analytical as well as numerical skills.

Module	Sub-module	Syllabus Content	Hrs.
I	Vector algebra	Introduction - Vector Algebra, Scalar product, and their properties, Vector product, and their properties, Scalar triple product and its physical significance, Properties of scalar triple product, Vector triple product, Properties of vector triple product.	09
	Gravitation	Newton's law of gravitation, Motion of a particle in a central force field, Kepler's laws (statement only), Satellite in circular orbit and applications, geosynchronous orbits, Weightlessness, Basic idea of global positioning system (GPS) and its application.	06
II	Momentum and energy	Conservation of linear and angular momentum, work and energy theorem, conservation of energy (Single particle), Dynamics of a system of	07

		particles (linear momentum, angular momentum and energy), Center of mass, Motion of rockets (qualitative treatment only).	
	Rotational motion	Angular velocity, Angular momentum, and torque, Kinetic energy of rotation and moment of inertia, Moment of inertia of a spherical shell and solid cylinder (only about axis of symmetry), Motion of spherical shell and solid cylinder rolling down an inclined plane.	08

Reference Books

1. Mathematical Physics -B. S. Rajput, 25th edition 2013, Pragati Prakashan, Meerut.
2. Mechanics – D. S. Mathur, 2009, S. Chand & Company Ltd., New Delhi.
3. Mathematical Physics – B. D. Gupta, 3rd edition, 2009, Vikas Publishing House Pvt. Ltd., New Delhi.
4. Mathematical Physics – P. P. Gupta, R. P. S. Yadav, G. S. Malik, 4th edition 1983-84, Kedar Nath Ram Nath, Meerut, Delhi.
5. University Physics. FW Sears, MW Zemansky and HD Young, 13/e, 1986, Addison - Wesley.
6. Mechanics Berkeley Physics course, V.1: Charles Kittel, et. Al. 2007, Tata McGraw Hill.
7. Physics – Resnick, Halliday& Walker 9/e, 2010, Wiley Eastern Ltd, New Delhi.
8. Engineering Mechanics, Basudeb Bhattacharya, 2ndedn., 2015, Oxford University Press.

B. Sc. I (NEP-2.0) Semester I, PAPER-II IM-102 Electricity and Magnetism I (Theory Credits-02, 30 hours. Marks- 50)

Expected Course outcomes
<ul style="list-style-type: none"> • Students are able to understand the physical significance of gradient, divergence and curl.
<ul style="list-style-type: none"> • Students are able to apply concepts in vector calculus such as gradient, divergence and curl related to vector and scalar fields using Gauss, Stokes and green`s theorem.
<ul style="list-style-type: none"> • Students are able to understand and apply concepts of electrostatic field, potential to point charges, electric dipole and geometrically regular charged bodies.
<ul style="list-style-type: none"> • Students are able to understand and apply concept of energy density in electric field.
<ul style="list-style-type: none"> • Students are capable of applying above concepts to solve numerical exercise in electrostatics

Module	Sub-module	Syllabus Content	Hrs.
I	Vector analysis	Del operator, Scalar field, Gradient of a scalar field and its physical significance, vector field, Divergence of vector field and its physical significance, Curl of vector field, Line, surface and volume integral (definitions only), Gauss divergence theorem and Stoke's theorem.	07
	Electrostatics	Coulomb's law, Electric field, Electric field lines and its properties, electric flux, Gauss's theorem of electrostatics, electric potential as line integral of electric field, potential due to a point charge, electric dipole, uniformly charged spherical shell and solid sphere, calculation of electric field from potential.	08
II	Dielectrics	Dielectric medium, Dielectric Polarization, Polarization vector, Displacement vector, electric vector, Relation between E, P, and D vectors, Electric susceptibility of dielectrics.	06
	Magnetostatics	Introduction to magnetization and intensity of Magnetization, Biot-Savart's law & its applications- straight conductor, circular coil, solenoid carrying current, Divergence and curl of magnetic field, Magnetic vector potential, Ampere's circuital law (statement only)..	09

Reference Books

1. Mathematical Physics -B. S. Rajput, 25th edition 2013, Pragati Prakashan, Meerut.
2. Mathematical Physics – B. D. Gupta, 3rd edition, 2009, Vikas Publishing House Pvt. Ltd., New Delhi.
3. Mathematical Physics – P. P. Gupta, R. P. S. Yadav, G. S. Malik, 4th edition 1983-84, Kedar Nath, Ram Nath, Meerut, Delhi.
4. Electricity and Magnetism, Edward M. Purcell, 1986, McGraw-Hill Education.
5. Electricity and Magnetism, J.H. Fewkes & J. Yarwood. Vol. I, 1991, Oxford University Press.
6. Electricity and Magnetism, D C Tayal, 1988, Himalaya Publishing House.
7. University Physics, Ronald Lane Reese, 2003, Thomson Brooks/Cole.
8. Electricity and Magnetism, Khare and Shrivastav. Atma Ram & Sons, Delhi, 1976
9. University Physics 9th Edition, Young and Freedman.

B. Sc. I Semester I, Practical Course**PRPH-103-PRACTICAL PAPER-I****(Credits-02, 60 hours)****Physics Practical Course-I**

Expected Course outcomes
<ul style="list-style-type: none">• Apply fundamental mechanical principles: Utilize concepts like moment of inertia, simple harmonic motion, and gravity to design and conduct experiments, analyzing and interpreting results.
<ul style="list-style-type: none">• Develop experimental skills: Demonstrate competence in setting up apparatus, taking precise measurements, and calculating uncertainties, understanding limitations and sources of error.
<ul style="list-style-type: none">• Explore electrical components and circuits: Classify and characterize resistors, capacitors, and galvanometers based on their properties and roles in circuits, measuring resistance and magnetic field strength.
<ul style="list-style-type: none">• Investigate wave phenomena and their interactions: Analyze the behavior of sound waves in different media (magnetic vs. non-magnetic), employing a sonometer to determine frequency and comprehend the influence of material properties.
<ul style="list-style-type: none">• Determine the wavelength of light using the liquid lens method: Employ the principle of interference to measure the wavelength of a monochromatic light source by forming Newton's rings with a liquid lens, analyzing the relationship between ring diameter and wavelength.
<ul style="list-style-type: none">• Determine the angle of a prism using a spectrometer: Employ the spectrometer to accurately measure the angle of a prism, demonstrating proficiency in instrument alignment, calibration, and the application of optical principles for precise angular measurement.

Sr No	Name of The Experiment
Group: I	
1.	Measuring dimensions of the body/object by using a Vernier caliper and screw gauge.
2.	To determine the MI of the disc using an annular ring.
3.	To determine wavelength of convex lens by liquid lens method.
4.	To determine the modulus of rigidity by dynamic method.
5.	To determine 'g' by Bar Pendulum.
6.	To study the motion of a spring and calculate (a) spring constant (b) value of g.
7.	To determine 'g' by Kater's Pendulum.
8.	Exponential decay of amplitude of simple pendulum.
Group: II	
1.	To determine angle of prism using spectrometer.
2.	To study different types of resistors and capacitors.
3.	Series and Parallel connections of resistances.
4.	Verification of Ohm's law.
5.	To determine the resistance of the galvanometer using PO Box.
6.	Use of travelling microscope.
7.	To determine the frequency of A. C. mains by sonometer (magnetic material of wire).
8.	To determine the frequency of A. C. mains by sonometer (non-magnetic material).

Reference Books:

1. Advanced Practical Physics for students, B. L. Flint & H. T. Worsnop, 1971, Asia Publishing House.
2. A Text Book of Practical Physics, Indu Prakash and Ramakrishna, 11th Edition, 2011,

Kitab Mahal, New Delhi.

3. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
4. College Practical Physics – Khanna and Gulati (S. Chand and Co. Ltd, Delhi).
5. Practical Physics – Gupta and Kumar (Pragati Prakation Meerat)
6. Advanced Level Practical Physics – J.M. Nelcon, J.M. Ogloom (EIBS).
7. Engineering Practical Physics- S. Panigrahi & B. Mallick,2015, Cengage Learning India Pvt. Ltd.
8. B.Sc. Practical Physics - Harnam Singh and P S Hemne, S Chand publications.

B. Sc. I Semester I OPEN ELECTIVE COURSE
PHOEPR-101 Household Electrical and Electronic Appliances-I
(Credits-02, 60 hours, Marks-50)

Expected Course outcomes
<ul style="list-style-type: none"> • Demonstrate the ability to identify, represent, and test common electrical and electronic components using standard tools.
<ul style="list-style-type: none"> • Validate experimentally the behaviour of resistances and DC power supplies in series and parallel connections..
<ul style="list-style-type: none"> • Prepare, operate, and test different types of AC and DC power supplies, including variable and regulated sources.
<ul style="list-style-type: none"> • Acquire practical skills and safety awareness necessary for handling household electrical and electronic appliances.

Sr No	Name of The Experiment
Group: I	
1.	Identify and draw the symbols of various electrical components.
2.	Identify and draw the symbols of various electronic components.
3.	Use of various tools –multi-meter, cutter, different screwdrivers, testers, electronic gun
4.	Testing of electrical components.
5.	Testing of electronic components.
6.	Make series connections of resistances validate via experimental proof.
7.	Make parallel connections of resistances validate via experimental proof.

Group: II	
1.	Identify and verify - various DC voltage sources
2.	Make series connections for D. C. power supply and validate via experimental proof.
3.	Make parallel connections for D. C. power supply and validate via experimental proof.
4.	Prepare and test 3V and 5V AC voltages power supply.
5.	Prepare and test variable AC voltage power supply
6.	Prepare and test 3V and 6V DC voltage power supply.
7.	Prepare and test variable DC voltage power supply
8.	Prepare and test the regulated power supply

References

1. Electrical Wiring- O. B. Choudhari
2. Electrical Wiring and electrical technology - O. B. Choudhari

बी.एस्सी. भाग- I सेमिस्टर I ओपन इलेक्ट्रिक कोर्स
PHOEPR-101 गृहउपयोगी इलेक्ट्रिकल आणि इलेक्ट्रॉनिक उपकरणे -I
(Credits-02, ६० तास, Marks-50)

Expected Course outcomes
<i>विद्यार्थी विविध विद्युत व इलेक्ट्रॉनिक घटक ओळखू शकतील, त्यांचे प्रतीक रेखाटू शकतील व योग्य साधनांचा वापर करून त्यांची चाचणी करू शकतील.</i>
<i>विद्यार्थी प्रतिरोधक व डी.सी. वीजपुरवठ्याचे श्रेणी (series) व समांतर (parallel) संयोजन प्रायोगिक पद्धतीने पडताळू शकतील.</i>
<i>विद्यार्थी बदलणारा (variable) व नियंत्रित (regulated) अशा प्रकारच्या ए.सी. व डी.सी. वीजपुरवठ्याची तयारी, कार्यान्वयन व चाचणी करू शकतील.</i>
<i>विद्यार्थी घरगुती विद्युत व इलेक्ट्रॉनिक उपकरणे सुरक्षितपणे हाताळण्यासाठी आवश्यक व्यावहारिक कौशल्ये व सुरक्षा-जाणीव प्राप्त करू शकतील.</i>

Sr No	Name of The Experiment
ग्रुप १	
1.	विविध इलेक्ट्रिकल कॉम्पोनंटची चिन्हे ओळखा आणि काढा.
2.	विविध इलेक्ट्रॉनिक कॉम्पोनंटची चिन्हे ओळखा आणि काढा.
3.	मल्टी-मीटरचा, कटर, वेगवेगळ्या प्रकारचे स्कूड्रायव्हर्स, टेस्टर्स, इलेक्ट्रॉनिक गन इ. चा वापर करणे.
4.	इलेक्ट्रिकल कॉम्पोनंट टेस्ट करणे.
5.	इलेक्ट्रॉनिक कॉम्पोनंट टेस्ट करणे.
6.	रेझिस्टर ची सीरीज मध्ये जोडणी करणे व प्रायोगिकरित्या पडताळणे.
7.	रेझिस्टर ची पॅरलल मध्ये जोडणी करणे व प्रायोगिकरित्या पडताळणे.
Group: II	
1.	विविध डीसी व्होल्टेज स्रोत ओळखा आणि पडताळून पहा.
2.	डी. सी. पॉवर सप्लायसाठी सीरीज कनेक्शन बनवा आणि प्रायोगिक पुराव्याद्वारे सिद्ध करा.
3.	डी. सी. पॉवर सप्लायसाठी समांतर कनेक्शन बनवा आणि प्रायोगिक पुराव्याद्वारे सिद्ध करा.
4.	३ व्ही आणि ६ व्ही एसी व्होल्टेज पॉवर सप्लाय तयार करा आणि चाचणी करा.
5.	व्हेरिअबल एसी व्होल्टेज पॉवर सप्लाय तयार करा आणि चाचणी करा.
6.	३ व्ही आणि ६ व्ही डीसी व्होल्टेज पॉवर सप्लाय तयार करा आणि चाचणी करा.
7.	व्हेरिअबल डीसी व्होल्टेज पॉवर सप्लाय तयार करा आणि चाचणी करा.
8.	नियंत्रित वीज पुरवठा तयार करा आणि चाचणी करा.

संदर्भ

1. इलेक्ट्रिकल वायरिंग- ओ. बी. चौधरी
2. इलेक्ट्रिकल वायरिंग आणि इलेक्ट्रिकल तंत्रज्ञान - ओ. बी. चौधरी

**B. Sc. I (NEP-2.0) Semester II, PAPER-III
PMPH-201 Properties of Matter
(Theory Credits-02, 30 hours. Marks- 50)**

Expected Course outcomes
Students will understand the concepts of elasticity and learn to determine elastic constants, rigidity modulus, and moment of inertia through experiments.
Students will gain knowledge of surface tension, its measurement methods, and its applications in daily life and science.
Students will be able to explain fluid dynamics, apply Bernoulli's theorem, and analyze practical applications like pressure, pumps, and fluid flow systems.
Students will learn about viscosity, experimental determination of coefficient of viscosity, and the effect of temperature and pressure on liquid flow.

Module	Sub-module	Syllabus Content	Hrs.
I	Elasticity	Introduction (Hooke's law, Elastic moduli-Relation between elastic constants), Poisson's Ratio-Expression for Poisson's ratio in terms of elastic constants, Bending of beam, Bending moment, Cantilever (without considering weight of cantilever), Beam supported at both the ends (without considering weight of beam). Torsional oscillation, Determination of Rigidity modulus and moment of inertia - q , η and σ by Searle's method	09
	Surface tension	Surface tension (definition), Angle of contact and wettability, Relation between surface tension, excess of pressure and radius of curvature, Experimental determination of surface tension by Jaeger's method, Applications of surface tension.	06
II	Fluid dynamics	Introduction, Concept of viscous force and viscosity, Coefficient of viscosity, Steady and Turbulent flow, Reynolds number, Equation of continuity, Bernoulli's Theorem, practical applications: (i) Law of hydrostatic pressure (ii) Filter pump (iii) Speed of efflux (iv) Ventury tube.	08
	Viscosity	Introduction, Ideal and viscous fluids, Flow of liquid through capillary tube, Poiseuille's equation, Experimental determination of coefficient of viscosity of liquid by Poiseuille's method, effect of temperature and pressure on viscosity of liquid.	07

Reference Books

1. Physics – S.G. Starling and Woodal Longmans and Green Co. Ltd.
2. Elements of properties of matter – D.S. Mathur, Shamlal Charitable Trust New Delhi.
3. A text Book of properties of matter–N.S. Khare and S. Kumar. Atmaram and Sons New Delhi.
4. Physics Vol. I and Vol. II–David Halliday and Robert Resnik, Willey Eastern Ltd, New Delhi.
5. Concepts of Physics -H.C. Varma -Bharati Bhavan Publishers

**B. Sc. I (NEP-2.0) Semester II, PAPER-IV
PMPH-202 Electricity and Magnetism II
(Theory Credits-02, 30 hours. Marks- 50)**

Expected Course outcomes	
•	Students are able to understand importance of complex numbers in analysis of AC Circuits contacting Inductance(L) Capacitor(C) and Resistance (R) and their various configurations
•	Students are able to define and apply the concepts in AC circuits such as Impedance (Z), reactance (XC and XL), Admittance, Susceptance and Quality Factor (Q)
•	Students are able to understand and design AC bridge: Owen`s Bridge
•	Students are able to understand basic working principle of Ballistic galvanometer
•	Students are able to define constants of ballistic galvanometer
•	Students are able to understand the explain the phenomenon of hysteresis in magnetism
•	Students are able to discriminate different magnetic materials based on their characteristic properties

Module	Sub-module	Syllabus Content	Hrs.
I	A.C. circuits	Complex numbers and their application in solving a. c. series LCR circuit using j operator and phasor diagram, Resonance in LCR series circuit, Sharpness of resonance (qualitative treatment only), Resonance in LCR Parallel circuit, complex Impedance, Reactance, Admittance, and Susceptance, Examples of series	10

		and parallel resonance, A.C. Bridge - Owen's Bridge Q-factor (definition only).	
	Electromagnetic induction	Faraday's laws of electromagnetic induction, Lenz's law, self and mutual inductance, L of single coil, M of two coils, Energy stored in magnetic field.	05
II	Ballistic galvanometer	Construction and working of B. G., expression for charge flowing through ballistic galvanometer, Correction for damping in galvanometer, Constants of the ballistic galvanometer.	08
	Magnetic materials and their properties	Magnetic intensity, magnetic induction, permeability, magnetic susceptibility, diamagnetic, paramagnetic, ferromagnetic: Hysteresis and hysteresis curve, ferromagnetic and anti-ferromagnetic materials.	07

Reference Books

1. Electricity and Magnetism, Edward M. Purcell, 1986, McGraw-Hill Education.
2. Electricity and Magnetism, J.H. Fewkes & J. Yarwood. Vol. I, 1991, Oxford University Press.
3. Electricity and Magnetism, D C Tayal, 1988, Himalaya Publishing House.
4. University Physics, Ronald Lane Reese, 2003, Thomson Brooks/Cole.
5. Electricity and Magnetism, Khare and Shrivastav. Atma Ram & Sons, Delhi, 1976
6. University Physics 9th Edition, Young and Freedman.
7. Foundations of Electromagnetic Theory, Rritz and Milford. Pearson Publication
8. Electricity and Magnetism, Gupta, Kumar and Singal.
9. Basic Electronics and Liner Circuits, N. N. Bhargava, D. C. Kulshrestha and S. S. Gupta, Tata McGraw-Hill
10. Electronic Fundamentals and Applications, J. D. Ryder, Prentice-Hall of India Pvt. Ltd
11. Network theory and Filter Design, V. K. Aatre, New Age International Publisher
12. Principals of Electronics, V. K. Mehata, S. Chan

B. Sc. I Semester II, Practical Course
PRPH-203-PRACTICAL PAPER-II
(Credits-02, 60 hours)
Physics Practical Course-II

Expected Course outcomes
<ul style="list-style-type: none"> • Master mechanical measurements and principles: Utilize advanced techniques like Poiseuille's method, bending, and vibration to measure viscosity, Young's modulus, and Poisson's ratio, demonstrating understanding of fluid dynamics and elasticity.
<ul style="list-style-type: none"> • Determine the wavelength of light using a spectrometer: Employ the spectrometer to accurately measure the wavelength of a light beam, demonstrating understanding of calibration procedures and the principles of diffraction and interference.
<ul style="list-style-type: none"> • Explore AC circuits and impedance: Analyze the behavior of series and parallel LCR circuits, measuring impedance and comprehending the influence of individual components (L, C, R) on resonance and phase relationships.
<ul style="list-style-type: none"> • Investigate bridge circuits and transformers: Utilize a B.G. bridge to determine unknown resistances and delve into the principles and applications of transformers, understanding their role in AC power transmission and voltage transformation.
<ul style="list-style-type: none"> • Verify the operation and characteristics of a bridge rectifier: Construct and test a bridge rectifier circuit to convert AC input to DC output, analyzing its efficiency, ripple factor, and performance under varying load conditions

Sr No	Name of The Experiment
Group: I	
1.	To determine the coefficient of viscosity by Poiseuille's method.
2.	To determine Y by method of bending.
3.	To determine wavelength of beam using spectrometer.
4.	To determine the viscosity of viscous liquid by the Stokes method.
5.	To determine Poisson's ratio of rubber (rubber tube).
6.	Young's modulus of the material of bar by vibration.
7.	To determine the time period and constant of the logarithmic decrement of B. G.
8.	To determine constants of B. G.
Group: II	
1.	To determine the impedance of the series LCR circuit.
2.	To study the series LCR circuit.
3.	To study a parallel LCR circuit.
4.	Verification of Bridge Rectifier.
5.	Verification of Kirchhoff's voltage law.
6.	Owen's Bridge- To determine the resistance of a coil by DC balance.
7.	To Study voltage regulation using Zener Diode.
8.	To determine the impedance of the series LCR circuit.

Reference Books:

1. A Text Book of Practical Physics, Indu Prakash and Ramakrishna, 11th Edition, 2011, Kitab Mahal, New Delhi.
2. Advanced Practical Physics for students, B. L. Flint & H. T. Worsnop, 1971, Asia Publishing House.
3. Engineering Practical Physics- S. Panigrahi & B. Mallick, 2015, Cengage Learning India Pvt. Ltd.
4. College Practical Physics – Khanna and Gulati (S. Chand and Co. Ltd, Delhi).

5. Practical Physics – Gupta and Kumar (Pragati Prakashan Meerat)
6. Advanced Level Practical Physics – J.M. Nelcon, J.M. Ogloom (EIBS).
7. B.Sc. Practical Physics - Harnam Singh and P S Hemne, S Chand publications.
8. Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers

B. Sc. I Semester II OPEN ELECTIVE COURSE
PHOEPR-201 Household Electrical and Electronic Equipment -II
(Credits-02, 60 hours, Marks-50)

Expected Course outcomes	
	• Students will learn to test, repair, and maintain different types of power supplies, lamps, and household wiring systems.
	• Students will gain practical skills in repairing and troubleshooting household electrical and electronic appliances like tube lights, irons, and bells.
	• Students will understand and apply the concepts of series and parallel connections in LED lamps, strings, and other lighting systems.
	• Students will develop hands-on experience in handling emergency torches, batteries, and small electronic gadgets safely and effectively.

Sr No	Name of The Experiment
Group: I	
1.	Test and repair DC power supply.
2.	Test and repair AC power supply.
3.	Make and test the connection of the table lamp.
4.	Make and test the connections of the extension box.
5.	Test and repair basic fluorescent tube lights.
6.	Test and repair the electronic tube light system.
7.	Testing and repairing of electrical Irons.
8.	Testing and repairing of electronic Irons.
Group: II	
9.	Testing and repairing of electrical Bell

10.	Testing and repairing of electronic Bell
11.	Testing and repairing of decoration LED lamps and strings - I. (Series connection)
12.	Testing and repairing of decoration LED lamps and strings - II (Parallel connection)
13.	Testing and repairing battery (cell) torch.
14.	Testing and repairing of emergency torch - I (Single light)
15.	Testing and repairing of an emergency torch - II (multilight)
16.	Testing and repairing electronic toys/ electronic watch/remote

References

1. Electrical Wiring- O. B. Choudhari
2. Electrical Wiring and electrical technology - O. B. Choudhari

**बी.एस्सी. भाग- I सेमिस्टर II ओपन इलेक्ट्रिकल कोर्स
PHOEPR-201 गृहउपयोगी इलेक्ट्रिकल आणि इलेक्ट्रॉनिक उपकरणे -II
(Credits-02, ६० तास, Marks-50)**

Expected Course outcomes
विद्यार्थी विविध वीजपुरवठा प्रणाली, दिवे व घरगुती वायरिंग यांची चाचणी, दुरुस्ती व देखभाल करू शकतील.
विद्यार्थी घरगुती विद्युत व इलेक्ट्रॉनिक उपकरणे जसे की ट्यूब लाईट, इस्त्री, घंटा यांची दुरुस्ती व दोषनिवारण कौशल्य आत्मसात करू शकतील.
विद्यार्थी एलईडी दिवे, सिरीज व पॅरेलल जोडणीतील दिव्यांच्या माळा व इतर प्रकाशयंत्रणांमध्ये सैद्धांतिक ज्ञानाचा प्रत्यक्ष वापर करू शकतील.
विद्यार्थी आपत्कालीन टॉर्च, बॅटरी व लहान इलेक्ट्रॉनिक उपकरणे सुरक्षितपणे हाताळण्याचा प्रत्यक्ष अनुभव मिळवू शकतील.

Sr No	Name of The Experiment
ग्रुप १	
1.	डी. सी. पावर सप्लाय ची चाचणी व दुरुस्ती.
2.	ए. सी. पावर सप्लाय ची चाचणी व दुरुस्ती.

3.	टेबल लॅम्पची जोडणी व चाचणी.
4.	एक्स्टेंशन बॉक्सची जोडणी व चाचणी.
5.	फ्लोरोसेंट ट्यूब ची चाचणी व दुरुस्ती.
6.	इलेक्ट्रॉनिक ट्यूबलाईटची चाचणी व दुरुस्ती.
7.	इलेक्ट्रिकल इस्त्रीची चाचणी व दुरुस्ती.
8.	इलेक्ट्रॉनिक इस्त्रीची चाचणी व दुरुस्ती.
Group: II	
1.	इलेक्ट्रिकल बेलची चाचणी व दुरुस्ती.
2.	इलेक्ट्रॉनिक बेलची चाचणी व दुरुस्ती.
3.	एल. ई. डी. ददि/माळा यांची चाचणी व दुरुस्ती - I (सीरीज जोडणी).
4.	एल. ई. डी. ददि/माळा यांची चाचणी व दुरुस्ती - II (पॅरलल जोडणी).
5.	बॅटरी (ड्राय सेल) चाचणी व दुरुस्ती.
6.	आपत्कालीन टॉर्चची चाचणी व दुरुस्ती - I (सिंगल लाईट).
7.	आपत्कालीन टॉर्चची चाचणी व दुरुस्ती - II (मल्टी लाईट).
8.	इलेक्ट्रॉनिक खेळणी /इलेक्ट्रॉनिक घड्याळ/रिमोट यांची चाचणी व दुरुस्ती.

संदर्भ

1. इलेक्ट्रिकल वायरिंग- ओ. बी. चौधरी
2. इलेक्ट्रिकल वायरिंग आणि इलेक्ट्रिकल तंत्रज्ञान - ओ. बी. चौधरी

B.Sc. I Syllabus (NEP-2.0)**To be implemented from June 2025 onwards Semester I & II****Nature of Question paper**

Seat No.	
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 <p>॥ विद्या सर्वस्य भूषणम् ॥ Warana University</p>	<p>WARANA UNIVERSITY A STATE PUBLIC UNIVERSITY Established under Section 3 (6) of MPUA 2016</p>	
<p>A/P Warananagar, Tal: Panhala, Dist: Kolhapur, MH, INDIA 416 113</p>	<p>+1800 599 2328</p>	<p>www.waranauniversity.org</p>

End Semester Examination, November - 2025

Course Name :

Course Code:

Day & Date :

Max Marks :

Instructions:

- a) All Questions are compulsory
- b) Figures to the right indicates full marks
- c) Use of non-programmable calculator is allowed
- d) Assume suitable data if required

		Marks	B.L	CO
Q.1	Choose the correct alternative and rewrite the sentence again. 6 Marks	06		
	<ul style="list-style-type: none"> a) b) c) d) e) f) 			
Q.2	Attempt any TWO of the following (Out of Three) <ul style="list-style-type: none"> a) b) c) 	12		
Q.3	Answer any Three of the following (Out of Five) <ul style="list-style-type: none"> a) b) c) d) e) 	12		

B.Sc. Physics Part I (NEP-2020)
To be implemented from June 2025 onwards
Nature of Practical Examination

Total Marks: 50

Scheme of Practical Examination for B. Sc. Part -I

1. Practical examination will be conducted semester wise.
2. Practical examination will be conducted for one day per batch.
3. The examination will be conducted in two sessions per day and each session will be of three hours duration.
4. Every candidate should perform one experiment each from Group I and Group II.
5. At least eighty percent practical should be completed by the student.
6. The marks distribution for practical is as below

Practical groups	Marks
Group I	20
Group II	20
Certified laboratory journal	10
Total Marks	50

B.Sc. Physics Part I (NEP-2020)**To be implemented from June 2025 onwards****Nature of Practical Examination****Total Marks 50****Scheme of Practical Examination for B. Sc. Part –I (OE)**

1. Practical examination will be conducted semester wise.
2. Practical examination will be conducted for one day per batch.
3. The examination will be conducted in two sessions per day and each session will be of three hours duration.
4. Every candidate should perform one experiment each from Group I and Group II.
5. At least eighty percent practical should be completed by the student.
6. The marks distribution for practical is as below

Practical groups	Marks
Group I	20
Group II	20
Certified laboratory journal	10
Total Marks	50

1. Determination of CZPA, Grading and Declaration of result

University has adopted 10-point Grading System as follows:

- In each semester, marks obtained in each course (Paper) are converted to grade points: ○ If the total marks of course are 100 and passing criteria is 40%, then use the following Table for the conversion.

1. Gradation Chart:

Table

Marks Obtained	Numerical Grade (Grade Point)	CGPA	Letter Grade
Absent	0 (zero)	-	Ab: Absent
0–39	0 to 4	0.0–4.99	F: Fail
40–49	5	5.00–5.49	C: Average
50–54	6	5.50–6.49	B: Above Average
55–64	7	6.50–7.49	B+: Good
65–74	8	7.50–8.49	A: Very Good
75–84	9	8.50–9.49	A+: Excellent
85–100	10	9.50–10.0	O : Outstanding

Note:

1. Marks obtained ≥ 0.5 shall be rounded off to next higher digit.
2. The SGPA & CGPA shall be rounded off to 2 decimal points.
3. Marks obtained in 50 marks or 200 marks paper shall be converted to 100 marks.

Calculation of SGPA & CGPA

1. Semester Grade Point Average (SGPA)

$$SGPA = \frac{\sum(\text{Course credits} \times \text{Grade points obtained}) \text{ of a semester}}{\sum(\text{Course credits}) \text{ of respective semester}}$$

2. Cumulative Grade Point Average (CGPA)

$$CGPA = \frac{\sum(\text{Total credits of a semester} \times \text{SGPA of respective semester}) \text{ of all semesters}}{\sum(\text{Total course credits}) \text{ of all semesters}}$$

2. NATURE OF QUESTION PAPER AND SCHEME OF MARKING:

For 4 Credits 60:40

For 2 Credits 30:20

NOTE: As per Science Subject Pattern

3. Internal Evaluation Scheme

As per university rules

4. Duration of Examination

- | | | | |
|-----|---------------------------------------|-----------|---------|
| iv. | Duration of Examination for | 60 marks- | 2 Hours |
| v. | Duration of Examination for | 30 marks- | 1 Hours |
| vi. | Duration of Practical Examination for | 50 marks- | 2 Hours |

5. Course Wise Syllabus (Paper)

- | | | | |
|------|------------|----------------|---------|
| i. | COs | | |
| ii. | Module | Teaching Hours | Credits |
| iii. | References | | |

WARANA CLUSTER UNIVERSITY, WARANANAGAR
NEP-2020: Credit Framework for UG(B.Sc.) Programmes under Faculty of SCIENCE

SEM (Level)	COURSES			OE	VSC/SEC	AEC/VEC/IKS	OJT/FP/CEP /CC/RP	Total Credits	Degree/Cum. Cr. MEME
	Course-1	Course-2	Course-3						
SEMI (4.5)	DSC-I(2) DSC-II (2) DSC P-I(2)	DSC-I(2) DSC-II (2) DSC P-I(2)	DSC-I(2) DSC-II (2) DSC P-I(2)	OE-1(2) (T/P)		IKS-I(2)		22	UG Certificate 44
SEMII (4.5)	DSC-III(2) DSC-IV (2) DSC P-II(2)	DSC-III(2) DSC-IV (2) DSC P-II(2)	DSC-III(2) DSC-IV (2) DSC P-II(2)	OE-2(2) (T/P)		VEC-I(2) (Democracy, Election and Constitution)		22	
Credits	8(T)+4(P)=12	8(T)+4(P)=12	8(T)+4(P)=12	2+2=4 (T/P)	--	2+2=4	--	44	Exit Option:4 credits NSQF/Internship/Skill courses
	MAJOR		MINOR						
SEMIII (5.0)	Major V(2) Major VI (2) Major P III (2)	--	Minor V(2) Minor VI (2) Minor P III(2)	OE-3(2) (T/P)	VSC I (2) (P) (Major specific) SEC I(2) (T/P)	AEC I(2) (English)	CC-I (2)	22	UG Diploma 88
SEMIV (5.0)	Major VII(2) Major VIII (2) Major P IV (2)	--	Minor VII(2) Minor VIII (2) Minor P IV (2)	OE-4(2) (T/P)	SEC-II(2) (T/P)	AEC-II(2) (English) VEC-II(2) (Environmental studies)	CEP-I(2)	22	
Credits	8(T)+4(P)=12		8(T)+4(P)=12	2+2=4(T/P)	4(T/P)+2(P)=6	2+4=6	2+2=4	44	Exit Option:4 credits NSQF/Internship/Skill courses
SEM V (5.5)	Major IX(2) Major X (2) Major P V (4)	Major I (ELEC)(2) Major P-I (ELEC) (2)	-	OE-5(2) (T/P)	VSC II (2) (Major specific)(P)	AEC III(2) (English)	OJT (04)	22	UG Degree 132
SEMVI (5.5)	Major XI(2) Major XII (2) Major P VI (4)	Major II (ELEC)(2) Major P-II(2) (ELEC)	-		VSC III (2) (Major specific) (P) SEC III(2) (T/P)	AEC IV(2) (English) IKS 2 (Major specific) (2)	FP-(02)	22	
Credits	8(T)+8(P)=16	4(T)+4(P)=8	-	2(T/P)	2(T/P)+4(P)=6	4+2=6	4+2=6	44	
Total Credits	40+20=60		24	10	12	16	10	132	Exit Option