



Laboratory Manual

Science

Class X

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राष्ट्रीय शैक्षिक अनुसंधान और प्रशिक्षण परिषद्
NATIONAL COUNCIL OF EDUCATIONAL RESEARCH AND TRAINING





FOREWORD

The National Council of Educational Research and Training (NCERT) is the apex body concerning all aspects of school education. It has recently developed textual material in Science for the secondary stage which is based on the National Curriculum Framework–2005. NCF–2005 recommends that children’s experience in school education must be linked to the life outside school so that learning experience is joyful and fills the gap between the experience at home and in community. It recommends to diffuse the sharp boundaries between different subjects and discourages rote learning. The syllabi and the textual material developed recently is an attempt to implement this basic idea. The present Laboratory Manual will be complementary to the Science textbook for Class X. It is in continuation to the NCERT’s efforts to improve upon comprehension of concepts and practical skills among students. The purpose of this manual is not only to convey the approach and philosophy of the laboratory course to students and teachers but also to provide them appropriate guidance for carrying out experiments in the laboratory. This manual is supposed to encourage children to reflect on their own learning and to pursue further activities and questions. Of course the success of this effort also depends on the initiatives taken by the principals and teachers to encourage children to carry out experiments in the laboratory and to develop their own thinking and nurture creativity.

The methods adopted for performing the practicals and their evaluation will determine how effective this practical book will prove to make the children’s life at school a happy experience, rather than a source of stress and boredom. This laboratory manual attempts to provide space to opportunities for contemplation and wondering, discussion in small groups, and activities requiring hands-on experience. It is hoped that the material provided in this manual will help students in carrying out laboratory work effectively and will encourage teachers to introduce some open-ended experiments at the school level.

New Delhi
21 May 2008

YASH PAL
Chairman
National Steering Committee
National Council of Educational
Research and Training



THE CONSTITUTION OF INDIA

PREAMBLE

WE, THE PEOPLE OF INDIA, having solemnly resolved to constitute India into a **SOVEREIGN SOCIALIST SECULAR DEMOCRATIC REPUBLIC** and to secure to all its citizens :


JUSTICE, social, economic and political;

LIBERTY of thought, expression, belief, faith and worship;

EQUALITY of status and of opportunity; and to promote among them all

FRATERNITY assuring the dignity of the individual and the unity and integrity of the Nation;

IN OUR CONSTITUENT ASSEMBLY this twenty-sixth day of November, 1949, do **HEREBY ADOPT, ENACT AND GIVE TO OURSELVES THIS CONSTITUTION.**





PREFACE

The Laboratory Manual in Science for Class X is in continuation of our efforts in implementing the recommendations of National Curriculum Framework–2005. This manual is complementary to the Class X Science textbook and aims at enhancing children's comprehension of scientific concepts as also acquiring basic experimental skills. In the learning of science emphasis is on the enquiry approach and hands-on experience instead of lecture method alone. The recommendations of NCF–2005 on Teaching of Science encourage experimental work and introduction of carefully designed experiments. Schools may also be given a choice to select experiments according to the available infrastructure, cultural and environmental resources. At the secondary stage experimental work, often involving quantitative measurement as a tool to verify theoretical principles should form an integral part of the curriculum. This manual covers selected topics in the broad themes of Materials, The World of the Living, The Natural Phenomenon, and How Things Work. It is an integrated approach to science at this stage. In this manual, a coherent coverage of scientific concepts manifesting themselves in our daily life. It is aimed at motivating the reader to design an experiment, to make observations methodically and to draw logical conclusions. The experiments are designed to expose the learners to basic tools and techniques of scientific investigations.

Based on the science curriculum up to secondary stage, fifty-six experiments are given in this manual. All experiments conform to a general format that includes – aim, theory, materials required, procedure, observations, results and discussion, precautions, and questions. The questions are aimed at testing learner's understanding of concepts underlying the experiment. Several experiments also include 'a note for the teacher' that suggests viable alternatives and clarifies certain anticipated difficulties while performing the experiment. Further, applications are also quoted at several places to relate the concepts to daily life situations. Some experiments have been left open-ended for teachers to innovate, modify and improve. Teachers may adapt or adopt these experiments for facilitating their teaching-learning processes. To kindle the spirit of scientific exploration and experience the thrill of science learning, some projects are also suggested in this manual.

It is a pleasure to express my thanks and gratitude to all those who have been involved at all stages during the development of this manual. I acknowledge the efforts of Dr Gagan Gupta, **Coordinator** of this programme and members of the team who contributed to the development and finalisation of the manual. I especially thank Professor Krishna Kumar,





Director and Professor G. Ravindra, **Joint Director**, NCERT for their administrative support and keen interest in the development of this manual. I am also grateful to the participating teachers and subject experts in the review workshop for their comments and suggestions which have helped in the refinement of this manual. We warmly welcome comments and suggestions from our readers for further improvement of this manual.

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Our National Anthem

*Jana-gana-mana adhinayaka, jaya he
Bharata-bhagya-vidhata.
Punjab-Sindh-Gujarat-Maratha
Dravida-Utkala-Banga
Vindhya-Himachala-Yamuna-Ganga
Uchchhala-jaladhi-taranga.
Tava shubha name jage,
Tava shubha asisa mage,
Gahe tava jaya gatha.
Jana-gana-mangala-dayaka jaya he
Bharata-bhagya-vidhata.
Jaya he, jaya he, jaya he,
Jaya jaya jaya, jaya he!*

Our National Anthem, composed originally in Bangla by Rabindranath Tagore, was adopted in its Hindi version by the Constituent Assembly as the national anthem of India on 24 January 1950.





ACKNOWLEDGEMENT

The National Council of Educational Research and Training (NCERT) acknowledges the valuable contribution of the individuals and organisations involved in the development of this laboratory manual. The Council also acknowledges the valuable contribution of the following academics for reviewing and refining the manuscript of the laboratory manual: Amina Ansari, **TGT**, Sardar Patel Vidyalaya, Lodhi Colony, New Delhi; I.P. Aggarwal, **Professor**, Regional Institute of Education, NCERT, Bhopal; Sanjeev Bansal, **Lecturer**, Ahlcon Public School, Mayur Vihar, Delhi; M.N. Bapat, **Reader**, Regional Institute of Education, NCERT, Bhopal; R.S. Dass, **Vice-Principal (Retired)**, BRMB Senior Secondary School, Lajpat Nagar, New Delhi; Johnson David, **PGT (Retired)**, Rajkiya Pratibha Vikas Vidyalaya, Suraj Mal Vihar, Delhi; Rupamanjari Ghosh, **Professor**, School of Physical Sciences, Jawaharlal Nehru University, New Delhi; J.S. Gill, **Professor (Retired)**, DESM, NCERT, New Delhi; Lalit Gupta, **TGT**, Government Boys Senior Secondary School, Hastal, New Delhi; Seema Gupta, **TGT**, Somerville School, Noida; Raji Kamlasanan, **PGT**, DTEA Senior Secondary School, R.K. Puram, New Delhi; Kanhiya Lal, **Principal (Retired)**, Directorate of Education, New Delhi; Charu Maini, **PGT**, Amity International School, Gurgaon; Meeta Purkayastha, **PGT**, New State Academy Senior Secondary School, Pitampura, New Delhi; A.K. Seth, **Vice-Principal**, B.R. Government Sarvodaya Bal Vidyalaya, Shahdara, Delhi; R.S. Sindhu, **Professor**, DESM, NCERT, New Delhi; and Abinash Kumar Singh, **PGT**, Kendriya Vidyalaya, Janakpuri, New Delhi.


The Council also acknowledges the support provided by the administrative staff of DESM; Deepak Kapoor, **Incharge**, Computer Station; Ritu Jha, **DTP Operator** and Achal Kumar **Proof Reader** for helping in shaping this laboratory manual. The efforts of the Publication Department are also highly appreciated.





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Do You Know

According to the 86th Constitutional Amendment Act, 2002, free and compulsory education for all children in the 6–14-year age group is now a Fundamental Right under Article 21-A of the Constitution.

**EDUCATION IS NEITHER A
PRIVILEGE NOR FAVOUR BUT A
BASIC HUMAN RIGHT TO
WHICH ALL GIRLS AND WOMEN
ARE ENTITLED**

*Give Girls
Their Chance !*

