

*Seventh Edition*

# Lab Manual

# PHYSICS

XIII

# Saraswati Physics Lab Manual Class 12

**David Halliday**



## **Saraswati Physics Lab Manual Class 12:**

*Lab Manual-Physics-TB-12\_E-R* Dr R K Gupta, Lab Manual Physics TB 12\_E R *ICSE-Lab Manual Physics-TB-10* Dr M K Gandhi, ICSE Lab Manual Physics TB 10 *EduGorilla's CBSE Class 12th Physics Lab Manual | 2024 Edition | A Well*

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CBSE Laboratory Manual Physics Class 12th Er. Akash Shukla, 2022-12-13 Once Owen Chamberlain said The development of Physics like the development of any science is a continuous one It is a constant effort of NCERT that it puts on its textbooks to promote clearer understanding of concepts in every student As important as theoretical study is practical study is also essential to prove theories into realities The freshly updated edition of LABORATORY MANUAL Physics for class XII has been designed as a complete package to understand all the relevant Physics experiments in a simple lucid and interactive manner Strictly based on CBSE guidelines each experiment includes theory to give deep insights into each concept formula term definition etc Viva Voce questions Precautions Activities Diagrams and Appendices are accumulated to make concepts clearer in accordance with the curriculum Along with the experiments suggested Investigatory Projects will reveal the complete adherence of CBSE curriculum This book serves as a step by step guide for conducting experiments in such a way that students will not need to refer to any other book for explanations of the concepts An all inclusive guidance book for Physics laboratory experiment Coverage of each experiment in a simple and lucid manner Detailed and Step by Step procedure for each experiment Necessary precautions to be followed for the experiment Viva Voce Questions to get an understanding on the experiment Suggested Investigatory Projects of the CBSE curriculum Clearly labeled Diagrams in each experiment Appendices related to some useful data TABLE OF CONTENT General Introduction of Practical Work How to Record an Experiment Experimental Errors Logarithms Basic Trigonometry Study of Graphs Section A Experiments Activities Section B Experiments Activities Suggested Investigatory Projects Appendices *Practical/Laboratory Manual Physics Class - XII -by Er. Meera Goyal (SBPD Publications)* Er. Meera Goyal, 2021-07-03 In accordance to the new syllabus of Central Board of Secondary Education CBSE New Delhi and other State Boards following CBSE Curriculum **Physics Lab Manual Class XI | According to the latest CBSE syllabus and other State Boards following the CBSE curriculum**

Mr. Rohit Manglik, Mr. Pradeep Dwivedi, 2022-08-04 With the NEP and expansion of research and knowledge has changed the

face of education to a great extent In the Modern times education is not just constricted top the lecture method but also includes a practical knowledge of certain subjects This way of education helps a student to grasp the basic concepts and principles Thus trying to break the stereotype that subjects like Physics Chemistry and Biology means studying lengthy formulas complex structures and handling complicated instruments we are trying to make education easy fun and enjoyable

**Practical/Laboratory Manual Physics Class XII based on NCERT guidelines by Dr. Sunita Bhagia & Megha Bansal** Dr. J. P. Goel, Er. Meera Goyal, 2020-06-24

**SECTION A EXPERIMENTS**

- 1 To determine resistance per cm of a given wire by plotting a graph for potential difference versus current
- 2 To find resistance of a given wire using meter bridge and hence determine the specific resistance Resistivity of its material
- 3 To verify the laws of combination Series Parallel of resistance using ameter bridge
- 4 To compare the e m f of two given primary cells using potentiometer
- 5 To determine the internal resistance of a given primary cell e g Leclanche cell using potentiometer
- 6 To determine the resistance of a galvanometer by half deflection method and to find its figure of merit
- 7 A To convert a given galvanometer of known resistance and figure of merit into an ammeter of desired range and to verify the same
- 7 B To convert a given galvanometer of known resistance and figure of merit into a voltmeter of desired range and to verify the same
- 8 To find the frequency of AC mains with a sonometer and horse shoe magnet

**SECTION B EXPERIMENTS**

- 1 To find the value of  $v$  for different values of  $u$  in case of a concave mirror and to find the focal length
- 2 To find the focal length of a convex lens by plotting graph between  $u$  and  $v$  or  $1/u$  and  $1/v$
- 3 To find the focal length of a convex mirror using a convex lens
- 4 To find the focal length of a concave lens using a convex lens
- 5 To determine the angle of minimum deviation for a given prism by plotting a graph between the angle of incidence and angle of deviation
- 6 To determine refractive index of a glass slab using a travelling microscope
- 7 To find the refractive index of a liquid by using a convex lens and a plane mirror
- 8 To draw I V characteristics curve of a p n function in forward bias and reverse bias
- 9 To draw the characteristics curve of a zener diode and to determine its reverse break down voltage
- 10 To study the characteristics of a common emitter n p n or p n p transistor and to find out the values of current and voltage gains

**SECTION A ACTIVITIES**

- 1 To measure the resistance and impedance of an inductor with or without iron core
- 2 To measure resistance voltage AC DC current AC and check continuity of given circuit using multimeter
- 3 To assemble a household circuit comprising of three bulbs three on off switches a fuse and a power source
- 4 To assemble the components of a given electrical circuit
- 5 To study the variation in potential drop with length of a wire for a steady current
- 6 To draw the diagram of a given open circuit comprising atleast a battery resistor rheostat key ammeter and voltmeter Make the components that are not connected in proper order and correct the circuit and also the circuit diagram

**SECTION B ACTIVITIES**

- 1 To study effect of intensity of light by varying distance of the source on an LDR Light Depending Resistor
- 2 To identify a diode a LED a transistor an IC a resistor and a capacitor from mixed collection of such items
- 3 Use a multimeter to  
i identify the transistor  
ii distinguish between n p n and p n p type transistor  
iii see the unidirectional flow of current in case

of a diode and a LED iv Check whether a given electronic components e g diode transistor or IC is in working order 4 To observe refraction and lateral deviation of a beam of light incident obliquely on a glass slab 5 To observe polarisation of light using two polaroids 6 To observe diffraction of light due to a thin slit 7 To study the nature and size of the image formed by i convex lens ii concave mirror on a screen by using candle and a screen for different distance of the candle from the lens mirror 8 To obtain a lens combination with the specified focal length by using two lenses from the given set of lenses

**SUGGESTED INVESTIGATORY PROJECT** 1 To Study Various factors on which the Internal Resistance EMF of a cell depends 2 To study the variations in current following in a circuit containing L D R because of variation a In the power of incandescent lamp used to illuminate the L D R Keeping all the lamps in fixed position b In the Distance of a incandescent lamp of fixed power used to illuminate the L D R 3 To find the refractive indices of a Water b Oil Transparent using a plane mirror an equiconvex lens made from a glass of known refractive index and an adjustable object needle 4 To design an appropriate logic gate combination for a given truth table 5 To investigate the relation between the ratio of i Output and Input voltage ii Number of turns in secondary coils and primary coils of a self designed transformer 6 To Investigate the dependence of angle of deviation on the angle of incidence using a hollow prism filled one by one with different transparent fluids 7 To Estimate the charge induced on each one of the two identical styrofoam balls suspended in a vertical plane by making use of Coulomb's Law 8 To study the factors on which the self inductance of a coil depends by observing the effect of this coil when put in series with a resistor bulb in a circuit fed up by an a c source of adjustable frequency 9 To study the earth's magnetic field using a tangent galvanometer

**APPENDIX** Some Important Tables of Physical Constants Logarithmic and other Tables

ICSE-Lab Manual Physics-TB-09 Dr M K Gandhi, ICSE Lab Manual Physics TB 09 Practical/Laboratory Manual Physics Class - 12 Er. Meera Goyal, 2023-04-30 Sections A 1 Experiments 2 Activities Sections B 1 Experiments 2 Activities 3 Suggested Investigatory 4 Project Work

*Core Laboratory Manual of Physics for Class XII* Anil Sharma, Prashant Sharma, 2020-04-16 Goyal Brothers Prakashan Physics Grade 12 Student Lab Manual 3rd Edition 259077, BJU Press, 2010-03-01

**Lab Manual Latest Edition** Dr. J. P. Goel, 2016-12-17 Lab E Manual Physics For XIIth Practicals A Every student will perform 10 experiments 5 from each section 8 activities 4 from each section during the academic year Two demonstration experiments must be performed by the teacher with participation of students The students will maintain a record of these demonstration experiments B Evaluation Scheme for Practical Examination One experiment from any one section 8 Marks Two activities one from each section 4 4 8 Marks Practical record experiments activities 6 Marks Record of demonstration experiments Viva based on these experiments 3 Marks Viva on experiments activities 5 Marks Total 30 Marks

**Section A Experiments** 1 To determine resistance per cm of a given wire by plotting a graph of potential difference versus current 2 To find resistance of a given wire using metre bridge and hence determine the specific resistance of its material 3 To verify the laws of combination series parallel of resistances using a metre bridge 4 To compare the emf of two given

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**Activities**

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- 2 To measure resistance voltage AC DC current AC and check continuity of a given circuit using multimeter
- 3 To assemble a household circuit comprising three bulbs three on off switches a fuse and a power source
- 4 To assemble the components of a given electrical circuit
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- 1 To find the value of  $v$  for different values of  $u$  in case of a concave mirror and to find the focal length
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- 3 Use of multimeter to i identify base of transistor ii distinguish between npn and pnp type transistors iii see the unidirectional flow of current in case of a diode and a LED iv check whether a given electronic component e g diode transistor or I C is in working order
- 4 To observe refraction and lateral deviation of a beam of light incident obliquely on a glass slab
- 5 To observe polarization of light using two Polaroids
- 6 To observe diffraction of light due to a thin slit
- 7 To study the nature and size of the image formed by i convex lens ii concave mirror on a screen by using a candle and a screen for different distances of the candle from the lens mirror
- 8 To obtain a lens combination with the specified focal length by using two lenses from the given set of lenses

**Suggested Investigatory Projects**

- 1 To investigate whether the energy of a simple pendulum is conserved
- 2 To determine the radius of gyration about the centre of mass of a metre scale as a bar pendulum
- 3 To investigate changes in the velocity of a body under the action of a constant force and determine its acceleration
- 4 To compare effectiveness of different materials as insulators of heat
- 5 To determine the wavelengths of laser beam by diffraction
- 6 To study various factors on which the internal resistance emf of a cell depends
- 7 To construct a time switch and study dependence of its time constant on various factors
- 8 To study infrared

radiations emitted by different sources using photo transistor 9 To compare effectiveness of different materials as absorbers of sound 10 To design an automatic traffic signal system using suitable combination of logic gates 11 To study luminosity of various electric lamps of different powers and make 12 To compare the Young's modulus of elasticity of different specimens of rubber and also draw their elastic hysteresis curve 13 To study collision of two balls in two dimensions 14 To study frequency response of i a resistor an inductor and a capacitor ii RL circuit iii RC circuit iv LCR series circuit

*Core Laboratory Manual of Physics for Class XI* Anil Sharma, Prashant Sharma, Goyal Brothers Prakashan, 2020-04-16 Goyal Brothers Prakashan

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*Physics Kit Grd 12* 209767, 2005-02-11 Contains the Teacher's Edition Student Text Lab Manual Teacher's Edition and Student Lab Manual Grade 12

*(WCS) Fundamentals of Physics Extended 7th Edition with Physics Lab Manual for Univ Del Turabo Set* David Halliday, 2005-07-01

**Practical/Laboratory Manual Physics Class XI based on NCERT guidelines by Dr. J. P. Goel & Er. Meera Goyal** Dr. J. P. Goel, Er. Meera Goyal, 2020-06-24

SECTION A EXPERIMENTS 1 Measurement of Length 1 To measure the diameter of a small spherical cylindrical body by using a vernier callipers 2 To measure the dimensions of a given regular body of known mass using vernier callipers and hence find its density 3 To measure the internal diameter and depth of a given cylindrical vessel say calorimeter beaker by using vernier callipers and hence find its internal volume i.e. capacity Viva voce 2 Screw Gauge Micrometer 4 To determine the diameter of a given wire using a screw gauge and find its volume 5 To find the thickness of a given sheet with the help of screw gauge 6 To measure the volume of an irregular lamina by using a screw gauge Viva voce 3 Spherometer 7 To measure the radius of curvature of a given spherical surface convex lens by using a spherometer Viva voce 4 Mass and Weight 8 To determine the mass of two different objects using a beam balance Viva voce 5 Parallelogram Law of Vectors 9 To find the weight of a given body using parallelogram law of vectors Viva voce 6 Simple Pendulum Measurement of Time 10 Using a simple pendulum plot  $L$  vs  $T$  and  $L$  vs  $T^2$  graphs Hence find the effective length of a second's pendulum using appropriate graphs Viva voce 7 Friction 11 To study the relationship between force of limiting friction and normal reaction and to find the coefficient of friction between a block and a horizontal surface Viva voce 8 Motion of a Body Along an Inclined Plane 12 To find the downward force along an inclined plane acting on a roller due to gravitational pull of the earth and study its relationship with the angle of inclination by plotting graph between force and  $\sin \theta$  Viva voce SECTION B EXPERIMENTS 1 Elasticity 1 To determine the Young's modulus of elasticity of the material of the wire using Searle's apparatus Viva voce 2 Spring Constant 2 To find the spring constant of a helical spring by plotting load extension graph Viva voce 3 Boyle's Gas Law 3 To study the variation in volume with pressure for a sample of air constant temperature by plotting graphs between  $P$  and  $V$  and between  $P$  and  $1/V$  18 Viva voce 4 Surface Tension 4 To determine the surface tension of water by capillary rise method Viva voce 5 Viscosity 5 To

determine the coefficient of viscosity of given liquid by measuring the terminal velocity of a given spherical body in it Viva voce 6 Newton's Law of Cooling 6 To study the relationship between temperature of a hot body and time by plotting a cooling curve Viva voce 7 Vibrations of Strings 7 To study the relation between frequency and length for a given wire under constant tension using a sonometer Viva voce 8 To study the relation between the length of a given wire and tension for constant frequency using sonometer Viva voce 8 Vibrations of Air Columns 9 To find the velocity of sound in air at room temperature using a resonance tube by two resonance positions Viva voce 9 Specific Heat 10 To determine specific heat of a given solid by the method of mixture 11 To determine the specific heat of a given liquid by method of mixture Viva voce SECTION A ACTIVITIES 1 To make a paper scale of given least count e.g. 0.2 cm 0.5 cm and use it to measure the length of a given object 2 To determine the mass of a given body using a metre scale and by applying principle of moments Viva voce 3 To plot a graph for a given set of data using proper choice of scales and error bars Viva voce 4 To measure the force of limiting friction for rolling of a roller on horizontal plane Viva voce 5 To study the variation in the range of a jet of water with angle of projection Viva voce 6 To study the conservation of energy of a ball rolling down on inclined plane using a double inclined plane Viva voce 7 To study dissipation of energy of a simple pendulum by plotting a graph between square of amplitude and time Viva voce SECTION B ACTIVITIES 1 To observe the change of the state and plot a cooling curve for molten wax Viva voce 2 To observe and explain the effect of heating on a bimetallic strip Viva voce 3 To note the change in level of liquid in a container on heating and interpret the observations Viva voce 4 To study the effect of detergent in surface tension by observing capillary rise Viva voce 5 To study the factors affecting the rate of loss of heat of a liquid Viva voce 6 To study the effect of load on depression of a suitably clamped meter scale loaded i at its end ii in the middle Viva voce 7 To observe the decrease in pressure with the increase in velocity of the fluid Viva voce APPENDIX Some Important Tables of Physical Constants Log Antilog and other Tables Physics 12 : Student Laboratory Manual Somers, Ron, British Columbia. Division of Public Instruction. Curriculum Development Branch, British Columbia. Physics 11/12 Curriculum Revision Committee, 1985

**Comprehensive Practical Physics XI** J. N. Jaiswal, 2012-08



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### **Table of Contents Saraswati Physics Lab Manual Class 12**

1. Understanding the eBook Saraswati Physics Lab Manual Class 12
  - The Rise of Digital Reading Saraswati Physics Lab Manual Class 12
  - Advantages of eBooks Over Traditional Books
2. Identifying Saraswati Physics Lab Manual Class 12
  - Exploring Different Genres
  - Considering Fiction vs. Non-Fiction
  - Determining Your Reading Goals
3. Choosing the Right eBook Platform
  - Popular eBook Platforms
  - Features to Look for in an Saraswati Physics Lab Manual Class 12
  - User-Friendly Interface
4. Exploring eBook Recommendations from Saraswati Physics Lab Manual Class 12
  - Personalized Recommendations
  - Saraswati Physics Lab Manual Class 12 User Reviews and Ratings
  - Saraswati Physics Lab Manual Class 12 and Bestseller Lists

- 
5. Accessing Saraswati Physics Lab Manual Class 12 Free and Paid eBooks
    - Saraswati Physics Lab Manual Class 12 Public Domain eBooks
    - Saraswati Physics Lab Manual Class 12 eBook Subscription Services
    - Saraswati Physics Lab Manual Class 12 Budget-Friendly Options
  6. Navigating Saraswati Physics Lab Manual Class 12 eBook Formats
    - ePub, PDF, MOBI, and More
    - Saraswati Physics Lab Manual Class 12 Compatibility with Devices
    - Saraswati Physics Lab Manual Class 12 Enhanced eBook Features
  7. Enhancing Your Reading Experience
    - Adjustable Fonts and Text Sizes of Saraswati Physics Lab Manual Class 12
    - Highlighting and Note-Taking Saraswati Physics Lab Manual Class 12
    - Interactive Elements Saraswati Physics Lab Manual Class 12
  8. Staying Engaged with Saraswati Physics Lab Manual Class 12
    - Joining Online Reading Communities
    - Participating in Virtual Book Clubs
    - Following Authors and Publishers Saraswati Physics Lab Manual Class 12
  9. Balancing eBooks and Physical Books Saraswati Physics Lab Manual Class 12
    - Benefits of a Digital Library
    - Creating a Diverse Reading Collection Saraswati Physics Lab Manual Class 12
  10. Overcoming Reading Challenges
    - Dealing with Digital Eye Strain
    - Minimizing Distractions
    - Managing Screen Time
  11. Cultivating a Reading Routine Saraswati Physics Lab Manual Class 12
    - Setting Reading Goals Saraswati Physics Lab Manual Class 12
    - Carving Out Dedicated Reading Time
  12. Sourcing Reliable Information of Saraswati Physics Lab Manual Class 12
    - Fact-Checking eBook Content of Saraswati Physics Lab Manual Class 12
    - Distinguishing Credible Sources
  13. Promoting Lifelong Learning

- Utilizing eBooks for Skill Development
- Exploring Educational eBooks

#### 14. Embracing eBook Trends

- Integration of Multimedia Elements
- Interactive and Gamified eBooks

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