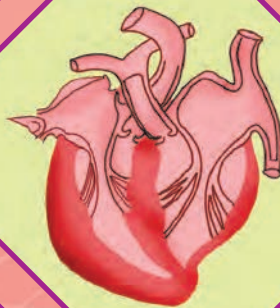
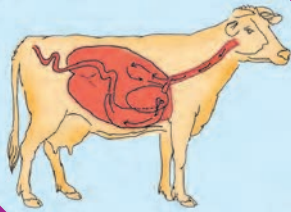




ANIMAL SCIENCE AND TECHNOLOGY

Standard XI



The Constitution of India

Chapter IV A

Fundamental Duties

ARTICLE 51A

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 practices 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 and wild life 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 achievement;
- (k) who is a parent or guardian to provide opportunities for education to his child or, as the case may be, ward between the age of six and fourteen years.

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.

Animal Science and Technology

Standard XI



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**

Reprint : 2022

© **Maharashtra State Bureau of Textbook Production and Curriculum Research, Pune - 411 004.**

The Maharashtra State Bureau of Textbook Production and Curriculum Research reserves all rights relating to the book. No part of this book should be reproduced without the written permission of the Director, Maharashtra State Bureau of Textbook Production and Curriculum Research, 'Balbharati', Senapati Bapat Marg, Pune 411004.

Subject Committee

Dr. Chandrashekhar V. Murumkar, **Chairman**

Dr. Anil Udhavrao Bhikane

Dr. Babasaheb Manikrao Thombare

Dr. Balaji Narayanrao Ambore

Shri. Kumar Ramchandra Kulkarni

Shri. Jaysing Tatoba Sawant

Dr. Ulhas Shivaji Gaikwad

Dr. Suhas Shamrao Patil

Dr. Sanjay Dattatraya Mandakmale

Shri. Gunvant Sangappa Biradar

Dr. Somnath Mane

Dr. Hanumant S. Jagtap

Shri. Rajiv Arun Patole, **Member Secretary**

Illustrations and Cover

Shri. Vivekanand S. Patil

Typesetting

DTP Section, Textbook Bureau, Pune

Co-ordination

Shri. Rajiv Arun Patole

**Special Officer for Animal
Science and Technology**

Paper

70 GSM Creamwove

Print Order

Printer

Authors/Writing Committee

Dr. Anil Udhavrao Bhikare,

Convener : Writing Committee

Dr. Ulhas Shivaji Gaikwad

Dr. Balaji Narayanrao Ambore

Shri. Kumar Ramchandra Kulkarni

Dr. Suhas Shamrao Patil

Dr. Sanjay Dattatraya Mandakmale

Dr. Babasaheb Manikrao Thombare

Shri. Jaysing Tatoba Sawant

Shri. Gunvant Sangappa Biradar

Production

Shri Sachchitanand Aphale

Chief Production Officer

Shri Prashant Harne

Production Officer

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,

Welcome to std. XI. We have great pleasure in offering to you textbook of Animal Science and Technology based on the new syllabi. This textbook is designed to get you prepared for higher studies. The information and skill from this textbook will also help to develop entrepreneurship qualities.

The educational science understands a paradigm shift in our country. The student community is waiting for exploring new vistas to meet the demands and challenges. It was necessary to bring a change at +2 level of education. This stage deals with adolescents, who are hungry for knowledge and are sensitive as well. Efforts are made to make this text compatible and digestible for this age group.

Indian livestock plays an important role in the national economy and in the socioeconomic development of the country besides providing food and nutritional security to millions of people. Livestock are the best insurance against the vagaries in nature like draught, famine and other natural calamities. The increasing significance and visible impact of livestock gives stability to agriculture by supplementing family income and generating gainful employment in the rural sector. Thus, livestock provides sustenance to millions of peoples in the vast arid and drought prone area of country.

While studying this textbook the section ‘can you recall’ ‘recall a little’ and ‘can you tell’ are used for revision. Many activities given under the titles ‘observe and discuss’ and ‘try this’ ‘use your brain power’ think about it’ etc. will stimulate power of thinking. Ask your teachers, parents and classmates for help wherever you need it.

QR code is given by using you can get additional audio – visual information as supporting articles. The students from rural area, enrolling for this subject will certainly get advanced knowledge of livestock management, thereby they will educate their parents for the same advanced techniques of livestock management.

While studying the book make proper use of devices of information communication technology, which will make studies much easier. The efforts taken to prepare the textbook will not only enrich the learning experiences of the students, but also benefit other stakeholders such as teachers, parents as well as candidates appearing for the competitive examinations.

We look forward to a positive response from the teachers and students.
Our best wishes to all!



(Dr. Sunil Magar)
Director

Pune

Date : 20 June 2019

Bharatiya Sour : 30 Jyeshtha 1941

Maharashtra State Bureau of
Textbook Production and
Curriculum Research, Pune 4

- For Teachers -

Dear Teachers,

We are happy to introduce the revised textbook of Animal Science and Technology for std. XI. This book is a sincere attempt to follow the maxims of teaching as well as develop a 'constructivist' approach to enhance the quality of learning. The demand for more activity based, experiential and innovative learning opportunities is the need of the time. The present curriculum has been restructured so as to bridge the credibility gap that exists in the 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 constructivism and activity based learning.
- 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.
- Each unit is structured in a definite manner. It starts from the basic concepts of Animal Science required for each component comes under the subject. Application of technology is given in content. This knowledge will help students to understand further chapters in each unit.
- Each chapter provides various charts, pictures, diagrams for better understanding, so you can use this for effective teaching.
- Ask the students about the related information, background about the chapter. You are provided, for this with the different boxes like 'Can You Recall', 'Do you know?', 'Try this'.
- Encourage the students to collect related information by providing them the websites.
- Teaching- learning interactions, processes and participation of all students are necessary and so is your active guidance.
- Do not use the content of the boxes titles 'Do you know?' for evaluation.
- Exercises include parameters such as correlation, critical thinking, analytical reasoning etc. Evaluation pattern should be based on the given parameters. Equal weightage should be assigned to all the topics. Use different combinations of questions.

Components of chapter :

Remember



Try this



Can you recall?



Can you tell?



Use your brain power



Do you know ?



Think about



Just do it



Can you imagine ?



Observe that



Can you think



Internet my friend

DISCLAIMER Note : All attempts have been made to contact copy right/s (©) but we have not heard from them. We will be pleased to acknowledge the copy right holder (s) in our next edition if we learn from them.

Competency Statements - Standard XI

Area/ Unit/ Lesson	After studying the contents in Textbook students.....
<i>Livestock and Poultry Breeds</i>	<ul style="list-style-type: none"> • Explain integrated livestock farming. • Suggest medicinal uses of livestock. • Analyse the data of livestock related components example, milk production, egg production, etc. • Understand the livestock population in Maharashtra. • Compare the livestock production in Maharashtra. • Explains the nutritive values of livestock production. • Calculate and compare the income from livestock production. • Selects and suggest organic farming • Understands the challenges in Livestock population and its Production • Nomenclature the parts of different livestock • Classify cattle, buffalo, goat, sheep, and poultry breeds • Explains the habitats, characteristics of different breeds • Understand the commercial importance of different breeds. • Explain the role of different livestock in economical development. • Correlate livestock and poultry breed with health and hygiene. • Take efforts to create awareness regarding agriculture supporting business. • Collect data of livestock in surrounding. • Analyse the collected information of livestock and make conclusions.
<i>Livestock Nutrition</i>	<ul style="list-style-type: none"> • Explain feed nutrients. • Enlist the nutrients in feed. • Identify the importance and functions of feed nutrients. • Explain functions of nutrients. • Analyse nutrients with their functions. • Differentiate vitamins with their characteristics. • Explain the sources and functions of vitamins in livestock. • Identify symptoms of deficiencies of vitamins in livestock. • Explain the sources and functions of minerals in livestock. • Identify symptoms of deficiencies of minerals in livestock. • Classify feed stuffs. • Differentiate roughages and concentrates with their characteristics. • Explain special feeds. • Explain unconventional feed stuff with classification. • Understand projected demand supply and fodder deficits in India. • Classify fodder crops. • Explain the importance of nutrition • Classify the different nutrients and its importance • Understand the different cultivation practices related to forages, feeds and feed technology • Understand the feed technology • Explain the process of pellet making machine. • Create feed blocks.

<i>Anatomy and Physiology of Livestock and Poultry</i>	<ul style="list-style-type: none"> • Explain the skeletal system in detail. • Identify and explain bone type. • Discuss the structure of bones. • Classify bones with diagrammatic representation. • Explain skeleton types with reference to joints. • Explain the respiratory system in detail with diagrammatic representation of different organs. • Explain the circulatory system with reference to different organs. • Explain blood composition. • Differentiate between Arteries and Veins. • Explain the digestive system with reference to different organs. • Draw structures of digestive system. • Differentiate digestive system of ruminants and non ruminants. • Explain the Urinary system with reference to different organs. • Explain the reproductive system with reference to different organs. • Explain the Nervous system and endocrine system with reference to different organs. • Explain endocrine organs and their functions.
<i>Livestock Breeding</i>	<ul style="list-style-type: none"> • Understand the concept of animal breeding and its development. • Understand the new technologies reference to reproductive technologies in livestock. • Explain the systems of breeding in detail (Advantages and disadvantages). • Explain transgenic animals, cloning technique. • Create awareness about the need and impact of technology on livestock breeding.

CONTENTS

Sr. No	Title	Page No
1	Scope and Opportunities in Animal Husbandry	1 - 9
2	Cattle Breeds	10 - 25
3	Buffalo Breeds	26 - 34
4	Goat and Sheep Breeds	35 - 48
5	Poultry Breeds	49 - 55
6	Feeds and Feeding	56 - 82
7	Forage Production	83 - 94
8	Feed Technology	95 - 108
9	Anatomy and Physiology of Livestock	109 - 144
10	Poultry Anatomy and Physiology	145 - 154
11	Animal Breeding and Selection	155 - 167
12	Reproductive Technologies	168 - 183