OSWAAL CBSE

Laboratory Manual

Physics

Class 11

Highlights

1. Strictly as per latest CBSE guidelines.
2. Includes all Activities / Experiments specified in latest CBSE curriculum.
3. Includes 'Viva Voce' Questions for each activity / experiment.
4. High Quality figures for overall understanding of the concepts.
5. Projects to facilitate collective efforts and extension of learning to real life situations.
6. Brief description of each Activity / Experiment given as 'Theoretical Concepts'.

OSWAAL

LABORATORY MANUAL in PHYSICS

Class 11

Name .....

School .....

Class..... Section .....

Roll No. .....

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16.06

Certificate

This Certificate is presented to

Mr. / Ms .....

Father's Name .....

Class..... Division .....

Roll No. .....

For successfully completing the Experiments specified in the

CBSE Curriculum

Signature

School Stamp

Date

PREFACE

CBSE always believe in Global Trends of Educational Transformation. The CBSE curriculum gets its lead from National Curriculum Framework – 2005 and Right to Free and Compulsory Education Act – 2009. As said by John Holt "We learn to do something by doing it. Laboratory work has special importance in the learning of science as scientific principles develop and grow on the basis of Laboratory work.

The Physics Lab Manual for Classes XI & XII has been written so as to supplement the need of the students to prepare for lab work and improve practical skills among students.

This Lab Manual includes all activities and experiments as specified in latest CBSE curriculum. Each activity/experiment comprises of theoretical concepts which provides brief description about activities. At the end of every activity Viva Voce questions have been given for extra practice. Projects have been added to facilitate collective efforts and extension of learning to real life.

This book is strictly according to the latest CBSE guidelines, and contains more than sufficient viva voce questions and brief description of each activity/experiment, which help students in practicing and completing the lab work. All activities and experiments are always checked twice. Practically, this book provides students everything they need to learn during their lab work. Since we believe in continuous improvement, hence this book has been written with accuracy as well as updated as per CBSE guidelines and reviewed at different tiers by panel of experts.

We are sure that this book will serve as a perfect teaching guide for the teachers and good lab manual for the students. It is expected that they will take full advantage of our knowledge and experience.

At last we would like to thank our authors, editors, reviewers and specially students who regularly send us suggestions which helps in continuous improvement of this book and makes this book stand in the category of "One of the Best". Wish you all Happy Learning.

–Publisher

CONTENTS

..... contd. Contents

Activities

LIST OF EXPERIMENTS

Practicals should be conducted alongside the concepts taught in theory classes.

Sr. No.	Experiment	Date	Page	Remarks

Practicals

Evaluation Scheme for Examination	Marks
Two experiments one from each section	8+8
Practical record (experiment and activities)	6
Investigatory project	3
Viva on experiments, activities and project	5
Total	30

PRACTICAL SYLLABUS — 60 Periods

The record, to be submitted by the students, at the time of their annual examination, has to include:

- Record of at least 15 experiments (with a minimum of 6 from each section), to be performed by the students.
- Record of at least 5 activities (with a minimum of 2 each from section A and section B), to be demonstrated by the teachers.
- Report of the project to be carried out by the students.

Section–A : Experiments

1. To measure diameter of a small spherical/cylindrical body and to measure internal diameter and depth of a given beaker/calorimeter using Vernier Callipers and hence find its volume.
2. To measure diameter of a given wire and thickness of a given sheet using screw gauge.
3. To determine volume of an irregular lamina using screw gauge.
4. To determine radius of curvature of a given spherical surface by a spherometer.
5. To determine the mass of two different objects using a beam balance.
6. To find the weight of a given body using parallelogram law of vectors.
7. Using a simple pendulum, plot its L-T^2 graph and use it to find the effective length of second's pendulum.
8. To study variation of time period of a simple pendulum of a given length by taking bobs of same size but different masses and interpret the result.
9. 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.
10. 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 θ by plotting graph between force and $\sin\theta$.

Activities – For the purpose of demonstration only

1. To make a paper scale of given least count, e.g., 0.2cm, 0.5 cm.
2. To determine mass of a given body using a metre scale by principle of moments.
3. To plot a graph for a given set of data, with proper choice of scales and error bars.
4. To measure the force of limiting friction for rolling of a roller on a horizontal plane.
5. To study the variation in range of a projectile with angle of projection.
6. To study the conservation of energy of a ball rolling down on an inclined plane (using a double inclined plane).
7. To study dissipation of energy of a simple pendulum by plotting a graph between square of amplitude and time.

SECTION–B Experiments

1. To determine Young's modulus of elasticity of the material of a given wire.
2. To find the force constant of a helical spring by plotting a graph between load and extension.
3. To study the variation in volume with pressure for a sample of air at constant temperature by plotting graphs between P and V, and between P and 1/V.
4. To determine the surface tension of water by capillary rise method.
5. To determine the coefficient of viscosity of a given viscous liquid by measuring terminal velocity of a given spherical body.
6. To study the relationship between the temperature of a hot body and time by plotting a cooling curve.
7. To determine specific heat capacity of a given solid by method of mixtures.
8. To study the relation between frequency and length of a given wire under constant tension using sonometer.
9. To study the relation between the length of a given wire and tension for constant frequency using sonometer.
10. To find the speed of sound in air at room temperature using a resonance tube by two resonance positions.

Record of the Activities/Projects performed

Sr. No.	Activity / Project	Date	Page No.	Remarks/ Signature

Section A:
Experiments

Chapter 1

USE OF VERNIER CALLIPERS

Concepts

Vernier Callipers was invented by a French mathematician Pierre Vernier. It is used to measure the length of a rod or cylinder, diameter of a sphere, the internal and external diameter of a hollow cylinder and the depth of a small vessel. The construction of vernier callipers is shown in the labelled Fig. AE1.1.

- It consists of a steel strip graduated in cm. This is called the main scale.
- There is another strip known as vernier scale which can slide over the main scale, and is graduated with the number of divisions.
- The vernier scale can be fixed at any position on the main scale by means of a screw.
- There are two jaws perpendicular to the main scale. One of the jaw is fixed at the left end of the main scale and other jaw is fixed on the frame of the vernier scale. The lower outside jaws are used to measure the length or the external diameter of an object (rod or cylinder) and the upper inside jaws are used to measure the internal diameter of a hollow cylinder.
- The vernier callipers is provided with a long thin strip attached at the back of the main scale. This strip is used to measure the depth of any small vessel. This strip is also known as depth measuring prong.

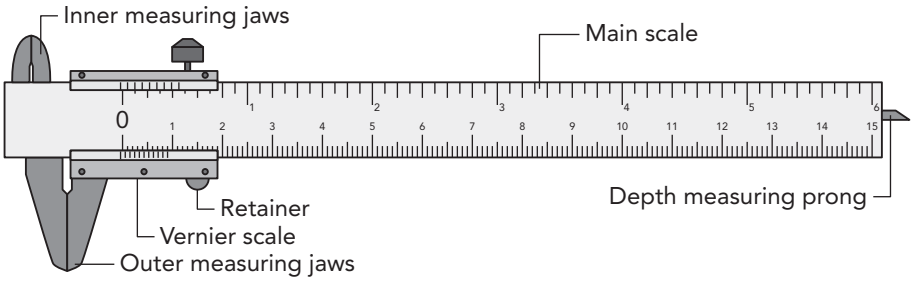

Fig. AE 1.1 : Vernier Callipers

Least count : The least distance which can be measured accurately by an instrument is called least count of that instrument. The difference between the values of one main scale division and one vernier scale division is called the vernier constant or the least count, since it is the least distance which can be measured by that instrument.

If the value of one division of main scale is x and the length of n divisions of vernier scale is equal to the length of $(n - 1)$ divisions of main scale then,

$$\text{Least count} = \frac{x}{n} = \frac{\text{value of 1 main scale division}}{\text{Total number of divisions on the vernier scale}}$$

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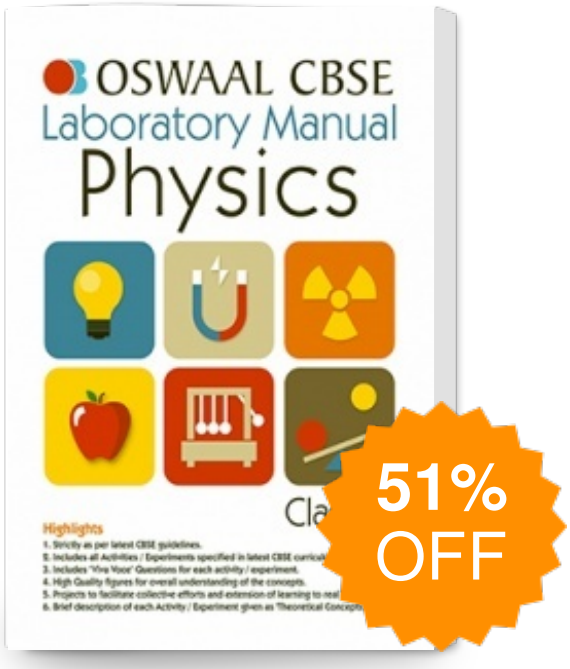

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