

PHYSICAL SCIENCES

Part I

Standard

IX



Government of Kerala
Department of Education

Prepared by
State Council of Educational Research and Training (SCERT)
KERALA

2010

THE NATIONAL ANTHEM

Jana-gana-mana adhinayaka, jaya he
Bharatha-bhagya-vidhata.
Punjab-Sindh-Gujarat-Maratha
Dravida-Utkala-Banga
Vindhya-Himachala-Yamuna-Ganga
Uchchala-Jaladhi-taranga
Tava subha name jage,
Tava subha asisa mage,
Gahe tava jaya gatha.
Jana-gana-mangala-dayaka jaya he
Bharatha-bhagya-vidhata.
Jaya he, jaya he, jaya he,
Jaya jaya jaya, jaya he!

PLEDGE

India is my country. All Indians are my brothers and sisters.

I love my country, and I am proud of its rich and varied heritage.
I shall always strive to be worthy of it.

I shall give respect to my parents, teachers and all elders and
treat everyone with courtesy.

I pledge my devotion to my country and my people. In their well-
being and prosperity alone lies my happiness.

Prepared by :

State Council of Educational Research and Training (SCERT)

Poojappura, Thiruvananthapuram 695012, Kerala

Website : www.scertkerala.gov.in

e-mail : scertkerala@asianetindia.com

Phone : 0471 - 2341883, Fax: 0471 - 2341869

First Edition: 2010

Typesetting : Computer Lab., SCERT

© Department of Education, Government of Kerala

Dear students,

We have already realised how to make learning an enjoyable experience by observing and analysing the changes happening around us. Science is an ever expanding branch of knowledge and the study of science is a never-ending process.

The knowledge you construct through thinking, collecting data and sharing your experiences with friends leads the learning process forward. A number of questions will arise in your mind during the process of knowledge construction. You may not get answers for all of them. It is you yourself who should engage in the exploration of new avenues of knowledge and formulate ways for finding the answers to such questions. Your textbook and your teacher will be with you in this attempt.

Learning becomes enjoyable when learning activities cease to be burdensome. Many such possibilities are available in this book. May your journey through science along with your friends make learning a real celebration.

With love and regards,

Prof. M.A. Khader
Director, SCERT

Textbook Development Committee

Physical Sciences IX

Advisor

Prof. H.C. Pradhan, Centre Director, Homi Bhabha Centre for Science Education,
Tata Institute of Fundamental Research (TIFR), Mumbai

Chairman

Dr. Mohammed Shafi, Professor, Dept. of Chemistry, Calicut University, Kozhikode

Members

Dr. Alaudeen.M, Principal (Rtd.), Govt. College, Elerithattu, Kasaragode
Anil Kumar. P.K., HSA, CHMHS, Thillankeri, Thalassery, Kannur.
Babu Payyath, HSA, GVHSS, Meppayyur, Vadakara, Kozhikode.
P.D. Baby, HSA, St.Antony's HSS, Poonjar, Kottayam
G.Balakrishnan Nair, Head (Rtd.), Dept. of Physics, NSS College, Pandalam, Pathanamthitta
N.K. Gopalan, HSA (Rtd.), K.K.M.G.V. HSS, Orkatteri, Vadakara.
Dr.S. Mohanan, Reader and Head of the Dept. in Physics (Rtd.), University College, Thiruvananthapuram
Pradeep Kumar K.V., HSA, Moothedath HSS, Thaliparamba, Kannur
Ramesh Kumar M.K., HSA, Pappinisserry Panchayath HSS, Kannur
K.G. Saji Kumar, HSA., GV & HSS for Girls, Manacaud. Thiruvananthapuram
Sebastian Lukose T.J., Sel. Grade Lecturer (Rtd.), University College, Thiruvananthapuram
Dr. Sethumadhavan, Head, Dept of Physics, SNG College, Kozhikode
K. Suresh Kumar, HSA, AMHSS, Thirumala, Thiruvananthapuram
V. Sivan, HSA (Rtd.), HSS, Mannapra, Palakkad
T.I. Unnikrishnan, HM (Rtd.), AKKRHS for Boys, Chelannur, Kozhikode

Academic Co-ordinator

Dr. Ancey Varughese, Research Officer (Physics), SCERT, Thiruvananthapuram

Artists

Abhilash Thiruvoth, NVT (Chemistry), GVHSS, Atholi, Kozhikode
Bimalkumar.S., Drawing Teacher, GMVHSS for Boys, Kollam
Mohan Das P.M., Drawing Teacher, Moothedath HSS, Thaliparamba, Kannur

Expert Committee

Mohan Kumar C., Deputy Director (Rtd.), Collegiate Education, Kollam
K. Pappooty, Director, State Institute of Encyclopedic Publications, Thiruvananthapuram
Dr. K. Subhash Babu, Deputy Director, Collegiate Education, Thiruvananthapuram
K.Suresh Babu, Head, Dept. of Physics, Govt College, Madapally
Dr.V. Unnikrishnan Nair, Prof. (Rtd.), Dept. of Opto Electronics, University of Kerala, Thiruvananthapuram

English Translation

D.Thomas, Sel. Grade Lecturer in English (Rtd), Mar Ivanios College, Thiruvananthapuram.
D.Premlal, Sel. Grade Lecturer in English, University College, Thiruvananthapuram.
N.G.Krishnapillai, Head (Rtd), Dept. of Physics, VTM NSS College, Dhanuvachapuram, Thiruvananthapuram.
Geetha.P., Panthiyil, Cochin-16.



State Council of Educational Research and Training

Vidyabhavan, Poojappura, Thiruvananthapuram 695 012

Contents

1. Nature of Materials	07
2. Separation of Mixtures.....	17
3. Periodic table and the Chemical bond....	25
4. Motion	45
5. Wave Motion	58
6. Gravitation.....	65
7. Work, Energy and Power	77

CONSTITUTION OF INDIA

Part IV A

FUNDAMENTAL DUTIES OF CITIZENS

ARTICLE 51 A

Fundamental Duties- It shall be the duty of every citizen of India:

- (a) to abide by the Constitution and respect its ideals and Institutions, the National Flag and the National Anthem;
- (b) to cherish and follow the noble ideals which inspired our national struggle for freedom;
- (c) to uphold and protect the sovereignty, unity and integrity of India;
- (d) to defend the country and render national service when called upon to do so;
- (e) to promote harmony and the spirit of common brotherhood amongst all the people of India transcending religious, linguistic and regional or sectional diversities; to renounce practice derogatory to the dignity of women;
- (f) to value and preserve the rich heritage of our composite culture;
- (g) to protect and improve the natural environment including forests, lakes, rivers, wildlife and to have compassion for living creatures;
- (h) to develop the scientific temper, humanism and the spirit of inquiry and reform;
- (i) to safeguard public property and to abjure violence;
- (j) to strive towards excellence in all spheres of individual and collective activity so that the nation constantly rises to higher levels of endeavour and achievements.
- (k) who is a parent or guardian to provide opportunities for education to his child or, as the case may be, ward between age of six and fourteen years.