

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 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.

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

S E M E S T E R – I (Duration – 6 Months)															
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
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			
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			
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 • 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. • Total Marks for B.Sc.-I (Including English) : 1100 • Total Credits for B.Sc.-I (Semester I & II) :															
(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															

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

S E M E S T E R – III (Duration – 6 Months)																	
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	
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	100	25		---	---	
									30		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
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) : 700						
• 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
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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
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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
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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
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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
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Microbial Food Fermentation

Definition, Microorganisms used in food fermentation

Fermented foods

Food born disease

Food born infection

Unit II:	15 Hours
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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
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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
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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
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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
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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
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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
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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
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Sensory analysis of Food
Human Senses
Methods of Sensory Analysis
Shelf life of food

Unit II:	15 Hours
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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
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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
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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
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Introduction to metabolism
Catabolism
Metabolism
Methods to study metabolism
Metabolism of Carbohydrates
Digestion and Absorption of Carbohydrates

Unit II:	15 Hours
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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 Satyanarayana 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
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Lipid metabolism
Digestion and absorption of Lipids
Oxidation of fatty acids
Ketone bodies
Lipoproteins
Adipose tissue

Unit II:	15 Hours
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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
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Introduction and Concept of Food Biotechnology
Cell Biology and Genetics
Bioprocess and Biochemical Engineering
Genetics & Molecular Biotechnology
Recombinant DNA Technology

Unit II:	15 Hours
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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
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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
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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