SHIVAJI UNIVERSITY, KOLHAPUR

Estd. in 1962
'A^{++}' Accredited by NAAC (2021) with CGPA 3.52

CHOICE BASED CREDIT SYSTEM

Syllabus For

B.Sc. Part - I

Food Science (Entire)

SEMESTER I AND II

(Syllabus to be implemented from June-2021)

B.Sc. Part - I

Food Science (Entire)

SEMESTER I AND II

(Syllabus to be implemented from June, 2021 onwards)

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

  This syllabus is framed to give sound knowledge with understandingof 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.

(i) Structure of B. Sc. Food Science (Entire) Program [Semester I & II]

Structure – I

Sr. No.	Course (Subject) Title	TEACHING SCHEME						EXAMINATION SCHEME						
		THEORY				PRACTICAL			THEORY				PRACTICAL	
		Credits	No. of lectures	Hours		Credits	No. of lectures	Hours	Hours	Max	Total Marks	Min	Hours	Max	Min
S E M E S T E R – I (Duration – 6 Months)															
1	DSC-FS-A1	**2**	5	4		**2**	4	**3.2**	2	50	**100**	**35**	**Practical Examination is ANNUAL**	**50**	**18**
2	DSC-FS-A2	**2**							2	50					
3	DSC-FS-A3	**2**	5	4		**2**	4	**3.2**	2	50	**100**	**35**			
4	DSC-FS-A4	**2**							2	50					
5	DSC-FS-A5	**2**	5	4		**2**	4	**3.2**	2	50	**100**	**35**		**50**	**18**
6	DSC-FS-A6	**2**							2	50					
7	DSC-FS-A7	**2**	5	4		**2**	4	**3.2**	2	50	**100**	**35**			
8	DSC-FS-A8	**2**							2	50					
9	AECC-A	**2**	4	3.2		-----	-----	-----	2	50	**50**	**18**		---	---
	Total	**18**	**24**	**19.2**		**8**	**16**	**12.8**			**450**				
S E M E S T E R – II (Duration – 6 Months)															
1	DSC-FS-B1	**2**	5	4		**2**	4	**3.2**	2	50	**100**	**35**	**As per BOS Guidelines**	**50**	**18**
2	DSC-FS-B2	**2**							2	50					
3	DSC-FS-B3	**2**	5	4		**2**	4	**3.2**	2	50	**100**	**35**			
4	DSC-FS-B4	**2**							2	50					
5	DSC-FS-B5	**2**	5	4		**2**	4	**3.2**	2	50	**100**	**35**		**50**	**18**
6	DSC-FS-B6	**2**							2	50					
7	DSC-FS-B7	**2**	5	4		**2**	4	**3.2**	2	50	**100**	**35**			
8	DSC-FS-B8	**2**							2	50					
9	AECC-B	**2**	4	3.2		-----	-----	-----	2	50	**50**	**18**		---	---
	Total	**18**	**24**	**19.2**		**8**	**16**	**12.8**			**450**			**200**	
	Grand Total		**48**	**38.4**			**32**	**25.6**			**900**				

- Student contact hours per week : 32 Hours (Min.)
- Theory and Practical Lectures : 48 Minutes Each
- Total Marks for B.Sc.-I (Including English) : **1100**
- Total Credits for B.Sc.-I (Semester I & II) :
- **DSC –** Discipline Specific Core course: All papers are compulsory.
- **AECC** – Ability Enhancement Compulsory Course (A & B)- English
- Practical Examination will be conducted annually for 50 Marks per course (subject).
- ***There shall be separate passing for theory and practical courses.***

(A) Non-Credit Self Study Course : Compulsory Civic Courses (CCC)
For Sem I: CCC – I : Democracy, Elections and Good Governance

(B) Non-Credit Self Study Course : Skill Development Courses (SDC)
For Sem II: SDC – I : Any one from following (i) to (v)
i) Business Communication & Presentation ii) Event management iii) Personality Development,
iv) Yoga & Physical Management v) Resume, Report & Proposal writing

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

B. Sc Food Science Part-I (Semester I & II)

THEORY

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

PRACTICAL

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

*DSC FS: Discipline Specific Core Course Food Science

*AECC: Ability Enhancement Compulsory Course: Compulsory English

(ii) Structure of B. Sc. Food Science (Entire)Program [Semester III & IV]

Structure – II

Sr. No.	Course (Subject) Title	TEACHING SCHEME						EXAMINATION SCHEME						
		THEORY			PRACTICAL			THEORY				PRACTICAL		
		Credits	No. of lectures	Hours	Credits	No. of lectures	Hours	Hours	Max	Total Marks	Min	Hours	Max	Min
S E M E S T E R – III (Duration – 6 Months)														
1	DSC-FS-C1	**2**	3	2.4	4	8	6.4	2	50	**100**	**35**	**Practical Examination is ANNUAL**	**50**	**18**
2	DSC-FS-C2	**2**	3	2.4				2	50					
3	DSC-FS-C3	**2**	3	2.4	4	8	6.4	2	50	**100**	**35**		**50**	**18**
4	DSC-FS-C4	**2**	3	2.4				2	50					
5	DSC-FS-C5	**2**	3	2.4	4	8	6.4	2	50	**100**	**35**		**50**	**18**
6	DSC-FS-C6	**2**	3	2.4				2	50					
7	AECC-C	**4**	4	3.2	---	---	---	---	---	---	---		---	---
	TOTAL	**16**	**22**	**17.6**	**12**	**24**	**19.2**			**300**	---		---	---
S E M E S T E R – IV (Duration – 6 Months)														
1	DSC-FS-D1	**2**	3	2.4	4	8	6.4	2	50	**100**	**35**	**As per BOS Guidelines**	**50**	**18**
2	DSC-FS-D2	**2**	3	2.4				2	50					
3	DSC-FS-D3	**2**	3	2.4	4	8	6.4	2	50	**100**	**35**		**50**	**18**
4	DSC-FS-D4	**2**	3	2.4				2	50					
5	DSC-FS-D5	**2**	3	2.4	4	8	6.4	2	50	**100**	**35**		**50**	**18**
6	DSC-FS-D6	**2**	3	2.4				2	50					
7	AECC- C AECC- D	---	---	---	---	---	---	3	70 30	**100**	**25** **10**		---	---
	TOTAL	**12**	**18**	**14.4**	**12**	**24**	**19.2**			**400**	---		---	---
			40	**32**		**48**	**38.4**			**700**	--		**300**	

- Student contact hours per week : 32 Hours (Min.)
- Total Marks for B.Sc.-II (Including EVS) **1000**
- Theory and Practical Lectures : 48 Minutes Each
- Total Credits for B.Sc.-II (Semester III & IV) :
- **DSC : -** Discipline Specific Core Course : All papers are compulsory.
- **AECC**- Ability Enhancement Compulsory Course (C) : Environmental Studies: EVS (Theory – 70 & Project – 30 Marks)
- Practical Examination will be conducted annually for100 Marks per course (subject).
- ***There shall be separate passing for theory and practical courses also for Environmental Studies.***

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

B. Sc Food Science Part-II (Semester III & IV)

THEORY

Course code	Name of Course	Course code	Name of Course
Semester-III		**Semester-IV**	
DSC FS-C1	Cereal and Bakery Product Processing-I	**DSC FS-D1**	Milk and Milk Product Processing-I
DSC FS-C2	Cereal and Bakery Product Processing-II	**DSC FS-D2**	Milk and Milk Product Processing-II
DSC FS-C3	Legume and Oilseed Processing-I	**DSC FS-D3**	Meat, Fish and Poultry Processing-I
DSC FS-C4	Legume and Oilseed Processing-II	**DSC FS-D4**	Meat, Fish and Poultry Processing-II
DSC FS-C5	Fruits and Vegetable Processing-I	**DSC FS-D5**	Spices and Condiments Processing-I
DSC FS-C6	Fruits and Vegetable Processing-II	**DSC FS-D6**	Spices and Condiments Processing-II
AECC-C	Environmental Studies (Theory)	**AECC-D**	Environmental Studies (Project)

PRACTICAL

DSC FS-P9	Lab Course IX (Based on DSC FS-C1 and DSC FS-C2)
DSC FS-P10	Lab Course X (Based on DSC FS-C3 and DSC FS-C4)
DSC FS-P11	Lab Course XI (Based on DSC FS-C5 and DSC FS-C6)
DSC FS-P12	Lab Course XII (Based on DSC FS-D1 and DSC FS-D2)
DSC FS-P13	Lab Course XIII (Based on DSC FS-D3 and DSC FS-D4)
DSC FS-P14	Lab Course XIV (Based on DSC FS-D5 and DSC FS-D6)

*DSC FS: Discipline Specific Core Course Food Science

*AECC: Ability Enhancement Compulsory Course: Environmental Studies

(iii) Structure of B. Sc. Food Science (Entire)Program [Semester V & VI]

Structure – III

S E M E S T E R – V (Duration – 6 Months)																	
Sr. No.	**Subject Title**	**TEACHING SCHEME**							**EXAMINATION SCHEME**								
		THEORY				**PRACTICAL**				**THEORY**				**PRACTICAL**			
		Credits	**No. of lectures**	**Hours**		**Credits**	**No. of lectures**	**Hours**	**Hours**	**Theory**	**Internal**	**Min Marks**		**Hours**	**Max Marks**	**Min Marks**	
1	DSE-FS-E1	**2**	3	2.4		**2**	**5**	**4**	2	40	10	**14+4=18**		**Practical Examination is ANNUAL**	**50**	**18**	
2	DSE-FS-E2	**2**	3	2.4		**2**	**5**	**4**	2	40	10	**14+4=18**					
3	DSE-FS–E3	**2**	3	2.4		---	---	---	2	40	10	**14+4=18**			---	---	
4	DSE-FS–E4	**2**	3	2.4		---	---	---	2	40	10	**14+4=18**			---	---	
5	AECC-E	**2**	4	3.2		---	---	---	2	40	10	**14+4=18**			---	---	
6	Project -I	---	---	---		**4**	**10**	**8**	---	---	---	---			**50**	**18**	
	TOTAL	**10**	**16**	**12.8**		**8**	**20**	**16**		**200**	**50**	---					
S E M E S T E R – VI (Duration – 6 Months)																	
1	DSE-FS–F1	**2**	3	2.4		**2**	**5**	**4**	2	40	10	**14+4=18**		**As per BOS Guidelines**	**50**	**18**	
2	DSE-FS–F2	**2**	3	2.4		**2**	**5**	**4**	2	40	10	**14+4=18**					
3	DSE-FS–F3	**2**	3	2.4		---	---	---	2	40	10	**14+4=18**			---	---	
4	DSE-FS–F4	**2**	3	2.4		---	---	---	2	40	10	**14+4=18**			---	---	
5	AECC-F	**2**	4	3.2		---	---	---	2	40	10	**14+4=18**			---	---	
6	Project-II	---	---	---		**4**	**10**	**8**	---	---	---	---			**50**	**18**	
TOTAL		**10**	**16**	**12.8**		**8**	**20**	**16**		**200**	**50**	---					
GRAND TOTAL			**32**	**25.6**			**40**	**32**		**400**	**100**	**--**			**200**		

- Student contact hours per week : 32 Hours (Min)
- Total Marks for B.Sc.-III (Including English) : 7**00**
- Theory and Practical Lectures : 48 Min. Each
- Total Credits for B.Sc.-III (Semester V & VI) :
- **DSE**- Discipline Specific Elective : All papers are compulsory.
- **AECC**- Ability Enhancement Compulsory Course (E & F) : English
- Practical Examination will be conducted annually for 200 Marks.
- ***There shall be separate passing for theory, internal and practical.***

(A) Non-Credit Self Study Course : Compulsory Civic Courses (CCC)For Sem V: CCC – II
: Constitution of India and Local Self Government

(B) Non-Credit Self Study Course : Skill Development Courses (SDC)
For Sem VI: SDC – II: Any one from following (vi) to (x)
vi) Interview & Personal Presentation Skill, vii) Entrepreneurship Development Skill, viii) Travel & Tourism,
ix) E-Banking & Financial Services, x) RTI & Human Right Education (HRE), IPR & Patents

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

B. Sc Food Science Part-III (Semester V & VI)

THEORY

Course code	Name of Course	Course code	Name of Course
Semester-V		**Semester-VI**	
DSE FS-E1	Principles of Food Packaging	**DSEFS-F1**	Food Additives
DSE FS-E2	Snack Food Processing	**DSE FS-F2**	Sugar and Confectionery Processing
DSE FS-E3	Food Safety Management System	**DSE FS-F3**	Food Business Entrepreneurship
DSE FS-E4	Fundamentals of Research Methodology	**DSE FS-F4**	Fundamentals of New Product Development
AECC-E	English – III	**AECC-F**	English – IV

PRACTICAL

DSE FS-P8	Lab Course VIII (Based on DSE FS-E1 & DSE FS-E2)
DSE FS-P9	Lab Course IX (Project Phase-I)
DSE FS-P10	Lab Course X (Based on DSE FS-F1 & DSE FS-F2)
DSE FS-P11	Lab Course XI (Project Phase-I)

*DSE FS: Discipline Specific Elective Food Science

*AECC: Ability Enhancement Compulsory Course: Compulsory English

B. Sc. Part I, Semester I
DSC FS-A1 Fundamentals of Food Science-I
Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes

Unit I:	**15 Hours**

Introduction to Food and Food Science

Functions of food

Objectives of Food Science

Industrial Aspects of Food Science

Unit II:	**15 Hours**

Classification of food

Basic food groups

Classification of food according food science

Introduction to Food Processing

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

DSC FS-A2 Fundamentals of Food Science-II
Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes

Unit I:	**15 Hours**

Food preparation and storage

Basic terms used in food preparation

Pre - preparation of cooking

Cleaning, Sorting, Grading, Peeling, Storage of food

Unit II:	**15 Hours**

Methods of cooking

Traditional cooking techniques

Modern cooking techniques

Objectives and importance of cooking

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
DSC FS-A3 Food Chemistry-I
Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes

Unit I: **15 Hours**

Definition and Introduction to food chemistry

Water

Water and forms of water

Role of water in food

Water activity and storage of food

Carbohydrates

Definition and Classification

Structure and Sources

Physical and chemical properties

Unit II: **15 Hours**

Proteins

Definition and Classification

Structure and Sources

Physical and chemical properties

Lipids

Definition and Classification

Structure and Sources

Physical and chemical properties

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.

B. Sc. Part I, Semester I
DSC FS-A4 Food Chemistry-II
Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes

Unit I:	**15 Hours**

Minerals

Definition and Types of minerals

Sources

RDA and Deficiency

Food Pigments

Introduction

Classification

Characteristics

Industrial applications of colors/pigments in food processing

Unit II:	**15 Hours**

Vitamins

Definition and Types of vitamins

Sources

RDA and deficiency

Food flavors

Introduction

Classification

Characteristics

Industrial applications of flavors in food processing

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.

B. Sc. Part I, Semester I
DSC FS-A5 Food Microbiology-I
Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes

Unit I:	**15 Hours**

Introduction to Microbiology

Concept of General Microbiology

Morphological characteristics of Bacteria, Yeasts and Molds

Physical and chemical factors affecting growth of microorganisms

Unit II:	**15 Hours**

Microbial Contamination of Food

Introduction of sources of contamination

Food Spoilage

Food born intoxication

Control of microorganisms in food

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.

B. Sc. Part I, Semester I
DSC FS-A6 Food Microbiology-II
Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes

Unit I:	**15 Hours**

Microbial Food Fermentation

Definition, Microorganisms used in food fermentation

Fermented foods

Food born disease

Food born infection

Unit II:	**15 Hours**

Cultivation of microorganisms

Pure culture techniques

Methods of isolation and cultivation

Enumeration of microorganisms - Qualitative and Quantitative

Stains and Staining Techniques

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.

B. Sc. Part I, Semester I
DSC FS-A7 Principles of Food Preservation-I
Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes

Unit I: **15 Hours**

Food Preservation

Introduction to food preservation

Concept and importance

Common terms used in food preservation

Principles of food preservation

Prevention or delay microbial decomposition

Prevention or delay of self decomposition

Methods of preservation

Unit II: **15 Hours**

Preservation by High temperature

Introduction and Classification

Pasteurization, Sterilization, UHT, Blanching and Canning

Preservation by use of preservatives

Classification of Food preservatives

Characteristics of preservatives

Suggested Reading:

1. Arsdel W.B., Copley, M.J. and Morgen, A.I. Food Dehydration, 2nd Edn. (2 vol. 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
DSC FS-A8 Principles of Food Preservation-II
Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes

Unit I: 15 Hours

Preservation by low temperature

History and Concept

Methods of low temperature Preservation

Advantages and disadvantages

Preservation by drying

History and Concept

Methods of Drying and Dehydration

Advantages and disadvantages

Unit II: 15 Hours

Preservation by irradiation

Concept of irradiation

Food irradiation

Methods of irradiation

Advantages and disadvantages

Modern Techniques in Food Preservation

Hurdle technology

Pulse electric field

High Pressure Processing

Advantages and disadvantages

Suggested Reading:

1. Arsdel W.B., Copley, M.J. and Morgen, A.I. Food Dehydration, 2nd Edn. (2 vol. 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

B. Sc. Part I, Semester II
DSC FS-B1 Fundamentals of Food Analysis-I
Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes

Unit I:	**15 Hours**

Introduction and Objectives of Food Analysis

Need of quality control and quality assurance

Principles and functions of quality control

Quality attributes of food

Unit II:	**15 Hours**

Sampling of Food

Types of samples

Methods of food sampling

Proximate analysis of Food

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
DSC FS-B2 Fundamentals of Food Analysis-II
Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes

Unit I:	**15 Hours**

Sensory analysis of Food

Human Senses

Methods of Sensory Analysis

Shelf life of food

Unit II:	**15 Hours**

Food Adulteration

Types of adulterants

Methods of detecting adulterants in food

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
DSC FS-B3 Human Nutrition-I
Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes

Unit I:	**15 Hours**

Introduction to Nutrition

Menu Planning and Balance Diet

Food Pyramid and Food Groups

Nutritional and Food Requirements of Adults

Unit II:	**15 Hours**

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

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 Text book on Food and Nutrition, Second Edition, BAPPCO Publication.

B. Sc. Part I, Semester II
DSC FS-B4 Human Nutrition-II
Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes

Unit I:	**15 Hours**

Nutritional and Food Requirements during Adolescence

Food Habits and Nutritional Problems

Nutritional and Food Requirements for Expectant Mothers

Pre-conceptual Nutrition

Unit II:	**15 Hours**

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

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 Text book on Food and Nutrition, Second Edition, BAPPCO Publication.

B. Sc. Part I, Semester II
DSC FS-B5 Food Biochemistry-I
Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes

Unit I:	**15 Hours**

Introduction to metabolism

Catabolism

Metabolism

Methods to study metabolism

Metabolism of Carbohydrates

Digestion and Absorption of Carbohydrates

Unit II:	**15 Hours**

Basics of Metabolic Pathways

Glycolysis

Kreb's cycle

Electron Transport Chain

Gluconeogenesis

Glycogen metabolism

Gluconeogenesis

HMP pathway

Galactose metabolism

Fructose metabolism

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
DSC FS-B6 Food Biochemistry-II
Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes

Unit I:	**15 Hours**

Lipid metabolism

Digestion and absorption of Lipids

Oxidation of fatty acids

Ketone bodies

Lipoproteins

Adipose tissue

Unit II:	**15 Hours**

Protein metabolism

Digestion and absorption of proteins

Transamination

Deamination

Urea cycle

Suggested Reading:

1. U Satyanaraynaa 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

B. Sc. Part I, Semester II
DSC FS-B7 Food Biotechnology-I
Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes

Unit I:	**15 Hours**

Introduction and Concept of Food Biotechnology

Cell Biology and Genetics

Bioprocess and Biochemical Engineering

Genetics & Molecular Biotechnology

Recombinant DNA Technology

Unit II:	**15 Hours**

Historical perspectives and application of plant tissue culture

Method of plant tissue culture: Formulation of medium explants collection

Surface sterilization, Inoculation, Callus Induction

Subculture and regeneration of plants

Suggested Reading:

1. H. K. Das. Text Book of Biotechnology (Wiley Publications)

2. H. J. Rehm and G. Reed. Biotechnology. VIH Publications, Germany

3. P.K. Gupta Introduction to Biotechnology

4. W. Barz, E. Reinhard, M.H. Zenk Plant Tissue Culture and its Biotechnological Applications

B. Sc. Part I, Semester II
DSC FS-B8 Food Biotechnology-II
Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes

Unit I: 15 Hours

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

Unit II: 15 Hours

Immunology

Introduction to immune system

Organs and cells of immune system

Types of Immunity (Innate and Acquired)

Antigens and characteristics

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

Common Compulsory Paper