SHIVAJI UNIVERSITY, KOLHAPUR.

Accredited By NAAC with 'A' Grade

Revised Syllabus For

B.Sc Part-I

Food Science and Technology (Entire)

CBCS PATTERN

Syllabus to be implemented from

June, 2020 onwards.

Structure of Program and list of courses are as follows:

(i)Structure of B.Sc. Food science and Technology

(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-FST-A1	2	5	4	2	4	3.2	2	50			PRACTICAL EXAMINATION IS ANNUAL				
2	DSC-FST-A2	2						2	50	100	35					
3	DSC-FST-A3	2	5	4	2	4	3.2	2	50							
4	DSC-FST-A4	2						2	50	100	35					
5	DSC-FST-A5	2	5	4	2	4	3.2	2	50							
6	DSC-FST-A6	2						2	50	100	35					
7	DSC-FST-A7	2	5	4	2	4	3.2	2	50							
8	DSC-FST-A8	2						2	50	100	35					
9	AECC-A	2	4	3.2	-----	-----	-----	2	50	50	18					
	TOTAL	18	24	19.2	8	16	12.8	------		450						

SEMESTER-II (Duration – 6 Months)																
1	DSC-FST-B1	2	5	4	2	4	3.2	2	50			as per BOS Guidelines				
2	DSC-FST-B2	2						2	50	100	35					
3	DSC-FST-B3	2	5	4	2	4	3.2	2	50							
4	DSC-FST-B4	2						2	50	100	35					
5	DSC-FST-B5	2	5	4	2	4	3.2	2	50							
6	DSC-FST-B6	2						2	50	100	35					
7	DSC-FST-B7	2	5	4	2	4	3.2	2	50							
8	DSC-FST-B8	2						2	50	100	35					
9	AECC-B	2	4	3.2	-----	-----	-----	2	50	50	18					
	TOTAL	**18**	**24**	**19.2**	**8**	**16**	**12.8**	------		**450**					**200**	
	GRAND TOTAL	**36**	**48**	**38.4**	**16**	**32**	**25.6**	------		**900**						

Student contact hours per week: 32 hours (Min)	Total marks for B.Sc-I (including English): 1100
Theory and Practical lectures: 48 minutes each	Total credits for B.Sc I (Semester I & II): **52**

DSC – Discipline specific core course: All papers are compulsory

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

Practical Examination will be conducted annually for 50 marks per course(Subject).

There shall be separate passing for theory & Practical courses.

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

(B)Non Credit Self Study Course: Skill Development Courses(SDC)
For Sem II : SDC – I: Anyone From Following (i) to (v)

i) Business Communication & Presentation. ii)Event Management iii)Personality development iv)Yoga & Physical management v) Resume, Report & proposal writing.

(ii)Structure of B.Sc. Food science and Technology

(Entire) Programme Sem III & IV

Structure -II

SEMESTER-III (Duration – 6 Months)																
Sr no	Course(subject) Title	TEACHING SCHEME						EXAMINATION SCHEME								
		THEORY			PRACTICAL			THEORY				PRACTICAL				
		Credits	No. of lectures	Hours	Credits	No. of lectures	Hours	Hours	Max	total marks	min	hours	max	min		
1	DSC-FST-C1	2	3	2.4	4	8	6.4	2	50			PRACTICAL EXAMINATION IS ANNUAL				
2	DSC-FST-C2	2	3	2.4				2	50	100	35					
3	DSC-FST-C3	2	3	2.4	4	8	6.4	2	50							
4	DSC-FST-C4	2	3	2.4				2	50	100	35					
5	DSC-FST-C5	2	3	2.4	4	8	6.4	2	50							
6	DSC-FST-C6	2	3	2.4				2	50	100	35					
7	AECC-C	4	4	3.2	-----	-----	-----	----	----	----	----					
	TOTAL	16	22	17.6	12	24	19.2	------		300						

SEMESTER-IV (Duration – 6 Months)																
1	DSC-FST-D1	2	5	4	2	4	3.2	2	50	100	35	as per BOS Guidelines	100	35		
2	DSC-FST-D2	2						2	50							
3	DSC-FST-D3	2	5	4	2	4	3.2	2	50	100	35		100	35		
4	DSC-FST-D4	2						2	50							
5	DSC-FST-D5	2	5	4	2	4	3.2	2	50	100	35		100	35		
6	DSC-FST-D6	2						2	50							
7	AECC-C	----	----	----	-----	-----	-----	3	70	100	25	----	----	----		
	AECC-D								30		10					
	TOTAL	**12**	**18**	**14.4**	**12**	**24**	**19.2**	------		**400**	----	----				
	GRAND TOTAL	**28**	**40**	**32**	**24**	**48**	**38.4**	------		**700**	----	----	300			

Student contact hours per week: 32 hours (Min)	Total marks for B.Sc-II (including EVS): 1000
Theory and Practical lectures: 48 minutes each	Total credits for B.Sc II (Semester III & IV): **52**
DSC – Discipline specific core course: All papers are compulsory	
AECC – Ability Enhancement Compulsory Course(C) : Environmental Studies: EVS(Theory- 70 & Project- 30 marks)	
Practical Examination will be conducted annually for 100 marks per course(Subject).	
There Shall Be Separate Passing For Theory & Practical Courses. Also For Environmental Studies.	

(iii)Structure of B.Sc. Food science and Technology

(Entire) Programme Sem V& VI

Structure -III

SEMESTER-V (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	Theory	internal	min marks	hours	max marks	min marks	
1	DSC-FST-E1	2	3	2.4	2	5	4	2	40	10	14+4=18	PRACTICAL EXAMINATION IS ANNUAL			
2	DSC-FST-E2	2	3	2.4	2	5	4	2	40	10	14+4=18				
3	DSC-FST-E3	2	3	2.4	2	5	4	2	40	10	14+4=18				
4	DSC-FST-E4	2	3	2.4	2	5	4	2	40	10	14+4=18				
5	AECC-E	2	4	3.2	----	-----	-----	2	40	10	14+4=18				
	TOTAL	10	16	12.8	8	20	16		200	50	----				

SEMESTER-VI (Duration – 6 Months)															
1	DSC-FST-F1	2	3	2.4	2	5	4	2	40	10	14+4=18	as per BOS Guidelines	50	18	
2	DSC-FST-F2	2	3	2.4	2	5	4	2	40	10	14+4=18		50	18	
3	DSC-FST-F3	2	3	2.4	2	5	4	2	40	10	14+4=18		50	18	
4	DSC-FST-F4	2	3	2.4	2	5	4	2	40	10	14+4=18		50	18	
5	AECC-F	2	4	3.2	-----	-----	-----	2	40	10	14+4=18	----	----	----	
	TOTAL	**10**	**16**	**12.8**	**8**	**20**	**16**		**200**	**50**	----	----			
	GRAND TOTAL	**20**	**32**	**25.6**	**16**	**40**	**32**		**400**	**100**	----	----	200		

Student contact hours per week: 32 hours (Min)	Total marks for B.Sc-III (including English): 700
Theory and Practical lectures: 48 minutes each	Total credits for B.Sc III (Semester V & VI): **36**

DSE – Discipline specific elective: All papers are compulsory

AECC – Ability Enhancement Compulsory Course(E & F) English

Practical Examination will be conducted annually for 200 marks

There Shall Be Separate Passing For Theory, Internal & Practical.

(A)Non-Credit Self Study Course: Compulsory Civic Course(CCC)
For Sem V: CCC-II: Constitution of India & local self government

(B)Non Credit Self Study Course: Skill Development Courses(SDC)
For Sem VI : SDC – II: Anyone From Following (vi) to (x)
vi) Interview & personal presentation skill, vii) Entrepreneurship development skill, viii) Travel & tourism, ix)E-Banking & financial services, x) RTI & human Right Education(HRE), IPR & Patents.

B. Sc. (Food Science & Technology) (Semester-) (Part-)

EXAMINATION

Subject name

Subject code

Day and date:

Time:

Q1) Select the correct alternatives from given choices. [10]

a)

b)

c)

d)

e)

f)

g)

h)

i)

j)

Q2) Answer the following (any two) **[20]**

a)

b)

c)

Q3) Solve the following (any four) **[20]**

a)

b)

c)

d)

e)

f)

B. Sc. (Food Science & Technology) (Semester-) (Part-)

EXAMINATION

Subject name

Subject code

Day and date:

Time:

Q1) Select the correct alternatives from given choices. [10]

a)

b)

c)

d)

e)

f)

g)

h)

i)

j)

Q2) Answer the following (any two) **[20]**

a)

b)

c)

Q3) Solve the following (any four) **[20]**

a)

b)

c)

d)

e)

f)

Structure of Program and list of courses are as follows:

(i)Structure of B.Sc. Food science and Technology

(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-FST-A1	2	5	4	2	4	3.2	2	50			PRACTICAL EXAMINATION IS ANNUAL				
2	DSC-FST-A2	2						2	50	100	35					
3	DSC-FST-A3	2	5	4	2	4	3.2	2	50							
4	DSC-FST-A4	2						2	50	100	35					
5	DSC-FST-A5	2	5	4	2	4	3.2	2	50							
6	DSC-FST-A6	2						2	50	100	35					
7	DSC-FST-A7	2	5	4	2	4	3.2	2	50							
8	DSC-FST-A8	2						2	50	100	35					
9	AECC-A	2	4	3.2	-----	-----	-----	2	50	50	18					
	TOTAL	18	24	19.2	8	16	12.8	------		450						

SEMESTER-II (Duration – 6 Months)																
1	DSC-FST-B1	2	5	4	2	4	3.2	2	50			as per BOS Guidelines	50	18		
2	DSC-FST-B2	2						2	50	100	35					
3	DSC-FST-B3	2	5	4	2	4	3.2	2	50				50	18		
4	DSC-FST-B4	2						2	50	100	35					
5	DSC-FST-B5	2	5	4	2	4	3.2	2	50				50	18		
6	DSC-FST-B6	2						2	50	100	35					
7	DSC-FST-B7	2	5	4	2	4	3.2	2	50				50	18		
8	DSC-FST-B8	2						2	50	100	35					
9	AECC-B	2	4	3.2	-----	-----	-----	2	50	50	18		200			
	TOTAL	**18**	**24**	**19.2**	**8**	**16**	**12.8**	------		**450**						
	GRAND TOTAL	**36**	**48**	**38.4**	**16**	**32**	**25.6**	------		**900**						

Student contact hours per week: 32 hours (Min)	Total marks for B.Sc-I (including English): 1100
Theory and Practical lectures: 48 minutes each	Total credits for B.Sc I (Semester I & II): **52**
DSC – Discipline specific core course: All papers are compulsory	
AECC – Ability Enhancement Compulsory Course(A & B) - English	
Practical Examination will be conducted annually for 50 marks per course(Subject).	
There shall be separate passing for theory & Practical courses.	
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(B)Non Credit Self Study Course: Skill Development Courses(SDC) For Sem II : SDC – I: Anyone From Following (i) to (v) i) Business Communication & Presentation. ii)Event Management iii)Personality development iv)Yoga & Physical management v) Resume, Report & proposal writing.	

(ii)Structure of B.Sc. Food science and Technology

(Entire) Programme Sem III & IV

Structure -II

SEMESTER-III (Duration – 6 Months)																
Sr no	Course(subject) Title	TEACHING SCHEME						EXAMINATION SCHEME								
		THEORY			PRACTICAL			THEORY				PRACTICAL				
		Credits	No. of lectures	Hours	Credits	No. of lectures	Hours	Hours	Max	total marks	min	hours	max	min		
1	DSC-FST-C1	2	3	2.4	4	8	6.4	2	50	100	35	PRACTICAL EXAMINATION IS ANNUAL				
2	DSC-FST-C2	2	3	2.4				2	50							
3	DSC-FST-C3	2	3	2.4	4	8	6.4	2	50	100	35					
4	DSC-FST-C4	2	3	2.4				2	50							
5	DSC-FST-C5	2	3	2.4	4	8	6.4	2	50	100	35					
6	DSC-FST-C6	2	3	2.4				2	50							
7	AECC-C	4	4	3.2	-----	-----	-----	----	----	----	----					
	TOTAL	16	22	17.6	12	24	19.2	------		300						

SEMESTER-IV (Duration – 6 Months)																
1	DSC-FST-D1	2	5	4	2	4	3.2	2	50	100	35	as per BOS Guidelines	100	35		
2	DSC-FST-D2	2						2	50							
3	DSC-FST-D3	2	5	4	2	4	3.2	2	50	100	35		100	35		
4	DSC-FST-D4	2						2	50							
5	DSC-FST-D5	2	5	4	2	4	3.2	2	50	100	35		100	35		
6	DSC-FST-D6	2						2	50							
7	AECC-C AECC-D	----	----	----	-----	-----	-----	3	70 30	100	25 10	----	----	----		
	TOTAL	**12**	**18**	**14.4**	**12**	**24**	**19.2**	------		**400**	----	----				
	GRAND TOTAL	**28**	**40**	**32**	**24**	**48**	**38.4**	------		**700**	----	----	300			

Student contact hours per week: 32 hours (Min)	Total marks for B.Sc-II (including EVS): 1000
Theory and Practical lectures: 48 minutes each	Total credits for B.Sc II (Semester III & IV): **52**
DSC – Discipline specific core course: All papers are compulsory	
AECC – Ability Enhancement Compulsory Course(C) : Environmental Studies: EVS(Theory- 70 & Project- 30 marks)	
Practical Examination will be conducted annually for 100 marks per course(Subject).	
There Shall Be Separate Passing For Theory & Practical Courses. Also For Environmental Studies.	

(iii)Structure of B.Sc. Food science and Technology

(Entire) Programme Sem V& VI

Structure -III

SEMESTER-V (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	Theory	internal	min marks	hours	max marks	min marks		
1	DSC-FST-E1	2	3	2.4	2	5	4	2	40	10	14+4=18	PRACTICAL EXAMINATION IS ANNUAL				
2	DSC-FST-E2	2	3	2.4	2	5	4	2	40	10	14+4=18					
3	DSC-FST-E3	2	3	2.4	2	5	4	2	40	10	14+4=18					
4	DSC-FST-E4	2	3	2.4	2	5	4	2	40	10	14+4=18					
5	AECC-E	2	4	3.2	----	-----	-----	2	40	10	14+4=18					
	TOTAL	10	16	12.8	8	20	16		200	50	----					

SEMESTER-VI (Duration – 6 Months)														
1	DSC-FST-F1	2	3	2.4	2	5	4	2	40	10	14+4=18	as per BOS Guidelines	50	18
2	DSC-FST-F2	2	3	2.4	2	5	4	2	40	10	14+4=18		50	18
3	DSC-FST-F3	2	3	2.4	2	5	4	2	40	10	14+4=18		50	18
4	DSC-FST-F4	2	3	2.4	2	5	4	2	40	10	14+4=18		50	18
5	AECC-F	2	4	3.2	-----	-----	-----	2	40	10	14+4=18	----	----	----
	TOTAL	**10**	**16**	**12.8**	**8**	**20**	**16**		**200**	**50**	----	----		
	GRAND TOTAL	**20**	**32**	**25.6**	**16**	**40**	**32**		**400**	**100**	----	----	200	

Student contact hours per week: 32 hours (Min)	Total marks for B.Sc-III (including English): 700
Theory and Practical lectures: 48 minutes each	Total credits for B.Sc III (Semester V & VI): 36

DSE – Discipline specific elective: All papers are compulsory

AECC – Ability Enhancement Compulsory Course(E & F) English

Practical Examination will be conducted annually for 200 marks

There Shall Be Separate Passing For Theory, Internal & Practical.

(A)Non-Credit Self Study Course: Compulsory Civic Course(CCC)
For Sem V: CCC-II: Constitution of India & local self government

(B)Non Credit Self Study Course: Skill Development Courses(SDC)
For Sem VI : SDC – II: Anyone From Following (vi) to (x)
vi) Interview & personal presentation skill, vii) Entrepreneurship development skill, viii) Travel & tourism, ix)E-Banking & financial services, x) RTI & human Right Education(HRE), IPR & Patents.

CBCS B.Sc : Food Science & technology(Entire): List of Courses:

i)B.Sc FST Part 1, Sem I & II

Course Code	Name of Course	Course Code	Name of Course
Sem I		Sem II	
DSC FST-A1	Food Chemistry I	DSC FST-B1	Food Biochemistry I
DSC FST-A2	Food Chemistry II	DSC FST-B2	Food Biochemistry II
DSC FST-A3	Food Microbiology I	DSC FST-B3	Dairy Technology I
DSC FST-A4	Food Microbiology II	DSC FST-B4	Dairy Technology II
DSC FST-A5	Principles of Food Preservation I	DSC FST-B5	Human Nutrition I
DSC FST-A6	Principles of Food Preservation II	DSC FST-B6	Human Nutrition II
DSC FST-A7	Human Physiology I	DSC FST-B7	Computer Basics application I
DSC FST-A8	Human Physiology II	DSC FST-B8	Computer Basics application II
AECC-A	English I	AECC-B	English II

Practical

DSC FST-P1	Lab Course I (Based on DSC FST A3 DSC FST A4)	DSC FST-P3	Lab Course III(Based on DSC FST B3 & DSC FST B4)
DSC FST-P2	Lab Course II(Based on DSC FST A1 & DSC FST A2)	DSC FST-P4	Lab Course IV(Based on DSC FST B7 & DSC FST B8)

DSC FST: - Discipline Specific Core Course Food Science & technology

AECC : - Ability Enhancement Compulsory Course : Compulsory English.

ii)B.Sc FST Part 2 Sem III & IV

Course Code	Name of Course	Course Code	Name of Course
Sem III		Sem IV	
DSC FST-C1	Cereal & Legume Technology I	DSC FST-D1	Processing of Fruits & Vegetables I
DSC FST-C2	Cereal & Legume Technology II	DSC FST-D2	Processing of Fruits & Vegetables II
DSC FST-C3	Post Harvest Technology I	DSC FST-D3	Oil Seed & Nuts Technology I
DSC FST-C4	Post Harvest Technology II	DSC FST-D4	Oil Seed & Nuts Technology II
DSC FST-C5	Bakery & Confectionary Technology I	DSC FST-D5	Food Packaging I
DSC FST-C6	Bakery & Confectionary Technology II	DSC FST-D6	Food Packaging II
AECC-C	Environmental Studies(Theory)	AECC-D	Environmental Studies(Project)

Practical

DSC FST-P5	Lab Course V (Based on DSC FST C5 & DSC FST C6)	DSC FST-P7	Lab Course VII(Based on DSC FST D1 & D2)
DSC FST-P6	Lab Course VI(Based on DSC FST C1 & DSC FST C3)		

DSC FST: - Discipline Specific Core Course Food Science & technology

AECC : - Ability Enhancement Compulsory Course : Environmental Studies

iii)B.Sc FST Part 3 Sem V & VI

Course Code	Name of Course	Course Code	Name of Course
Sem V		Sem VI	
DSC FST-E1	Animal Product Technology I	**DSC FST-F1**	Animal Product Technology II
DSC FST-E2	Fermentation Technology I	**DSC FST-F2**	Fermentation Technology II
DSC FST-E3	Food Quality & Safety Management I	**DSC FST-F3**	Food Quality & Safety Management II
DSC FST-E4	Food Additives & Toxicology I	**DSC FST-F4**	Food Additives & Toxicology II
AECC-E	English III	**AECC-F**	English IV

Practical

DSC FST-P8	Lab Course VIII (Based on DSC FST E1 & DSC FST E2)	**DSC FST-P10**	Lab Course X(Based on DSC FST E3 & F3)
DSC FST-P9	Lab Course IX(Based on DSC FST F2 & DSC FST F4)	**DSC FST-P11**	Project

DSC FST: - Discipline Specific Core Course Food Science & technology

Semester I

FOOD CHEMISTRY– Paper I DSC FST –A1

Food Chemistry - I Credits2 (Marks 50) Hours 30, 37.5 lectures of 48 Minutes

Unit I	Hours Allotted
1. Introduction to food chemistry 2. Major and minor food components 3.Chemistry of Carbohydrates • Introduction • Classification • Structure – Monosaccharide's, Disaccharides, Oligosaccharides, Polysaccharides • Physic-chemical properties of carbohydrates • Functions • Sources of carbohydrates • Digestion and absorption of carbohydrates • Dietary fibers • Soluble and insoluble fiber • Role of fibers in human nutrition	15
Unit II	**Hours Allotted**
Chemistry of proteins • Introduction • Physic-chemical properties of amino acids • Protein Structure and classification- primary, secondary, tertiary and quaternary • Functional properties of proteins • Classification of amino acids • Digestion and absorption of proteins • Sources of proteins • Nutritional properties of proteins • Modification of food proteins during processing and storage.	15

References:

- Biochemistry by Dr. U Satyanarayan.
- Textbook of Biochemsitry by Albert Lehninger.
- Food facts and Principles by Shakuntala Manay, M.Shadakshar Swamy.
- Essentials of Food Science by Vicky A Vaclavik, Elizabeth W Christian.
- Food Chemistry I by Fennama.O.R
- Food science by Potter

Semester I

FOOD CHEMISTRY– Paper II DSC FST –A2

Food Chemistry - II Credits2 (Marks 50) Hours 30, 37.5 lectures of 48 Minutes

Unit I	Hours Allotted
Chemistry of Fats • Introduction • Major lipid components- Fatty acids, phospholipids, sphingo lipids, sterols, waxes. • Structure • Classification of Fatty acids • Physico-chemical Properties of lipids • Sources of fats • Digestion & absorption of fats • Cholesterol • Ketone bodies • Functionality of triglycerol in foods(Texture, appearance & flavor) • Chemical Deterioration of lipids(hydrolytic & oxidative reactions) • Food lipids & health	15
Unit II	**Hours Allotted**
Vitamins • Introduction • Addition of nutrients to food • Dietary recommendation • Sources of Vitamins • Bioavailability of Vitamins • Types of Vitamins(Fat soluble & Water soluble vitamins) • Fat soluble vitamins- Vitamin A,D,E,K- sources, functions & dietary Disorders of Vitamins • Water soluble Vitamins Vitamin B Complex, Vitamin C- sources, functions & dietary Disorders of Vitamins. **Minerals** • Introduction • Nutritional aspects of minerals • Bioavailability of minerals	15

• Nutritional aspects of essential minerals(calcium, phosphorous, sodium, potassium, chloride, iron, zinc, iodine, selenium- Sources, Functions & disorders)	

References:

- Food science by Sumati R Mudambi, Shalini M rao, M.V. Rajagopal
- Food science by Potter
- Food Chemistry I by Fennama.O.R
- Food and Nutrition By Swaminathan
- Biochemistry by Dr. U Satyanarayan.
- Textbook of Biochemsitry by Albert Lehninger.

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Semester I

FOOD MICROBIOLOGY– Paper I DSC FST –A3

Food Microbiology - I Credits2 (Marks 50) Hours 30, 37.5 lectures of 48 Minutes

Unit I	Hours Allotted
• **Introduction To Food Microbiology** • Importance Of Food Microbiology • Introduction To Types Of Microorganisms • Morphology Of Microorganisms • Cytology Of Bacteria(Structure Of Typical Bacterial Cells, Structure Of Prokaryotic & Eukaryotic Cells) • Food As A Substrate For Microorganisms • Hydrogen Ion Concentration Ph • Oxidation Reduction Potential • Nutrient Content • Accessory Food Substance Or Vitamins • Inhibitory Substance Or Biological Structure • Combined Effects Of Factors Affecting Growth	15
Unit II	**Hours Allotted**
Microorganism Important In Food Microbiology • Molds • General Characteristics Of Mold • Classification & Identification Of Mold • Yeasts & Yeast Like Fungi • Bacteria • Microbial Nutrition & Types • Control Of Microorganisms	15

References:

- Textbook Of Microbiology By Ananth Narayan & C.K.J. Paniker
- Basics Food Microbiology By George Banwart
- Modern Food Microbiology By William Frazier
- Food Microbiology By M.R Adams & M.O. Mos
- Fundamental Of Food Microbiology By Bibek Ray & Arun Bhunia
- Microbiology By Dr.M.G. Bodhankar, Miss. Trupti Bapat, Mrs. Nivedita Joshi(Phadake Prakashan)

Semester I

FOOD MICROBIOLOGY– Paper II DSC FST –A4

Food Microbiology - II Credits2 (Marks 50) Hours 30, 37.5 Lectures Of 48 Minutes

Unit I	Hours Allotted
General Principles Underline Spoilage: • Chemical Changes Caused By Microorganisms • Fitness Or Unfitness Of Food For Consumption • Causes Of Spoilage • Classification Of Foods By Ease Of Spoilage • Factors Affecting Kinds & Numbers Of Microorganisms In Food • Factors Affecting The Growth Of Microorganisms In Food • Chemical Changes Caused By Microorganisms • Spoilage Of Cereals & Related Products • Spoilage Of Sugar & Confectionary Products • Spoilage Of Fruits & Vegetables • Spoilage Of Meat, Fish & Poultry • Spoilage Of Milk & Milk Products • Spoilage Of Eggs	15
Unit II	**Hours Allotted**
Food Contamination Due To Microorganisms: • Definition, Introduction • Sources Of Contamination From Air • Sources Of Contamination From Water • Sources Of Contamination From Soil • Sources Of Contamination From Sewage • During Handling & Processing • Food Borne Intoxication – Staphylococcus And Botulism • Food Borne Infection – Salmonellosis • Food Borne Toxic Infection – Cholera • Seafood Toxicants – Shellfish Poisoning	15

References:

- Textbook Of Microbiology By Ananth Narayan & C.K.J. Paniker
- Basics Food Microbiology By George Banwart
- Modern Food Microbiology By William Frazier
- Food Microbiology By M.R Adams & M.O. Mos
- Fundamental Of Food Microbiology By Bibek Ray & Arun Bhunia
- Microbiology By Dr.M.G. Bodhankar, Miss. Trupti Bapat, Mrs. Nivedita Joshi(Phadake Prakashan)

Semester I

PRINCIPLES OF FOOD PRESERVATION – Paper I DSC FST –A5

Principles of Food Preservation - I Credits2 (Marks 50) Hours 30, 37.5 Lectures Of 48 Minutes

Unit I	Hours Allotted
Introduction To Food Preservation • Importance Of Food Preservation • Principles Of Food Preservation • Water Activity & Its Significance In Food Preservation • Overview Of Traditional Methods Of Food Preservation • General Principles Of Food Preservation • Methods Of Food Preservation • Asepsis • Removal Of Microorganisms • Maintenance Of Anaerobic Conditions • Natural & Chemical Food Preservatives • Permissible Limits Of Food Preservatives • Safety Accepts Of Food Preservative	15
Unit II	**Hours Allotted**
1)**Food Deterioration** • Microbial Spoilage- Food Enzymes, Insects, Parasites, Rodents • Other Factors Such As Temperature, Moisture, Oxygen & Time 2)**Preservation By High Temperature** • Methods & Advantages • Sun Drying • Solar Drying • Mechanical Dehydration • Merits & Demerits • Factors Affecting Drying	15

• Blanching • Pasteurization • Sterilization • Canning • Extrusion Cooking • Factors Affecting Heat Resistance (Thermal Death Time)	

References:

- Food Science By Potter
- Food Science By Shrilakshmi
- Food Processing & Preservation By G Subbulakshmi, Shobha A Udipi
- Food Processing Technology By P.J.Fellows
- Food Facts And Principles By Shakuntala Manay

Semester I

PRINCIPLES OF FOOD PRESERVATION – Paper II DSC FST –A6

Principles of Food Preservation - II Credits2 (Marks 50) Hours 30, 37.5 Lectures Of 48 Minutes

Unit I	Hours Allotted
1) Preservation By Use Of Low Temperature • Growth Of Microorganism At Low Temperature • Temperature Employed In Low Temperature Storage • Refrigeration (Advantages, Factor Affecting Common Spoilage) • Difference Between Freezing & Refrigeration • Methods Of Freezing(Freeze Drying, Freeze Concentration, Steps Involved In Freezing, Common Food Spoilage & Storage) • Effects Of Sub Freezing And Freezing Temperatures On Microorganisms **2) Preservation By Food Additives** • Definition Of Food Additives • Ideal Antimicrobial Preservative • Added Preservative • Developed Preservative	15
Unit II	**Hours Allotted**
1)Recent Methods For Food Preservation(Radiation) • Dielectric Heating, Ohmic Heating • Infrared Heating • Pulsed Electric Field Process • High Pressure Processing • Processing Using Ultrasound • Hurdle Technology • Ultraviolet Radiation • Ionizing Radiation • Gamma Rays & Cathode Rays • Microwave Processing	15

2)Household Preservation Method • Salt Curing • Oiling • Smoking • Principles • Characteristics • Advantages	

References:

- Food Science By Potter
- Food Science By Shrilakshmi
- Food Processing & Preservation By G Subbulakshmi, Shobha A Udipi
- Food Processing Technology By P.J.Fellows
- Food Facts And Principles By Shakuntala Manay
- Food Microbiology 5th Edition By William Frazier

Semester I

HUMAN PHYSIOLOGY – Paper I DSC FST –A7

Human Physiology - I Credits2 (Marks 50) Hours 30, 37.5 Lectures of 48 Minutes

Unit I	Hours Allotted
1) Cells • Structure, Functions Of Cells • Tissues- Definition, Types, Characteristics, Classification, Functions & Formation • Different Systems Of Body • Axial Skeleton • Appendicular Skeleton Cavities Of The Body 2) Blood • Composition & Functions • Plasma Proteins • Homeostasis • Coagulation Of RBC's • WBC's • Platelets • Anemia • Blood Transfusion & Blood Groups	15
Unit II	**Hours Allotted**
1)Cardiovascular system • Structure Of Heart & Blood Vessels • Properties Of Cardiac Muscles • Functional Tissues • Cardiac Cycle • Heart Rate • Cardiac Output • Blood Pressure • Radial Pulse 2)Respiratory system • Physiological Anatomy Of Respiratory Tract • Mechanism Of Respiration • Transport Of Respiratory Gases In Blood	15

• Gases Exchange In Lungs & Tissues	

References:

- Human Physiology by Chattergee vol I and II
- Textbook of medical physiology by A.C. Guyton.
- Concise medical physiology by Sujit Choudhari.
- Basic clinical physiology by J.H. Green.
- Ross and Wilson`s anatomy and physiology in health and illness by Anne Waugh and Allison Grant
- Physiology by Vijaya Joshi
- Essentials of medical physiology by Sembulingam K

Semester I

HUMAN PHYSIOLOGY – Paper II DSC FST –A8

Human Physiology - II Credits2 (Marks 50) Hours 30, 37.5 Lectures of 48 Minutes

Unit I	Hours Allotted
1) Digestive System • Anatomical Consideration Of The Digestive Tract • Liver, Pancreas • Digestion & Absorption Of Carbohydrate • Digestion & Absorption Of Protein • Digestion & Absorption Of Fat 2) Excretory System • Structure Of Excretory System • Structure Of Kidney • Function Of Kidney • Nephrons • Urine Formation • Composition Of Urine • Micturition	15
Unit II	**Hours Allotted**
1)Endocrinology • Introduction To Endocrinology • Hormones • Pituitary Gland • Thyroid Gland • Parathyroid Gland • Adrenal Gland • Endocrine Functions Of Pancreas 2)Reproductive System • Male & Female Reproductive Organs • Physiology Of Menstruation • Pregnancy And Associated Changes • Plancenta	15

• Mammary Gland • Lactation	

References:

- Human Physiology By Chattergee Vol I And II
- Textbook of Medical Physiology by A.C. Guyton.
- Concise Medical Physiology by Sujit Choudhari.
- Basic Clinical Physiology by J.H. Green.
- Ross And Wilson`S Anatomy And Physiology In Health And Illness By Anne Waugh And Allison Grant
- Physiology By Vijaya Joshi
- Essentials Of Medical Physiology By Sembulingam K

Semester II

FOOD BIOCHEMISTRY – Paper I DSC FST –B1

Food biochemistry- I Credits2 (Marks 50) Hours 30, 37.5 Lectures of 48 Minutes

Unit I	Hours Allotted
1. **Introduction-** definition, importance of Food biochemistry 2. **pH and buffers –** • Ionization Of Water • Weak Acids And Weak Bases • pH Scale 3. **The atom and chemical bonds** • Structure Of An Atom • Nature Of Chemical Bonding • Types Of Chemical Bonding 4. **Enzymes and co-enzymes** • Definition, classification, • Functions • Nomenclature and structure • Co-enzymes and its functions, classification • Mechanism of co-enzymes action • Enzyme kinetics and environmental effects • Enzyme inhibition	15
Unit II	**Hours Allotted**
Carbohydrate metabolism • Central pathway of carbohydrate metabolism: regulatory mechanism, bioenergetics and significance • EMP pathway • HMP shunt • TCA cycle • Glycoxylate cycle • Glycogenolysis • Glyconeogenesis • Glycolysis • Inborn error of carbohydrate metabolism	15

References:

1. Principles off biochemistry by Lehninger
2. Biochemistry by Steryer
3. Principles off biochemistry by Ponald. JVOET
4. Enzyme technology by Anusha Bhaskar , V.G.Vidhya
5. Principals of enzyme technology by M.Y.Khan, Farah Khan.
6. Fundamentals of biochemistry by J.L.Jain, Sunjay Jain, Nitin Jain.

Semester II

FOOD BIOCHEMISTRY – Paper II DSC FST –B2

Food biochemistry- II Credits2 (Marks 50) Hours 30, 37.5 Lectures of 48 Minutes

Unit I	Hours Allotted
1. **Metabolism Of Protein -** • Urea cycle, • Catabolism of amino acid • Transamination, • Deamination • Diseases in protein metabolism. 2. **Nucleic acids** • Introduction, Definition • Types • Base composition • Evolution of Waston-Crick model • Double helical structure • Denaturation and renaturation • Molecular weight, length • DNA- structure, • RNA –structure	15
Unit II	**Hours Allotted**
Metabolism Of Fat And Lipid • Oxidation of fatty acid- catabolism. • Anabolism - biosynthesis of fatty acid: saturated fatty acids • Biosynthesis of unsaturated fatty acids • Biosynthesis of triglycerides • Biosynthesis of phospholipids • Biosynthesis of sterols, • Cholesterol Metabolism • Inborn error in lipid metabolism **Hormones** • Definition, general functions • Types and its functions • Mechanism of hormones	15

References

- Fundamentals of biochemistry by J.L.Jain, Sunjay Jain, Nitin Jain.
- Principles off biochemistry by Lehninger
- Biochemistry by Steryer
- Principles off biochemistry by Ponald. JVOET
- Enzyme technology by Anusha Bhaskar , V.G.Vidhya
- Principals of enzyme technology by M.Y.Khan, Farah Khan.

Semester II

DAIRY TECHNOLOGY – Paper I DSC FST –B3

Dairy Technology – I Credits2 (Marks 50) Hours 30, 37.5 Lectures of 48 Minutes

Unit I	Hours Allotted
1. Introduction To Dairy Industry- • Development of milk processing industry in India-Present status & scope • Sources & composition of milk • Indian standards , Composition, Factors affecting composition of milk • Food and Nutritive value • Physico-chemical properties of Milk • Microbiology of milk • Types of milk – Whole milk, low fat milk, toned milk, double toned milk, fortified milk, flavored milk, spray dried milk. **2. Primary processes-** • Clean milk production • Buying and collection of milk • Cooling and transportation of milk • Action of milk on metals • Manufacture, packaging, and storage of pasteurized milk • Distribution • Cleaning and sanitization of dairy equipments • Judging and grading of milk • Flavour defect in milk, their causes and their prevention • Uses of milk	15
Unit II	**Hours Allotted**
Special milks • Sterilized milk, • Homogenized milk • Soft-curd milk • Flavored milk • Vitaminzed/ irradiated milk • Fermented milk • Standardized milk • Reconstituted / rehydrated milk	

• Recombined milk • Toned milk • Double toned milk	15

References

- Dairy technology by Sukumar de
- Principles of dairy processing by James.N.Warner
- Milk & milk product by Eckles, Combs and macy
- Technology of Indian milk product by Aneja Et Al
- Dairy chemistry & biochemistry by P.F.Fox, P.L.H Mcswenny
- Dairy processing & assurance by R.C.Chandan
- Dairy ingredients for food processing by R.C. Chandan & Arun kilara
- Dairy industry in India current perspective & status by biology Essay(review article)
- Fluid milk industry by Henderson. J.L 1971, AVI Piblication.
- Dairy science and technology 2nd edition, 2006, by Walstra.P, Taylor and Francis.

Semester II

DAIRY TECHNOLOGY – Paper II DSC FST –B4

Dairy Technology – II Credits2 (Marks 50) Hours 30, 37.5 Lectures of 48 Minutes

Unit I	Hours Allotted
1. Cream • Definition, classification, composition • Food and nutritive value, physico - chemical properties • Production process • Manufacture of different types of cream • Judging and grading of cream • Defects of cream, their causes and prevention • Uses of cream 2. Butter • Definition, classification, composition • Food and nutritive value, physico- chemical properties • Production process • method of manufacturing • yield • Judging and grading of table butter • Defects of butter, their causes and prevention • Uses of butter 3. Ghee • Definition, classification, composition • Food and nutritive value, physico- chemical properties • method of manufacturing • anti-oxidants as preservative • Judging and grading of ghee • Defects of ghee, their causes and prevention • Uses of ghee	15
Unit II	Hours Allotted
1. Ice cream • Definition, classification, composition • Food and nutritive value • Role of constituents • Properties of mixture • Method of manufacture, packaging, hardening and	

storage • Soft ice cream • Judging and grading of ice cream • Defects of ice cream, their causes and prevention • Uses of ice cream **2. Cheese** • Definition, classification, composition • Food and nutritive value • Manufacturing of cheddar cheese, curing, freezing, yield • Cottage cheese • Processed cheese • Packaging and storage Judging and grading of cheddar cheese • Defects of ice cheese, their causes and prevention • Uses of ice cheese	15

References

- Dairy technology by Sukumar de
- Principles of dairy processing by James.N.Warner
- Milk & milk product by Eckles, Combs and macy
- Technology of Indian milk product by Aneja Et Al
- Dairy chemistry & biochemistry by P.F.Fox, P.L.H Mcswenny
- Dairy processing & assurance by R.C.Chandan
- Dairy ingredients for food processing by R.C. Chandan & Arun kilara
- Dairy industry in India current perspective & status by biology Essay(review article)
- Fluid milk industry by Henderson. J.L 1971, AVI Piblication.
- Dairy science and technology 2nd edition, 2006, by Walstra.P, Taylor and Francis.

Semester II

HUMAN NUTRITION – Paper I DSC FST –B5

Human Nutrition– I Credits2 (Marks 50) Hours 30, 37.5 Lectures of 48 Minutes

Unit I	Hours Allotted
1)Introduction to Food Nutrition. • Definitions & History. • Nutrition Research in India. • Functions of Food; Physiological, Psychology & Social • Understanding Relationship between Food & Health of People, • Recommended Dietary Allowances (RDA) **2)Nutrients** • Introduction • definition • malnutrition • over nutrition • guidelines for good health • dietetics and its scope **3)Energy** • Units of Energy- Calorie & Joule • Energy Value of Food, • Basal Metabolism- Definition of BMR, Daily BMR Activities • Biological Value of food • Factors Affecting BMR • Energy requirement and its estimation	15
Unit II	**Hours Allotted**
1)Role of Nutrients • Introduction, classification • Carbohydrates, composition, classification, digestion, absorption & metabolism, Functions, sources, requirements of carbohydrates. • Dietary fibre- Definition, sources, role of fibre in human nutrition **2)Proteins-** • composition, classification, digestion, absorption & metabolism, Functions, sources, evaluation of protein, quality, PER, BV & chemical score.	15

3)Lipids & water • Lipids-, composition, classification, digestion, absorption & metabolism, Functions, sources, requirements of lipids. • Water- Importance, Distribution in the body, funvtions of water & sources, water intake & loss.	

References :

- Nutrition Science by B. Srilakshmi
- Textbook of human nutrition 3rd edition by Mahtab S Bamji, Kamala KrishnaSamy, G.N.V Brahmam
- Advance textbook on food and nutrition vol I second edition by Swaminathan M
- Dietary guidelines for Indians, ICMR, National Institute for Nutrition Hyderabad
- Food nutrition and diet therapy 14th edition by Krause.M.V and Hunesher M.A
- Nutrition & dietetics 4th edition- Shubhangini Joshi

Semester II

HUMAN NUTRITION – Paper II DSC FST –B6

Human Nutrition– II Credits2 (Marks 50) Hours 30, 37.5 Lectures of 48 Minutes

Unit I	Hours Allotted
1)Macro,micro & trace minerals • Classification, distribution in the body, functions, sources, requirements & effects • Efficiency of calcium, phosphorous, magnesium, sodium, potassium, selenium, iron, zinc, iodine & flourine **2)Vitamins** • Fat soluble- chemsitry, functions, sources, requirements, deficiency & hypervitaminosis of vitamin A, D, E, K • Water soulbe vitamins, chemsitry, functions, sources, requirements, deficiency of B-complex vitamins & VItamin C **3)Menu planning** • Menu planning for the family • Menu planning in hospital setting • balanced diet	15
Unit II	**Hours Allotted**
1)Diets during normal life cycle • Nutrition during pregnancy • Nutrition during lactation • Nutrition frominfancy to adolescence • ways of measuring growth • Relationship of Nutrients to the growth process • Nutritional requirements of different age groups • Nutrition for Aging & the aged **2)Diet during energy imbalance** **3)diet for diabetes mellitus** **4)diet for cardiovascular disease.**	15

References :

- Nutrition Science by B. Srilakshmi
- Textbook of human nutrition 3rd edition by Mahtab S Bamji, Kamala KrishnaSamy, G.N.V Brahmam
- Advance textbook on food and nutrition vol I second edition by Swaminathan M
- Dietary guidelines for Indians, ICMR, National Institute for Nutrition Hyderabad
- Food nutrition and diet therapy 14th edition by Krause.M.V and Hunesher M.A
- Nutrition & dietetics 4th edition- Shubhangini Joshi

Semester II

COMPUTER BASICS APPLICATION – Paper I DSC FST –B7

COMPUTER BASICS APPLICATION I Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 Minutes

Unit I	Hours Allotted
1)Introduction to computer • Definition, characterstics • evolution • generation of computer • types of computer **2)Structure & working of computer** • Block diagram of computer • Binary numbers • Functions, importance of CPU,ALU, Memory unit, input & output devices • Basic operation of computer	15
Unit II	**Hours Allotted**
1))Computer memory • memory concept • memory organisation • Primary storage devices • Secondary storage devices **2)Operating systems & MS Office** • Introduction to operating systems • Windows application • MS word • MS excel • MS excess • MS powerpoint	15

References :

- Fundamentals of computer- V.Rajaraman
- Computer fundamentals by P.K.Sinha & Priti Sinha, 4th edition BPB publication
- Computing fundamentals & C programming by Balagurusamy.E
- Textbook of information technology by Bansal.S.K.
- Introduction to information technology Pearsons education new delhi India

Semester II

COMPUTER BASICS APPLICATION – Paper II DSC FST –B8

COMPUTER BASICS APPLICATION II Credits 2 (Marks 50) Hours 30, 37.5 Lectures of 48 Minutes

Unit I	Hours Allotted
1))Computer Network • LAN,MAN • WAN • Intranet, extranet, servers, modem, fibre optics • Basics of HTML, WWW, URL, TCP or IP • E-mail 2)Multimedia • Introduction to multimedia • Basic elements, hardware • Application of multimedia • Authorizing tools	15
Unit II	**Hours Allotted**
Applications of computers in food science & nutrition • Powerpoint presentation • Nutrient & diet Calculations • Nutrition education & counselling • Nutrition softwares & websites • E-Journals in food science & nutrition	15

References :

- Fundamentals of computer- V.Rajaraman
- Computer fundamentals by P.K.Sinha & Priti Sinha, 4th edition BPB publication
- Computing fundamentals & C programming by Balagurusamy.E
- Textbook of information technology by Bansal.S.K.

Lab course I(DSC FST P1)

Sr no.	Name of practicals
1	Study of compound microscope
2	Demonstration, construction & working of autoclave & hot air oven
3	Demonstration, construction & working of centrifuge & incubator
4	Demonstration, construction & working of pH meter
5	Demonstration, construction & working of laminar air flow
6	Demonstration, construction & working of miscallaneous equipments
7	Study of different ingredients of culture media
8	study of monochrome staining
9	study of gram staining
10	Preparation of peptone water
11	Preparation of general purpose media
12	Preparation of selective & differential media
13	sterlization of different culture media & glassware
14	Isolation of microorganisms from air
15	Preparation of slant, stab & plates using nutrient agar
16	Techniques of incubation(aerobic, anaerobic)
17	Morphological study of fungi
18	Isolation of bacteria by pure culture techniques(streak plate or pour plate)
19	Isolation of moulds from food
20	Microbial analysis of different food samples

Lab course IV(DSC FST P4)

Sr no.	Name of practicals
1	study of basic components of word document
2	Study of basic formating on word document
3	Study of use of tables in word document
4	Study of creating charts in word
5	Study of macrosin word document
6	Study of mail mergein word document
7	Study of hyperlinking in word document
8	Study of creative files preparing using word art and small art in word document
9	Study of basic components of excel document
10	Study of creating tables in excel document
11	study of functions of excel document
12	study of formulas of excel document
13	study of basic components of powerpoint document
14	study of preparing slides
15	study of making an animated slides
16	study of basic components of outlook document
17	study of mails in outlook
18	study of contacts in outlook
19	study of calendar in outlook
20	study of tasks in outlook

Lab course II(DSC FST P2)

Sr no.	Name of practicals
1	Determination of hardness of water
2	Isolation of caesin from milk
3	Natural acidity of milk
4	Estimation of protein by biuret method.
5	Estimation of reducing & non reducing sugar.
6	Determination of p^H of Different food sample.
7	Estimation of carbohydrates by Phenol sulfuric acid method
8	Estimation of starch by anthrones method
9	Isolation of starch from potato
10	Determination for smoke point for different fats & oils
11	Preparation of primary & secendory solutions
12	Determination of acidity of given food samples
13	Determination of iodine value of oil
14	Determination of acid value of fat
15	Gluten formation from wheat flour
16	Effect of soaking, germination, & fermentation of pulses
17	Estimation of milk proteins by coagulation & precipitation methods
18	Coagulation of egg white & egg yolk

Lab course III(DSC FST P3)

Sr no.	Name of practicals
1	Physical examination of milk
2	Specific gravity of milk
3	Titrable acidity of milk
4	Protein estimation in milk
5	Adulteration of milk
6	MBRT & Resazurin test
7	Total solids & SNF of milk
8	Preparation of dahi
9	Preparation of chakka
10	Preparation of Shrikhand
11	Preparation of Lassi
12	Preparation of Paneer
13	Preparation, sensory & quality evaluation of rabadi
14	Preparation sensory & quality evaluation of Khoa
15	Preparation & quality evaluation of gulab jam
16	Preparation of Flavoured milk
17	Preparation of rasgulla
18	Preparation of Rasmalai
19	Preparation of Icecream
20	Preparation of Kulfi