

# **SHIVAJI UNIVERSITY, KOLHAPUR.**



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CHOICE BASED CREDIT SYSTEM

Syllabus For

**B.Sc. Part - I**

**Food Technology and Management (Entire)**

**SEMESTER I AND II**

**(Syllabus to be implemented from August, 2022 onwards.)**

**B.Sc. Part - I**  
**Food Technology and Management (Entire)**

**SEMESTER I AND II**

**(Syllabus to be implemented from August, 2022 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 technology and management to undergraduate students of B. Sc. Food technology and Management, (Entire) Program.

Students learn Food technology and Management as a separate course (subject) from B. Sc. I.

The goal of the syllabus is to make the study of Food technology and Management popular, interesting and encouraging students for higher studies including research.

## **B.Sc. (Food Technology and Management)**

### **Program Outcome**

- Utilize knowledge from the physical and biological sciences as a basis for understanding the role of food, nutrients, in food processing and preservation.
- Students will be able to deliver effective presentation of food safety, quality and hygiene to the general public.
- Students will gain ability to function as an individual as well as a member of team.
- Students will understand the impact of Food Science and Technology in society and environmental context for sustainable development.
- Students will be able to carry out Nutritional evaluation of food products and shelf-life.
- Students will develop vertical progression to higher studies.
- Students will be promoted for start-up projects.

### **Program Specific Outcome**

- Increase the employability of women in the food processing sector of Indian economy and this has been accorded priority in policy making.
- Expose the participant to the basic essentials of Food Technology & preservation so that they become capable of independently handling food processing units.
- Students will be able to understand the nutritional side which may help to inculcate the scientific view regarding dietary habits of population.
- Enabling the participants to keep themselves abreast of recent changes in Food Technology and Management.
- Creating necessary awareness amongst students regarding the laws affecting Food Processing and Preservation.
- Inculcating entrepreneurship attitude and self employment attitude in students.

❖ Structure of Program and List of Courses are as follows:

**(i) Structure of B. Sc. Food Technology and Management (Entire)  
Programme Sem I & II**

**Structure – I**

SEMESTER – 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-FTM-A1	2	3	2.25	-	-	-	2	50	50	18	<b>PRACTICAL EXAMINATION IS ANNUAL</b>		
2	DSC-FTM-A2	2	3	2.25	-	-	-	2	50	50	18			
3	DSC-FTM-A3	2	3	2.25	-	-	-	2	50	50	18			
4	DSC-FTM-A4	2	3	2.25	-	-	-	2	50	50	18			
5	DSC-FTM-A5	2	3	2.25				2	50	50	18			
6	DSC-FTM-A6	2	3	2.25	-	-	-	2	50	50	18			
7	AECC-A	2	4	3.0	-----	-----	-----	2	<b>50</b>	50	18			
	Total (A)	<b>14</b>						-	-	<b>350</b>	-			
8	SEC-I	-	-	-	<b>2</b>	<b>4</b>	<b>4</b>							
9	VBC-I				<b>1</b>	<b>2</b>	<b>2</b>							
10	Laboratory Course I	-	-	-	3	8	6.0	-	-	-	-			
11	Laboratory Course II				3	8	6.0	-	-	-	-			

**ii) Structure of B. Sc. Food Technology and Management (Entire)  
Programme Sem III & IV**

**Structure - II**

**S E M E S T E R – II (Duration – 6 Months)**

1	DSC-FTM-B1	2	3	2.25	-	-	-	2	50	50	18			
2	DSC-FTM-B2	2	3	2.25	-	-	-	2	50	50	18			
3	DSC-FTM-B3	2	3	2.25	-	-	-	2	50	50	18			
4	DSC-FTM-B4	2	3	2.25	-	-	-	2	50	50	18			
5	DSC-FTM-B5	2	3	2.25	-	-	-	2	50	50	18			
6	DSC-FTM-B6	2	3	2.25	-	-	-	2	50	50	18			
7	AECC-A	2	4	3.0	-	-	-	2	50	50	18			
	Total (B)	14						-	-	350	-			
8	SEC-II	-	-	-	2	4	4							
9	VBC-II				1	2	2							
10	Laboratory Course I	-	-	-	3	8	6.0					6	100	35
11	Laboratory Course II				3	8	6.0					6	100	35
	Total (A+B)	28			12							-	200	-

• Student contact hours per week: 32 Hours (Min.)

• Total Marks for B.Sc.-I (Excluding English): **900**

• Theory and Practical Lectures: 45 Minutes Each

• Total Credits for B.Sc.-I (Semester I & II): **46**

• **AECC** – Ability Enhancement Compulsory Course (A & B)- English

- **SEC:** Skill Enhancement Course (Vocational Studies): Field Projects/ Internship/ Apprenticeship/
- Community Engagement and Service. Any one from pool of courses. For SEC courses there shall be only practical examination of 50 marks. **VBC:** Value Based Course (NSS/NCC/Sports/Cultural, etc.)

• Practical Examination will be conducted annually for 50 Marks per course (subject).

• **There shall be separate passing for theory and practical courses.**

• **Exit option after Level 5: Students can exit with Certificate Course in Science (with the completion of courses equal to minimum of 46 credits).**

**CBCS B. Sc. Food Technology and Management (Entire): List of courses:****i) B. Sc FTM. Part 1 (Sem I & II)**

Course code	Name of Course	Course code	Name of Course
<b>Sem I</b>		<b>Sem II</b>	
<b>DSC FTM-A1</b>	Food Science-I	<b>DSC FTM-B1</b>	Food Science-II
<b>DSC FTM-A2</b>	Food Preservation-I	<b>DSC FTM-B2</b>	Food Preservation-II
<b>DSC FTM-A3</b>	Human Physiology-I	<b>DSC FTM-B3</b>	Human Physiology-II
<b>DSC FTM-A4</b>	Food Chemistry -I	<b>DSC FTM-B4</b>	Food Chemistry -II
<b>DSC FTM-A5</b>	Food Microbiology -I	<b>DSC FTM-B5</b>	Food Microbiology -II
<b>DSC FTM-A6</b>	Dairy Technology -I	<b>DSC FTM-B6</b>	Dairy Technology -II
<b>AECC – A</b>	English – I	<b>AECC – B</b>	English – II
<b>SEC - I</b>	-	<b>SEC - II</b>	In-plant Training
<b>VBC-I</b>	NSS/NCC/Sports/Cultural, etc.	<b>VBC-II</b>	NSS/NCC/Sports/Cultural, etc.

**Practical**

<b>DSC FTM-P1</b>	Laboratory Course I (Based on DSC FTM-A4, DSC FTM-A5, DSC FTM-B4 and DSC FTM-B5)
<b>DSC FTM-P2</b>	Laboratory Course II (Based on DSC FTM -A2, DSC FTM-B2, DSC FTM-A6 and DSC FTM-B6)

- DSC FTM: - Discipline Specific Core Course Food technology and Management
- AECC: - Ability Enhancement Compulsory Course: Compulsory English
- SEC: - Skill Enhancement Course
- VBC: Value Based Course (NSS/NCC/Sports/Cultural, etc.)

❖ Structure of Program and List of Courses are as follows:

(i) **Structure of B. Sc. Food Technology and Management (Entire),  
Part II, Semester III & IV**

**Structure – II**

<b>S E M E S T E R – III (Duration – 6 Months)</b>														
<b>Sr. No.</b>	<b>Course (Subject) Title</b>	<b>TEACHING SCHEME</b>						<b>EXAMINATION SCHEME</b>						
		<b>THEORY</b>			<b>PRACTICAL</b>			<b>THEORY</b>				<b>PRACTICAL</b>		
		<b>Credits</b>	<b>No. of lectures</b>	<b>Hours</b>	<b>Credits</b>	<b>No. of lectures</b>	<b>Hours</b>	<b>Hours</b>	<b>Max</b>	<b>Total Marks</b>	<b>Min</b>	<b>Hours</b>	<b>Max</b>	<b>Min</b>
1	DSC-FTM-C1	2	3	2.25	-	-	-	2	50	50	18	<b>PRACTICAL EXAMINATION IS ANNUAL</b>		
2	DSC-FTM-C2	2	3	2.25	-	-	-	2	50	50	18			
3	DSC-FTM-C3	2	3	2.25	-	-	-	2	50	50	18			
4	DSC-FTM-C4	2	3	2.25	-	-	-	2	50	50	18			
5	DSC-FTM-C5	2	3	2.25				2	50	50	18			
6	DSC-FTM-C6	2	3	2.25	-	-	-	2	50	50	18			
7	AECC-C	2	4	3.0	-----	-----	-----	2	50	50	18			
	Total (C)	14						-	-	350	-			
8	SEC-III	-	-	-	2	4	4							
9	VBC-III				1	2	2							
10	Laboratory Course III	-	-	-	3	8	6.0	-	-	-	-			
11	Laboratory Course IV				3	8	6.0	-	-	-	-			

**S E M E S T E R – IV (Duration – 6 Months)**

1	DSC-FTM-B1	2	3	2.25	-	-	-	2	50	50	18			
2	DSC-FTM-B2	2	3	2.25	-	-	-	2	50	50	18			
3	DSC-FTM-B3	2	3	2.25	-	-	-	2	50	50	18			
4	DSC-FTM-B4	2	3	2.25	-	-	-	2	50	50	18			
5	DSC-FTM-B5	2	3	2.25	-	-	-	2	50	50	18			
6	DSC-FTM-B6	2	3	2.25	-	-	-	2	50	50	18			
7	AECC-D	2	4	3.0	-	-	-	2	50	50	18			
	Total (D)	14						-	-	350	-			
8	SEC-IV	-	-	-	2	4	4							
9	VBC-IV				1	2	2							
10	Laboratory Course III	-	-	-	3	8	6.0					6	100	35
11	Laboratory Course IV				3	8	6.0					6	100	35
	Total (C+D)	28			12							-	200	-

• Student contact hours per week: 32 Hours (Min.)

• Total Marks for B.Sc.-I (Excluding English): **900**

• Theory and Practical Lectures: 45 Minutes Each

• Total Credits for B.Sc.-I (Semester I & II): **46**

• **AECC** – Ability Enhancement Compulsory Course (A & B)- English

- **SEC:** Skill Enhancement Course (Vocational Studies): Field Projects/ Internship/ Apprenticeship/
- Community Engagement and Service. Any one from pool of courses. For SEC courses there shall be only practical examination of 50 marks. **VBC:** Value Based Course (NSS/NCC/Sports/Cultural, etc.)

• Practical Examination will be conducted annually for 50 Marks per course (subject).

• *There shall be separate passing for theory and practical courses.*

• *Exit option after Level --: Students can exit with \_\_\_\_\_ Course in Science (with the completion of courses equal to minimum of 46 credits).*



**CBCS B. Sc. Food Technology and Management (Entire): List of courses:**

i) B. Sc. (FTM. Part II) (Semester III & IV)

Course code	Name of Course	Course code	Name of Course
<b>Sem I</b>		<b>Sem II</b>	
<b>DSC FTM-C1</b>	Human Nutrition-I	<b>DSC FTM-D1</b>	Human Nutrition -II
<b>DSC FTM-C2</b>	Food Biochemistry -I	<b>DSC FTM-D2</b>	Food Biochemistry -II
<b>DSC FTM-C3</b>	Post-Harvest Technology-I	<b>DSC FTM-D3</b>	Post-Harvest Technology -II
<b>DSC FTM-C4</b>	Processing and Preservation of Fruits and Vegetables -I	<b>DSC FTM-D4</b>	Processing and Preservation of Fruits and Vegetables -II
<b>DSC FTM-C5</b>	Grain Science and Technology-I	<b>DSC FTM-D5</b>	Grain Science and Technology-II
<b>DSC FTM-C6</b>	Food Packaging –I	<b>DSC FTM-D6</b>	Food Packaging –II
<b>AECC – C</b>	Environment Studies (Theory)	<b>AECC – D</b>	Environment Studies (Project)
<b>SEC – III</b>	-	<b>SEC - IV</b>	Internship Training/Field Projects
<b>VBC-III</b>	Sports/Cultural/ NSS/NCC	<b>VBC-IV</b>	Sports/Cultural/NSS/NCC

- DSC FTM: - Discipline Specific Core Course Food technology and Management
- AECC: - Ability Enhancement Compulsory Course: Compulsory English
- SEC: - Skill Enhancement Course
- VBC: Value Based Course (NSS/NCC/Sports/Cultural, etc.)

Practical

<b>DSC FTM-P3</b>	Laboratory Course III (Based on DSC FTM-C1, DSC FTM-D1, DSC FTM-C2 and DSC FTM-D2)
<b>DSC FTM-P4</b>	Laboratory Course IV (Based on DSC FTM-C3 and DSC FTM-D3 and DSC FTM-C4 and DSC FTM-D4)

❖ Structure of Program and List of Courses are as follows:

(i) **Structure of B. Sc. Food Technology and Management (Entire),  
Part III, Semester V & VI**

**Structure – III**

<b>S E M E S T E R – V (Duration – 6 Months)</b>													
<b>Sr. No.</b>	<b>Course (Subject) Title</b>	<b>TEACHING SCHEME</b>						<b>EXAMINATION SCHEME</b>					
		<b>THEORY</b>			<b>PRACTICAL</b>			<b>THEORY</b>				<b>PRACTICAL</b>	
		<b>Credits</b>	<b>No. of lectures</b>	<b>Hours</b>	<b>Credits</b>	<b>No. of lectures</b>	<b>Hours</b>	<b>Hours</b>	<b>Max</b>	<b>Total Marks</b>	<b>Min</b>	<b>Hours</b>	<b>Max</b>
1	DSC-FTM-E1	2	3	2.25	-	-	-	2	50	50	18	<b>PRACTICAL EXAMINATION IS ANNUAL</b>	
2	DSC-FTM-E2	2	3	2.25	-	-	-	2	50	50	18		
3	DSC-FTM-E3	2	3	2.25	-	-	-	2	50	50	18		
4	DSC-FTM-E4	2	3	2.25	-	-	-	2	50	50	18		
5	DSC-FTM-E5	2	3	2.25				2	50	50	18		
6	DSC-FTM-E6	2	3	2.25	-	-	-	2	50	50	18		
7	AECC-E	2	4	3.0	-----	-----	-----	2	50	50	18		
	<b>Total (E)</b>	<b>14</b>						-	-	350	-		
8	SEC-V	-	-	-	2	4	4						
9	VBC-V				1	2	2						
10	Laboratory Course V	-	-	-	3	8	6.0	-	-	-	-		
11	Laboratory Course VI				3	8	6.0	-	-	-	-		
12	Project				3	8	6.0						

**S E M E S T E R – VI (Duration – 6 Months)**

1	DSC-FTM-F1	2	3	2.25	-	-	-	2	50	50	18			
2	DSC-FTM-F2	2	3	2.25	-	-	-	2	50	50	18			
3	DSC-FTM-F3	2	3	2.25	-	-	-	2	50	50	18			
4	DSC-FTM-F4	2	3	2.25	-	-	-	2	50	50	18			
5	DSC-FTM-F5	2	3	2.25	-	-	-	2	50	50	18			
6	DSC-FTM-F6	2	3	2.25	-	-	-	2	50	50	18			
7	AECC-E	2	4	3.0	-	-	-	2	50	50	18			
	Total (F)	14						-	-	350	-			
8	SEC-VI	-	-	-	2	4	4							
9	VBC-VI				1	2	2							
10	Laboratory Course V	-	-	-	3	8	6.0						6	100
11	Laboratory Course VI				3	8	6.0					6	100	35
12	Project				3	8	6.0						100	
	Total (E+F)	28			18							-	300	-

- Student contact hours per week: 32 Hours (Min.)
- Theory and Practical Lectures: 45 Minutes Each
- **AECC** – Ability Enhancement Compulsory Course (E & F)- English
  - **SEC:** Skill Enhancement Course (Vocational Studies): Field Projects/ Internship/ Apprenticeship/ Community Engagement and Service. Any one from pool of courses. For SEC courses there shall be only practical examination of 50 marks. **VBC:** Value Based Course (NSS/NCC/Sports/Cultural, etc.)
- Practical Examination will be conducted annually for 50 Marks per course (subject).
- **There shall be separate passing for theory and practical courses.**
- **Exit option after Level ---: Students can exit with \_\_\_\_\_ Course in Science (with the completion of courses equal to minimum of 52 credits).**
- Total Marks for B.Sc.-I (Excluding English): **1000**
- Total Credits for B.Sc.-I (Semester I & II): **52**

**CBCS B. Sc. Food Technology and Management (Entire): List of courses:**

**i) B. Sc. FTM. Part III (Sem V & VI)**

Course code	Name of Course	Course code	Name of Course
<b>Sem I</b>		<b>Sem II</b>	
<b>DSC FTM-D1</b>	Animal Product Technology-I	<b>DSC FTM-E1</b>	Animal Product Technology -II
<b>DSC FTM-D2</b>	Bakery and Confectionery-I	<b>DSC FTM-E2</b>	Bakery and Confectionery -I
<b>DSC FTM-D3</b>	Beverage Technology -I	<b>DSC FTM-E3</b>	Beverage Technology -II
<b>DSC FTM-D4</b>	Food Quality Control Safety and Waste management-I	<b>DSC FTM-E4</b>	Food Quality Control Safety and Waste management -II
<b>DSC FTM-D5</b>	Therapeutic Nutrition -I	<b>DSC FTM-E5</b>	Therapeutic Nutrition -II
<b>DSC FTM-D6</b>	Industrial Business Management –I	<b>DSC FTM-E6</b>	Industrial Business Management —II
<b>AECC – C</b>	English – III	<b>AECC – D</b>	English – IV
<b>SEC – V</b>	-	<b>SEC - VI</b>	In-plant Training/Field Projects
<b>VBC-V</b>	Sports/Cultural/ NSS/NCC	<b>VBC-VI</b>	Sports/Cultural/NSS/NCC

**Practical**

<b>DSC FTM-P5</b>	Laboratory Course V (Based on DSC FTM-D2, DSC FTM-E2, DSC FTM D3and DSC FTM-E3)
<b>DSC FTM-P6</b>	Laboratory Course VI (Based on DSC FTM-E4 and DSC FTM-F4 and DSC FTM-E5 and DSC FTM-F5)
<b>DSC FTM-P7</b>	<b>Project</b>

- DSC FTM: - Discipline Specific Core Course Food technology and Management
- AECC: - Ability Enhancement Compulsory Course: Compulsory English
- SEC: - Skill Enhancement Course
- VBC: Value Based Course (NSS/NCC/Sports/Cultural, etc.)

❖ **Total Credits year-wise:**

<b>Year</b>	<b>Credits</b>
B. Sc. (FTM) I	46
B. Sc. (FTM) II	46
B. Sc. (FTM) III	52

❖ **Pool of SEC Courses:**

<b>Sr. No.</b>	<b>Name of Qualification</b>	<b>Sector</b>
1	Skill Development	English
2	Resource Management & Sustainable Development	Environment Science
3	Social Media & Digital Communications	Commerce
4	Adolescents Relations & Well-being	Psychology-Arts
5	Entrepreneurship Development Programme	Commerce
6	Modern Office Management	Management
7	Leadership and Personality Development	Commerce
8	Financial Literacy and Banking	Commerce
9	Green-House Technology	Environment Science

**\*Note: Each odd semester will be allotted with SEC course from the above given pool of courses.**

**Course Outcomes- B.Sc. (FTM) Part 1(Sem I)**

Class	Course Code / Course Name	Course Outcome
<b>B.Sc. (FTM) I Semester I CBCS</b>	<b>DSC FTM A1 Food Science I</b>	<p>Understand the food groups and their function</p> <p>Acquire knowledge on different methods of cooking</p> <p>Apply process of different foods</p>
	<b>DSC FTM A-2 Food Preservation I</b>	<p>Gain knowledge about the principles involving food preservation by moisture control, application of heat, removal of heat, fermentation and emerging technologies</p> <p>Distinguish between high &amp; low temperature processing.</p>
	<b>DSC FTM A-3 Human Physiology I</b>	<p>Understand the functions of important physiological systems such as cardiovascular, respiratory, renal, endocrine and digestive systems</p> <p>Relate the structures with functions of tissues &amp; organs</p>
	<b>DSC FTM A-4 Food Chemistry I</b>	<p>To understand reactions of carbohydrates, lipids and proteins during storage and processing of food and how these influence the quality and properties of the food.</p> <p>To understand the importance of water for stability and quality of foods.</p>

<b>Class</b>	<b>Course Code / Course Name</b>	<b>Course Outcome</b>
<b>B.Sc. (FTM) I Semester I CBCS</b>	<b>DSC FTM A-5 Food Microbiology I</b>	<p>Explain types, characteristics and significance of microorganisms</p> <p>Describe the structure and functions of major components of microbial cells</p> <p>Understand the concept of microbial growth, its measurement and growth curves, factors influencing their growth and survival.</p> <p>Discuss various methods of sterilization and disinfection</p>
	<b>DSC FTM A-6 Dairy Technology I</b>	<p>To understand processes involved in production of milk and milk products</p> <p>Understand &amp; apply drying process in manufacturing of dried milks</p>
	<b>AECC-A English</b>	<p>Communicate effectively orally and in writing</p> <p>Use academic writing associated with the communication discipline</p>

**Semester I**  
**FOOD SCIENCE – Paper I**  
**(DSC FTM-A1 – Food Science I)**  
**Credits 2 (Marks 50)**

<b>Unit – I</b>	<b>Hours Alloted</b>
<p><b>Introduction to Food Science</b></p> <ul style="list-style-type: none"> <li>• Definition &amp; Function of food</li> <li>• Basic food groups by ICMR</li> <li>• Food in relation to health</li> <li>• Cooking &amp; Objectives of cooking</li> <li>• Methods of Cooking- Conduction, Convection &amp; radiation</li> <li>• Microwave Cooking</li> <li>• Solar Cooking</li> <li>• Classification of Cooking method- Moist, Dry &amp; Combination methods</li> </ul> <p><b>Food Preparation</b></p> <ul style="list-style-type: none"> <li>• Definition</li> <li>• Preliminary Treatments</li> <li>• Sorting and grading- Extra class, Class I and Class II</li> <li>• Peeling- Steam peeling, Knife peeling, Abrasion peeling, Caustic peeling, Flame peeling</li> </ul> <p><b>Cereals</b></p> <ul style="list-style-type: none"> <li>• Introduction &amp; Definition</li> <li>• Structure</li> <li>• Composition and Nutritive Value of cereals</li> <li>• Important Cereals- Wheat, Rice, Oats, Rye And Barley</li> <li>• Cereals storage techniques- Traditional and modern methods</li> <li>• Cereal protein</li> <li>Effect of cooking on cereals- Gelatinisation and dextrinisation.</li> </ul>	<b>15</b>
<b>Unit – II</b>	
<p><b>Pulses</b></p> <ul style="list-style-type: none"> <li>• Introduction &amp; Definition</li> <li>• Structure</li> <li>• Composition and Nutritive Value</li> </ul>	



<ul style="list-style-type: none"> <li>• Important Pulses-Bengal Gram,Black Gram,Green Gram,Lentil and Cow pea</li> <li>• Processing of pulses</li> <li>• Pulse cookery</li> <li>• Toxic constituents in pulses</li> <li>• Factors affecting cooking quality</li> </ul> <p><b>Nuts</b></p> <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Composition and nutritive value of nuts</li> <li>• Specific nuts- Cashew-nut, Coconut, groundnut, almonds, Chestnut</li> <li>• Toxins in nuts</li> <li>• Role of nuts in cookery</li> </ul> <p><b>Oils and Fats</b></p> <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Nutritional importance of fats and oils</li> <li>• Structure of oil seed</li> <li>• Sources-Groundnut,Rapeseed or mustard, Sesame seeds,Cotton seed and Coconut</li> <li>• Functions of oils and fats in food</li> <li>• Animal fats &amp; plant fats</li> <li>• Role of fats and oils in cookery</li> <li>• Quality assessment of oils and fats</li> </ul>	<p><b>15</b></p>
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**References**

1. N. ShakuntalaManay, M. Shadaksharswamy, (2012), Food Facts & Principles-3rd edition, New age International (P) limited publication
2. B. Srilakshmi, (2018), Food Science-7th edition, New age International (P) limited publication
3. Norman N. Potter, (1999), Food Science-5th edition, Springer
4. Sumati R. Mudambi, (2006), Food Science-7th edition, New age International (P) limited publication
5. P.J.Fellow, (2000) Food Processing Technology- 2<sup>nd</sup> edition, Woodhead publication limited
6. Dr. Abhijit A. Gatade ,(2020 ) A handbook on oil and fat technology, Self published, e-book- Google book

**Semester I**  
**Food Preservation – Paper I**  
**(DSC FTM-A2 – Food Preservation I)**  
**Credits 2 (Marks 50)**

<b>Unit – I</b>	<b>Hours Allotted</b>
<p><b>Fundamentals of Food Preservation</b></p> <ul style="list-style-type: none"> <li>• Introduction &amp; Definition of Food Preservation</li> <li>• Importance &amp; Need of Food Preservation</li> <li>• Principles of Food Preservation</li> <li>• Techniques of Food Preservation</li> </ul> <p><b>Food Spoilage</b></p> <ul style="list-style-type: none"> <li>• Definition and Introduction to Food Spoilage</li> <li>• Types and Causes of Food Spoilage</li> <li>• Physico-chemical changes in Food due to Spoilage</li> <li>• Microbial Spoilage of Food- Yeast, Moulds and Bacteria</li> <li>• Enzymatic spoilage of food</li> <li>• Food spoilage by moisture</li> <li>• Food spoilage by temperature</li> <li>• Food spoilage by oxygen, light and time</li> <li>• Food spoilage by insects, rodents and parasites</li> </ul> <p><b>Control of Access of Micro-organisms</b></p> <ul style="list-style-type: none"> <li>• Asepsis</li> <li>• Filtration &amp; Clarification</li> <li>• Food Hygiene, Sanitation &amp; Disinfection</li> <li>• General Hygiene Practices</li> <li>• Personal Hygiene</li> <li>• Sanitation of Food Processing Equipments</li> </ul>	<b>15</b>
<b>Unit II</b>	
<p><b>Food Preservation by High Temperature</b></p> <ul style="list-style-type: none"> <li>• Concept &amp; Importance</li> <li>• Definition &amp; Principle</li> <li>• Effect of heat on microorganisms</li> </ul>	

<ul style="list-style-type: none"> <li>• Thermal death time</li> <li>• Factors affecting heat resistance</li> <li>• Theory &amp; Equipment</li> <li>• Methods- Boiling, Blanching, Pasteurization, Sterilization, UHT &amp; Canning</li> <li>• Effect of high temperature on food</li> <li>• Advantages &amp; Disadvantages</li> </ul> <p><b>Food Preservation by Low temperature</b></p> <ul style="list-style-type: none"> <li>• Concept &amp; History</li> <li>• Definition &amp; Principle</li> <li>• Effect of cold temperature on microorganisms</li> <li>• Methods of low temperature Preservation- Cellar storage, Refrigeration or Chilling &amp; Freezing</li> <li>• Theory &amp; Equipment</li> <li>• Treatments Prior to Freezing</li> <li>• Effect on food</li> <li>• Advantages &amp; Disadvantages</li> </ul>	<p><b>15</b></p>
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1. Potter (1996) Food science, CBS publication & distribution
2. B. Shrilakshmi (2001) Food Science, New Age International (P) Limited Publication
3. N. Shakuntala Manay, M. Shadaksharswamy (2008) Food Facts & Principles, New Age International (P) Limited Publication
4. G. Subbulakshmi, Shobha A Udipi (2001) Food Processing and Preservation, New Age International (P) Limited Publication
5. P.J. Fellow (2005) Food Processing Technology, Woodhead Publication Pvt Ltd.
6. Virag Gupta Food Safety & Standards Act 2006, Rules 2011, Regulations (2021), Commercial Law Publication (India) Pvt Ltd
7. Norman Desrosier Technology of Food processing (1987), CBS publication & distribution

**Semester I**  
**Human Physiology – Paper I**  
**(DSC FTM-B2 – Human Physiology I)**  
**Credits 2 (Marks 50)**

<b>Unit I</b>	
<p><b>Cells, Tissues and Organization of body</b></p> <ul style="list-style-type: none"> <li>• Structures and functions of cell and cell organelles</li> <li>• Types of Tissues</li> <li>• Different systems of body</li> <li>• Axial Skeleton and Appendicular Skeleton</li> <li>• Cavities of the body</li> </ul> <p><b>Blood</b></p> <ul style="list-style-type: none"> <li>• Composition and functions of Blood</li> <li>• Structure and functions of RBC, WBC and Platelets</li> <li>• ABO and Rh Blood group system</li> </ul> <p style="text-align: center;">Haemostasis</p>	<b>15</b>
<b>Unit II</b>	
<p><b>Respiratory System</b></p> <ul style="list-style-type: none"> <li>• Organs of respiratory system and their functions</li> <li>• Mechanism of respiration</li> <li>• External respiration</li> <li>• Internal respiration</li> <li>• Lung Volumes and capacities</li> </ul> <p><b>Cardiovascular system</b></p> <ul style="list-style-type: none"> <li>• Structure and functions of Heart</li> <li>• Types of blood circulation</li> <li>• Cardiac cycle</li> <li>• Heart Rate Cardiac output Stroke volume</li> <li>• Blood Pressure Methods of determination and Factors affecting Blood pressure</li> </ul>	15

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1. Chatterjee C.C (2003) Human physiology Volume I and II, CBS Publishers and Distributors Pvt. Ltd.
2. Guyton Arthur. C (2003) Textbook of Medical Physiology, Prism Books Pvt. Ltd.

3. Sembulingam, K.(2001) Essentials of Medical Physiology, Jaypee Brothers Medical Publishers Pvt. Ltd.
4. Joshi Vijaya D (2004) Preparation Manual for Undergraduates Physiology, Elsevier
5. Prof.A.K Jain (1998) Textbook of Physiology, Avichal Publisher Company
6. Indu Khurana Arushi (2009) Textbook of Anatomy and Physiology for Nurses and Allied Health Sciences, CBS Publishers and Distributors Pvt. Ltd.

**Semester I**  
**Food Chemistry – Paper I**  
**DSC FTM-A4 – Food Chemistry I**  
**Credits 2 (Marks 50)**

<b>Unit – I</b>	<b>Hours Alloted</b>
<p><b>Water</b></p> <ul style="list-style-type: none"> <li>• Forms of water in food</li> <li>• Functions of water</li> <li>• Water Activity and relative vapor pressure</li> <li>• Role of water activity in storage of food</li> <li>• Sorption Theorem</li> <li>• Water Quality Parameters</li> </ul> <p><b>Carbohydrates</b></p> <ul style="list-style-type: none"> <li>• Definition and Classification</li> <li>• Physical, Chemical and Structural properties of monosaccharides</li> <li>• Dietary fibres</li> <li>• Sources and effect of processing on carbohydrates</li> </ul>	<b>15</b>
<b>Unit II</b>	
<p><b>Lipids</b></p> <ul style="list-style-type: none"> <li>• Types of fatty acids</li> <li>• Physical and chemical properties of fatty acids</li> <li>• Definition and Classification of lipids</li> <li>• Chemical Properties of lipids</li> <li>• Quality tests for Oils/Fats</li> </ul> <p><b>Vitamins</b></p> <ul style="list-style-type: none"> <li>• Definition and functions of Vitamins</li> <li>• Fat Soluble Vitamins-Vitamin A, D, E and K</li> <li>• Water soluble vitamins – B Complex Vitamins and Vitamin C</li> </ul>	<b>15</b>

## **REFERENCES**

1. H.D.Belitz, W.Grosch, P.Schieberle (2009) Food Chemistry, Springer
2. Potter (1996) Food Science, CBS publishers & Distributors Pvt. Ltd.
3. N. Shakuntala Manay, M.Shadaksharswamy(2008) Food Facts & Principles, New Age International (P) Limited
4. John M.DeMan (1999) Principles of Food Chemistry, Springer
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7. Sumati R. Mudambi, Shalini M. Rao, M.V.Rajagopal (2006) Food Science New Age International (P) Limited
8. S.M Reddy (2015) Basic Food Science and Technology, New Age International (P) Limited Publication
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**Semester I**  
**Food Microbiology – Paper I**  
**DSC FTM-A5 – Food Microbiology I**  
**Credits 2 (Marks 50)**

<b>Unit I</b>	<b>Hours Alloted</b>
<p><b>Introduction to Microbiology</b></p> <ul style="list-style-type: none"> <li>• Definition of Microbiology</li> <li>• Important contributions of various scientists</li> <li>• Classification of microorganisms</li> <li>• Morphology of bacteria: Size, Shape, and Arrangements, Definition and Function of Spore.</li> <li>• Cytology of bacteria- the structure of typical bacterial cell, structure, and functions of the cell wall.</li> <li>• Nutritional Requirements-Nutrition, temperature, moisture content, oxygen, osmotic pressure, hydrogen ion concentration, and light</li> <li>• Growth and Growth curve of bacteria.</li> </ul> <p><b>Techniques in microbiology</b></p> <ul style="list-style-type: none"> <li>• Sterilization-Physical methods- Temperature, Filtration, UV radiation, and Osmotic pressure</li> <li>• Chemical methods- Use of chemical agents for sterilization</li> <li>• Definition of Media, Components of Media</li> <li>• Types of media: Natural, Synthetic, Semi-synthetic, Special, Selective, and Differential media</li> <li>• Cultural methods- Isolation techniques: Streak plate, pour plate, and Spread plate.</li> </ul>	<b>15</b>
<b>Unit II</b>	
<p><b>Stains and Staining Procedures of Bacteria</b></p> <ul style="list-style-type: none"> <li>• Definition of dye and stains, classification of stains- Acidic, Basic, and Neutral</li> <li>• Staining procedures: Principles and Procedure</li> <li>• Mechanism and applications of- Simple staining, Differential staining-</li> </ul>	



<p>Gram staining, and Acid fast staining.</p> <ul style="list-style-type: none"> <li>• Mechanism and applications of Negative staining, Special staining</li> </ul> <p><b>Recombinant DNA Technology</b></p> <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Definition of Recombinant DNA Technology/ Genetic Engineering</li> <li>• Enzymes used in Recombinant Technology</li> <li>• Steps in Gene Cloning</li> <li>• Vectors used in Recombinant Technology</li> <li>• Genetically Modified Foods</li> <li>• Advantages &amp; Disadvantages of GM Foods</li> </ul>	<p><b>15</b></p>
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## **REFERENCES**

- 1) R. Ananthanarayan, C.K. Jayram Paniker (2001), Orient Longman Ltd.
- 2) James M. Jay (1987), Modern Food Microbiology, CBS Publishers and Distributors.
- 3) S. P. Narang (2016), Food Microbiology, APH Publishing Corporation.
- 4) Sinha U. (1994), An Introduction to Bacteria, Vikas Puublishing House Pvt. Ltd.
- 5) Bibek Ray, Arun Bhunia (2018) Funtamental Food Microbiology 5<sup>th</sup> Edition, CRC Press.
- 6) Kanika Sharma (2007) Manual of Microbiology Tools and Techniques 2<sup>nd</sup> Edition.
- 7) Dr. G. L. Bhoosreddy, Dr. B.J. Wadher, Dr. A.V. Gomashe, Dr. Mrs. K.V. Dubey (2014) Industrial Microbiology, Himalaya Publishing House.
- 8) Michael Pelczar.Jr. , E.C.S. Chan, Noel R. Krieg (1996) Microbiology, Tata MacGraw Hill Publishing Company Limited, New Delhi.
- 9) S.S. Purohit (2001) Microbiology Fundamentals and Applications 6<sup>th</sup> Edition, Agrobios.
- 10) B.D. Singh (2006), Biotechnology, Kalyani Publishers.
- 11) Dr. M.G. Bodhankar, Mrs. Tripti Bapat, Mrs. N.S. Joshi (2003), Phadke Prakashan.
- 12) R.C. Dubey, A Textbook of Biotechnology, S.Chand Publication.

**Semester I**  
**Dairy Technology – Paper I**  
**DSC FTM-A6 – Dairy Technology I**  
**Credits 2 (Marks 50)**

<b>Unit I</b>	<b>Hours Alloted</b>
<p><b>Market Milk</b></p> <ul style="list-style-type: none"> <li>• Introduction &amp; Definition</li> <li>• Chemical composition &amp; Nutritive value</li> <li>• Factors affecting chemical composition of Milk</li> <li>• Physico-chemical properties of Milk</li> <li>• Milk protein allergy- Lactose intolerance</li> <li>• Microbiology of milk</li> <li>• Preservation of milk and milk products</li> <li>• Processing of milk – RMRD, Pre-heating, Filtration/Clarification, cooling, Standardization, Pasteurization, Homogenization, Packaging and storage</li> <li>• Judging and Grading of Milk</li> <li>• Flavor defects in Milk, their causes and prevention</li> <li>• Adulteration of milk</li> </ul> <p><b>Special Milks</b></p> <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Types of special milks- Definition, Standards, Processing &amp; Uses</li> <li>• Sterilized Milk</li> <li>• Homogenized Milk</li> <li>• Flavored Milk</li> <li>• Fermented Milks- Natural Butter Milk, Cultured Butter Milk, Acidophilus Milk, Bulgarian Butter Milk, Kefir, Kumis &amp; Yoghurt</li> <li>• Reconstituted/Rehydrated Milk</li> <li>• Recombined Milk</li> <li>• Toned Milk &amp; Double Toned Milk</li> <li>• Vitaminized/Irradiated Milk</li> </ul>	<b>15</b>

<b>Unit II</b>	
<p data-bbox="204 185 376 215"><b>Dried Milks</b></p> <ul style="list-style-type: none"> <li data-bbox="264 244 608 273">• Definition &amp; Standards</li> <li data-bbox="264 302 485 331">• Classification</li> <li data-bbox="264 360 608 389">• Chemical Composition</li> <li data-bbox="264 418 632 448">• Food and Nutritive value</li> <li data-bbox="264 477 995 506">• Milk Drying systems- Drum Drying &amp; Spray Drying</li> <li data-bbox="264 535 1182 564">• Manufacturing of Whole Milk Powder &amp; Skimmed Milk Powder</li> <li data-bbox="264 593 584 622">• Packaging &amp; Storage</li> <li data-bbox="264 651 580 680">• Judging and Grading</li> <li data-bbox="264 710 711 739">• Defects- causes and prevention</li> <li data-bbox="264 768 368 797">• Uses</li> </ul> <p data-bbox="204 909 679 938"><b>Condensed and Evaporated Milks</b></p> <ul style="list-style-type: none"> <li data-bbox="264 967 464 996">• Introduction</li> <li data-bbox="264 1025 655 1055">• Definition &amp; Classification</li> <li data-bbox="264 1084 783 1113">• Chemical composition and Standards</li> <li data-bbox="264 1142 632 1171">• Food and Nutritive Value</li> <li data-bbox="264 1200 663 1229">• Physico-chemical properties</li> <li data-bbox="264 1258 951 1288">• Manufacture, Packaging, Storage and Distribution</li> <li data-bbox="264 1317 576 1346">• Judging and Grading</li> <li data-bbox="264 1375 775 1404">• Defects- their causes and prevention</li> <li data-bbox="264 1433 368 1462">• Uses</li> </ul>	<b>15</b>

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1. DeySukumar - Outlines of Dairy Technology. Oxford Univ. Press. New Delhi.- 1997
2. Robinson R. K- Modern Dairy Technology. Elsevier Applied Science UK.- 1994
3. Warner J. M. - Principles of Dairy Processing. Wiley Eastern Ltd. New Delhi.
4. Clarence Henry Eckles. - Milk and Milk Products. Tata MaCrow Hill - 1973
5. D. D. Patange, D.K. Kamble, R.C. Ranveer – A Text Book on Milk and Milk Products. Jaya Publishing House – 2018
6. Dr. Pandurang Gangasagare – Processing of Milk. Agrotech Press – 2016
7. Sudhi Ranjan, Vijay J. Jadhav – Handbook of Quality Control Of Dairy And Meat Product. Biotech Books - 2012

**Course Outcomes- B.Sc. (FTM) Part 1(Sem II)**

Class	Course Code / Course Name	Course Outcome
<p><b>B.Sc. (FTM) I Semester II CBCS</b></p>	<p><b>DSC FTM – B1 Food Science - II</b></p>	<p>Use combination of foods in the development of food products.</p> <p>Identify and control adulterants in various foods &amp; evaluate food quality</p> <p>Gain knowledge of food composition (including major chemical interactions and nutritional factors) in the context of food quality and safety</p>
	<p><b>DSC FTM –B2 Food Preservation- II</b></p>	<p>Focus on various chemical additives &amp; their effect on food products.</p> <p>Explore the principle of preservation in non-thermal processing of food</p>
	<p><b>DSC FTM –B3 Human Physiology - II</b></p>	<p>Understand the functions of important physiological systems such as renal, endocrine and digestive systems</p> <p>Recognise the clinical symptoms of nutritional deficiencies</p>
	<p><b>DSC FTM –B4 Food Chemistry - II</b></p>	<p>To understand the chemistry of additives influencing colour and flavour of food knowledge.</p> <p>To Gain knowledge related to important sources of vitamins and minerals in food and their functions</p>

Class	Course Code / Course Name	Course Outcome
<b>B.Sc. (FTM) I Semester II CBCS</b>	<b>DSC FTM –B5 Food Microbiology - II</b>	<p>Understand the relevance of microbial spoilage of various foods &amp; its intoxications.</p> <p>Provide framework on the concepts of quality control activities</p> <p>Understand the processes &amp; application of fermentation in food industries.</p>
	<b>DSC FTM –B6 Dairy Technology - II</b>	<p>Know about process involved in processing of various fat rich dairy products</p> <p>Provide knowledge regarding commercial production of cheese &amp; ice-creams</p>
	<b>AECC-B English-II</b>	<p>Communicate effectively orally and in writing</p> <p>Use academic writing associated with the communication discipline</p>

**Semester II**  
**FOOD SCIENCE – Paper II**  
**(DSC FTM-B1 – Food Science II)**  
**Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes**

<b>Unit – I</b>	<b>Hours Alloted</b>
<p><b>Fruits</b></p> <ul style="list-style-type: none"> <li>● Introduction</li> <li>● Classification</li> <li>● Composition and Nutritive value of fruits</li> <li>● Ripening of fruits</li> <li>● Post harvest changes and Storage of fruits</li> <li>● Enzymatic and Non- enzymatic browning</li> </ul> <p><b>Vegetables</b></p> <ul style="list-style-type: none"> <li>● Introduction</li> <li>● Classification</li> <li>● Composition and Nutritive value of vegetables</li> <li>● Pigments in vegetables</li> <li>● Salads</li> <li>● Storage of vegetables</li> <li>● Fruits and vegetables as a functional food</li> </ul> <p><b>Spices</b></p> <ul style="list-style-type: none"> <li>● Introduction</li> <li>● General functions of spices</li> <li>● Major Spices-Black pepper, Cardamom, Ginger, chilies and turmeric</li> <li>● Minor spices- Cinnamon, fenugreek, Garlic, Mustard and clove</li> <li>● Adulteration of spices</li> </ul>	<b>15</b>
<b>Unit – II</b>	
<p><b>Sugar and Related products</b></p> <ul style="list-style-type: none"> <li>● Nutritive value</li> <li>● Properties</li> <li>● Sugar related products</li> <li>● Sugar cookery</li> <li>● Artificial sweeteners</li> </ul> <p><b>Effect of Processing</b></p>	<b>15</b>

- Effect of processing on Physical properties of food
- Effect of processing on sensory properties of food
- Effect of processing on nutritional properties of food

**Food Adulteration**

- Definition
- Types of Adulterants
- Methods to detect adulteration

**REFERENCES**

- 1.N. ShakuntalaManay, M. Shadaksharswamy, (2012), Food Facts & Principles-3rd edition , New age International (P) limited publication
2. B. Srilakshmi, (2018), Food Science-7th edition ,New age International (P) limited publication
3. Norman N. Potter, (1999), Food Science-5th edition, Springer
- 4.Sumati R. Mudambi, (2006), Food Science-7th edition,New age International (P) limited publication
5. P.J.Fellow, (2000) Food Processing Technology- 2<sup>nd</sup> edition, Woodhead publication limited



**Semester II**  
**Food Preservation – Paper II**  
**DSC FTM-B2 – Food Preservation II**  
**Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes**

<b>Unit I</b>	
<p><b>Food Preservation by Drying/Dehydration</b></p> <ul style="list-style-type: none"> <li>• Concept &amp; Definition</li> <li>• Underlying Principle</li> <li>• Factors affecting rate of drying</li> <li>• Pretreatments to food before drying</li> <li>• Natural drying- Sun Drying</li> <li>• Artificial Dehydration methods or Types of Dryers- Drum Dryer, Spray Dryer, Tray Dryer, Tunnel Dryer, Vacuum Shelf Dryer, Rotary Dryer, Kiln Dryer, Air lift Dryer, Fluidized Bed Dryer &amp; Freeze Dryer</li> <li>• Theory, Applications &amp; Advantages</li> <li>• Changes in food due to dehydration</li> <li>• Rehydration or Reconstitution</li> </ul> <p><b>Food Preservation by Irradiation</b></p> <ul style="list-style-type: none"> <li>• History, Introduction,</li> <li>• Definition, Principle,</li> <li>• Kinds of Ionizing radiations,</li> <li>• Measurement of radiations,</li> <li>• Mode of action,</li> <li>• Effect of irradiations on Food,</li> <li>• Effect on micro-organisms,</li> <li>• Classification, Applications,</li> <li>• Packaging of irradiated foods,</li> <li>• Safety &amp; Regulations of irradiated foods</li> </ul>	<b>15</b>

<b>Unit II</b>	
<p><b>Recent/Non-destructive methods of Food Preservation</b></p> <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Methods- Theory, Equipment &amp; Applications</li> <li>• Dielectric heating</li> <li>• Ohmic heating</li> <li>• Infrared heating</li> <li>• Pulsed electric field processing</li> <li>• High pressure processing</li> <li>• Ultrasound heating</li> <li>• Hurdle technology</li> </ul> <p><b>Food Additives</b></p> <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Functions, Need &amp; Safety</li> <li>• Types of Food Additives</li> <li>• Mode of Action and Applications</li> <li>• Class I Preservatives(Natural)</li> <li>• Class II Preservatives (Artificial)</li> <li>• Chelating agents</li> <li>• Curing agents</li> <li>• Coloring agents</li> <li>• Emulsifying agents</li> <li>• Antioxidants</li> <li>• Humectants</li> <li>• Leavening agents</li> <li>• Stabilizers and Thickeners</li> <li>• Flour improvers</li> </ul>	<b>15</b>

## **REFERENCES**

1. Potter (1996) Food science, CBS publication & distribution
2. B. Shrilakshmi (2001) Food Science, New Age International (P) Limited Publication
3. N. Shakuntala Manay, M. Shadaksharswamy(2008) Food Facts& Principles, New Age International (P) Limited Publication
4. G. Subbulakshmi, Shobha A Udipi(2001) Food Processing and Preservation, New Age International (P) Limited Publication
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7. Norman Desrosier Technology of Food processing (1987),CBS publication & distribution

**Semester II**  
**Human Physiology – Paper II**  
**DSC FTM-B3 – Human Physiology II**  
**Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes**

<b>Unit I</b>	<b>Hours Alloted</b>
<p><b>Digestive System</b></p> <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Parts of Digestive system- Structure and their functions</li> <li>• Liver and Pancreas -Structure and functions</li> <li>• Absorption of digested food</li> </ul> <p><b>Urinary System</b></p> <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Parts of Urinary system and their functions</li> <li>• Formation of urine</li> <li>• Physical examination of urine</li> <li>• Normal constituents of urine</li> </ul>	<b>15</b>
<b>Unit II</b>	
<p><b>Nervous System</b></p> <ul style="list-style-type: none"> <li>• Structure and functions of brain and Spinal cord</li> <li>• Peripheral Nervous system</li> <li>• Somatic and Autonomous system</li> <li>• Reflex action</li> <li>• Neurotransmitters</li> </ul> <p><b>Lymphatic system</b></p> <ul style="list-style-type: none"> <li>• Formation of lymph</li> <li>• composition of lymph</li> <li>• Parts of lymphatic system and their functions</li> </ul>	<b>15</b>

## **REFERENCES**

1. Chatterjee C.C (2003) Human physiology Volume I and II,CBS Publishers and Distributors Pvt. Ltd.
2. Guyton Arthur. C (2003) Textbook of Medical Physiology, Prism Books Pvt. Ltd.
3. Sembulingam, K.(2001) Essentials of Medical Physiology, Jaypee Brothers Medical Publishers Pvt. Ltd.
4. Joshi Vijaya D (2004) Preparation Manual for Undergraduates Physiology,Elsevier
5. Prof.A.K Jain (1998) Textbook of Physiology, Avichal Publisher Company
6. Indu Khurana Arushi(2009) Textbook of Anatomy and Physiology for Nurses and Allied Health Sciences, CBS Publishers and Distributors Pvt. Ltd.

**Semester II**  
**Food Chemistry – Paper II**  
**DSC FTM-B4 – Food Chemistry II**  
**Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes**

<b>Unit I</b>	<b>Hours Alloted</b>
<p><b>Proteins</b></p> <ul style="list-style-type: none"> <li>• Definitions of proteins and amino acids, sources</li> <li>• Classification of amino acids, Physical and chemical properties of amino acids, Peptides</li> <li>• Classification of proteins, structure of proteins, properties of proteins</li> <li>• Reactions involved in food processing, Texturized protein</li> <li>• Effect of processing on proteins</li> </ul> <p><b>Minerals</b></p> <ul style="list-style-type: none"> <li>• Definition, macro-minerals – Calcium, Phosphorus, Sulphur, Magnesium, Sodium, Potassium and Chloride</li> <li>• Micro-minerals – Iron, Fluorine, Zinc, Copper, Iodine, Cobalt, Chromium and other micronutrients</li> <li>• Sources, excess, deficiency, RDA and effect of processing on minerals.</li> </ul>	<b>15</b>
<b>Unit II</b>	
<p><b>Flavours</b></p> <ul style="list-style-type: none"> <li>• Introduction to taste, Chemical structure and taste</li> <li>• Basic tastes</li> <li>• Taste inhibition and modification</li> <li>• Flavour enhancement</li> <li>• Introduction to odour, molecular structure and flavour, aroma compounds and aroma extraction</li> </ul>	

<ul style="list-style-type: none"> <li>• Food flavours, astringency, flavours of some food</li> </ul> <p><b>Colors and pigments</b></p> <ul style="list-style-type: none"> <li>• Introduction, Colour systems- CIE System, Munsell system, Hunter system, Lovibond system</li> <li>• Classifications of colours- Natural and artificial</li> <li>• Gloss, Colour pigments- Chlorophyll, Carotenoid. Tetra-pyrol, Anthocyanin, Flavonoids, Tannin, Betalains, Quinones, Xanthones, Caramel.</li> </ul>	<p><b>15</b></p>
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### **REFERENCES**

1. H. D. Belitz, W. Grosch, P. Schieberle (2009) Food chemistry, Springer
2. Potter (1996) Food science, CBS publication & distribution
3. N. Shakuntala Manay, M. Shadaksharswamy(2008) Food Facts& Principles, New Age International (P) Limited Publication
4. John M. DeMan (1999) Principles of food Chemistry, Springer
5. Dr. U. Satyanarayan (2017) Biochemistry, Elsevier Relx India. Pvt, Ltd
6. Albert Lehninger(1990) Textbook of Biochemistry CBS publication & distribution
7. Sumati R. Mudambi, Shalini M. Rao, M.V.Rajagopal (2006) Food Science New Age International (P) Limited Publication
8. S.M Reddy (2015) Basic Food Science and Technology, New Age International (P) Limited Publication
9. Lillian Meyer (1987) Food Chemistry, CBS publication & distribution

**Semester II**  
**Food Microbiology – Paper II**  
**DSC FTM-B5 – Food Microbiology II**  
**Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes**

Unit – I	Hours Alloted
<p><b>Microbiology and Spoilage of food</b></p> <p>Factors influencing food spoilage – Intrinsic &amp; Extrinsic factors</p> <p>Contamination and spoilage of fruits and vegetables</p> <p>Contamination and Spoilage of cereal- cereal products</p> <p>Contamination and Spoilage of meat, fish, poultry</p> <p>Contamination and Spoilage of milk- milk products</p> <p><b>Microbiology of water</b></p> <p>Bacterial flora of water</p> <p>Indicators of faecal pollution and their advantages</p> <p>Bacteriological determination of water- Standard plate count, Total plate count</p> <p>Qualitative test- Standard multiple tube fermentation &amp; IMVIC test</p> <p>Quantitative test- Most probable number test.</p>	<b>15</b>
Unit II	
<p><b>Food-Borne illness: Bacterial and Non-bacterial</b></p> <p>Food Borne Intoxications – Staphylococcal poisoning, Botulism</p> <p>Food Borne Infections – Salmonellosis, Shigellosis</p> <p>Food Borne Toxic Infections – Cholera, Listeriosis</p> <p>Mycotoxins – Aflatoxin, Patulin, Ochratoxin</p> <p>Food – Borne Parasites – Trichinosis</p> <p>Seafood Toxicants – Shellfish Poisoning, Scombroid Food Poisoning</p> <p><b>Food Fermentations</b></p> <p>Role of micro-organisms in fermentation</p> <p>Probiotics – Definition and Importance, Yogurt Production</p> <p>Fermented Meat &amp; Fish Products – Sausages, Fermented Fish</p> <p>Fermented Fruit &amp; Vegetable Products – Sauerkraut, Kimchi, Vinegar, Citric acid</p> <p>Fermented Cereal Products – Miso, Soy Sauce</p> <p>Economically important fermented foods – Wine</p>	<b>15</b>



## **REFERENCES**

- 1) W.C. Frazier (2016), Food Microbiology, Tata MacGraw Hill Publishing Company Limited.
- 2) Dr. Chand Pasha, Dr. A. Madhuri, Dr. P. Muthenna, Dr. T. Raga Sudha (2020), Food Microbiology, Divya Lakshmi Publishers and Distributors.
- 3) Bibek Ray, Arun Bhunia (2018) Funtamental Food Microbiology 5<sup>th</sup> Edition, CRC Press.
- 4) L. E. Casida Jr. (2019), Industrial Microbiology 2<sup>nd</sup> Edition, New Age International Publishers.
- 5) M. R. Adams, M.O. Moss (2015), Food Microbiology, New Age International Publishers.
- 6) James M. Jay (1987), Modern Food Microbiology, CBS Publishers and Distributors.
- 7) Dey S. 1994. Outlines of Dairy Technology. Oxford Univ. Press. New Delhi.

**Semester II**  
**Dairy Technology – Paper II**  
**DSC FTM-B6 – Dairy Technology II**  
**Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 minutes**

Unit I	Hours Alloted
<p><b>Fat Rich Dairy Products</b></p> <ul style="list-style-type: none"> <li>• Definition &amp; Standards</li> <li>• Classification &amp; Chemical composition</li> <li>• Food and Nutritive Value</li> <li>• Physico-chemical properties</li> <li>• Manufacture, Packaging, Storage and Distribution</li> <li>• Judging and Grading</li> <li>• Defects- their causes and prevention</li> <li>• Uses of Fat Rich Dairy Products</li> <li>• Neutralization of Cream- Definition, Objectives &amp; Procedure</li> <li>• Products- Cream, Butter and Butter Oil</li> </ul> <p><b>Indian Dairy Products</b></p> <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Definition &amp; Standards</li> <li>• Chemical composition</li> <li>• Nutritive Value</li> <li>• Manufacturing, Packaging &amp; Storage</li> <li>• Uses</li> <li>• Products- Kheer, Khoa, Rabri, Kulfi, Dahi, Shrikhand, Paneer, Channa, Ghee &amp; Lassi</li> </ul>	<b>15</b>
Unit II	
<p><b>Cheese</b></p> <ul style="list-style-type: none"> <li>• History</li> <li>• Definition &amp; Standards</li> <li>• Classification</li> <li>• Chemical composition</li> </ul>	<b>15</b>

<ul style="list-style-type: none"> <li>• Food and Nutritive value</li> <li>• Types &amp; Classification</li> <li>• Manufacturing of Cheddar Cheese,</li> <li>• Packaging and Storage</li> <li>• Judging and Grading</li> <li>• Defects- causes and prevention</li> <li>• Uses</li> </ul> <p><b>Ice-cream</b></p> <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Definition &amp; Standards</li> <li>• Classification</li> <li>• Chemical Composition</li> <li>• Food and Nutritive value</li> <li>• Role of constituents</li> <li>• Manufacturing, packaging and storage</li> <li>• Judging and Grading</li> <li>• Overrun</li> <li>• Defects- causes and prevention</li> <li>• Uses</li> </ul>	
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## **REFERENCES**

1. DeySukumar - Outlines of Dairy Technology. Oxford Univ. Press. New Delhi.- 1997
2. Robinson R. K- Modern Dairy Technology. Elsevier Applied Science UK.- 1994
3. Warner J. M. - Principles of Dairy Processing. Wiley Eastern Ltd. New Delhi.
4. Clarence Henry Eckles. - Milk and Milk Products. Tata MaCrow Hill - 1973
5. D. D. Patange, D.K. Kamble, R.C. Ranveer – A Text Book on Milk and Milk Products. Jaya Publishing House – 2018
6. Dr. Pandurang Gangasagare – Processing of Milk. Agrotech Press – 2016
7. Sudhi Ranjan, Vijay J. Jadhav – Handbook of Quality Control Of Dairy And Meat Product. Biotech Books - 2012

### DSC FTM-P1 - LAB COURSE I

<b>Sr. No.</b>	<b>Name of the Practical</b>
1)	Study of Compound Microscope
2)	Study of Laboratory Equipments
3)	Preparation Of Culture Media
4)	Study of general techniques for isolation of pure cultures
5)	Isolation of micro-organisms from Soil
6)	Determination of Standard or Total Plate counts (SPC/TPC) of given food
7)	Determination of Yeast count from the given sample
8)	Monochrome Staining
9)	Gram Staining
10)	Determination of MPN of given Water sample
11)	Study of biochemical properties of bacteria IMViC Test
12)	Effect of browning on fruits and vegetables
13)	Effect of acid and alkali on colour of fruit and vegetables
14)	Pectin strength of different fruits
15)	Effect of sugar on boiling point of water
16)	Effect of heat of on fruits and vegetables
17)	Isolation of starch from potato
18)	Isolation and characterization of casein from milk
19)	Gelatinization of food starches
20)	Determination of Smoke point of Oils
21)	Acid value of fats and oils

## DSC FTM-P2 - LAB COURSE II

Sr. No.	Name of the Practical
1)	Physical Examination of Milk
2)	Specific Gravity of Milk
3)	Heat Stability of Milk
4)	Titration Acidity of Milk
5)	Adulteration of Milk & Milk- Water, Cane sugar & Starch
6)	Methylene Blue Reduction Time & Resazurin Test
7)	Preparation of Dahi & Mishti Dahi
8)	Preparation of Chakka
9)	Preparation of Shrikhand
10)	Preparation of Lassi
11)	Preparation of Paneer & Channa
12)	Preparation & Quality evaluation of Basundi
13)	Preparation & Quality evaluation of Rabri
14)	Preparation & Quality evaluation of Khoa
15)	Preparation & Quality evaluation of Malai & Kandi Pedha
16)	Preparation & Quality Evaluation of Rasogulla & Rasmalai
17)	Preparation of Whey Beverage
18)	Preparation of Ice-Cream & kulfi
19)	Preparation & Quality Evaluation of Gulab-jamun
20)	Preparation & Quality Evaluation of Instant Gulab-jamun
21)	Formulation & Quality Evaluation of Flavored Milk
22)	Visit to Milk & Milk Products Processing Plants

# Syllabus for SEC Courses

## RESOURCES AND SUSTAINABLE DEVELOPMENT

- Introduction to concept and dimensions of sustainable development, major conferences and agreements on sustainable development - Power point presentation and group discussion.
- MDG's and challenges to sustainable development (Climate and Global Change, Energy, Water Resources, Population, Economic Development, etc.); (Case study approach)
- Water/Air analysis - Lab testing and class presentation
- Experiential learning through field visit: Sewage treatment plant/ Vermicomposting unit/ Air Monitoring Laboratory/ Environment Pollution Detecting Laboratory/ Rain Water Harvesting System/ Biogas Plant/ Green Building/ Ecotel Hotel/ CPCB/ Greenhouse/ Solid Waste Management Plant/ hydro/thermal power plants/ Environmental Agencies or National Parks/ Sanctuaries/ Biosphere Reserves.
- Development of awareness programme on sustainable consumption practices for masses.
- A Survey related to environmental issues amongst the citizens: Data to be collected and analyzed statistically with suggestions for environmental management Or Secondary data collection/Case profile of any one govt. or non-govt. organization that contributed to environmental protection in India.

# **SOCIAL MEDIA AND DIGITAL COMMUNICATION**

## **Module I: Social Media**

- Social Media: concept, types, reach and access
- Assessing social media campaigns
- Designing social media campaigns for advocacy, social mobilization, marketing and advertising

## **Module II : Digital Communication**

- Digital Communication: concept, types, reach and access
- Analysis of web page designs
- Tools and methods to create digital designs for web pages

## **RECOMMENDED READINGS**

1. Hinton, S and Larissa, H. (2013) Understanding Social Media, Sage Publications India
2. Lister, M, Dovey, J. and et al (2003 ed) New Media: A Critical Introduction, Routledge Taylor and Francis Group, London

## **ADOLESCENTS' RELATIONS AND WELL-BEING**

1. Class room exercise on peer relationships
2. Understanding self as a male/female adolescent: exercise on self-reflection
3. Writing a brief biography of relationship with a close friend
4. Relations with parents and siblings- separate interviews
5. Analysis of different forms of media to understand interpersonal relationships
6. Workshops- managing emotions with reference to relationships and to learn crisis management
7. Methods of promoting well-being- yoga, self-development resources, counselling

## **RECOMMENDED READINGS**

- 1) Manthei, R. (1997). *Counselling: The skills of finding solutions to problems*. London: Routledge.
- 2) Sharma, N. (2009). *Understanding Adolescence*, New Delhi: National Book Trust.
- 3) Rice, F. P. (2007). *Adolescent: Development, Relationships and Culture*.
- 4) Santrock, J. W. (2010). *Life Span Development: A Topical Approach*, New Delhi: Tata McGraw Hill



## **MODERN OFFICE MANAGEMENT**

### **Module I: Fundamentals of Office Management**

- **Introduction:** Meaning, importance and functions of modern office
- **Modern Office Organization:** Meaning, Steps in office organization, Organization structure
- **Nature of office services:** Types of services in a modern office- decentralized and centralized
- **Office management:** Meaning and major processes of Office management
- **Office Manager:** Responsibilities of Office manager.
- **Office staff:** Skill Required for Office Jobs, Duties and Responsibilities of Office Staff.

### **Module II: Record Management:**

- **Introduction to records:** Objectives of Record Keeping and types of office records
- **Filing:** Objectives and Importance of Filing, Essentials of a Good Filing System, Classification of Files and Filing Procedure
- **Filing Methods:** Horizontal Filing -meaning, types, Vertical Filing- meaning, equipment used, advantage and disadvantages.
- **Indexing:** Meaning and essentials of good indexing, type of index
- **Retention and disposal of files:** Meaning and benefits of record retention, need for disposal of files, life-cycle stages of files.

### **References: –**

1. Office Management By Ankita Bhatia Dr. R. K. Chopra
2. Office Management By Dr. P. Rizwan Ahmed
3. Office Management By R S N Pillai

# **Leadership and Personality Development**

## **Module I: Leadership**

- Concept of leadership and Types of leaders
- Theories of Leadership: Trait theory, Behavioral theories, Contingency theory
- Essential qualities of an effective leader

## **Module II: Personality Development**

- Concept of Personality
- Personality traits
- Self-Esteem and Self-Confidence
- SWOT Analysis and Goal-Setting
- Stress Management

### **Book Reference:**

1. Organisational Behaviour, M. Parikh and R. Gupta, Tata McGraw Hill Education Private Limited
2. Organisational Behavior, D. Nelson, J.C Quick and P. Khandelwal, Cengage Publication.
3. Human Behavior at Work—Keith Davis
4. Organisational Behaviour—Stephon Robbins

# **FINANCIAL LITERACY AND BANKING**

## **Module I: Introduction to banking:**

- Banking structure in India and Role of Reserve Bank of India.
- Savings and investment: Importance of savings and investments, Risk and Return
- Savings and Investment schemes - Tax saving Schemes, Government Schemes- National Saving Certificates, Public Provident Fund, Post Office Schemes, Equity Linked Savings Schemes, Retirement Benefits Schemes- NPS (New Pension System).
- Evolution of money.

## **Module II: Banking Activities**

- Deposits and Types of Deposits-Saving Bank Accounts, Fixed Deposit Accounts, Recurring Deposit Account, Special Term Deposit Schemes
- Loans and Types of loan advanced by Banks and Other secondary functions of Bank.
- Digital banking: ATM, Debit card, Credit card, UPI, artificial intelligence and digital currency
- Types of transactions: Cheque, types of Cheque, RTGS and NEFT

## **Books for References:**

1. V.A Avadhani – Investment management.
2. C R Kothari – Financial services in India
3. B.E Milling – The basics of Finance
4. A.Zokaityte – Financial Literacy Education
5. Indian financial System, by T. R. Jain and R. L.Sharma, VK Global Publisher.
6. Money and Banking by T. R. Jain and R. K. Kaundal, VK Global Publisher.

# Green-house Technology

## Module I:

- Introduction, scope – classification of green-houses – construction of green-houses – heating unit – cooling unit – environment control (light & temperature).
- Net-poly houses – low-cost green houses, Root media for green houses.
- Fertilizers: Organic & inorganic, liquid fertilizers, applications of fertilizers.
- Water in green-houses: Irrigation system in green-houses – misting, drip irrigation, micro-irrigation, water quality, water sanitation.

## Module II:

- Plant Protection in Green-houses: Diseases of Green-house plants (Bacterial, fungal, nematodes & viral diseases)
- Management of pest & diseases – integrated pest management
- Applications of Green-house Technology: Importance of Green-house Technology, Micro-propagation & green-house planting of tissue culture transplants.
- Advantages & disadvantages of green-house technology, Seed production, cut flower gardening.

## References:

1. Dubey R. C.2006. A textbook of Biotechnology. S. Chand & Company, New Delhi.
2. Sheela V. L. 2011. Horticulture. MJP Publishers. Chennai.
3. Prasad S., Kumar U. 2012. Green House Management for Horticultural Crops. Agro-bios. India.
4. Pant V. & Nelson. 1991. Green House Operation & Management. Bali Publication, New Delhi.

## **Entrepreneurship Development:**

**Module I:** Meaning, concept, characteristics and types of entrepreneurs. Development of entrepreneurship, Culture, Stages in Entrepreneurship processes. Micro, small and medium Enterprise Industries in India.

**Module II:** Public and private system of stimulation, support and sustainability of Entrepreneurship, Requirement, Availability and access to Finance, Marketing Assistance, Technology and Industrial Accommodation. 08- classes Unit-IV Identification of Business idea, project formulation and Business plan, Project report, Appraisal.

### **Book Recommended:**

1. Desai. V. Dynamic of Entrepreneurial Development and Management.
2. Batra Dangwal, Entrepreneurship and scale Industries.
3. Malhotra I. S and Gupta S.L. Management of small-scale Industries. New Delhi, Galgotia
4. Drucker, Peter Innovation and Entrepreneurship. East West Press (P) Ltd., 1992. 5. Gupta, C.B and Srinivasan, Entrepreneurial Development in India

## **Skill Development**

- Communication Skills (verbal and non-verbal)
- Body language (formal and informal situations)
- Public Speaking
- Telephone etiquette
- Developing Self Esteem
- Leadership Training
- Time Management Training
- Business Etiquette