

# **SHIVAJI UNIVERSITY, KOLHAPUR**



**„A<sup>++</sup>” accredited by NAAC (2022) with CGPA 3.52**

**CHOICE BASED CREDIT SYSTEM WITH MULTIPLE  
ENTRY AND  
MULTIPLE EXIT OPTIONS AS PER NEP-2020**

**SYLLABUS FOR B. Sc. PART - I**

**“FOOD SCIENCE (ENTIRE)”**

**SEMESTER I & II**

**(SYLLABUS TO BE IMPLEMENTED FROM ACADEMIC YEAR 2022-23)**

**B.Sc. Part-I**  
**Food Science (Entire)**  
**SEMESTER I AND II**  
**(Syllabus to be implemented from June, 2022 onwards)**

- Guidelines shall be as per B.Sc. Regular Program
- Rules and Regulations shall be as per B.Sc. Regular Program except CBCSR. B. Sc. 3 Structure of Program and List of Courses.

**Preamble:**

- This syllabus is framed to give out knowledge with understanding of Food Science subject to undergraduate students of B.Sc. Food Science (Entire) Program. Students will learn Food Science as a separate course (Subject) from B.Sc. Part-I.
- The goal of the syllabus is to make the study of Food Science more popular, generate an interest amongst the students about the field and encourage them for higher studies including research.

**Structure of Program and List of Courses are as follows.**

<b>SEMESTER-I (Duration-6 Months)</b>																
Sr. No.	Course (Subject) Title	TEACHINGS CHEME						EXAMINATIONS CHEME								
		THEORY			PRACTICAL			Internal		THEORY				PRACTICAL		
		Credits	No. of lectures	Hours	Credits	No. of lectures	Hours	Max	Mini	Hours	Max	Total Marks	Min	Hours	Max	Min
1	DSC-FS-A1	2	5	4	2	4	3.2	10	4	2	40	80	28	Practical Examination is ANNUAL	50	18
2	DSC-FS-A2	2						10	4	2	40					
3	DSC-FS-A3	2	5	4	2	4	3.2	10	4	2	40	80	28			
4	DSC-FS-A4	2						10	4	2	40					
5	DSC-FS-A5	2	5	4	2	4	3.2	10	4	2	40	80	28			
6	DSC-FS-A6	2						10	4	2	40					
7	DSC-FS-A7	2	5	4	2	4	3.2	10	4	2	40	80	28			
8	DSC-FS-A8	2						10	4	2	40					
9	AECC-A	4	4	3.2	--	----	----	10	4	2	40	50	18	---	---	
10	Sec-I (VBC-I) Compulsory	2	Election, Democracy and Good Governance ( On-line and Self -Study Mode)					----	----	1	50	50	18			
	Total	22	24	19.2	8	16	12.8	---	---		500					
<b>SEMESTER-II(Duration-6Months)</b>																
Sr. No	Course (Subject) Title	TEACHING SCHEME						EXAMINATION SCHEME								
		THEORY			PRACTICAL			Internal		THEORY				PRACTICAL		
		Credits	No. of lectures	Hours	Credits	No. of lectures	Hours	Max	Mini	Hours	Max	Total Marks	Min	Hours	Max	Min
1	DSC-FS-B1	2	5	4	2	4	3.2	10	4	2	40	80	28	As per BOS Guidelines	50	18
2	DSC-FS-B2	2						10	4	2	40					
3	DSC-FS-B3	2	5	4	2	4	3.2	10	4	2	40	80	28			
4	DSC-FS-B4	2						10	4	2	40					
5	DSC-FS-B5	2	5	4	2	4	3.2	10	4	2	40	80	28			
6	DSC-FS-B6	2						10	4	2	40					
7	DSC-FS-B7	2	5	4	2	4	3.2	10	4	2	40	80	28			
8	DSC-FS-B8	2						10	4	2	40					
9	AECC-B	4	4	3.2	--	----	----	10	4	2	40	50	18	---	---	
10	SEC- II (VBC-II) Compulsory)	2	Constitution of India & Local Self Government ( On-line and Self -Study Mode)					---	---	1	50	50	18			
	Total	22	24	19.2	8	16	12.8				500				200	
	<b>GrandTotal</b>	<b>44</b>	<b>48</b>	<b>38.4</b>	<b>16</b>	<b>32</b>	<b>25.6</b>				<b>1000</b>					
	<ul style="list-style-type: none"> <li>Student contact hours per week :32Hours(Min.)</li> </ul>									<ul style="list-style-type: none"> <li>Total Marks for B.Sc.-I(Including English):1200</li> </ul>						
	<ul style="list-style-type: none"> <li>TheoryandPracticalLectures:48MinutesEach</li> </ul>									<ul style="list-style-type: none"> <li>Total Credits for B.Sc.-I(Semester I&amp;II): 60</li> </ul>						
	<ul style="list-style-type: none"> <li>DSC-Discipline Specific Core course: All papers are compulsory.</li> </ul>															
	<ul style="list-style-type: none"> <li>AECC- Ability Enhancement Compulsory Course(A&amp;B)-English</li> </ul>															
	<ul style="list-style-type: none"> <li>Practical Examination will be conducted annually for 50 Marks per course (subject).</li> </ul>															
	<ul style="list-style-type: none"> <li>There shall be separate passing for theory and practical courses.</li> </ul>															
	<ul style="list-style-type: none"> <li>Except English &amp; SEC, there shall be combined passing for two theory papers of 40 marks each, .and minimum 28 marks required for passing out of 80</li> </ul>															
	<ul style="list-style-type: none"> <li>SEC: Skill Enhancement Courses includes Skill Based Courses and Value Based Courses.</li> <li>In case of VBC-I &amp; II there shall be 25 Multiple Choice Questions (MCQ) of 2 marks each and minimum 18 marks are recruited for passing.</li> </ul>															

**CBCS B.Sc. Food Science (Entire): List of courses**

**B.Sc. Food Science Part-I: Semester I &II THEORY**

<b>Course code</b>	<b>Name of Course</b>	<b>Course code</b>	<b>Name of Course</b>
<b>Semester I</b>		<b>Semester II</b>	
<b>DSCFS-A1</b>	Fundamentals of Food Science-I	<b>DSCFS-B1</b>	Fundamentals of Food Analysis-I
<b>DSCFS-A2</b>	Fundamentals of Food Science-II	<b>DSCFS-B2</b>	Fundamentals of Food Analysis-II
<b>DSCFS-A3</b>	Food Chemistry-I	<b>DSCFS-B3</b>	Human Nutrition-I
<b>DSCFS-A4</b>	Food Chemistry-II	<b>DSCFS-B4</b>	Human Nutrition-II
<b>DSCFS-A5</b>	Food Microbiology-I	<b>DSCFS-B5</b>	Food Biochemistry-I
<b>DSCFS-A6</b>	Food Microbiology-II	<b>DSCFS-B6</b>	Food Biochemistry-II
<b>DSCFS-A7</b>	Principles of Food Preservation-I	<b>DSCFS-B7</b>	Food Biotechnology-I
<b>DSCFS-A8</b>	Principles of Food Preservation-II	<b>DSCFS-B8</b>	Food Biotechnology-II
<b>AECC-A</b>	English-I	<b>AECC-B</b>	English-II

**PRACTICAL**

<b>DSCFS-P1</b>	Lab Course I (Based on DSCFS-A1, A2, A3 & A4)	<b>DSCFS-P3</b>	Lab Course III (Based on DSCFS-B1, B2, B3 & B4)
<b>DSCFS-P2</b>	Lab Course II (Based on DSCFS-A5, A6, A7 & A8)	<b>DSCFS-P4</b>	Lab Course IV (Based on DSCFS-B5, B6, B7 & B8)

\*DSCFS: Discipline Specific Core Course Food Science

\*AECC: Ability Enhancement Compulsory Course: Compulsory English

**PROGRAM OUTCOMES**

PO1	Apply the scientific method to food science problems
PO2	Apply critical thinking and analytical evaluation to contemporary food science information and literature.
PO3	Apply principles from general chemistry, microbiology, analysis biotechnology and biochemistry to food science problems.
PO4	To provide knowledge and skills for better preservation techniques, processing and value addition to agricultural products.
PO5	To promote research and development for food product and process and guarantee sanitation and safety of processed food items.
PO6	Utilize advanced instruments and technologies to process and analyze food products and to solve food safety problems.
PO7	Critically access and analyze food science information available in the public domain in an innovative and ethical way.
PO8	Design food products that meet the various food regulations and laws
PO9	Utilize knowledge from the physical and biological sciences as a basis for understanding the role of food and nutrients in health and disease processes.
PO10	Taking roles as researchers, academics, practitioners, or professionals with reliable skills, mastering concepts and theories, and applying and developing food and related sciences.

## **PROGRAM SPECIFIC OUTCOMES**

PSO1	To impart knowledge in various aspects of Food Technology through Theory and Practical knowledge.
PSO2	To impart the knowledge about various compounds such as protein, carbohydrates, lipids amino acids, minerals, vitamins etc associated with the chemical compositions of food, their structures and functions.
PSO3	The students can gain knowledge about some very essential topic of nutrition and its metabolism balance inside the body
PSO4	To make the students familiar with the technologies of food processing and preservation of plant and animal foods, cereals, pulses, oilseeds, fruits vegetables, spices, meat, fish, poultry, sea food, milk and dairy products.
PSO5	To development students understanding and communication skills through various assignments which will enable them to develop skills in writing and effective's interpersonal skills. A presentation in different topics enhances their confidence, ability to express themselves & presentation skills

## COURSE OUTCOME FUNDAMENTALS OF FOOD SCIENCE

CO1	Students will understand the basic concepts in food science and will get knowledge of the different food preparation methods.
CO2	They will understand the requirement of food with respect to energy, food and consumer safety, nutrients and their impact on health.
CO3	They will get the knowledge of nutritive value of cereals, pulses, nuts, fruits and vegetables, ant nutritional factors, germination of pulses, factors affecting cooking
CO4	Students will acquire the knowledge of structure and nutritive value and chemical composition of various foods

### B.Sc. Part I, Semester I

#### DSCFS-A1 FUNDAMENTALS OF FOOD SCIENCE-I

Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48

Unit I	Hours
Introduction to Food and Food Science Functions of food Objectives of Food Science Industrial Aspects of Food Science	15
Unit II	
Classification of food Basic food groups Classification of food according food science Introduction to Food Processing	15

#### Suggested Reading:

1. Food Science by B. Srilakshmi
2. Food Science by Potter
3. Food Processing Technology by P. J. Fellows
4. Food Facts and Principles by Shakuntala Manay

**B.Sc. Part I, Semester I**

**DSCFS-A2 FUNDAMENTALS OF FOOD SCIENCE-II**

Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48

<b>Unit I</b>	<b>Hours</b>
Food preparation and storage Basic terms used in food preparation Pre- preparation of cooking Cleaning, Sorting, Grading, Peeling, Storage of food	15
<b>Unit II</b>	
Methods of cooking Traditional cooking techniques Modern cooking techniques Objectives and importance of cooking	15

**Suggested Reading:**

1. Food Science by B. Srilakshmi
2. Food Science by Potter
3. Food Processing Technology by P. J. Fellows
4. Food Facts and Principles by Shakuntala Manay



## COURSE OUTCOME FOOD CHEMISTRY

CO1	Students will get introduced to Food chemistry and nutrition concept
CO2	Explain properties & reactions of carbohydrates, lipids and proteins during storage and processing of food.
CO3	Explain the importance of water for stability and quality of foods
CO4	Give an overview of the main classes of compounds influencing colour and flavor of food and have knowledge on important sources of vitamins and minerals in food and how these affect other quality aspects of food

### B.Sc. Part I, Semester I DSCFS-A3 FOOD CHEMISTRY-I

Credits 2 (Marks50) Hours30, 37.5 Lectures of 48 minutes

Unit I	Hours
Definition and Introduction to food chemistry <b>Water</b> Water and forms of water Role of water in food Water activity and storage of food <b>Carbohydrates</b> Definition and Classification Structure and Sources Physical and chemical properties	15
Unit II	
<b>Proteins</b> Definition and Classification Structure and Sources Physical and chemical properties <b>Lipids</b> Definition and Classification Structure and Sources Physical and chemical properties	15

#### Suggested Reading:

1. Birch, G. G., Cameron, A. G. and Spencer, M. Food Science, 3rd Ed. Pergamon Press, New York.
2. Fennema, O. R. Ed. Principles of Food Science: Part-I
3. Marcel Dekker, Food Chemistry. New York.
4. Meyer, L. H. Food Chemistry. East-West Press Pvt. Ltd., New Delhi..
5. Potter, N. N. Food Science. 3rd Ed. AVI, Westpor

**B.Sc. Part I, Semester I**  
**DSCFS-A11 FOOD CHEMISTRY-II**

Credits 2 (Marks50) Hours30, 37.5 Lectures of 48 minutes

<b>Unit I</b>	<b>Hours</b>
<b>Minerals</b> Definition and Types of minerals Sources R D A and Deficiency <b>Food Pigments</b> Introduction Classification Characteristics Industrial applications of colors/ pigments in food processing	15
<b>Unit II</b>	
<b>Vitamins</b> Definition and Types of vitamins Sources RDA and deficiency <b>Food flavors</b> Introduction Classification Characteristics Industrial applications of flavors in food processing	15

**Suggested Reading:**

1. Birch, G. G., Cameron, A. G. and Spencer, M. Food Science, 3rd Ed. Pergamon Press, New York.
2. Fennema, O. R. Ed. Principles of Food Science: Part-I
3. Marcel Dekker, Food Chemistry. New York.
4. Meyer, L. H. Food Chemistry. East- West Press Pvt. Ltd., New Delhi..
5. Potter, N. N. Food Science. 3rd Ed. AVI, Westport.

## COURSE OUTCOME FOOD MICROBIOLOGY

CO1	Students will understand the basic concepts in microbiology, principle and working of different instruments used in lab along with its application.
CO2	They will get the knowledge about the how bacteria grows, different factors which affect their growth, different requirements for bacterial growth, different isolation and purification methods used for bacteria
CO3	They will understand the principle and importance of different staining methods used for bacteria.
CO4	They will gain knowledge on different sources, types of bacteria that cause spoilage in food, various changes that occur during spoilage in food depending on their nutrient content.

### B. Sc. Part I, Semester I

#### DSCFS -A12 FOOD MICROBIOLOGY-I

Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes

<b>Unit I</b>	<b>Hours</b>
Introduction to Microbiology Concept of General Microbiology Morphological characteristics of Bacteria, Yeasts and Molds Physical and chemical factors affecting growth of microorganisms	15
<b>Unit II</b>	
Microbial Contamination of Food Introduction of sources of contamination Food Spoilage Food born intoxication Control of microorganisms in food	15

#### **Suggested Reading:**

1. FoodMicrobiology.3rd Edn.VNR, New York. Robinson, R. K. Ed.1983.
2. Dairy Microbiology. Applied Science, London.
3. Branen A. L. and Davidson, P. M. Antimicrobials in Foods. Marcel Dekker, New York

**B. Sc. Part I, Semester I**

**DSCFS –A13 FOOD MICROBIOLOGY-II**

Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes

<b>Unit I</b>	<b>Hours</b>
Microbial Food Fermentation Definition, Microorganisms used in food fermentation Fermented foods Food born disease Food born infection	15
<b>Unit II</b>	
Cultivation of microorganisms Pure culture techniques Methods of isolation and cultivation Enumeration of microorganisms - Qualitative and Quantitative Stains and Staining Techniques	15

**Suggested Reading:**

1. Food Microbiology. 3rd Edn.VNR, New York. Robinson, R. K. Ed. 1983.
2. Dairy Microbiology. Applied Science, London.
3. Branen A. L. and Davidson, P. M. Antimicrobials in Foods. Marcel Dekker, New York.

## COURSE OUTCOME PRINCIPLE OF FOOD PRESERVATION

CO1	They will understand importance of preservatives different methods and its importance.
CO2	Explain the basic principles of food preservation processes: heating, chilling, freezing, control of water activity, acidification, chemical preservatives, packaging, etc.
CO3	Explain the range of processing operations used for food preservation including thermal processing, chilling and freezing, dehydration, irradiation, nonthermal methods, etc
CO4	Explain effects of processing and storage conditions on shelf life of foods

### B. Sc. Part I, Semester I

#### DSCFS - A14 PRINCIPLES OF FOOD PRESERVATION- I

Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes

Unit I	Hours
<b>Food Preservation</b> Introduction to food preservation Concept and importance Common terms used in food preservation <b>Principles of food preservation</b> Prevention or delay microbial decomposition Prevention or delay of self decomposition Methods of preservation	15
<b>Unit II</b>	
<b>Preservation by High temperature</b> Introduction and Classification Pasteurization, Sterilization, UHT, Blanching and Canning <b>Preservation by use of preservatives</b> Classification of Food preservatives Characteristics of preservatives	15

#### Suggested Reading:

1. Arsdel W. B., Copley, M. J. and Morgen, A. I. Food Dehydration, 2nd Edn. (2vol. Set). AVI, Westport.
2. Bender, A. E. Food Processing and Nutrition. Academic Press, London.
3. Fellows, P. and Ellis H. Food Processing Technology: Principles and Practice, New York.

**B. Sc. Part I, Semester I**

**DSCFS - A15 PRINCIPLES OF FOOD PRESERVATION- II**

Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes

Unit I	Hours
<b>Preservation by low temperature</b> History and Concept Methods of low temperature Preservation Advantages and disadvantages <b>Preservation by drying</b> History and Concept Methods of Drying and Dehydration Advantages and disadvantages	15
Unit II	
<b>Preservation by irradiation</b> Concept of irradiation Food irradiation Methods of irradiation Advantages and disadvantages <b>Modern Techniques in Food Preservation</b> Hurdle technology Pulse electric field High Pressure Processing Advantages and disadvantages	15

**Suggested Reading:**

1. Arsdel W. B., Copley, M. J. and Morgen, A. I. Food Dehydration, 2nd Edn. (2vol. Set). AVI, Westport.
2. Bender, A. E. Food Processing and Nutrition. Academic Press, London.
3. Fellows, P. and Ellis H. Food Processing Technology: Principles and Practice, New York.

**B. Sc. Part I, Semester I**  
**AECC-A English-I**  
**Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes**  
**Common Compulsory Paper**

**Module I**

- A) Developing Vocabulary
- B) Technology with a Human Face – E.F. Schumacher
- C) How Beautiful - P. K. Padhy

**Module II**

- A) Narration
- B) As a Flower I Come - by Sundaram

**Module III**

- A. Description
- B. I Have a Dream - Martin Luther King

**Module IV**

- A) The Auspicious Vision- Tagore
- B. The Book - Iftikar Rizvi

## COURSE OUTCOME FUNDAMENTAL OF FOOD ANALYSIS

CO1	Understand the principles of food analysis by conducting various analytical techniques; learn various physical, chemical and biochemical analyses of foods
CO2	To understand how to validate a method to monitor microbiological and/or chemical hazards in food
CO3	They will gain knowledge about panel members, their selection, types and tasks to implement a sampling plan to monitor chemical and microbiological hazards in food.
CO4	They will acquire knowledge about sensory attributes, facilities for sensory evaluation sensory evaluation methods of food.

### **B.Sc. Part I, Semester II DSCFS-B18 FUNDAMENTALS OF FOOD ANALYSIS- I**

Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes

<b>Unit I</b>	<b>Hours</b>
Introduction and Objectives of Food Analysis Need of quality control and quality assurance Principles and functions of quality control Quality attributes of food	15
<b>Unit II</b>	
Sampling of Food Types of samples Methods of food sampling Proximate analysis of Food	15

#### **Suggested Reading:**

1. Aurand, L. W. and Woods, A. E. Food Chemistry. AVI, Westport.
2. Birch, G. G., Cameron, A.G. and Spencer, M. Food Science, 3rd Ed. Pergamon Press, New York.
3. Fennema, O. R. Ed. Principles of Food Science: Part-I Food Chemistry.
4. S. Suzanne Nielsen. Food Analysis– Google Book edited.



## **B.Sc. Part I, Semester II**

### **DSCFS-B19 FUNDAMENTALS OF FOOD ANALYSIS- II**

Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes

<b>Unit I</b>	<b>Hours</b>
Sensory analysis of Food Human Senses Methods of Sensory Analysis Shelf life of food	15
<b>Unit II</b>	
Food Adulteration Types of adulterants Methods of detecting adulterants in food	15

#### **Suggested Reading:**

1. Aurand, L. W. and Woods, A. E. Food Chemistry. AVI, Westport.
2. Birch, G. G., Cameron, A. G. and Spencer, M. Food Science, 3rd Ed. Pergamon Press, New York.
3. Fennema, O. R. Ed. Principles of Food Science: Part-I Food Chemistry.
4. S. Suzanne Nielsen. Food Analysis– Google Book edited

## COURSE OUTCOME HUMAN NUTRITION

CO1	They will acquire knowledge about basics of nutrition, balanced diet, vitamins and minerals-
CO2	Educate others about holistic Nutrition, life style, wellness and healthy living Familiarize nutritional assessment, RDA and Recommendations & Guidelines
CO3	Gain knowledge on changes during various stages of growth and development throughout life cycle
CO4	Understand the basic principles of diet and diet therapy, acquire the knowledge of modifications of normal diet for therapeutic purposes.

### B. Sc. Part I, Semester II DSCFS-B 20 HUMAN NUTRITION – I

Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes

Unit I	Hours
Introduction to Nutrition Menu Planning and Balance Diet Food Pyramid and Food Groups Nutritional and Food Requirements of Adults	15
<b>Unit II</b>	
Nutritional and Food Requirements for Infants Food Requirements for Low Birth Weight and Preterm Baby Weaning foods Nutritional and Food Requirements for Preschool and School going Children Feeding Programmes and School Lunch Programmes	15

#### **Suggested Reading:**

1. B. Srilakshmi. Dietetics, Revised Fifth Edition, New Age International Publishers
2. B. Srilakshmi. Nutrition Science, Third Edition, New Age International Publishers
3. Dr. M. Swaminathan. Advanced Textbook on Food and Nutrition, Second Edition, BAPPCO Publication.

**B.Sc. Part I, Semester II**  
**DSCFS-B 21 HUMAN NUTRITION- II**

Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes

<b>Unit I</b>	<b>Hours</b>
Nutritional and Food Requirements during Adolescence Food Habits and Nutritional Problems Nutritional and Food Requirements for Expectant Mothers Pre-conceptual Nutrition	15
<b>Unit II</b>	
Nutritional and Food Requirements for Lactating Women Nutritional and Food Requirements during Old Age Process of Ageing and Degenerative Diseases Nutritional and Food Requirements for Athlete	15

**Suggested Reading:**

1. B. Srilakshmi. Dietetics, Revised Fifth Edition, New Age International Publishers
2. B. Srilakshmi. Nutrition Science, Third Edition, New Age International Publishers
3. Dr. M. Swaminathan. Advanced Textbook on Food and Nutrition, Second Edition, BAPPCO Publication

## COURSE OUTCOME FOOD BIOCHEMISTRY

CO1	Understand the concepts of metabolism
CO2	Describe the Metabolism of carbohydrates, lipids and its regulation
CO3	Describe the metabolism of amino acids, nucleic acids and its regulation
CO4	Describe the metabolism of secondary metabolites

### B. Sc. Part I , Semester II DSCFS - B 22 FOOD BIOCHEMISTRY – I

Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes

Unit I	Hours
Introduction to metabolism Catabolism Metabolism Methods to study metabolism Metabolism of Carbohydrates Digestion and Absorption of Carbohydrates	15
Unit II	
Basics of Metabolic Pathways Glycolysis Kreb'scycle Electron Transport Chain Gluconeogenesis Glycogen metabolism Gluconeogenesis HMP pathway Galactose metabolism Fructose metabolism	15

#### Suggested Reading:

1. U Satyanaraynaa and U. Chakrapani. Biochemistry
2. Dr. A. C. Deb Fundamentals of Biochemistry
3. J. L. Jain. Fundamentals of Biochemistry
4. D. L. Nelson and M. M. Cox. Lehninger's Principles of Biochemistry

**B.Sc. Part I, Semester II**  
**DSCFS-B 23 FOOD BIOCHEMISTRY – II**

Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes

<b>Unit I</b>	<b>Hours</b>
Lipid metabolism Digestion and absorption of Lipids Oxidation of fatty acids Ketone bodies Lipoproteins Adipose tissue	15
<b>Unit II</b>	
Protein metabolism Digestion and absorption of proteins Transamination Deamination Ureacycle	15

**Suggested Reading:**

1. U Satyanarayana and U. Chakrapani. Biochemistry
2. Dr. A. C. Deb Fundamentals of Biochemistry
3. J. L. Jain. Fundamentals of Biochemistry
5. D. L. Nelson and M. M. Cox. Lehninger's Principles of Biochemistry

## COURSE OUTCOME FOOD BIOTECHNOLOGY

CO1	To understand the steps involved in recombinant DNA technology.
CO2	To understand principles of animal culture, media preparation
CO3	The objectives of this course are to introduce students to the principles, practices and applications of plant biotechnology, plant tissue culture, plant genomics, genetic transformation and molecular breeding of plants.
CO4	To get insight in Primary and Secondary organs of Immune system, learn about structural features of components of immune system as well as their function, development of immune system and mechanisms by which our body elicits immune response.

### B.Sc. Part I, Semester II DSCFS- B 24 FOOD BIOTECHNOLOGY – I

Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes

Unit I	Hours
Introduction and Concept of Food Biotechnology Cell Biology and Genetics Bioprocess and Biochemical Engineering Genetics & Molecular Biotechnology Recombinant DNA Technology	15
Unit II	
Historical perspectives and application of plant tissue culture Method of plant tissue culture: Formulation of medium explants collection Surface sterilization, Inoculation, Callus Induction Sub culture and regeneration of plants	15

#### **Suggested Reading:**

1. H. K. Das. Text Book of Biotechnology (Wiley Publications)
2. H. J. Rehm and G. Reed. Biotechnology. VI H Publications, Germany
3. P. K. Gupta Introduction to Biotechnology
4. W. Barz, E. Reinhard, M. H. Zenk Plant Tissue Culture and its Biotechnological Application

**B.Sc. Part I, Semester II**  
**DSCFS- B 25 FOOD BIOTECHNOLOGY- II**

Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48minutes

<b>Unit I</b>	<b>Hours</b>
Historical perspectives and application of animal tissue culture Explants- Culture of explants Cell culture technique: Initiation, Preparation and sterilization of media, Isolation of explants, Disaggregation of explants Culture and Subculture	15
<b>Unit II</b>	
Immunology Introduction to immune system Organs and cells of immune system Types of Immunity (Innate and Acquired) Antigens and characteristics	15

**Suggested Reading:**

1. S. Janarthanan and S. Vincent. Practical Biotechnology– Methods and Protocols (Universities Press)
2. Terence Gartoright. Animal Cells as Bioreactors. Cambridge Univ Press
3. Chinnarayappa Molecular Biotechnology (Universities Press)
4. Sudha Gangal. Principles and Practice of Animal Tissue Culture-By (Universities Press)

**B. Sc. Part I, Semester II**

**AECC-B English-II**

Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes

**Module V**

- A) Telephonic Communication
- B) Lost Forest - Johannes Jensen
- C) Stopping by Woods - Robert Frost

**Module VI**

- A) English for Specific Purposes
- B) Putting Data to Effective Use - Satish Tripathi

**Module VII**

- A) English for Advertising
- B) An Epithet- W.H.Davies

**Module VIII**

- A) The Golden Touch -Nathaniel Hawthorne
- B) Offering in the Temple -Desika Vinayakam Pillai



**NATURE OF QUESTION PAPER FOR B.Sc. PART – I, (40 + 10 PATTERN) ACCORDING TO  
REVISED STRUCTURE AS PER NEP – 2020 TO BE IMPLEMENTED FROM ACADEMIC  
YEAR 2022-23**

**Maximum Marks: 40**

**Duration: 2 hrs**

**Q. 1 Select the most correct alternate from the following [8]**

**i) to viii) MCQ one mark each with four options**

- A)
- B)
- C)
- D)

**Q.2 Attempt any TWO of the following [16]**

- A)
- B)
- C)

**Q. 3 Attempt any FOUR of the following [16]**

- a)
- b)
- c)
- d)
- e)
- f)

## PRACTICAL

<b>DSCFS-P1</b>	Lab Course I (Based on DSCFS-A1 and A2)	<b>DSCFS-P5</b>	Lab Course V (Based on DSCFS-B1 and B2)
<b>DSCFS-P2</b>	Lab Course II (Based on DSCFS-A3 and A4)	<b>DSCFS-P6</b>	Lab Course VI (Based on DSCFS-B3 and B4)
<b>DSCFS-P3</b>	Lab Course III (Based on DSCFS-A5 and A6)	<b>DSCFS-P7</b>	Lab Course VII (Based on DSC FS-B5 and B6)
<b>DSCFS-P4</b>	Lab Course IV (Based on DSCFS-A7 and A8)	<b>DSCFS-P8</b>	Lab Course VIII (Based on DSCFS-B7 and B8)

### Laboratory course

#### DSCFS-A1 and A2 Fundamentals of food science

1. Study of cereals
2. Study of pulses
3. Study of fruits
4. Study of vegetables
5. Study of milk & milk products
6. Study of meat, fish, poultry
7. Study of pre-preparation of cooking
8. Study of methods of cooking

#### DSCFS-A3 and A4 Food chemistry

1. Determination of moisture content in food
2. Estimation of protein
3. Natural acidity of milk
4. Pectin strength of different fruits extract
5. Acid value of fats and oils
6. Effect of sugar on boiling point of water
7. Smoke point of fats and oils
8. Effect of browning of fruits and vegetables

### **DSCFS-A5 and A6 Food microbiology**

1. Study of compound microscope
2. Study of lab equipments
3. Study of components used for culture media
4. Peptone water
5. Preparation of general purpose media
6. Preparation of selective and differential media
7. Preparation of culture medium for yeast, mould and fungi
8. Isolation of microorganisms from air
9. Isolation of microorganisms from soil
10. Study of skin microflor

### **DSCFS-A7 and A8 Fundamentals of food preservation**

1. Study of different equipments
2. Blanching of vegetables
3. Aonla pickle
4. Drying and dehydration of fruits
5. Drying and dehydration of vegetables
6. Canning of fruits and vegetables
7. Study of dryers
8. Preparation of RTS

### **DSCFS-B1 and B2 Food analysis**

1. Study of laboratory equipments
2. Determination of moisture content
3. Determination of fat by soxhlet method
4. Determination of gluten content
5. Alcoholic acidity of flour
6. GSM of packaging material
7. Estimation of crude fiber
8. Determination of ash content
9. To study methods of studying adultrants

### **DSCFS-B3 and B4 Human nutrition**

1. Calculation of BMR and body surface area
2. Calculation of energy value of food
3. Preparation of balance diet
4. Anthropometric measurements
5. Role of various national and international agencies in field of human nutrition
6. . Nutritional labeling of food products
7. Diet for specific health condition
8. Planning of protein rich diet
9. Planning of mid-day meal for pre-school children
10. To plan low cost recipe for lactating women

### **DSC FS-B5 and B6 Food biochemistry**

1. Effect of saliva amylase
  - a. Effect of temperature
  - b. Effect of pH
  - c. Effect of salinity
2. Retention of carbohydrates
  - a. Glucose
  - b. Fructose
  - c. Sucrose
3. Detection of protein
4. Estimation of protein
5. Estimation of lipid

### **DSCFS-B7 and B8 Food Biotechnology**

1. Isolation and Preservation of industrially important Microorganisms.
2. Stabilization of strains of microorganisms useful in fermentation.
3. Scale up kinetic studies in different fermentation processes.
4. Isolation of DNA from bacterial cell.
5. Transformation in E.coli
6. Alcohol production
7. Organic acid production and purification
8. Agarose gel electrophoresis
9. SDS-PAGE
- 10.** Column chromatography