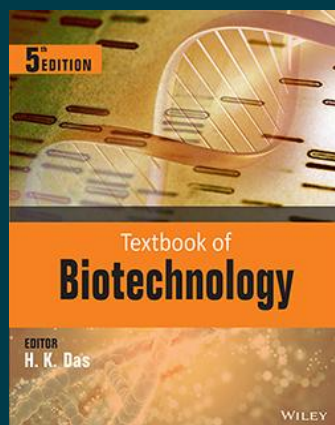


**WILEY**

## Textbook of Biotechnology, 5ed

By H.K. Das

**Paperback**

ISBN: 9788126564040

Publication: [ NOT PROVIDED ] *publication\_date*

Page Count: 1104 pages

**₹1,309.00**

### • Description

Textbook of Biotechnology, 5<sup>th</sup> edn., has evolved considerably since the first edition was published in October, 2004, with respect to both structure and content. The main objective has been to conform as far as possible to the recommendations of the expert committees of both University Grants Commission and Department of Biotechnology, Government of India, who had developed the curricula. Hence, the sequence of the chapters in the textbook has been kept exactly as the sequence in which the expert committees had arranged the topics in the recommended Biotechnology curriculum. A broad-spectrum of subjects necessary to understand and teach Biotechnology has been covered and each chapter is written in an in-depth and up-to-date manner.

### • About the Author

#### **H.K. Das**

Dr. H. K. Das has been the Member

### • Table of Contents

#### 1. Biomolecules

##### 1.1 Chemical Foundation of Biology

##### 1.2 Classes of Organic Compounds

##### 1.3 Principles of Thermodynamics

##### 1.4 Carbohydrates

##### 1.5 Amino Acids and Peptides

##### 1.6 Heterocyclic Compounds and Secondary Metabolites

##### 1.7 Lipids - Classification, Structure and Function

##### 1.8 Proteins - Classification and Separation, Purification, End Group Analysis

##### 1.9 Separation Techniques for Lipids and Carbohydrates

#### 2. Macromolecules

##### 2.1 Macromolecules and Supra-molecular Assemblies

##### 2.2 Sequencing of Proteins and Nucleic Acids

##### 2.3 Protein-Protein and Protein-Ligand Interactions: Physical and Chemical Methods for Study

##### 2.4 Conformational Properties of Polynucleotides

##### 2.5 Properties of Double Helical DNA

- 2.6 Structure and Properties of RNA
- 2.7 Structural Features of Proteins
- 2.8 Protein-assisted Folding
- 2.9 DNA-binding Proteins
- 2.10 Protein–Nucleic Acid Interactions
- 2.11 Physical and Chemical Methods for Immobilization of Macromolecules such as Enzymes
- 2.12 Glycoproteins
- 2.13 Lipoproteins
- 2.14 Chromatin Organization
- 2.15 Ribosome Organization and Function
- 2.16 Protein Denaturation
- 2.17 Nucleic Acid Hybridization: Structural Analysis and Biological Studies
- 2.18 Ribozymes and Catalytic Antibodies: Functional Proteins
- 2.19 Protein and Nucleic Acid Databases: Structural Comparison at Secondary and Tertiary Levels
- 3. Analytical Techniques for the Study of Biomolecules
  - 3.1 Ultraviolet and Visible Absorption Spectroscopy
  - 3.2 Infrared Spectroscopy
  - 3.3 Raman Spectroscopy
  - 3.4 Resonance Raman Spectroscopy
  - 3.5 Circular Dichroism (CD) Spectroscopy
  - 3.6 Viscosity
  - 3.7 Centrifugation
  - 3.8 Determination of Structure of Proteins
  - 3.9 Electrophoresis
  - 3.10 Fluorescence Spectroscopy
  - 3.11 Mass Spectrometry
  - 3.12 Electron Cryomicroscopy
  - 3.13 Recent Advances in Spectroscopy
- 4. Biophysical Chemistry
  - 4.1 Interactions in Biological Systems
  - 4.2 Structure of Proteins
  - 4.3 Multiple Equilibrium
- 5. Basic Enzymology
  - 5.1 Introduction
  - 5.2 Nomenclature and Classification
  - 5.3 Assay of Enzyme Activity
  - 5.4 Mechanism of Action
  - 5.5 Enzyme Kinetics

5.6 Regulation

5.7 Isoenzymes

5.8 Applications

5.9 Epilogue

6. Metabolic Pathways and Their Regulation

6.1 Introduction

6.2 Bioenergetics and Metabolism

6.3 Catabolic (Degradative) and Anabolic (Biosynthetic) Pathways

6.4 Identification of a Metabolic Sequence

6.5 Glycolysis

6.6 The Tricarboxylic Acid Cycle

6.7 The Glyoxalate Cycle

6.8 Alternate Routes of Glucose Catabolism

6.9 The Biosynthesis of Carbohydrates

6.10 Biosynthetic Pathways Leading from Glucose 6-Phosphate

6.11 Lipid Metabolism: Synthesis and Transport

7. Cell Biology

7.1 The Cell Theory

7.2 Diversity of Cell Size and Shape

7.3 Structure of Prokaryotic and Eukaryotic Cells

7.4 Isolation and Growth of Cells

7.5 Microscopic Techniques for the Study of Cells

7.6 Subcellular Fractionation

7.7 Cellular Organelles

7.8 Transport of Nutrients, Ions and Macromolecules across Membrane

7.9 Cellular Energy Transactions: Role of Mitochondria and Chloroplast

7.10 The Cell Cycle

7.11 Cellular Responses to Environmental Signals in Plants and Animals

7.12 Cell Motility: Cilia and Flagella

7.13 Biology of Cancer

7.14 Cellular Differentiation

7.15 Mitosis, Meiosis and Fertilization

7.16 Protein Localization

7.17 Receptor-Mediated Endocytosis

8. Animal Cell Biotechnology

8.1 Structure and Organization of Animal Cell

8.2 Primary Culture and Established Cell Line Cultures

8.3 Equipments and Materials for Animal Cell Culture Technology

8.4 Cell Culture Contaminants

8.5 Basic Techniques of Mammalian Cell Culture: Disaggregation of Tissue and Primary Culture, Maintenance of Cell Culture and Cell Separation

8.6 Growth Media

8.7 Biology and Characterization of Cultured Cells, Measurement of Viability and Cytotoxicity, Measuring Parameters of Growth

8.8 Manipulation of Cultured Cells and Tissues

8.9 Application of Animal Cell Culture

8.10 Stem Cell Culture

8.11 Apoptosis

8.12 Containment Levels

9. Microbial Physiology

9.1 The Beginning of Microbiology

9.2 Culture Methods

9.3 Origin and Evolution of Microbes

9.4 Microbial Diversity

9.5 Microbial Cell Structure

9.6 Microbial Growth

9.7 Carbon Metabolism

9.8 Metabolic Diversity Among Microorganisms

10. Medical Microbiology

10.1 Host-Parasite Relationship

10.2 Microbial Diseases

10.3 Life Cycle and Molecular Biology

10.4 Chemotherapy and Antibiotics

11. Biology of the Immune System

11.1 Introduction

11.2 The Immune System: Its Organization and its Cells

11.3 The Molecular Components of an Immune Response

11.4 Effector Components of an Immune Response

11.5 Induction and Regulation of the Immune Response

11.6 Immunity in Health and Diseases

12. Microbial Genetics

12.1 Genes, Mutations and Mutagens

12.2 Bacterial Genetic System

12.3 Bacterial Viruses and their Genetic Systems

12.4 Fungal Genetic Systems

13. Molecular Biology

13.1 Introduction to Molecular Biology

13.2 DNA Replication

13.3 DNA Repair and Recombination

13.4 Gene Transcription

13.5 Post Transcriptional Modifications of mRNA

13.6 Translation of mRNA into Protein

13.7 Post Translational Protein Sorting and Sub-cellular Localization

13.8 Regulation of Gene Expression by Oncogenes and Tumor-suppressor Genes

13.9 Gene Silencing by External Interventions

13.10 Homologous Recombination

13.11 Molecular Mapping of Genome

13.12 Genome Organization

14. Genetic Engineering

14.1 Scope of Genetic Engineering

14.2 Milestones in Genetic Engineering

14.3 Molecular Tools Used in Genetic Engineering and Their Applications

14.4 Nucleic Acid Purification, Yield Analysis

14.5 Nucleic Acid Amplification and its Applications

14.6 Gene Cloning Vectors

14.7 Restriction Mapping of DNA Fragments and Map Construction; Nucleic Acid Sequencing

14.8 cDNA Synthesis and Cloning

14.9 Alternative Strategies of Gene Cloning

14.10 Site-directed Mutagenesis and Protein Engineering

14.11 How to Study Gene Regulation?

14.12 Expression Strategies for Heterologous Genes

14.13 Processing of Recombinant Proteins

14.14 Phage Display

14.15 T-DNA and Transposon Tagging

14.16 Transgenic and Gene Knockout Technologies

14.17 Gene Therapy

15. Plant Biotechnology

15.1 Conventional Plant Breeding

15.2 Cell and Tissue Culture

15.3 Tissue Culture Media

15.4 Isolation and Maintenance of Callus and Suspension Cultures

15.5 Organogenesis and Somatic Embryogenesis

15.6 Shoot-tip Culture, Clonal Propagation and Production of Virus-free Plants

15.7 Embryo Culture and Embryo Rescue

15.8 Protoplast Isolation, Culture and Fusion

15.9 Anther, Pollen and Ovary Culture for Production of Haploid and Homozygous Lines

15.10 Cryopreservation, DNA Banks and Germplasm Conservation

15.11 Basic Techniques in Recombinant DNA Technology

15.12 Plant Transformation Technology

15.13 Application of Plant Transformation for Productivity and Performance

15.14 Chloroplast Transformation

15.15 Metabolic Engineering and Industrial Products

15.16 Molecular Marker-aided Breeding

15.17 Arid and Semiarid Plant Biotechnology

15.18 Green House and Green Home Technology

16. Genomics and Functional Genomics

16.1 Whole Genome Analysis

16.2 Human Genome Project - Genesis

16.3 Functional Genomics

16.4 Proteome Analysis

17. Bioprocess Engineering and Technology

17.1 Introduction to Bioprocess Engineering and Technology

17.2 The Component Parts of a Fermentation Process

17.3 Material Balance

17.4 Bioreactors

17.5 Kinetics of Microbial Growth

17.6 Heat Transfer

17.7 Dimensional Analysis

17.8 Mass Transfer

17.9 Measurement and Control of Bioprocess Parameters

17.10 Sterilization

17.11 Media Design

17.12 Isolation and Preservation of Industrial Microorganisms

17.13 Downstream Processing

17.14 Whole Cell Immobilization and its Industrial Application

17.15 Industrial Production of Chemicals and Biomolecules

17.16 Mineral Beneficiation and Oil Refinement

17.17 Food Technology

17.18 Enzyme Engineering

18. Environmental Biotechnology

18.1 Environment

18.2 Environmental Pollution

18.3 Air Pollution and its Control through Biotechnology

- 18.4 Global Water Distribution and Need for its Management
- 18.5 Microbiology of Wastewater Treatment: Aerobic Processes
- 18.6 Microbiology of Wastewater Treatment: Anaerobic Processes
- 18.7 Treatment Schemes for Wastewaters from Dairy, Distillery, Tannery, Sugar and Antibiotic Industry
- 18.8 Microbiology of Degradation of Xenobiotics in Environment
- 18.9 Bioremediation of Contaminated Soils and Wasteland
- 18.10 Biopesticides in Integrated Pest Environment
- 18.11 Solid Waste
- 18.12 Global Environmental Problems
- 18.13 Basics of Collecting and Analysis of Environmental Samples
- 18.14 Emerging New Research Areas in Environmental Biotechnology: Bio-Aerosol/Aerobiology
- 18.15 Metagenomics and Environment
- 19. Biostatistics
  - 19.1 Meaning and Scope of Biostatistics
  - 19.2 Visual Presentation of Data
  - 19.3 Summary Measures
  - 19.4 Bivariate Data
  - 19.5 Probability Distribution
  - 19.6 Statistical Inference
  - 19.7 Multivariate Data and Statistical Methods
- 20. Computer Applications
  - 20.1 Introduction of Digital Computers
  - 20.2 Flow Charts and Programming Techniques
  - 20.3 Introduction to Data Structures and Database Concepts
  - 20.4 Introduction to Web and Internet
  - 20.5 Introduction to C and Q Basic Languages
  - 20.6 Microsoft Word: The Word Processing Software
  - 20.7 Microsoft Excel: The Spreadsheet and Presentation Software
  - 20.8 Presentation Graphics Packages
  - 20.9 The PERL Language: Language for Bioinformatics Application
- 21. Bioinformatics
  - 21.1 Introduction
  - 21.2 Biological Databases
  - 21.3 Sequence Comparison
  - 21.4 Multiple Sequence Alignment
  - 21.5 Profiles, Motifs and Feature Identification
  - 21.6 Phylogeny
  - 21.7 Bioinformatics in Genomics

21.8 Rational Drug Design  
21.9 Network Bioinformatics  
21.10 Appendix: Open Source/Freely Available Software for Bioinformatics  
22. Intellectual Property Rights in Biotechnology  
22.1 Introduction  
22.2 Forms of IPR  
22.3 TRIPs and Patent Law  
22.4 Patents in Biotechnology  
22.5 Other Biotech Patents  
22.6 Additional Information Related to Patents in Biotechnology  
22.7 Plant Variety Protection  
22.8 Conclusion  
Important Decisions of the Indian Patent Office Relating to Biotechnology  
23. Biomedical Ethics  
23.1 Introduction  
23.2 International Codes and Declarations  
23.3 Basis of Ethical Principles  
23.4 Codes and Guidelines in India  
23.5 Special Ethical Issues Resulting from the Recent Advances in the Biomedical Field  
Color Section  
Index

---

**To purchase this product, please visit:**

<https://wiley.indiafin.com/textbook-of-biotechnology-5ed.html>



Scan to buy