

Laboratory Manual

Biology

Class XI

विद्यया ऽ मृतमश्नुते



एन सी ई आर टी
NCERT

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 refinement of School Education. It has recently developed textual material in Biology for Higher Secondary stage which is based on the National Curriculum Framework (NCF)-2005. NCF 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 recent development of syllabi and textual material is an attempt to implement this basic idea. The present Laboratory Manual will be complementary to the textbook of Biology for Class XI. 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 practical course to students and teachers but to provide them appropriate guidance for carrying out experiments in the laboratory. The 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 to be taken by the principals and teachers to encourage children to carry out experiments in the laboratory and develop their 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. The practical book 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.

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21.5.08

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PREFACE

The development of the present laboratory manual is in continuation to the National Council of Educational Research and Training's efforts to improve upon comprehension of concepts and practical skills among the students. The present laboratory manual will be complementary to the textbook of Biology for Class XI.

The expansion of scientific knowledge and consequently the change in the system of education has led to the development of new methods of instructions. Today the stress is laid on the enquiry approach and discussion method instead of lecture method of teaching. Biology is now something more than observation of living organisms. Study of Biology includes microscopic observations to reveal minute internal details of the organisms, biochemical testing to understand complex reactions taking place inside the organisms, experiments with live organism to understand various physiological processes and even much more. In other words, experiments in Biology truly represents an interdisciplinary approach of learning.

The new syllabus of Biology has been designed to cater to the needs of pupil who are desirous of pursuing science further. The fundamental objective of this course is to develop scientific attitude and desired laboratory skills required for pursuing Biology as a discipline at this level. A similar approach has been taken while formulating the practical syllabus of Biology for higher secondary stage. The practical syllabus includes content based experiments, which help in comprehension of the concepts. There are altogether thirty four exercises in the present manual which are based on Biology curriculum for Class XI. For each practical work, principle, requirements, procedure, precautions, observations, discussion and the questions are given in the book. The methodology of preparation of any reagent, if required, has been given along with the requirement for the convenience of student and teachers. The questions are aimed to develop learner's understanding of the related problems. However, the teacher may provide help in case the problem is found to be beyond the capability of the learner. Precautions must be well understood by the learners before proceeding with the experiments and projects.

Appropriate appendices related to the observation and study of organisms are given along with the experiment. International symbols for units, hazards and hazard warnings are given at appropriate places in the book. It is expected that this will make the learners more careful about the environment and make them careful while dealing with the equipments and chemicals in the laboratory.

It gives me a pleasure to express my thanks to all those, who have been associated at various stages of development of this laboratory manual. It is hoped that this practical book will improve teaching learning process in Biology to a great extent. The learners will be able to

understand the subject well and will be able to apply the acquired knowledge in new situations.

I acknowledge with thanks the dedicated efforts and valuable contribution of Dr. Dinesh Kumar, coordinator of this programme and other team members who contributed and finalised the manuscript. I especially thank Professor G. Ravindra, *Director*, NCERT for their administrative support and keen interest in the development of this laboratory manual. I am also grateful to the participating teachers and subject experts who participated in the review workshop and provided their comments and suggestions which 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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