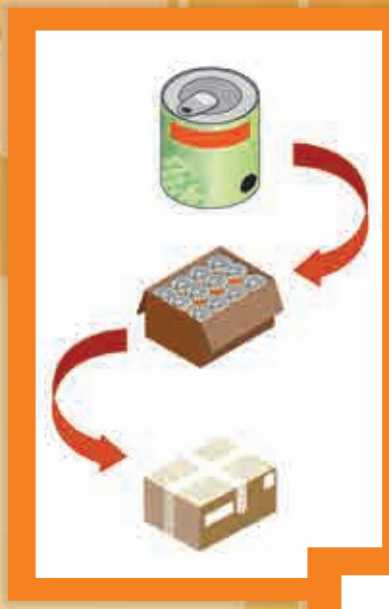
FOOD SCIENCE AND TECHNOLOGY

Standard XI



The Coordination Committee formed by GR No. Abhyas - 2116/(Pra.Kra.43/16) SD - 4 Dated 25.4.2016 has given approval to prescribe this textbook in its meeting held on 20.6.2019 and it has been decided to implement it from academic year 2019-20.

Food Science and Technology

STANDARD ELEVEN

Y1V1C7

Download DIKSHA App on your smartphone. If you scan the Q.R. Code on this page of your textbook, you will be able to access full text. If you scan the Q.R. Code provided, you will be able to access audio-visual study material relevant to each lesson, provided as teaching and learning aids.

2019

Maharashtra State Bureau of Textbook Production and Curriculum Research, Pune.

First Edition : 2019

Subject Committee:

Dr. Wazid Ali Khan
(Chairman)

Dr. Naikare Shriram Maruti

Dr. Anuradha Anil Nagpal

Dr. Madhuri V. Kaley

Dr. Rahul C. Ranveer

Dr. Abhijeet Arun Gatade

Dr. Rinku Sudarshan Agrawal

Dr. Shalini S. Arya

Mrs. Mittal Vaibhav Upadhyay

Dr. Jayshila Manohar Baswant

Dr. Iranna S. Udachan

Shri. Rajiv Arun Patole
(Member Secretary)

Illustrations and cover
Shri Vivekanand S. Patil

Coordinator
Shri. Rajiv Arun Patole
Special Officer
(Food Science and Technology)

Typesetting
DTP Section, Textbook Bureau, Pune

Paper
70 GSM Creamwove

Print Order

Printer

Production :
Shri Sachchitanand Aphale
Chief Production Officer
Shri Liladhar Atram
Production Officer

Reviewer :
Dr. Chandrashekhar V. Murumkar

Chief Co-ordinator
Smt. Prachi Ravindra Sathe

Publisher :
Shri Vivek Uttam Gosavi
Controller
Maharashtra State Textbook Bureau, Prabhadevi, Mumbai - 400 025

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.

NATIONAL ANTHEM

Jana-gana-mana-adhināyaka jaya hē
Bhārata-bhāgya-vidhātā,

Panjāba-Sindhu-Gujarāta-Marāthā
Drāvida-Utkala-Banga

Vindhya-Himāchala-Yamunā-Gangā
uchchala-jaladhi-taranga

Tava subha nāmē jāgē, tava subha āsisa māgē,
gāhē tava jaya-gāthā,

Jana-gana-mangala-dāyaka jaya hē
Bhārata-bhāgya-vidhātā,

Jaya hē, Jaya hē, Jaya hē,
Jaya jaya jaya, jaya hē.

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 my parents, teachers and all elders respect, and treat everyone with courtesy.

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

Preface

Dear Students

It is a matter of pleasure and pride to place this exposition on food science and technology book in the hand of the young generation. This text book aims to create awareness about the food science and technology as food processing industry is highly significant for India's development because of vital linkages and synergies, it promotes between the two pillars of our economy, industry and agriculture. In India, the food sector has emerged as high growth and high profit sector due to its immense potential for value addition particularly within the food processing industry.

This book is designed for the Food Science and Technology students and offers the learner tremendous scope for life skill development. The National Curriculum Framework (NCF) was formulated in 2005, followed the state Curriculum Framework (SCF) in 2010. Based on the given these two frameworks, reconstruction of the curriculum and preparation of a revised syllabus has been undertaken which will be introduced from the academic year 2019-20. The text book incorporating the revised syllabus has been prepared and designed by the Maharashtra State Bureau of Textbook Production and Curriculum Research, (Balbharati), Pune.

Food science can be expressed as the application of the basic science and engineering to study the fundamentals of physical, chemical, and biochemical nature of food and principles of food processing. Food technology is the use of the information generated by food science in the selection, preservation, processing, packaging and distribution as it affects the consumption of safe, nutritious and wholesome food by application of techniques.

The new syllabus focuses on the conceptual principles related to food and its various aspects, its understanding and application in day-to-day life and ability to solve different upcoming problem and issues like various deficiency disease, application of technology in food industry etc. For the first time in syllabus of food science and technology various independent activity have been introduced which not only help to comprehend the content but also understand its application.

The book is prepared by using 5 units with 16 chapters starting from Introduction to food science, scope and opportunities, food group in first unit, the second unit comprises of nutrients in food which contain macro, micro nutrients and food groups, the third unit cover methods of preservation with cooking methods, food spoilage and techniques in food preservation. Unit 4 explains different post harvest technology by covering fruits and vegetables, cereals, pulses and oilseeds, spices, tea, coffee and cocoa, sugar and their products. The last unit contains advances in food technology-1 with packaging technology, nanotechnology and functional foods.

The curriculum and syllabus confirm to the maxims of teaching such as moving from simple to complex, concrete to abstract, known to unknown and from part to whole.

Throughout the book, numerous tables, figures, photographs and illustrations are given, which will help in quick understanding and grasping the matter. QR codes have been introduced for gaining the additional information about abstract of chapters and practice question/activities.

The efforts taken to prepare the textbook will not only enrich the learning experiences of the students, but also benefit other stake holders such as teachers, parents, food entrepreneurs as well as candidates aspiring for the competitive examination.

We look forward to a positive response from the teachers and students.

Our best wishes to all!

(Dr. Sunil Magar)
Director
Maharashtra State Bureau of Textbook
Production and Curriculum Research, Pune

Pune
Date : 20 June 2019
Bharatiya Saur : 30 Jyeshtha 1941

- For Teachers -

Dear Teachers,

We are happy to introduce the revised textbook of Food Science and Technology for Std XI. This book is a sincere attempt to follow the maxims of teaching as well as develop a 'constructive' approach to enhance the quality of learning. The demand for more activity based, experiential and innovative learning opportunities is the need of the hour. The present curriculum has been restructured so as to bridge the credibility gap that exists between what is taught and what students learn from direct experience in the outside world. Guidelines provided below will help to enrich the teaching-learning process and achieve the desired learning outcomes.

- To begin with, get familiar with the textbook yourself.
- The present book has been prepared for constructive and activity-based teaching.
- Teachers must skillfully plan and organize the activities provided in each chapter to develop interest as well as to stimulate the thought process among the students.
- Always teach with proper planning.
- Use teaching aids as required for the proper understanding of the subject.
- Do not finish the chapter in short.
- Follow the order of the chapters strictly as listed in the contents because the units are introduced in a graded manner to facilitate knowledge building.
- Facilitate peer learning as much as possible by reorganizing the class structure frequently.
- Teaching-learning interactions, processes and participations of all students are very essential and so is your active guidance.
- Ask questions based on previous knowledge of different concepts of lesson.
- Do not use the boxes titled 'Do you know?' for evaluation. However, teachers must ensure that students read this extra information.
- Information provided in boxes with the title 'Can You Tell', 'Always Remember' should be considered for evaluation.
- Exercises provided after each unit are prepared using different parameters like observation, co-relation, critical thinking, analytical reasoning etc.
- Evaluation pattern should be based on the above mentioned parameters. Equal weight age should be assigned to all the topics. Use different combinations of questions. Stereotype questions should be avoided.
- Use demonstration, discussion method for teaching.
- 'Can You Recall' is the first main starting point of lesson which helps for the introduction of topic. This will also helpful for students regarding understanding the content of lesson.
- Use QR Code given in the textbook. Keep checking the QR Code for updated information.
- 'Activity' is used in lesson and exercise for better understanding and application of the content which studied.
- Exercise is given at the end of lesson. In exercise different type of questions/ activities are given.
- Teacher should use their freedom to acquaint the students with different food products and recipies of given region.
- Remember that mathematical and statistical tools are also important to understand Food Science and Technology.
- Glossary, brief definitions and abbreviations are provided towards the end of the textbook for further clarification.

Best wishes for a wonderful teaching experience and fruitful welcome!

Competency Statements

Standard XI

Unit	**Competency Statements** **After studying the content in Textbook students will …**
Food Science and Technology	• Explain the importance of food science and technology • Elaborate the scope and correlation of food science with other subjects • Select the opportunities regarding the occupations related to food science and technology • Compare food groups correlated with day-to-day food items • Define the terminologies in food science and technology • Explain and draw food pyramid and elaborate balance diet.
Nutrients in food	• Review the important constituents of food and their functions. • Understand relationship between deficiencies of nutrients. • Describe the energy value of food and various method to calculate it • Understand the Basal Metabolic Rate (BMR) and calculate the Body Mass Index (BMI)
Food Processing and Preservation	• Do the activities related to food cooking • Take precautions during food cooking • Explain food spoilage and its effects • Do the processes of food preservation and food processing • Explain the importance of food processing and food preservation • Draw the flow diagrams in food processing and food preservation
Post Harvest Technology	• Explain the term post-harvest technology • Elaborate different types in post-harvest technology • Explain the process of post-harvest technology with respect to » Fruits and vegetables » Cereals, pulses and oil seeds » Spices and condiments » Tea, coffee and cocoa processing » Sugar and its products
Advance in Food Technology	• Create awareness about advances in food technology • Explain the packaging technology and its importance • Explain the role of Nano technology in food science • Explain the concept of functional food

Contents