

**Rayat Shikshan Sanstha's  
Sadguru Gadage Maharaj College, Karad  
(Autonomous)**

**Undergraduate Programme**

**B. Sc. in Food Science (Entire)**

**Syllabi of the course**

**Choice based credit system syllabus**

**(To be implemented from academic year 2022-23)**

**Department of Food Science**

## **Syllabus for Bachelor of Science Part – I (B. Sc. - I – Food Science)**

**(w.e.f. June, 2022)**

**1. Title of the course: B.Sc. Part – I (Food Science)**

**2. General Objectives of the Course:**

- ✓ The content of the syllabus have been framed as per the UGC norms.
- ✓ The students are expected to gain knowledge about food science through research, to apply and disseminate knowledge for the next advance education.
- ✓ The practical courses are in relevance to the theory courses to know the Standard Operating Procedures of advanced machineries & their technical knowledge.

**3. Eligibility of course:**

For admission into bachelor's degree of Food Science, one should pass higher secondary school certificate examination i.e. H.S.C. science or 12<sup>th</sup> science or equivalent examination from a recognized board.

**4. Duration:**

The duration for B.Sc. degree course is of 3 years with semester pattern of 6 semesters.

- B.Sc- Part-I: Semester I & II
- B.Sc- Part-II: Semester III & IV
- B.Sc- Part-III: Semester V & VI

**5. Medium of Instruction: English**

**6. Structure of the ( B.Sc. I) course:**

Duration – One year

B.Sc.-I comprises of total two semesters. In each semester there will be nine theory papers and Practical examination will be conducted annually.

**Subject wise evaluation pattern and credit system: B.Sc. Part I, Food Science:  
Sem.-I and Sem-II As per NEP 2022-23**

**SEMESTER-I**

Course code	Subject Code	Course/Subject	AC	CCE		SEE		Total	Credits
				Max	Min	Max	Min		
DSC FS-101	BFST-101	Food Chemistry-I	TH	10	04	40	16	50	02
DSC FS-102	BFST-102	Human Nutrition-I	TH	10	04	40	16	50	02
DSC FS -103	BFST-103	Chemistry-I	TH	10	04	40	16	50	02
DSC FS-104	BFST-104	Food Microbiology-I	TH	10	04	40	16	50	02
DSC FS-105	BFST-105	Food Toxicology-I	TH	10	04	40	16	50	02
DSC FS-106	BFST- 106	Food Preservation-I	TH	10	04	40	16	50	02
DSC FS-107	BFST-107	Post-Harvest Technology-I	TH	10	04	40	16	50	02
DSC FS-108	BFST-108	Dairy Technology-I	TH	10	04	40	16	50	02
AECC-A	BFST-109	English for communication-I	TH	10	04	40	16	50	04
SEC-1 (VBC-I)	1111	Democracy, Elections and Good Governance	TH	--	--	50	20	50	02
<b>Total Semester I</b>								<b>500</b>	<b>22</b>

**SEMESTER-II**

Course code	Subject Code	Course/Subject	AC	CCE/Oral		SEE/Exam		Total	Credits
				Max	Min	Max	Min		
DSC FS-201	BFST- 201	Food Chemistry-II	TH	10	04	40	16	50	02
DSC FS-202	BFST- 202	Human Nutrition-II	TH	10	04	40	16	50	02
DSC FS-203	BFST- 203	Chemistry-II	TH	10	04	40	16	50	02
DSC FS-204	BFST- 204	Food Microbiology-II	TH	10	04	40	16	50	02
DSC FS-205	BFST-205	Food Toxicology-II	TH	10	04	40	16	50	02
DSC FS-206	BFST-206	Food Preservation-II	TH	10	04	40	16	50	02
DSC FS-207	BFST- 207	Post-Harvest Technology-II	TH	10	04	40	16	50	02
DSC FS-208	BFST-208	Dairy Technology-II	TH	10	04	40	16	50	02
AECC-B	BFST-209	English for communication-II	TH	10	04	40	16	50	04
SEC- 2 (VBC-II)	2222	Constitution of India and Local Self Government	TH				20	50	02
DSC FS-P1	BFSP-210	Lab Course-I : Food Chemistry and Human Nutrition	PR	--	--	100	40	100	04
DSC FS-P2	BFSP-211	Lab Course-II :Chemistry and Food Microbiology	PR	--	--	100	40	100	04
DSC FS-P3	BFSP-212	Lab Course-III: Food Toxicology and Food Preservation	PR	--	--	100	40	100	04
DSC FS-P4	BFSP-213	Lab Course-IV: Post- Harvest Technology and Dairy Technology	PR	--	--	100	40	100	04
<b>Total Semester II</b>								<b>900</b>	<b>38</b>
<b>Total Semester I + Semester II: 500+900 = 1400,</b>								<b>Total Credits : 22+38 = 60</b>	

## 1. Nature of Question Paper for Semester Pattern

Time: - 2 hrs.

Total marks: -50

### Instructions:

1. All questions are compulsory.
2. Numbers in right indicate full marks.

**Q. No.1)** Multiple choice questions. (1 x 08) ..... (08)

**Q.No.2)** Attempt any two out of three (2 x 08)... ..... (16)

**Q.No.3)** Attempt any four out of six (4 x 08)..... (16)

### Internal

#### Examination

**CCE-I:** Marks

=10

**CCE-II:** Marks =10

## 2. Nature of Question Paper for Practical Examination

Time: - 3 hrs.

Total Marks-25

Perform three experiments.

**Ques. 1)** Major Experiment.....20 marks

**Ques. 2)** Minor Experiment.....10 marks

**Ques. 3)** Spotting ..... 10 marks

**Ques. 4)** Journal.....05 marks

**Ques. 5)** Oral.....05 marks

**Total = 50 marks**

## **Syllabus for B. Sc. (Food Science)**

### **Preamble**

This syllabus is framed to accommodate the widening horizons of the discipline of food Science and reflect the current changing needs of the students. Students learn Food Science as a separate subject from B.Sc. I, which increase the employability of students in food Industry. The exposure of students to the subject will enable them of independent handling of food processing and packaging unit.

The syllabus is based on basic and applied approach with vigor and depth. At the same time precaution is taken to make the syllabus comparable to the syllabi of other universities and the needs of industries and research. The units of the syllabus are well defined, taking into consideration the level and capacity of students.

### **General Programme Objectives**

1. To nurture the academicians with focus and commitment to their subject.
2. To shape good and informed citizens form the students entering into the program me.
3. To create a skilled work force to match the requirements of the society.
4. To impart knowledge of science is the basic objective of this program me.
5. To develop scientific attitude is the major objective so as to make the students open minded, critical and curious.
6. To develop skill in practical work, experiments and laboratory materials and equipment along with the collectionand interpretation of scientific data to contribute to science.

### **General Programme Outcomes**

1. The students will graduate with proficiency in subject of their choice.
2. The students will be eligible to continue higher studies and abroad in their subject.
3. The students will be eligible to appear for the examination for jobs in government organization.
4. The students will be eligible to apply for jobs with a minimum B.Sc. Food Scienceprogram.

### **Programme Specific Objectives of the Course**

1. To impart knowledge of various areas related to food Science.
2. To enable the students to understand food composition regarding physical, chemical, nutritional and microbiological.
3. To familiarize the students about techniques of variety of foods.
4. To emphasize the importance of food safety, food quality, food laws and regulations.
5. To expose the students to different food processes used in industries, packaging materials and in research field.
6. To prepare the students to accept the challenges in life sciences.
7. To develop skills required in various industries, research labs and in the field of agriculture, food, human health.

### **Program Specific Outcomes of the Course**

After successful completion of B.Sc. Food Science Course student will be able to:

1. Apply critical thinking and analytical evaluation to contemporary food science.
2. Demonstrate practical proficiency in a food analysis laboratory.
3. Identify the conditions, including sanitation practices, pathogens and microorganisms.
4. Explain the principles and current practices of processing techniques and the effects of processing parameters on product quality.
5. Explain the properties and uses of packaging materials.
6. Identify government regulations required for the manufacture and sale of food products.
7. Go for higher studies in the field of food Science.

**B. Sc. Part I**

<b>SADGURU GHADAGE MAHARAJ COLLEGE, KARAD</b>									
<b>COURSE STRUCTURE UNDER CHOICE BASED CREDIT SYSTEM (CBCS)</b>									
<b>B. Sc. FOOD SCIENCE (ENTIRE)</b>									
<b>B. Sc. I SEMESTER – I (Duration – 6 Months)</b>									
<b>Sr. No.</b>	<b>Course Code</b>	<b>Name of the Course</b>	<b>TEACHING SCHEME</b>						
			<b>Theory</b>			<b>Practical</b>			
			<b>No. of lectures</b>	<b>Hours</b>	<b>Credits</b>	<b>Course Code</b>	<b>No. of lectures</b>	<b>Hours</b>	<b>Credits</b>
1	BFST - 101	Food Chemistry –I	3	2.4	2	Lab-I BFSP- 110 ( Food Chemistry-I and Human Nutrition -I)	4	3.2	2
2	BFST - 102	Human Nutrition-I	3	2.4	2				
3	BFST - 103	Chemistry –I	3	2.4	2	Lab-II BFSP- 111 (Chemistry –I and Food Microbiology-I)	4	3.2	2
4	BFST - 104	Food Microbiology –I	3	2.4	2				
5	BFST -105	Food Toxicology-1	3	2.4	2	Lab-III BFSP- 112 (Food Toxicology-I and Food Preservation -I)	4	3.2	2
6	BFST-106	Food Preservation –I	3	2.4	2				
7	BFST - 107	Post-Harvest Technology-I	3	2.4	2	Lab-IV BFSP-113 (Post-Harvest Technology-I and Dairy technology-I)	4	3.2	2
8	BFST 108	Dairy Technology-I	3	2.4	2				
9	AEC-1	English-I	3	2.4	2				
	Total of SEM I		27	21.6	18		16	12.8	8

**B: B.Sc., FS: Food Science, T: Theory, P: Practical**

**SADGURU GHADAGE MAHARAJ COLLEGE, KARAD**

**COURSE STRUCTURE UNDER CHOICE BASED CREDIT SYSTEM (CBCS)**

**B. Sc. FOOD SCIENCE (ENTIRE)**

**B. Sc. II SEMESTER –II (Duration – 6 Months)**

Sr. No.	Course Code	Name of the Course	TEACHING SCHEME						
			Theory			Practical			
			No. of lectures	Hours	Credits	Course Code	No. of lectures	Hours	Credits
1	BFST -201	Food Chemistry –II	3	2.4	2	Lab-V BFSP-210 (Food Chemistry-II and Human Nutritional -II)	4	3.2	2
2	BFST –202	Human Nutrition-II	3	2.4	2				
3	BFST -203	Chemistry –II	3	2.4	2	Lab-VI BFSP-211 (Chemistry-II and Food Microbiology-II)	4	3.2	2
4	BFST –204	Food Microbiology – II	3	2.4	2				
5	BFST -205	Food Toxicology- II	3	2.4	2	Lab-VII BFSP-212 (Food Toxicology-II and Food Preservation-II)	4	3.2	2
6	BFST -206	Food Preservation -II	3	2.4	2				
7	BFST -207	Post-Harvest Technology-II	3	2.4	2	Lab-VIII BFS 213 (Post-Harvest Technology –II and Dairy Technology -II)	4	3.2	2
8	BFST -208	Dairy Technology-II	3	2.4	2				
9	AECC-2	English-II	3	2.4	2				
10	Total of SEM II		27	21.6	18		16	32	8
11	Total of SEM I and SEM II		54	43.2	36		12.8	25.6	16

**B: B.Sc., FS: Food Science, T: Theory, P: Practical**



### FOOD SCIENCE Semester-I

<b>Sr. No</b>	<b>Course Code</b>	<b>Subject Title</b>
1	BFST – 101	Food Chemistry –I
2	BFST - 102	Human Nutritional –I
3	BFST - 103	Chemistry-I
4	BFST - 104	Food Microbiology-I
5	BFST - 105	Food Toxicology-I
6	BFST - 106	Food Preservation-I
7	BFST - 107	Post-Harvest Technology-I
8	BFST - 108	Dairy Technology-I
9	AECC-1	English- I
10	Lab-I BFSP- 110	Food Chemistry -I and Human Nutritional –I
11	Lab-II BFSP- 111	Chemistry-I and Food Microbiology-I
12	Lab-III BFSP- 112	Food Toxicology -I and Food Preservation-I
13	Lab-IV BFSP- 113	Post-Harvest Technology-I and Dairy Technology-I

## FOOD SCIENCE Semester –II

<b>Sr. No.</b>	<b>Course Code</b>	<b>Subject Title</b>
1	BFST – 201	Food Chemistry –II
2	BFST – 202	Human Nutrition –II
3	BFST- 203	Chemistry-II
4	BFST-204	Food Microbiology-II
5	BFST – 205	Food Toxicology-II
6	BFST – 206	Food Preservation-II
7	BFST – 207	Post-Harvest Technology-II
8	BFST – 208	Dairy Technology-II
9	AECC-2	English- II
10	Lab-V BFSP- 210	Food Chemistry –II and Human Nutritional –II
11	Lab-VI BFSP- 211	Chemistry-II and Food Microbiology-II
12	Lab-VII BFSP- 212	Food Toxicology -II and Food Preservation-II
13	Lab-VIII BFSP- 213	Post-Harvest Technology-II and Dairy Technology-II

## Evaluation Structure B.Sc. I

### Semester I

Theory Course	SEE	Internal Evaluation	Practical course	Practical	Submission
		CCE		Exam	Journal + Student Performance/ Educational Tour
BFST-101	40	10	LAB- I	15	10
BFST-102	40	10			
BFST-103	40	10	LAB- II	15	10
BFST-104	40	10			
BFST-105	40	10	LAB- III	15	10
BFST-106	40	10			
BFST-107	40	10	LAB- IV	15	10
BFST-108	40	10			
*AECC-1	40	10			
<b>TOTAL</b>	<b>360</b>	<b>90</b>		<b>60</b>	<b>40</b>
<b>GRAND TOTAL</b>	<b>550</b>				

**\*For English:- Open Book Test/ Survey/ Writing Skill**

## Evaluation Structure B.Sc. I

### Semester II

Theory Course	SEE	Internal Evaluation	Practical course	Practical	Submission
		CCE		Exam	Journal + Student Performance/ Educational Tour
BFST-201	40	10	LAB- V	15	10
BFST-202	40	10			
BFST-203	40	10	LAB- VI	15	10
BFST-204	40	10			
BFST-205	40	10	LAB- VII	15	10
BFST-206	40	10			
BFST-207	40	10	LAB- VIII	15	10
BFST-208	40	10			
*AECC-2	40	10			
<b>TOTAL</b>	<b>360</b>	<b>90</b>		<b>60</b>	<b>40</b>
<b>GRAND TOTAL</b>	<b>550</b>				

**\*For English:- Open Book Test/ Survey/ Writing Skill**

**SEMESTER-I**  
**Theory Paper- I BFST- 101 Food Chemistry-I**

**Unit I Basic Food science** **(09 lectures)**

Basic concept on Food, Nutrition and Nutrients. Classification of Food, Classification of Nutrients.

**Unit II Carbohydrates** **(09 lectures)**

Definition, Classification, Structure and properties. Monosaccharides - glucose, fructose, galactose. Disaccharides - Maltose, lactose, sucrose Polysaccharides - Dextrin, starch, glycogen, resistant starch. Carbohydrates - Sources, daily requirements, functions.

**Unit III Lipids** **(09 lectures)**

Definition, Classification & Properties. Fatty acids-composition, properties, types. Lipids - sources, daily requirements, functions. Role & nutritional significances of PUFA, MUFA, SFA, W-3 fatty acid.

**Unit IV Proteins** **(09 lectures)**

Definition, Classification, Structure & properties. Amino acids Classification, types, functions. Proteins - Sources, daily requirements, functions. Factors affecting protein bio-availability including anti-nutritional factors

**Books**

1. John W. Brady. 2013. Introductory Food Chemistry. Comstock Publishing Associates, Cornell University Press, Ithaca, USA.
2. H.-D. Belitz, W. Grosch and P. Schieberle. 2009. Food Chemistry, 4th Ed. Springer-Verlag Berlin Heidelberg.

3. Owen R, Fennema. 1996. Food Chemistry, 3rd Ed. Marcel Dekker, Inc., New York, USA.
4. L. H. Meyer. 1974. Food Chemistry. The AVI Publishing Co Inc., Connecticut, MA, USA.

**SEMESTER-I****Theory Paper -II BFST – 102 Human Nutrition-I****Unit I Nutrition (09 lectures)**

Definition of the term Nutrients, Dietetics, Balance Diet, Health, Energy, Adequate Nutrition, Optimal Nutrition, Malnutrition, Under Nutrition, Over Nutrition, Balance diet. Food as a source of macro (Carbohydrate, fat & protein) and micronutrients (Vitamins & Minerals). Interrelationship between nutrition & health, visible symptoms of good health.

**Unit II Energy in Human Nutrition (09 lectures)**

Idea of Energy and its unit, Energy Balance, Assessment of Energy, Requirements deficiency and excess, Determination of Energy in food, B.M.R. and its regulation, S.D.A.

**Unit III Supplementary foods (09 lectures)**

Introduction. Historical perspectives. Supplementary foods In India. Indian multipurpose food. Malt food, Bal Ahar, Novel foods.

**Unit IV Recent concepts in food science (09 lectures)**

Introduction. Organic food, Food Fortification, Genetically Modified food, Bio fortification, Space food

**Books**

1. Gaile Moe, Danita Kelley, Jacqueline Berning and Carol Byrd-Bredbenner. 2013. Wardlaw's Perspectives in Nutrition: A Functional Approach. McGraw-Hill, Inc., NY, USA.

2. Carolyn D. Berdanier, Elaine B. Feldman and Johanna Dwyer. 2008. Handbook of Nutrition and Food, 2nd Ed. CRC Press, Boca Raton, FL, USA.
3. Jeremy M. Berg, John L. Tymoczko, Lubert Stryer and Gregory J. Gatto, Jr. 2002. Biochemistry, 7th Ed. W.H. Freeman and Company, NY, USA.



**SEMESTER – I****Theory Paper III: -BFST- 103 Chemistry-I****Unit I Chemical Bonds****(09 Lectures)**

Chemical Bonding, Molecular orbital theory, bonding, antibonding and nonbonding orbitals. Molecular orbitals. MO configuration of H<sub>2</sub>, N<sub>2</sub>, O<sub>2</sub>, F<sub>2</sub>. Bond order. Diamagnetism and para magnetism

**Unit II Industrial Chemistry****(09 Lectures)**

Industrial Chemistry: Synthesis, properties and uses of silicones. Fuel gases: natural gas, water gas, semi water gas, carburetted water gas, producer gas, oil gas (manufacturing details not required). Fertilizers: urea, ammonium sulphate, ammonium nitrate, potassium nitrate NPK fertilizer. Triple superphosphate

**Unit III Covalent Bond****(09 Lectures)**

Covalent bond: orbital overlap, hybridization, geometry of organic molecules CH<sub>4</sub>, C<sub>2</sub>H<sub>4</sub>, C<sub>2</sub>H<sub>2</sub>, C<sub>6</sub>H<sub>6</sub>. Inductive effect. Electrometric, mesomeric, hyperconjugative and steric effects. Effect in properties of compounds. Stereoisomerism Optical isomerism: symmetry, elements of symmetry. Cause of optical activity, tartaric acid, Racemization, Resolution. Geometric isomerism of maleic and fumaric acids

**Unit IV Solutions****(09 Lectures)**

Solutions types. Liquid in Liquid. Raoult's law. Deviation from ideal behavior. Binary liquid mixtures. Fractional distillation. Kinetics Rate, order, molecularity, pseudo first order, determination of order. Measurement of reaction. Effect of temperature on the rate. Energy of activation

**Books**

1. Principles of Inorganic Chemistry; By Puri, Sharma & Kalia, 3<sup>rd</sup> and 4<sup>th</sup> edition.
2. Inorganic Chemistry; By Gary L. Miessler & Donald A. Tarr; 3<sup>rd</sup> edition
3. Atomic structure and chemical bonding; By Manas Chanda; 2<sup>nd</sup> edition
4. Quantum Chemistry; By R. K. Prasad.
5. Inorganic chemistry- Principles of Structure and Reactivity; By James H. Huheey, Keiter, Medhi; 4<sup>th</sup> edition
6. Modern Inorganic Chemistry; By R. D. Madan, Concise Inorganic Chemistry; By J. D Lee; 5<sup>th</sup> edition.

**SEMSTER I****Theory Paper IV: BFST – 104 Food Microbiology- I****Unit I History and scope of Microbiology (09 Lectures)**

Discovery, importance and relevance of microorganisms. Microscopy: basic techniques of Microscopy optical and electron techniques of microscopy staining and its types.

**Unit II Microbial Control (09 Lectures)**

Sterilization and disinfection techniques. Physical and chemical methods of sterilization.

**Unit III Microbes (09 Lectures)**

Important cultural characteristics of Bacteria, Virus, Fungus and algae. Culture of microorganism's culture media natural complex, semi defined, synthetic media, minimal media. General and selective media, Anaerobic cultures.

**Unit IV Isolation and preservation (09 Lectures)**

Isolation and preservation of pure cultures. Pour plate method, streak plate spread plate and single cell isolation, micromanipulator and capillary pipette method. Applications- Food microbiology, Agriculture microbiology, medical microbiology, Industrial microbiology, Environmental and Biotechnology microbiology.

**Books**

1. Martin R. Adams and Maurice O. Moss. 2008. Food Microbiology, 3rd Ed., The Royal Society of Chemistry, Cambridge, UK.
2. James M. Jay. 2000. Modern Food Microbiology, 6th Ed. Aspen Publishers, Inc., Gaithersburg, Maryland, USA.
3. George J. Banwart. 1989. Basic Food Microbiology, 2nd Ed. Chapman & Hall, New York, USA.
4. William C. Frazier and & Dennis C. West off. 1987. Food Microbiology, 4th Ed. Tata McGraw Hill Education, New Delhi.

**SEMESTER -I****Paper - V BFST- 105 Food Toxicology-I****Unit I Principles of Toxicology (09 Lectures)**

Classification of toxic agents; characteristics of exposure; spectrum of undesirable effects; interaction and tolerance; biotransformation and mechanisms of toxicity  
Evaluation of toxicity: risk vs. benefit: experimental design and evaluation: prospective and retrospective studies: Controls: Statistics (descriptive, inferential): animal models as predictors of human toxicity

**Unit II Natural toxins in food (09 Lectures)**

Natural toxins of importance in food-toxins of plant and animal origin; microbial toxins (e.g., bacterial toxins, fungal toxins and Algal toxins), natural occurrence, toxicity and significance, determination of toxicants in foods and their management

**Unit III Food allergies and sensitivities (09 Lectures)**

Food allergies and sensitivities: natural sources and chemistry of food allergens; true/untrue food allergies; handling of food allergies; food sensitivities (anaphylactoid reactions, metabolic food disorders and idiosyncratic reactions); Safety of genetically modified food: potential toxicity and allergenicity of GM foods. Safety of children consumables.

**Unit IV Environmental contaminants and drug residues in food****(09 Lectures)**

Fungicide and pesticide residues in foods; heavy metal and their health impacts; use of veterinary drugs (e.g., Malachite green in fish and  $\beta$ -agonists in pork); other contaminants in food, radioactive contamination of food, Food adulteration and potential toxicity of food adulterants.

**Books**

1. Helferich, W., and Winter, C.K “Food Toxicology”,. CRC Press, LLC. Boca Raton, FL. 2007.
2. Shibamoto, T., and Bjeldanes, L. “Introduction to Food Toxicology”, 2009, 2ndEdition. Elsevier Inc., Burlington, MA.
3. Watson, D.H. “Natural Toxicants in Food”, CRC Press, LLC. Boca Raton, FL1998.
4. Duffus, J.H., and Worth, H.G. J. “Fundamental Toxicology”, The Royal Society of Chemistry. 2006.
5. Stine, K.E., and Brown, T.M. “Principles of Toxicology”, 2ndEdition. CRC Press. 2006.
6. Tönu, P. “Principles of Food Toxicology”. CRC Press, LLC. Boca Raton, FL. 2007.

**SEMESTER -I****Paper VI BFST – 106 Food Preservation-I****Unit I Introduction (09 Lectures)**

Definition and scope of Food Science and Technology, historical development of food processing and preservation, general principles of food preservation.

**Unit II Preservation of food by low temperatures (09 Lectures)**

Chilling; considerations relating to storage of foods at chilling temperature, applications and procedures controlled and modified atmosphere storage of foods. Freezing temperature: Freezing process, slow and fast freezing of foods and its consequences, other occurrences associated with freezing of foods. Technological aspects of pre-freezing, freezing, frozen storage and thawing of foods. Calculation of freezing time.

**Unit III Preservation of foods by high temperature (09 Lectures)**

Basic concepts in thermal inactivation of microorganisms-D, z, F values. Heat resistance of microorganisms. Cooking, blanching, pasteurization and sterilization of foods. Extrusion, baking, roasting, frying, dielectric heating, Ohmic, microwave, infrared and radiowave heating. Assessing adequacy of thermal processing of foods, general process of canning of foods, spoilages in canned foods

**Unit IV Chemical preservations (09 Lectures)**

Principles, technological aspects and applications of sugar and salt, antimicrobial agents, biological agent.

**Books**

1. Food Processing Technology: Principles and Practices. P.J. Fellows, Wood head Publishing, Oxford, 3rd edition, 2009.

2. Introduction to Food Process Engineering. Smith, P.G., Springer publ., 2 nd edition, 2011.
3. Introduction to Food Engineering. R.P. Singh, and D.R. Heldman, Elsevier publ., Amsterdam, 5thedition, 2016.
4. Food science. N.N. Potter and J.H. Hotchkiss, Springer publ., 2012.
5. Food Processing: Principles and Applications. H.S. Ramaswamy and M. Marcotte, Taylor and Francis publ., 1 st edition, 2005.
6. Industrial Drying of Foods.C.G.J. Baker, Blackie Academic and Professional, 1997.
7. Food science. B. Srilakshmi, New Age International, 2003.



**SEMESTER I****Paper VII: -BFST – 107 Post Harvest Technology-I****Unit I Importance of Post-Harvest Technology (09 Lectures)**

Importance of post- harvest technology Page, Need for Post-harvest technology Page, Post-Harvest Physiology Page, Preservation and Processing Page, Goals of post-harvest handling Page, Sub -disciplines of post-harvest technology Page, Functioning chain of PHT

**Unit II Structure and Composition of Fruits, Vegetables (09 Lectures)**

Structure of Fruits, and Vegetable, Composition of Fruits and Vegetables

**Unit III Physiology of Horticultural Produce (09 Lectures)**

Physiology of fruits and vegetables, Respiration. Classification of horticultural commodities according to their respiration rate, Factors responsible for the respiration

**Unit IV Biochemistry of Horticultural Produce (09 Lectures)**

Effects of ethylene, Ethylene Biosynthesis, Bio-chemical changes during ripening, Colour development in fruits and vegetables.

**Books**

1. Amalendu Chakraverty, Arun S. Mujumdar, G.S. Vijaya Raghavan and Hosahalli S. Ramaswamy. 2003. Handbook of Post Harvest Technology: Cereals, Fruits, Vegetables, Tea, and Spices. Marcel Dekker, Inc., NY, USA.
2. R.P. Srivastava and Sanjeev Kumar. 2002. Fruit & Vegetable Preservation: Principles and Practices, 3rd Ed. International Book Distribution Co., Delhi.
3. P.H. Pandey. 1997. Post Harvest Technology of Fruits and Vegetables. Saroj Prakashan, Allahabad

**SEMESTER I****Paper VIII BFST – 108 Dairy Technology -I****Unit I Introduction****(05 Lectures)**

Introduction and current status of Milk and milk products in India. Importance and future scope of milk processing plant in the country, rules and regulations for dairy plant establishment

**Unit II Handling and maintenance****(13 Lectures)**

Handling and maintenance of dairy plant equipment Dairy plant operations viz. receiving, separation, clarification, pasteurization, standardization, homogenization, sterilization, storage, transport and distribution of milk

**Unit III Problems****(09 Lectures)**

Problems of milk supply in India, UHT, toned, humanized, fortified, reconstituted and flavored milks. Inplant cleaning system

**Unit IV Scope and functions****(09 Lectures)**

Scope and functioning of milk supply schemes and various national and international organizations, Specifications and standards in milk processing industry, Dairy plant sanitation and waste disposal.

**Books**

1. Sukumar De. Outlines of Dairy Technology Oxford publication
2. Dr. S. S. Bhutkar Textbook of Technology of Milk & Milk Products, Agricos Publications

3. Dr. S. S. Bhutkar Practical Manual of Technology of Milk & Milk Products, Agricos Publications

4. J. G. Davis Milk testing a laboratory control of milk Agribios India.

**SEMESTER I**  
**Paper IX AECC I English –I**

**Unit I Use of English in Business Environment Topics**

Business Vocabulary: Vocabulary for banking, marketing and for maintaining public relations. What is a sentence? Elements of a sentence Types of sentences: Simple, compound, complex

**Unit II Writing a Letter of Application and CV/Resume Topics**

Structure of a letter of application for various posts CV/ Resume and its essentials.

**Unit III Presenting Information/Data Topics**

Presenting information/data using graphics like tables, pie charts, tree diagrams, bar diagrams, graphs, flowcharts.

**Unit IV Interview Technique**

Dos and don'ts of an interview preparing for an interview Presenting documents  
Language used in an interview

**Books**

1. Herekar, Prakash. Business Communication. Pune: Mehta Publications, 2007
2. Herekar, Prakash. Principals of Business Communication. Pune: Mehta Publications, 2003.

3. Pardeshi, P.C. Managerial Communication. Pune: Nirali Prakashan, 2008
4. Pradhan, N.S. Business Communication. Mumbai: Himalaya Publishing House, 2005
5. Rai, Urmila & S. M. Rai. Business Communication. Himalaya Publishing House, 2007
6. Sethi, Anjanee & Bhavana Adhikari. Business Communication. New Delhi: Tata McGraw Hill Tickoo, Champa & Jaya Sasikumar. Writing with a Purpose. New York: OUP, 1979
7. Sonie, Subhash C. Mastering the Art of Effective Business Communication. New Delhi: Student Aid Publication, 2008.

**SEMESTER I**  
**Lab I BSFP 110 Food Chemistry–I and Human Nutrition-I**

**Food Chemistry – I**

1. Qualitative tests for carbohydrates, lipids, amino acids, and proteins in food samples
2. To study some simple tests to identify the presence of oils and fats in the given sample
3. To determine adulteration carbohydrates, fat, oils and proteins in food sample
4. To determine moisture content of food sample
5. Determination of Melting point of fats and oils
6. Determination of ash in a given food sample.

**Human Nutrition-I**

1. Role of dietitian /nutritionist in diet counseling.
2. Food exchange list.
3. Diet plans for Athletes, Wrestler, Badminton Plyer, Cricketer and Chess Player
4. Diet plan to weight loss and weight gain.
5. Formulation and preparation of low cost and medium cost nutritious/ supplementary recipe.
6. Formulation and demonstration of nutrition education tools such as charts, posters and models related to health and nutrition education

**SEMESTER I**  
**Lab I BSFP 111 Chemistry-I and Food Microbiology-I**

**Chemistry-I**

1. Prepare dilute solutions of given concentrations of hydrochloric acid, sulphuric acid and nitric acid from their stock solution.
2. Preparation of standard solutions
3. Preparation of standard solution of 0.1N potassium dichromate and determination of strength of ferrous ammonium sulphate solution in normal terms & kg/dm<sup>3</sup>.
4. Determination of acidity in commercial vinegar using NaOH.
5. Determination of pH
6. Study the pH change by common ion effect in case of weak acids and weak bases using universal indicator solution or pH paper.

**Food Microbiology- I**

1. Introduction to the Basic Microbiology Laboratory Practices.
2. To study preparation of cotton plug for flasks and tubes.
3. To study wrapping of plates and pipettes.
4. To study use and care of compound microscope.
5. Study of laboratory equipment's- Autoclave, incubator, hot air oven, weighing balance.
6. To study preparation of slant, stab and plates using nutrient agar.

**SEMESTER I**  
**Lab I BSFP 112 Food Toxicology-I and Food Preservation-I**

**Food Toxicology- I**

1. Evaluation of GRAS aspect of food additives.
2. Study of E numbers for different food additives.
3. Qualitative analysis of benzoic acid in food sample.
4. Qualitative analysis of Sulphur dioxide in food sample.
5. Identification of Natural Colors- Caramel.
6. Identification of Natural Colors- Turmeric (curcumin).

**Food preservation- I**

1. Study different preservation methods of foods and vegetables
2. Use of additives (according to GRAS) in fruits, vegetables, milk and meat products.
3. Study the different preservatives.
4. Study the concept of shelf life of different foods.
5. Study the concept of Asepsis and sterilization.
6. Study preservation of food by dehydration and freezing method.



**SEMESTER I****Lab I BSFP 113 Post-Harvest Technology-I and Dairy Technology-I****Post-Harvest Technology-I**

1. Determination of Total Soluble Solids (TSS)
2. Physico-chemical evaluation of stored grains.
3. Determination of moisture content of cereal grains.
4. Determination of ash content of cereal grains.
5. Determination of starch content in cereal grains.
6. Determination of amylose content from rice.

**Dairy Technology-I**

1. Sampling and analysis of milk – Sp. gravity, physico- chemical properties and composition.
2. DMC and DYC reduction tests, presence of adulterants and preservatives.
3. Standardization of milk for markets.
4. Clarification and separation of milk.
5. Heat processing of milk – Pasteurization Sterilization.
6. Visit to Dairy plant.

**SEMESTER II****Paper I BFST – 201 Food Chemistry- II****Unit I Food groups (09 lectures)**

Basic 4, 5&7 food groups. Functional food groups-energy yielding, body building and protective foods (only sources and not properties and functions). Food Pyramid, My Plate. Study of various cooking methods - Boiling, steaming, stewing, frying, baking, roasting, broiling, cooking under pressure.

**Unit II Pulses and grams (09 lectures)**

Varieties of pulses & grams, composition, nutritive value, cooking quality of pulses, germination and its effect. Vegetables - Classification, composition, nutritive value, selection and preparation for cooking, methods and principle involved in cooking. Fruits - Composition, nutritive value, changes during ripening, methods and effects of cooking.

**Unit III Beverages (09 lectures)**

Classification, nutritive value, Milk based beverages- methods of preparing tea and coffee, fruit-based beverages and preparation of carbonated non – alcoholic beverages. Spices and Condiments - Uses and abuses. Fats and Oils - Types of oils, function of fats and oils, shortening effects of oil, smoking point of oil, factors affecting absorption of oil.

**Unit IV Meat & marine Science (09 lectures)**

Structure, composition, nutritive value, selection of meat, post mortem changes in meat, aging, tenderness, methods of cooking meat and their effects. Poultry – types, composition, nutritive value, selection, methods of cooking. Fish - Structure, composition, nutritive value, selection of fish, methods of cooking and effects.

**Books**

1. John W. Brady. 2013. Introductory Food Chemistry. Comstock Publishing Associates, Cornell University Press, Ithaca, USA.
2. H.-D. Belitz, W. Grosch and P. Schieberle. 2009. Food Chemistry, 4th Ed. Springer-Verlag Berlin Heidelberg.
3. Owen R, Fennema. 1996. Food Chemistry, 3rd Ed. Marcel Dekker, Inc., New York, USA.
4. L. H. Meyer. 1974. Food Chemistry. The AVI Publishing Co Inc., Connecticut, MA, USA.

**SEMESTER II**  
**Theory Paper II BFST – 202 Human Nutrition- II**

**Unit I Basic Principles of Meal Planning** **(09 lectures)**

Basic Principles & factors to be consider while planning menu for different age groups, My Plate. Recommended dietary allowances-RDA for Indians, basis for requirement of energy allowance for different growth pattern of children, energy allowance for various activities.

**Unit II Nutritional Needs during Pregnancy** **(09 lectures)**

Stages of pregnancy Normal growth and weight change, complications, Nutritional requirements, & meal planning. Nutritional needs during Lactation - physiology of lactation, hormonal control, nutritional components of colostrum and mature milk. Nutritional requirements of lactating women. Meal planning.

**Unit III Nutrition during Infancy** **(09 lectures)**

Growth and development, factors influencing growth, difference between breast feeding and bottle feeding, factors to be considered in bottle feeding, different types of milk formulae available commercially. Weaning Foods – Preparation of Weaning foods, commercially & by other organizations. Uses of growth chart to monitor growth & development. Nutritional requirements of infants” upto one year. Problems of feeding in normal and premature infants.

**Unit: IV Nutritional needs of children** **(09 lectures)**

Nutritional requirements of toddlers & school going children. Factors to be considered while planning meals for pre-school children. Eating problems of children and their management, packed lunch.

**BOOKS**

1. Gaile Moe, Danita Kelley, Jacqueline Berning and Carol Byrd-Bredbenner. 2013. Wardlaw's Perspectives in Nutrition: A Functional Approach. McGraw-Hill, Inc., NY, USA.
2. Carolyn D. Berdanier, Elaine B. Feldman and Johanna Dwyer. 2008. Handbook of Nutrition and Food, 2nd Ed. CRC Press, Boca Raton, FL, USA.
3. Jeremy M. Berg, John L. Tymoczko, Lubert Stryer and Gregory J. Gatto, Jr. 2002. Biochemistry, 7th Ed. W.H. Freeman and Company, NY, USA.

**SEMESTER - II****Theory Paper III BFST – 203 Chemistry- II****Unit I General Chemical methods (09 lectures)**

Metals General methods of extraction of metals. Types of ores. Methods of ore dressing. Reduction methods, electrical methods, types of refining Van Arkel Zone refining.

**Unit II Aromatic compounds (09 lectures)**

Electrophilic substitution in benzene- Mechanism of nitration, halogenation, alkylation, acylation, sulphonation, Preparation and properties of naphthalene. Heterocyclics: Preparation and properties of furan, thiophene, pyrrole and pyridine.

**Unit III Amino Acids (09 lectures)**

Classification, preparation and properties, preparation of peptides. Classification of proteins by physical properties and by biological functions. Carbohydrates: classification, preparation and properties of glucose and fructose. Discussion of open chain ring structures of glucose and fructose.

**Unit IV Energetics (09 lectures)**

Definition of first law thermodynamics. Types of systems. Reversible, irreversible. Isothermal and adiabatic processes. Spontaneous processes, Joule Thomson effect. Enthalpy, bond energy. Need for the second law. Carnot cycle and Carnot theorem. Entropy and its significance. Free energy change.

**Books**

- 1 John W. Brady. 2013. Introductory Food Chemistry. Comstock Publishing Associates, Cornell University Press, Ithaca, USA

2. H.-D. Belitz, W. Grosch and P. Schieberle. 2009. Food Chemisry, 4th Ed. Springer-Verlag Berlin Heidelberg
3. Owen R, Fennema. 1996. Food Chemistry, 3rd Ed. Marcel Dekker, Inc., New York, USA
4. Lillian Hoagland Meyer. 1974. Food Chemistry. The AVI Publishing Co Inc., Connecticut, MA, USA

**SEMESTER - II****Theory Paper IVBFST – 204 Food Microbiology II****Unit I Basic Food Microbiology (09 lectures)**

Brief history of food microbiology and introduction to important microorganisms in foods. Cultivation of microorganisms, Nutritional requirements of microorganisms, types of media used, methods of isolation.

**Unit II: Sterilization and Disinfections (09 lectures)**

Primary sources of microorganisms in foods, physical and chemical methods used in the destruction of microorganism in foods:

**Unit III: Fundamentals of Control of Microorganisms (09 lectures)**

Fundamentals of control of microorganism in foods: Extrinsic and intrinsic parameters affecting growth and survival of microbes' use of high and low temperature, dehydration, freezing, freeze-drying, irradiation and preservatives in food preservation.

**Unit IV: Food Spoilage (09 lectures)**

Contamination and microorganisms in the spoilage of different kinds of foods and such as cereal and cereal products, vegetable and fruits, fish and other sea foods, meat and meat products, eggs and poultry, milk and products, canned foods.

**Books**

1. Martin R. Adams and Maurice O. Moss. 2008. Food Microbiology, 3rd Ed., The Royal Society of Chemistry, Cambridge, UK.



2. James M. Jay. 2000. Modern Food Microbiology, 6th Ed. Aspen Publishers, Inc., Gaithersburg, Maryland, USA.
3. George J. Banwart. 1989. Basic Food Microbiology, 2nd Ed. Chapman & Hall, New York, USA.
4. William C. Frazier and & Dennis C. West off. 1987. Food Microbiology, 4th Ed. Tata McGraw Hill Education, New Delhi.

**SEMESTER - II****Theory Paper V BFST – 205 Food Toxicology II****Unit I Introduction to food toxicology (09 lectures)**

Classification, dose, determination toxins in food, naturally occurring toxins from animals, bacterial and fungal and sea food sources, Food additives as toxicants: artificial colors, preservatives, sweeteners; toxicants formed during food processing such as nitrosamines, maillard reaction products acrylamide, benzene, heterocyclic amines and aromatic hydrocarbons and irradiation

**Unit II Agricultural and industrial contaminants in foods (09 lectures)**

Pesticides residues in fruits and vegetables metal contaminants in foods and their toxicity in human body; animal drug residues in food and water, dioxins and related compounds in food; metals such as lead, arsenic and mercury

**Unit III Introduction: types of waste generated (09 lectures)**

Non-degradable wastes; food industrial wastes from fruit and vegetable processing industry, fish, meat and poultry and dairy industry, Utilization of waste: methods of utilizing wastes to make value added products; pectin, food colorants, antioxidants from fruit peels (citrus, mango, pomegranate), lycopene from tomato peels, enzymes from meat processing.

**Unit IV General principle of biodegradation (09 lectures)**

Biodegradation, biotransformation of industrial waste, Solid waste storage and disposal methods- land-filling, burial, incineration, recycling; standards for disposal of wastewater; physical wastewater treatment i.e. screening, racks, adsorption,

sedimentation; chemical wastewater treatment i.e. adsorption, chemical precipitation, flocculation, oxidation process; biological wastewater treatment i.e. anaerobic process

### Books

1. Helderich, W., and Winter, C.K “Food Toxicology”,. CRC Press, LLC. Boca Raton, FL. 2007.
2. Shibamoto, T., and Bjeldanes, L. “Introduction to Food Toxicology”, 2009, 2ndEdition. Elsevier Inc., Burlington, MA.
3. Watson, D.H. “Natural Toxicants in Food”, CRC Press, LLC. Boca Raton, FL1998.
4. Duffus, J.H., and Worth, H.G. J. “Fundamental Toxicology”, The Royal Society of Chemistry. 2006.
5. Stine, K.E., and Brown, T.M. “Principles of Toxicology”, 2ndEdition. CRC Press. 2006.
6. Tönu, P. “Principles of Food Toxicology”. CRC Press, LLC. Boca Raton, FL. 2007.

**SEMESTER - II****Paper VI BFST – 206 Food Preservation- II****Unit I Preservation by water removal (09 lectures)**

Drying of various foods, water activity and its effect on the keeping quality, sorption isotherms and their use. Characteristics of food substances related to their dehydration behaviors, drying phenomenon, factors affecting rate of drying, methods of drying of various food products, type of driers and their suitability for different foods; intermediate moisture foods.

**Unit II Preservation by irradiations (09 lectures)**

Isotopes and electron-based radiations, units and doses, effect on microorganisms and different nutrients; dose requirements for radiation preservation of foods, safe limits, irradiation mechanism and survival curve, irradiation of packaging materials.

**Unit III Hurdle technology (09 lectures)**

Hurdle technology definition and applications. Effects of various food processing operations on the nutritive value of foods

**Unit IV Advance processing (09 lectures)**

Aseptic Processing, Pulsed electric fields, Membrane processing, reverse osmosis, microfiltration, ultra filtration, dialysis.

**Books**

1. Food Processing Technology: Principles and Practices. P.J. Fellows, Woodhead Publishing, Oxford, 3rd edition, 2009

2. Food Processing: Principles and Applications. H.S. Ramaswamy and M.Marcotte, Taylor and Francis publ., 1 st edition, 2005.
3. Food science. B. Srilakshmi, New Age International, 2003
4. Food science. N.N. Potter and J.H. Hotchkiss, Springer publ., 2012
5. Industrial Drying of Foods. C.G.J. Baker, Blackie Academic and Professional, 1997
6. Introduction to Food Engineering. R.P. Singh, and D.R. Heldman, Elsevier publ., Amsterdam, 5th edition, 2016
7. Introduction to Food Process Engineering. Smith, P.G., Springer publ., 2 nd edition, 2011

**SEMESTER - II****Paper VII BFST – 207 Post-Harvest Technology-II****Unit I Judging Maturity in Horticultural Produce (09 lectures)**

Judging Maturity in Horticultural Produce Page, Computational methods Page, Physical methods Page, Chemical methods Page, Physiological maturity Page, Harvesting Page, Harvesting methods-Manual methods Page, Mechanical harvesting Page, Necessary care during Harvesting Page.

**Unit II Post- harvest treatments on horticultural produce (09 lectures)**

Introduction, post-harvest treatments, Pre-cooling :Pre-cooling, Types of Pre-cooling, Precautions to increase pre cooling efficiency ,Cleaning Washing, Dressing and Water spray, Introduction, Cleaning, Washing, Page, Sorting.

**Unit III Post- harvest treatments I (09 lectures)**

High temperature – Curing / Drying / Hot water treatments / Vapour heat treatment Degreening, Curing, Drying, Hot water treatments, Vapour heat treatment, Degreening Chemical treatment- Disinfestation ,Introduction, Disinfestation Page Methods of disinfestation, Post-harvest diseases of fruits, Chemicals used to control spoilage, Post-harvest pests.

**Unit IV Post- harvest treatments II (09 lectures)**

Sprout Suppressants, Introduction Page, Physiological basis for sprouting, Methods of sprout suppression, Mineral Application, Chemical used to extend the shelf life and quality, Fruit coating Waxing, Wax Coating , Fruit coating , Fruits suitable for waxing

,Types of Waxing, Commercial waxes, Methods of wax application ,Concentration of wax.

### **Books**

1. Amalendu Chakraverty, Arun S. Mujumdar, G.S. Vijaya Raghavan and Hosahalli S. Ramaswamy. 2003. Handbook of Post Harvest Technology: Cereals, Fruits, Vegetables, Tea, and Spices. Marcel Dekker, Inc., NY, USA.
2. R.P. Srivastava and Sanjeev Kumar. 2002. Fruit & Vegetable Preservation: Principles and Practices, 3rd Ed. International Book Distribution Co., Delhi.
3. P.H. Pandey. 1997. Post Harvest Technology of Fruits and Vegetables. Saroj Prakashan, Allahabad

**SEMESTER – II****Paper VIII BFST – 208 Dairy Technology- II****Unit I Fermented Milk (09 lectures)**

Technology of fermented milks Introduction and Preparation of starter culture, Introduction and Preparation of dahi, Introduction and Preparation of yoghurt, Introduction and Preparation of shrikhand)

**Unit II Milk products processing (09 lectures)**

Milk products processing viz. cream, butter, ghee, cheese, condensed milk, evaporated milk, whole and skimmed milk powder ice-cream, butter oil, khoa, channa, paneer and similar products.

**Unit III Judging and grading (09 lectures)**

Judging and grading of different milk products Cheese spreads by spray and roller drying techniques, EMC (Enzyme modified cheese)

**Unit IV Enzymes in dairy processing (09 lectures)**

Enzymes in dairy processing and sanitization viz. selection and use of dairy cleaner and sanitizer

**Books**

1. J. David Technological Advances in Indigenous Milk Products Jain Publication
2. S. S. Bhutkar Practical Manual of Technology of Milk & Milk Products, Agricos Publications



3. S. S. Bhutkar Textbook of Technology of Milk & Milk Products, Agricos Publications
4. Sukumar De. Outlines of Dairy technology Oxford publication

**SEMESTER – II****Paper IX AECC English II****Unit I Group Discussion (09 lectures)**

Preparing for a Group, Discussion Initiating a Discussion, Eliciting Opinions, Views, Expressing Agreement/ Disagreement Making Suggestions; Accepting and Declining Suggestions Summing up

**Unit II Business Correspondence (09 lectures)**

Writing Memos, emails, complaints, inquiries, etc Inviting Quotations Placing Orders, Tenders

**Unit III English for Negotiation (09 lectures)**

Business Negotiations Agenda for Negotiation Stages of Negotiation

**Unit 4: English for Marketing (09 lectures)**

Describing/Explaining a Product/Service Promotion of a Product Dealing/ bargaining with Customers Marketing a Product/Service: Using Pamphlets, Hoardings, Advertisement, Public Function/Festival

**Books:**

1. Herekar, Prakash. Business Communication. Pune: Mehta Publications, 2007
2. Herekar, Prakash. Principals of Business Communication. Pune: Mehta Publications,
3. John, David. Group Discussions. New Delhi: Arihant Publications
4. Kumar, Varinder. Business Communication. New Delhi: Kalyani Publishers, 2000

5. Pardeshi, P.C. Managerial Communication. Pune: Nirali Prakashan, 2008
6. Pradhan, N. S. Business Communication. Mumbai: Himalaya Publishing House, 2005
7. Rai, Urmila & S. M. Rai. Business Communication. Mumbai: Himalaya Publishing House, 2007
8. Sethi, Anjanae & Bhavana Adhikari. Business Communication. New Delhi: Tata McGraw Hill
9. Sonie, Subhash C. Mastering the Art of Effective Business Communication. New Delhi: Student Aid Publication, 2008. Tickoo, Champa & Jaya Sasikumar. Writing with a Purpose. New York: OUP, 1979.
10. Whitehead, Jeffrey & David H. White head. Business Correspondence. Allahabad: Wheeler publishing, 1996

**SEMESTER II**  
**Lab V BSFP 210 Food Chemistry–II and Human Nutrition-II**

**Food Chemistry – II**

1. Extraction and estimation of total sugars from food products
2. Estimation of crude fat contents of foods by Soxhlet method
3. Estimation of total Nitrogen of foods by Micro Kjeldahl methods
4. Separation of amino acids by column chromatography
5. Estimate the quantity of Vitamin A in food sample
6. Estimate the quantity of ascorbic acid by Titration method in food sample

**Human Nutrition-II**

1. Detection of nutritional biomarkers in body fluids.
2. Assessment of nutritional status of different age group using anthropometric tools.
3. Diet plan for different age groups.
4. Analysis of anti-nutrients in food.
5. Assessment of Protein quality of Dishes and meals by various indices- NDp Cal% and PDCAAS.
6. Blood glucose estimation

**SEMESTER II**  
**Lab I BSFP 211 Chemistry-II and Food Microbiology-II**

**Chemistry-II**

1. Determination of relative strength of acids.
2. Hardness of water.
3. Alkalinity of antacid.
4. Estimation of acetone.
5. Estimation of Vitamin C.
6. Identification of pigments in a given food sample

**Food Microbiology-II**

1. Simple staining
2. Negative staining
3. Microbial examination of different food materials
4. Isolation of bacteria by streak plate/spread plate technique
5. Isolation and detection of mold from bread
6. Detection of biomolecules- Carbohydrates and proteins

**SEMESTER II****Lab I BSFP 212 Food Toxicology-II and Food Preservation-II****Food Toxicology- II**

1. Identification of Gums in food.
2. Qualitative test for presence of non-nutritive sweetener- Cyclamate.
3. Determination of hardness of water
4. Determination of physico-chemical parameters of water
5. Evaluation of GRAS food additives used in different food products
6. Testing of antimicrobial agents.

**Food Preservation-II**

1. Perform pasteurization of fluids using different methods.
2. Drying of foods using different methods.
3. Cut – out analysis of canned foods.
4. Preservation of food by canning
5. Preparation of Amla Candy.
6. Principle and working of blanching process.
7. Clarification of fruit juices.

**SEMESTER II****Lab I BSFP 213 Post-Harvest Technology-II and Dairy Technology-II****Post-Harvest Technology-II**

1. Estimation of Ascorbic acid from fresh and dehydrated material.
2. Pre cooling packing methods for export or international trade.
3. Preservation by drying and dehydration.
4. Methods and equipment's of freeze drying.
5. Preparation of Jam, jellies, Marmalade
6. Preparation of pickle

**Dairy Technology-II**

1. Preparation of butter and Ghee
2. Preparation of Ice-cream
3. Preparation of dahi, shrikhand and lassi
4. Preparation of khoa and khoa based sweets
5. Preparation of channa, paneer and channa based sweets
6. Visit to Dairy plant.

