

**CHRIST COLLEGE (AUTONOMOUS),
IRINJALAKUDA**

IRINJALAKUDA, THRISSUR-PIN 680 125



DEGREE OF

**BACHELOR OF FOOD TECHNOLOGY
(CHOICE BASED CREDIT AND SEMESTER SYSTEM)**

UNDER THE

**FACULTY OF SCIENCE
SYLLABUS**

FOR THE STUDENTS ADMITTED FROM THE ACADEMIC

YEAR 2017 ONWARDS

BOARD OF STUDIES IN FOOD TECHNOLOGY (UG)

IRINJALAKUDA, THRISSUR-PIN 680 125

KERALA, 673 635, INDIA

LIST OF MEMBERS IN BOARD OF STUDIES

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ABOUT THE COURSE

B.Sc Food Technology is a **3-year science course** for the students who have a scientific bend and wish to work and research on food. The course consists of 3 years that is divided into **6 semesters** to make the concepts easily understandable. The main target for food technologists is to improve the food quality, making sure food lasts longer than usual, using fewer food items to get more quantity, creating disease-resistant food items, etc.

Food Technology deals with a blend of physical, chemical or microbiological techniques and processes for transforming raw ingredients into food and also other forms in food processing industry. Food technologists work in food industries and food processing organizations to process, preserve, package and labelling food and food items. Research teams under food technology use scientific means such as DNA technology, gene editing to edit genomes of the food items to improve its quality.

PROGRAMME SPECIFIC OUTCOME

Bachelor of science, Food Technology	B.sc Food Technology	CCASFT
PSO1	Understand the depth of knowledge in different topics of Food Technology	
PSO2	Apply theoretical knowledge of principles and concepts of innovative ideas in practical problems	
PSO3	Identify the area of their interest in academics and in research and development	
PSO4	Continue advanced study in various fields like cereals, dairy, alcohol, sugar, bakery and confectionery, fruits, vegetables, oil and oil seed processing, meat and fish	
PSO5	Understanding concepts such as the composition of food, develop in candidates an understanding of foods nutritional, physicochemical and microbial properties	
PSO6	Provide students an advanced insight to different techniques related to food preservation and food processing and also to teach students concept such as the importance of food quality, plant sanitation, food laws	
PSO7	Begin an employment in various fields like science, education, hotel, hospitals, food industries, laboratories, quality testing organisations, entrepreneur	

B.Sc. FOOD TECHNOLOGY DEGREE PROGRAMME-LRP (LANGUAGE REDUCED PATTERN)

The B.Sc. Degree Programme means the entire course study and examinations for the award of degree. The duration of BSc Food Technology under graduate programme shall be of 6 semesters distributed over a period of 3 years. A sequence of 18 academic weeks with a unit of five working days constitute one semester.

Course means a segment of subject matter to be covered in a semester (traditionally referred to as a paper). BSc Food Technology degree programme is a language reduced pattern has common courses of compulsory English and additional languages in 1st and 2nd semester which is taught by language teachers. Those are Common English course I, Common English course II, Common English course III, Common English course IV, Additional language course I and Additional language course II. It may be Hindi, Arabic or Malayalam. Additional language may be chosen by the students according to their wish. General Course I, II, III and IV are Numerical Skill, General informatics, Entrepreneurship Development and Environmental pollution and Health Hazards, respectively with a code of A which may be taught by either parent or Language Teachers depend upon their work load. Core courses in BSc Food Technology are 17 numbers with a code of B will be taught by parent department. Complimentary courses refer to course related to core course of BSc Food Technology degree programme which has Physics & Chemistry and are distributed in first four semesters. Food Science & Quality Control is chosen as complimentary course for BSc Chemistry degree programme with a code of C and finally open course which is taught to the students of other than B.Sc. Food Technology degree programme from parent department. There are 3 open courses, of which one course will be selected by student at his / her choice and will be studied in fifth semester with a code of D.

Credits means a unit of academic input measured in terms of weekly contact hours/course contents assigned to a course. Each course shall have certain credits. For passing the degree programme the student shall be required to achieve a minimum of 120 credits of which 38 credits shall be from common courses (14 credits for common English courses, 8 credits for Additional language courses and 16 credits for General Courses.) 56 credits from core ,complimentary(24 credits) and 2 credits from open course. Students of BSc Food Technology should undergo a project work for a period of 15 days during 5th or 6th semester which is done as 'In plant Training'.

Credit Distribution of B.Sc. Food Technology Programme

Sem	Common Course			General	Core Course						Complementary Course		Open Course	Total	
	English		Additional Language								I	II			
I	3	3	4			3						2	2		17
II	4	4	4			3						2	2		19
III				4	4	3	-				2	2		15	
IV				4	4	4	3				2+4	2+4		27	
V						3	4	4	3	-	-			2	16
VI						3	3	3	3	+	3	+	2		26
Total	14 Credits (400 Marks)		8 Credits (200 Marks)	16 credits (400 Marks)		56 Credits (1750 Marks)						12 Credits (400 Marks)	12 credits (400 Marks)	2 Credits (50 Marks)	120
	38 Credits (1000 Marks)					82 Credits (2600 Marks)									120
											Total Marks	3600			

Mark distribution

Common: English	4x100	400	600
Additional: Mal/Hindi.....	2x100	200	
General	4x100	400	400
Core	11 x 100	1100	1700
	4 x 150	600	
Project		50	50
Open		50	50
Complementary	4x2x100	800	800
Total marks			3600

Examinations

There shall be University Examinations at the end of semester. A student shall be permitted to appear for the semester examination, only if he or she secures not less than 75% attendance in each semester.

Practical Examination shall be conducted by the University at the end of 4th & 6th semester

Evaluation and Grading

Mark System is followed instead of direct grading for each Question. For each course in the semester letter grade, grade point and % marks are introduced in 7 point. Indirect grading system is given below. Each course is evaluated by assigning marks with a letter grades (A+, A, B, C, D, E or F) to that course by method of indirect grading. E grade or 40% marks is required for a pass in each course.

% of Marks	Grade	Interpretation	Grade Point Average	Range of Grade Points	Class
90 and above	A+	Outstanding	6	5.5 – 6	First Class with Distinction
80 to below 90	A	Excellent	5	4.5 – 5.49	
70 to below 80	B	Very Good	4	3.5 – 4.49	First Class
60 to below 70	C	Good	3	2.5 – 3.49	
50 to below 60	D	Satisfactory	2	1.5 – 2.49	Second Class
40 to below 50	E	Pass/Adequate	1	0.5 – 1.49	Pass
Below 40	F	Failure	0	0 – 0.49	Failure

A student who fails to secure a minimum grade for a pass in a course is permitted to write the exam along next batch.

Course Evaluation

The evaluation Scheme for each course shall contain two parts. They are

- 1) External Evaluation
- 2) Internal Evaluation

External Evaluation

External Evaluation carries 80% of marks. External Evaluation of even semesters (2, 4, and 6) will be conducted in centralized valuation campus immediately after their Examination. Answer scripts of odd semester (1, 3 & 5) exam will be evaluated by home valuation. The theory Exam has duration of 3 hours.

Questions Pattern for Core Courses (Theory)

Question Type	Part A	Number of Questions	Marks	Total Marks
Objective	A	10 out of 10	1	10x1= 10
Short Answer	B	5 out of 7	2	5x2 = 10
Short Essay	C	6 out of 8	5	6x5 = 30
Essay	D	2 out of 4	15	15x2 = 30
Total Marks				80

Questions Pattern for Complimentary Courses (Theory)

Question Type	Part A	Number of Questions	Marks	Total Marks
Objective	A	10 out of 10	1	10x1= 10
Short Answer	B	7 out of 7	2	7x2 = 14
Short Essay	C	5 out of 8	4	5x4 = 20
Essay	D	2 out of 3	10	10x2 = 20
Total Marks				64

Questions Pattern for open Courses

Question Type	Part A	Number of Questions	Marks	Total Marks
Objective	A	5 out of 5	1	5x1= 5
Short Answer	B	5 out of 7	2	5x2 = 10
Short Essay	C	3 out of 5	5	3x5= 15
Essay	D	1 out of 2	10	1x10= 10
Total Marks				40

Practical Examination

The external examination in practical courses shall be conducted by two examiners - one internal and an external, appointed by the University. The project evaluation can be conducted by external examiner only.

Technology of Food Preservation (FTL 3 B 06 P), Food Chemistry & Analytical Instrumentation (FTL 4 B 08 P) courses practical examination will be combined, the course code stands FTL 4 B 08 P (Credits 3) and conducted at the end of second year, similarly Cereals, Pulses and Oilseeds Technology (FTL 5 B 12 P) and Technology of Fruit , Vegetables, Spices & Plantation crops (FTL 6 B 18 P) courses practical examination will be

combined, the course code stands FTL 6 B 19P(Credits 6) , Technology of Animal Foods FTL 6 B 20 P (Credits 6) and Analysis of Foods FTL5 B 14P (Credits 3)will be conducted at the end of third year including Project work / In Plant training evaluation (Credit 2).

Question Pattern of Practical Exam (Core)

Record	Procedure	Work done	Spot test	Viva-voce	Total
20	20	20x2	20	20	120

Question Pattern of Practical Exam (Complementary)

Record	Procedure	Work done	Spot test	Viva-voce	Total
5	14	10x2	10	15	64

Internal Evaluation

Internal evaluation will be of 20% in each course. The college has to send the marks obtained by the students in internal exam to the university by head of department through principal of the college. Internal assessment marks should be published in the department notice board. A grievance committee is constituted at department level to look in to the matter of any discrepancy.

The internal assessment shall be based on a pre-determined transparent system involving written test, assignments, seminars and attendance in respect of theory course and on tests/records/viva-voce/attendance in respect of practical course. Internal evaluation for project shall be based on content and Method of presentation.

Distribution of Marks for Theory (Core)

Attendance		Test paper (1 st & 2 nd)		Seminar/Assignment/Viva	
Above 90%	5 marks	Above 90%	10 marks	Excellent	5 marks
85 to 89%	4 marks	85 to 89%	9 marks	Very good	4 marks
80 to 84%	3 marks	80 to 84%	8 marks	Good	3 marks
76 to 79%	2 marks	70 to 79%	7 marks	Average	2 marks
75%	1 mark	60 to 69%	6 marks	Poor	1 mark
Maximum	5 marks	Maximum	10 marks	Maximum	5 marks

Distribution of Marks for Theory (Complementary)

Attendance		Test paper (1 st & 2 nd)		Seminar/Assignment/Viva	
Above 90%	3 marks	90 & > 90%	10 marks	Excellent	3marks
80 to 89%	2 marks	85 to 89%	9Marks	good	2 marks
75 to 80 %	1 mark	80 to 84	8 Marks	Average	1 mark
		70 to 79%	7Marks		
		60 to 69%	6 Marks		
Maximum	3marks	Maximum	10 marks	Maximum	3 marks

Distribution of Marks for Theory (Open)

Attendance		Test paper (1 st & 2 nd)		Seminar/Assignment/Viva	
Above 90%	2 marks	Above 90%	6 marks	Excellent	2 marks
85 to 89%	1.5 marks	85 to 89%	5 marks	Very good	1.5 marks
80 to 84%	1 marks	80 to 84%	4 marks	Good	1marks
76 to 79%	0.5 marks	70 to 79%	3 marks	Average	0.5marks
75%	0.25 mark	60 to 69%	2 marks	Poor	0.25 mark
Maximum	2 marks	Maximum	6 marks	Maximum	2 marks

Distribution of Marks for Practical (Core)

Components	Maximum 30 Marks
Attendance	10
Lab performance	10
Viva-voce	10

Distribution of Marks for Practical (Complimentary)

Components	Maximum 16 Marks
Attendance	8
Lab performance	5
Viva-voce	3

Project work / in plant training

Students of B.Sc. Food Technology should undergo a project/ in plant training work for a period of 15 days during the sixth semester. The programme is arranged by the department of Food Technology in consultation with the food industries inside and outside Kerala. The purpose of the programme is to get hands-on experience on various aspects of food industries that form the strong foundation for the young food technologists. The department will allot students to the industry, in consultation with the industry concerned and based on merit of the students. The selected student should report for the programme on the stipulated date and attend the programme regularly without any lapse. On completion, each student should prepare a project / training report duly certified by the supervisor in the industry, a seminar should be conducted in the department. The bonafide project/ training report attested by the head of the department will be evaluated by the external examiner and a viva voce will be conducted. The scheme of the project report evaluation and viva-voce is as given below.

Project / In plant training / industrial Visit Total 50 Marks (External 40 Marks & Internal 10 Marks)

Components	External	Internal
Report	10 Marks	-
Presentation	20 Marks	5
Viva	10 Marks	-
Industrial Visit	-	5
Total	40 Marks	10

BSc Food Technology – Programme – Core Course structure, work load and credit distribution:

Course Code	Instructional Hours per week		Credits	Marks				Total
	Theory	Practical		Theory		Practical		
FTL 1 B 01 FTL 1 B 02 P	1	2	3	80	20	-	-	100
FTL 2 B 03 FTL 2 B 04 P	1	2	3	80	20	-	-	100
A11	4	-	4					
A12	4	-	4					
FTL 3 B 05 FTL 3 B 06 P	3	4	3	80	20	-	-	100
A13	4	-	4					
A14	4	-	4					
FTL 4 B 07	3	-	4	80	20	-	-	100
FTL 4 B 08 P	-	4	3	-	-	120	30	150
FTL 5 B 09	3	-	3	80	20	-	-	100
FTL 5 B 10	5	-	4	80	20	-	-	100
FTL 5 B 11	5	-	4	80	20	-	-	100
FTL 5 B 12 P	-	4	3	-	-	-	-	-
FTL 5 B 13 P	-	3		-	-	-	-	-
FTL 5 B 14 P	-	3	3	80	20	-	-	100
FTL 5 D 01 / 02 / 03	2	-	2	40	10	-	-	50
FTL 6 B 15 E	4	-	3	80	20	-	-	100
FTL 6 B 16	3	-	3	80	20	-	-	100
FTL 6 B 17	4	-	3	80	20	-	-	100
FTL 6 B 18	4		3			120	30	150
FTL 6 B 19 P	-	4	3+3=6	-	-	120	30	150
FTL 6 B 20 P		4	6			120	30	150
FTL 6 B 21 Pr	-	2	2	-	-	40	10	50
Total	-	-	58	920	230	520	130	1800

Semester I

Course code	Title of course	Hours per week	No. of credits	Total credits
A01	Common Course (English)I	4	3	17
A02	Common Course(English)II	5	3	
MAL1A07 A07 AR1A07	1.Common Course(Malayalam)I 2. Common Course(Hindi)I 3. Common Course(Arabic)I	5	4	
FTL 1 B 01	Perspectives of Food Science & Technology	1+2(P)	3	
PHY1C01	Properties of matter & Thermodynamics	2	2	
	Complementary Practical	2	-	
CHE 1 C0 1 T CHE 1 C0 1 P	General chemistry	2	2	
	Complementary Practical	2	-	

Semester II

Course code	Title of course	Hours per week	No. of credits	Total credits
A03	Common Course(English)III	4	4	19
A04	Common Course(English)IV	5	4	
MAL2A08 A08 AR2A08	Common Course(Malayalam)II Common Course(Hindi)II Common Course(Arabic)II	5	4	
FTL 2 B 03	Food Microbiology I 1+2	(P)	3	
PHY2C02	Mechanics, relativity, Weights & oscillation	2	2	
	Complementary Practical	2	-	
CHE 2 C0 2 T CHE 2 C0 1 P	Physical chemistry	2	2	
	Complementary Practical	2	-	

Semester III

Course code	Title of course	Hours per week	No. of credits	Total credits
A11	Numerical Skill	4	4	15
A12	General Informatics	4	4	
FTL 3 B 05	Technology of Food Preservation	3	3	
FTL 3 B 06 (P)	Technology of Food Preservation	4	-	
PHY3C03	Optics,laser,electronics &communication	3	2	
	Complementary Practical	2	-	
CHE 3 C0 3 T	Organic chemistry	3	2	
CHE 3 C0 1 P	Complementary Practical	2	-	

Semester IV

Course code	Title of course	Hours per week	No. of credits	Total credits
A13	Entrepreneurship Development Programme	4	4	27
A14	Nutrition & Health	4	4	
FTL 4 B 07	Food Chemistry & Analytical Instrumentation	3	4	
FTL 4 B 08 P	Food Chemistry & Analytical Instrumentation	4	3	
PHY4C04	Electricity, Magnetism & Nuclear physics	3	2	
PHY4C05	Complementary Practical	2	4	
CHE 4 C0 4 T	Physical & Applied chemistry	3	2	
CHE 4 C05 P	Complementary Practical	2	4	

Semester V

Course code	Title of course	Hours per	No. of credits	Total
FTL 5 B 09	Food Microbiology II	3	3	13
FTL 5 B 10	Cereals, Pulses and Oil seeds Technology	5	4	
FTL 5 B 11	Technology of Animal Foods	5	4	
FTL 5 B 12 P	Cereals, Pulses and Oil seeds Technology	4	-	
FTL 5 B 13 P	Food Microbiology II	3	-	
FTL 5 B 14 P	Analysis of Foods *	3	-	
FTL 5 D 01 / 02 / 03	1. Technology of Spices 2. Fruits and Vegetables Processing 3. Food & Health	2	2	

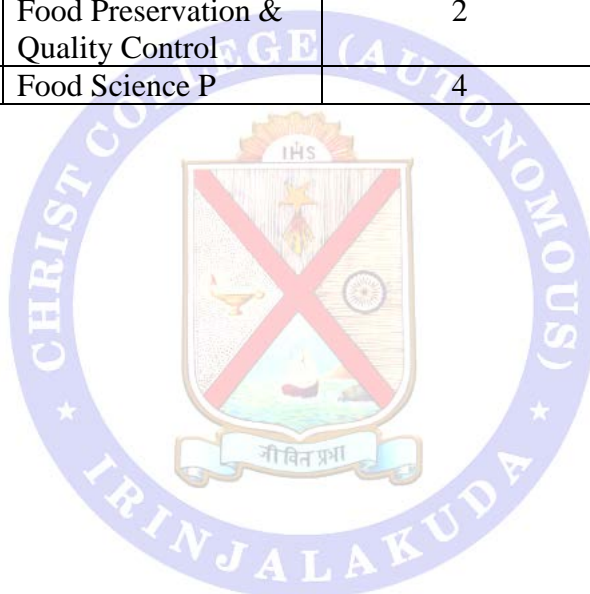
*Examination will be conducted at the end of 6th Semester

Semester VI

Course code	Title of course	Hours per	No. of credits	Total credits
FTL 6 B 15 E	Food Engineering	4	3	29
FTL 6 B 16	Dairy Technology	3	3	
FTL 6 B 17	Food safety, Food laws & Packaging Technology	4	3	
FTL 6 B 18	Technology of Fruits, Vegetables, Spices & Plantation	4	3	
FTL 6 B 19 P	Technology of Fruits, Vegetables, Spices & Plantation	4	6	
FTL 6 B 20 P	Technology of Animal Foods	4	6	
FTL 6 B 21Pr	Project work	2	2	
FTL 5 B 14 P	Analysis of Foods	-	3	

Complementary course

Course code	Title of course	No. of credits	Total credits
FTL1C01	Principles of Nutrition	2	12
FTL2C02	Food Chemistry	2	
FTL2 C03(P)	Food Chemistry P	-	
FTL 3 C 04	Principles of Food Science	2	
FTL3 C05(P)	Principles of Food Science P	-	
FTL 4C06	Food Preservation & Quality Control	2	
FTL4C07(P)	Food Science P	4	



*B.Sc. Food Technology**FTL 1 B 01 Perspectives of Food Science & Technology (1+2P=3 Credits)*

SI No:	Topic	Course outline	Hrs
1	Introduction	Scope of food science and Technology. Functions of food. Nutrients, Water, Carbohydrates, Proteins, Lipids, Vitamins and Minerals.	2
2	Composition and nutritive value	Pulses & Legumes, Nuts & Oilseeds, Meat, Fish, Egg and Milk Structure and composition of wheat and Rice. Classification and Composition of Fruits, Vegetables and Spices.	7
3	Food Quality Assessment	Sensory assessment-Appearance of food-perception, colour of foods, smell, flavour and Threshold tests, difference tests, ranking hedonic scale	3
4	Food Additives	Presevatives, coloring agents, flavour and flavour enhancer, Anti-oxidants, Artificial sweeteners, stabilizers, thickening agents, anticaking agents, bleaching and maturing agents, flour improvers, leavening agents, surface active agents.	3
5	Health foods	Functional foods, Prebiotics, Probiotics, Nutraceuticals, organic foods, GM foods	1
6	Food Research & Food Technology updates	Major centres of food research in India –CFTRI, DFRL, NIFTEM, IICPT & CIFT. Major Food Industries in India. Journals of Food Science & Technology, Indian Food Industry, Beverage Food World, Indian Food Packer, AFST (I)	2

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- S. Manany, N S. Swamy Food Facts and Principles. New Age International Publishers
- Murano, Peter S. Understanding Food Science and Technology .Thomson
- Sumati R Mudambi , Rajagopal M V. Fundamentals of Food and Nutrition. New Age International Publishers
- Shubhangini A Joshi . Nutrition and Dietics. Tata McGraw Hill Education Private Limited
- Vijaya Khader. Text Book of Food Science and Technology. ICAR
- Swaminathan M. Food Science Chemistry and Experimental Foods. Bappco
- Journals:
 - Indian Food Industry
 - Food packer
 - Journal of Food Science and Technology
 - Beverage Food World

FTL 1 B 02 P Perspectives of Food Science and Technology

SI No:	Practicals
1	Standardization of NaOH.
2	Standardization of HCl
3	Determination of Moisture using a) Hot air oven b) Distillation method c). Infrared method
4	Determination of Acidity & pH
5	Determination of T S S
6	Qualitative test for carbohydrates – Molisch’s test, Benedict’s test, Iodine test, Anthrone test, Selivanoff’s test.
7	. Qualitative Test of Proteins
8	Practical Demonstration- Pilot / Industrial scale Food Production / Processing
9	Industrial Visit I: Food Processing Unit.

FTL 2 B 03 Food Microbiology – I (1+2P=3 Credits)

SI No:	Topic	Course outline	Hrs
1	Evolution	History of Microbiology, - theory of spontaneous generation, Germ theory of disease, Koch's postulates, Pure culture concept.	2
2	Microscopy	Parts of microscope, Resolving power, Limits of resolution, Refractive index, Magnification. Light microscope – Bright field, Dark field. Electron microscope-Transmission Electron microscope, Scanning electron microscope.	3
3	Microorganisms	Structure, Morphology, Physical condition required for growth, growth curve.	7
	a) Bacteria	Reproduction – Binary fission, Transformation, Transduction and Conjugation. Nutritional requirements- Phototrophs, Chemotrophs, Autotrophs, Heterotrophs.	
	b) Fungi	Morphology, Classification, Phycomycetes, Ascomycetes, Basidiomycetes.	2
	c) Yeasts	Structure, Morphology, Reproduction – Budding. Deutromycetes Reproduction-Sexual and Asexual	2
	d) Virus	Classification, Composition, Morphology, Replication of virus.	2

References

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- Jay JM, Loessner MJ & Golden D A,2005. Modern Food Microbiology .Springer Verlag
- Ananthanarayanan R Jayaram Paniker CK ,2009 Text book of microbiology.University Press Pvt Ltd, Hyderabad
- Prescott, L.M, Harley, J.P and Klein, D.A Microbiology . McGraw Hill New York
- Frazier J& Westhoff DC,1988. Food Microbiology. McGraw Hill, New York.

- Pelczar JM & Reid RD . Microbiology. Tata McGraw Hill

FTL 2 B 04 P Food Microbiology I

SI No:	Practicals
1	Introduction to equipments and glassware used in microbiology
2	Sterilization techniques: Dry heat and moist heat
3	Staining techniques – simple staining, gram staining



FTL 3 B 05 Technology of Food Preservation (3 Credits)

SI No:	Topic	Course outline	Hrs
1	Thermal Processing	Principles and application–Blanching, Pasteurization, Sterilization, Ultra high temperature sterilization, Aseptic processing.	5
2	Drying	Significance: Natural drying- Sun and Solar drying, Artificial drying- Hot air drying, Drum drying, Spray drying, Dehydrofreezing, Freeze drying, Drying pre-treatments – blanching & sulphuring.	10
3	Low Temperature Processing	Refrigeration , Low temperature preservation of Fresh Fruits, Vegetables, Meat & Fish products. Chilling injury. Freezing , Principle, Freezing rate, Quick freezing, Slow freezing, Types of freezers- Air blast, Contact, Immersion, Fluidized bed and Cryogenic freezers. Quality of frozen foods- Retrogradation, Protein denaturation, Freezer burn.	5 8
4	Irradiation	Source of ionization irradiation, Dose and Dosimetry, Mode of action, Scope of irradiation.	5
5	Fermentation	Principles, Significance, Types of fermentation- Acetic, Lactic and Alcoholic.	6
6	Chemical Preservation	Natural preservatives-Mode of action. Chemical Preservatives - Sulphur dioxide, Benzoic acid, Sorbic acid, Propionic acid, Acetic acid.	7
7	Recent Trends	Food preservation applications– Pulsed electric fields, High pressure technology, Ohmic heating, Microwave heating, Ultrasonics, Nanotechnology, Hurdle technology.	6
8	New Product Development	Food needs, consumer preference and Market survey, Steps in new product development.	2

FTL 3 B 06 P Technology of Food Preservation

SI No:	Practicals
1	Qualitative determination of SO ₂
2	Qualitative determination of benzoic acid
3	Sensory evaluation
4	Dehydration of fruits in sugar syrup
5	Drying Kinetics of vegetables using cabinet drier
6	Determination of moisture content
7	Industrial Visit II: Well established Food Processing Unit.

References

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- Desrosier NW James N,1977 Technology of Food Preservation CBS Publishers
- Arti Sanhla Food Preservation. Principles and practices
- Manay,N.S,Shadaksharaswamy,M.,Foods:New Age international (P) publishers, New Delhi 2004
- Shafiur Rahman M., 1999, Hand book of food preservation. Marcel Dekker, Inc, New York.
- Subbulakshmi G and Udippi S.A Food Processing and PreservationI Foods:New Age international (P) publishers, New Delhi 2001

FTL 4 B 07 Food Chemistry & Analytical Instrumentation (4 Credits)

SI No:	Topic	Course outline	Hrs
1	Carbohydrates	Classification , properties and reactions of 1) Monosaccharides:Glucose& Fructose 2)Oligosaccharides : Maltose, lactose. Sucrose-properties- crystallization and inversion. 3) Polysaccharides:starch : components of starch, gelatinization, retrogradation, modified starch.Cellulose, hemicellulose, pectic substances, gums, dietary fibre	8
2	Proteins	Introduction to food protein, structure of protein, classification of proteins, amino acids, physicochemical properties, denaturation, reactions, protein determination	6
3	Lipids	Classification, fatty acids, saturated, unsaturated, polyunsaturated fatty acids, chemical properties, reactions, rancidity, auto-oxidation, antioxidants.	6
4	Water	Introduction, physical & chemical properties of water, moisture in foods, methods of moisture determination,hydrogen bonding, Free & bound water	6
6	Pigments	Properties and Occurrence: Chlorophyll, Carotenoids,.Flavanoids,Anthocyanins,Anthoxanthins, Myoglobin.	6
7	Enzymes	Introduction,Definition,Occurrence, Classification. Properties of Enzymes- Specificity, Factors affecting enzyme activity. Enzymes in food Industry.	8

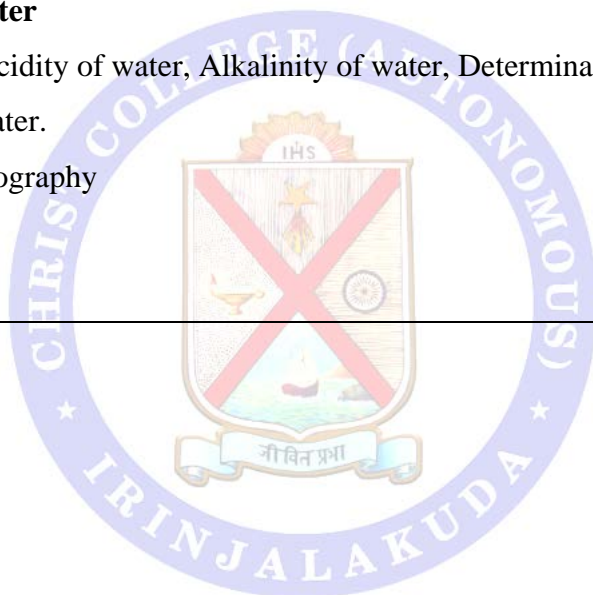
8	Colloids	Colloidal chemistry, Properties of solutions, Sols &	4
9	Emulsions	Suspensions, Food colloids. Emulsion, Types, Emulsifying Agents	2
10	Instrumentation		
	Colorimetry	Principles, Beer – Lambert’s Law, Techniques and Instrumentation. Flurimetry.	6
11	Spectrophotometry	Principles, Instrumentation, Parts of Spectrophotometers. Atomic Absorption spectrophotometry	6
12	Chromatography	Classification- Adsorption chromatography, Partition chromatography, Ion exchange. Paper chromatography, Column chromatography, Thin layer chromatography, Gas chromatography, High Pressure Liquid Chromatography. GCMS	10

References

- Ranganna S 2001. Hand book of analysis and quality control of fruits and vegetable products Tata- McGraw- Hill. .
- Meyer, L.H 1987 Food Chemistry CBS publishers.
- Belitz, H.D 1999 Food Chemistry Springer Verlag
- Fennema, OR. 1996 Food Chemistry Marcel Dekker
- Nielson S 1994 Introduction to Chemical Analysis of Foods Jones & Bartlett
- Pomrenz Y & Meloan CE 1996 Food Analysis Theory and Practice CBS
- Manay, N.S, Shadaksharaswamy, M., Foods: Facts and Principles New Age International Publishers
- Miller, Dennis D. Food Chemistry John Wiley and sons
- Wong, Dominic W.S Mechanism and Theory in Food Chemistry. CBS publishers.
- Sharma B.K. 2004, Instrumental Methods of Chemical Analysis. Goel Publishing House, New Delhi.

FTL 4 B 08 P Food Chemistry & Analytical Instrumentation (3 Credits)

SI No:	Practicals
1	<p>Chemical Analysis of Lipids</p> <p>a) Determination of Iodine value b) Determination of saponification value c) Determination of peroxide value d) Determination of Free Fatty Acid</p>
2	<p>Analysis of Protein</p> <p>Kjeldahl's methods</p>
3	<p>Analysis of Water</p> <p>Total solids, Acidity of water, Alkalinity of water, Determination of Chloride, Hardness of water.</p>
4	<p>Paper chromatography</p>
5	<p>Ash content</p>



FTL 5 B 09 Food Microbiology II (3 Credits)

SI No:	Topic	Course outline	Hrs
1	Culture Media	Bacteriological Media – Selective, Differential, Enrichment Media.	4
2	Methods of isolating Pure culture	Serial dilution, Pour plate, streak plate, stroke Culture.	4
3	Control of Microorganism	Physical agents – high temperature, low temperature, desiccation, osmotic pressure radiation, filtration. Chemical agents-Characteristics of an ideal antimicrobial chemical agent, Alcohols, Aldehydes, Dyes, Halogens, Phenols, Acids, Alkalis, Gases.	8
4	Food spoilage	Food spoilage: Sources of contamination, factors responsible for spoilage, factors affecting kinds and number of microorganisms in food. Chemical changes due to spoilage.	8
5	Effect of spoilage	Contamination and spoilage of Fruits and Vegetables, Meat & Meat products, Milk & Cream, Cereal & Cereal products, Spoilage of canned food.	8
6	Microbial intoxications & Infections	Definition, Exotoxin, Endotoxin, intoxications and infections – sources, symptoms Methods of Prevention and investigation of food borne disease outbreak.	8
7	Microbes in fermented foods	Fermented vegetable products, Sauer Kraut, pickles, soy sauces, idli Fermented dairy products – Cheese, yoghurt	8
8	Water & Milk testing	Microbiological testing of water & milk	6

References

- Banwart GJ ,1989. Basic Food Microbiology. AVI publishers
- Jay JM, Loessner MJ & Golden D A 2005. Modern Food Microbiology .Springer Verlag
- Ananthanarayanan R Jayaram Paniker CK 2009 Text book of microbiology.University Press Pvt Ltd, Hyderabad
- Prescott, L.M, Harley, J.P and Klein, D.A Microbiology . McGraw Hill New York
- Frazier J& Westhoff DC . 1988. Food Microbiology. McGraw Hill, New York.
- Pelczar JM & Reid RD . Microbiology. Tata McGraw Hill
- Black, JG. Microbiology .Principles and Explorations John Wiley

FTL 5 B 13 P Food Microbiology II

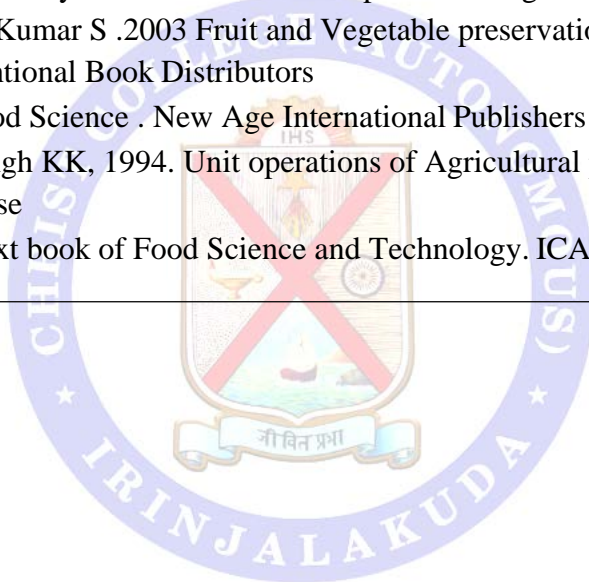
SI No:	Practicals
1	Isolation of pure culture: Pourplate, Streak plate
2	Microbial analysis of meats – Total plate count – <i>Staphylococcus</i>
3	Microbial analysis of Milk- Total plate count, Spices-Yeast and Mold,TPC
4	Microbial analysis of water – Coliforms

FTL 5 B 10 Cereals, Pulses and Oil seeds Technology (4 Credits)

SI No:	Topic	Course outline	Hrs
1	Technology of Wheat and Rice	<p>Wheat Milling of wheat, by-products – Whole wheat flour, Maida, semolina, Gluten.</p> <p>Rice Milling of rice, by-products of rice milling – Husk, Bran, Broken rice Parboiling- Merits and demerits, Curing, Aging of rice, Rice products – Flaked rice, Puffed rice.</p> <p>Technology of Oats and Barley</p>	22
2	Bakery and confectionary	<p>Baking Principles of baking, classification of baked foods.</p> <p>Bread: Bread making –Role of ingredients, Bread faults & remedies, staling of bread.</p> <p>Cake: Cake making, Role of ingredients, Types of making, cake faults and remedies.</p> <p>Biscuit: Biscuits & Cookies, Crackers and Wafers, technology of Biscuits, faults & Remedies.</p> <p>Confectionary: Raw materials, Hard candy, Toffee, Caramel.</p>	4 10 10 8
3	Millets	Pearl millet, Finger millet	5
4	Pulses	Processing- Soaking, Germination, Decortication, Cooking and Fermentation. Changes during germination, Antinutritional factors, Factors affecting cooking time.	5
5	Nuts & Oil seeds	Sources, Composition, Processing of oil seeds – Soya bean, coconut. Hydrogenation. Refining of fats & oils, bleaching, de-odourising, hydroxylation, shortening, margarine. Protein isolates, Texturised vegetable protein	8

References

- Hui, Y.H, Bakery products, Science and Technology , Black Well publishing, 2006
- Matz S.A; Bakery Technology and Engineering; 3 edn, CBS Publishers and distributors
- Faridi H, The science of cookie and cracker production; CBS Publishers and distributors
- Dendy D A V & Dobraszczyk BJ Cereals and cereal products, Aspen
- Kent NL 1983 Technology of cereals Pergamon press
- E J Pyler. Bakery science Technology. Vol I, II. Sosland Publications.
- Manley D. 2000. Technology of Biscuits, Crackers and Cookies. CRC press.
- Faridi H. Science of Cookie & Cracker Production
- S. Manany, N S. Swamy Food Facts and Principles. New Age International Publishers
- Srivastava RP & Kumar S .2003 Fruit and Vegetable preservation Principles and Practices. Interntional Book Distributors
- Srilakshmi B. Food Science . New Age International Publishers
- Sahay KM &. Singh KK, 1994. Unit operations of Agricultural processing Vikas Publishing House
- Vijaya khader. Text book of Food Science and Technology. ICAR



FTL 5 B 11 Technology of Animal Foods (4 Credits)

SI No:	Topic	Course outline	Hrs
1	Slaughter and Inspection of Meat	Humane method, Inspection of meat- Ante mortem and post-mortem inspection. Slaughter of sheep, pigs, poultry. Post mortem changes, ageing. Structure of meat, Factors affecting tenderness of meat, Effect of cooking on texture, colour and flavour.	26
2	Cured Meat	Role of ingredients, Methods of curing, Processing of Ham, Bacon. Sausage - classification, emulsion, ground sausage, processing, casings, Factors affecting quality of cured meat.	10
3	Preservation	Refrigeration, freezing, thermal processing, dehydration, irradiation, chemical, antibiotics.	6
4	By products	Rendering, Feeds, Hides, Skins, Hoofs, Horns.	6
5	Egg	Grading, Changes during storage. Egg quality- Factors affecting egg quality, Measures of egg quality, Effect of cooking, Factors affecting coagulation, Industrial use of egg. Preservation of egg Refrigeration, Freezing, Thermal processing, Dehydration, Coating.	12
6	Fish & Fish Products	Introduction, Spoilage indices Preservation Cold storage, freezing, smoking, pickling, canning of fish, Drying Fish products Fish protein concentrate, Fish oils- Body oil, Liver oil, Fish meal, Fish Ensilage, Chitosan, pearl Essence, Glue, Gelatin.	12

References

- Gracey JF Collins DS Meat Hygiene ELBS
- Person AM Gillet T A Processed Meats. CBS publishers
- Lawrie R A Lawries Meat Science Tata McGrawHhill
- Mountney T. Carmen G Prakhurst R Poultry Products Technology CBS



Publishers

- Ockerman H W Hancen C L Animal Byproduct Processing Elis Horwood
- Gopakumar K Tropical Fishery Products Oxford
- Jhingran VG Fish & Fisheries of India Hindustan Publishing Company
- Biswas KP A Text Book of Fish and Fisheries Technology Tata McGraw hill
- Stadelman, William J..Egg Science and Technology. CBS.
- Parkhurst, Carmen R .Poultry Meat and Egg Production.CBS

FTL 5 B 12 P Cereals, Pulses & Oil Seeds Technology

SI No:	Practicals
1	Determination of Moisture
2	Determination of Ash
3	Sedimentation value
4	Determination alcoholic acidity
5	Estimation of Gluten
6	Determination of Water absorption power
7	Qualitative analysis of gluten – Belshanke value
8	Determination of falling number
9	Preparation of Bread
10	Preparation of Biscuit
11	Preparation of Cake
12	Determination of Physical parameters of wheat and rice
13	Industrial Visit III: Food research laboratory.

FT 5 B 14 P Analysis of Foods (3 Credits)

SI No:	Practicals
1	Determination of reducing sugar, total reducing sugar in honey/ jaggery / sugar (Lane & Eynone Method).
2	Determination of Fructose: glucose ratio in honey (Iodimetry).
3	Determination of Gum Base Content in Bubble gum/ chewing gum/ Cocoa butter (soxhlet extraction method)
4	Detection and identification of synthetic food colours (Paper chromatographic method/ TLC)
5	Determination of Fat content in cocoa butter
6	Determination of acidity of extracted fat in cashewnuts / biscuits (Soxhlet extraction method)
7	Estimation of crude fibre in fruits
8	Estimation of starch content in vegetables
9	Estimation of Protein (Colorimetric method) content in food
10	Estimation of invert sugar in Jaggery / Honey
11	Test for chicory in coffee
12	Determination of Peroxidase enzyme
13	Rehydration ratio of dried foods

References

- Ranganna S 2001. Hand book of analysis and quality control of fruits and vegetable products Tata- McGraw- Hill. .
- Nielson S 1994 Introduction to Chemical Analysis of Foods Jones & Bartlett
- Pomrenz Y& Meloan CE 1996 Food Analysis Theory and Practice CBS
- Food Safety Standard authority of India site manual

FTL 6 B 15 E Food Engineering (3 Credits)

SI No:	Topic	Course outline	Hrs
1	Unit operations & Heat transfer	Mode of heat transfer– Conduction, Convection, Radiation.	6
2	Heat exchanger	Classification, contact type heat exchange - Immersion, Non-contact type heat exchanger, Plate Heat exchanger, Scraped surface Heat exchanger, Tubular Heat exchanger, Double & Triple tube Heat exchanger, Shell & Tube Heat exchanger. Pasteurization: LTLT, HTST, UHT, Pasteurizing equipments.	20
3	Refrigeration & Freezing	Refrigeration Principle of refrigeration, Vapour compression refrigeration cycle. Freezing Principle of freezing & freezing rate.	6
4	Evaporation	Principle, single effect evaporation, multiple effect evaporation. Types of evaporators - Horizontal tube, Vertical tube, Falling film evaporator, Raising film Evaporator.	8
5	Driers & Boilers	Driers Principle, constant rate & falling rate of period of drying. Types of driers -Drum drier, Cabinet drier, Tunnel drier, Spray drier, Fluidized bed drier. Boiler- Principle, working of water tube & fire tube boiler.	8
6	Rheology	Definition, Rheological characteristics of foods, viscosity, apparent viscosity- Newtonian and Non Newtonian.	6

References

- Rao D G. Fundamentals of Food Engineering. PHI learning private limited
- Sahay KM & Singh KK, 1994. Unit operations of Agricultural processing Vikas Publishing House
- R S Khurmi & J K Gupta, A Textbook of Refrigeration & Air conditioning, S Chand



- Singh RP, Heldman DR1993 Introduction to Food Engineering Academic Press
- Romeo. Toledo T Fundamentals Food Process Engineering CBSPublishers
- Charm SE, Macabe, WL Smith JC & Hariot P 1993. Unit Operations of Chemical Engineering. McGraw Hills.

FTL 6 B 16 Dairy Technology (3 Credits)

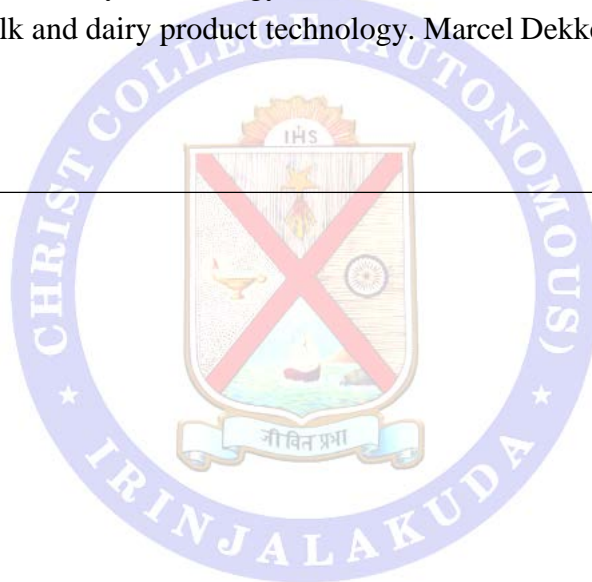
SI No:	Topic	Course outline	Hrs
1	Composition	Composition of milk from various sources, factors affecting composition of milk.	6
2	Properties	Physical and Chemical properties- Flavour, Colour, acidity, viscosity, Specific gravity, Freezing point, Boiling point, Effect of- heat, enzymes, acids and alkali.	7
3	Types of Milk	Toned, Double toned milk, Standardized milk, Homogenized milk, and Recombined milk.	6
4	Processing of Milk	Processing, distribution and storage of liquid milk.	4
5	Dairy Products a) Cream and Butter b) Ice cream	Composition, Processing and Technology. Technology of Ice cream: Ingredients, formulations, Freezing, Hardening, Storage, Distribution and defects. Frozen dessert.	4 5
6	c) Cheese d) Fermented milk Products e) Milk powder	Introduction, Classification of cheese. Processing of cheese: Cottage and Cheddar. Curd, yoghurt, Acidophilus milk, Kefir, koumiss, Probiotic	5 4
	Technology of Dairy by-products	Whole and skim milk powders, Instant milk powder. Whey protein products.	6 1

7	Dairy plant sanitation	Objectives, CIP, Sanitizers.	6
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References

- Sukumar D E. Outlines of Dairy Technology, Oxford University Press.
- Johnson, Webb .Fundamentals of Dairy Chemistry.CBS Publishers and Distributers
- Eckles, Clarence, Henry Milk and Milk Products, Tata MCGraw Hill publishers
- Kurmann, Joseph A. Encyclopedia of Fermented Fresh Milk Products, CBS Publishers and Distributers
- Atherton, Henry V. Chemistry and Testing of Dairy Products CBS Publishers and Distributers
- Johnson, Webb Fundamentals of Dairy Chemistry CBS Publishers
- Ananthkrishnan C P, Khan A Q, Padmanabhan P N. Technology of Milk Processing. Srilakshmi Publishers.
- Walstra P, Geurts T. Dairy Technology. Marcel Dekker
- Edgar Spreer. Milk and dairy product technology. Marcel Dekker



FTL 6 B 17 Food Safety, Regulations and Packaging (3 Credits)

SI No:	Topic	Course outline	Hrs
1	Food Safety & Hygiene	Importance of Food Safety, Food Hygiene, High risk food, Low risk food, Danger Zone, Personal hygiene.	5
2	Food Safety and Quality Management	GHP, GMP, SOP, HACCP (Food contaminants- Physical, Chemical, Biological and Allergens), ISO 22000, ISO 9001, Codex Alimentarius Commission (Codex), FAO	15
3	Traceability & Recalling	Objectives and Applications	3
4	Food Plant Sanitation	Structural requirements, SSOP, CIP, Chlorination, Detergents, Disinfectants and Sanitizers,	6
5	Food Laws & Regulations	Food Safety and Standards Act, FDA, Evolution in Food laws and regulations- PFA, FPO, AGMARK, BIS,	10
6	Food Adulteration	Common Food adulterants and their tests: Milk, Vegetable oil, Spices, Tea, Pulses, Sugar, Honey.	10
7	Food Sampling	Objectives, Sample collection, Sampling tools, Sampling procedure, Analysis.	8
8	Packaging Technology	Package evolution, Functions and design of different types of packaging materials – Metal, Glass, Paper, Plastic, Retortable Pouches, CAP, MAP, Smart, active, Aseptic, Biodegradable, Edible packages.	15

References

- Mathlouthi, M Food Packaging and Preservation . Aspen
- Richard A Sprenger, Hygiene for Management, Highfield.
- Larousse, Jean Food Canning Technology Wiley-VCH
- Mahadeviah M & Gowramma RV 1996 Food Packaging Materials. Tata McGraw Hill
- Painy FA.1992 A Hand Book of Food Packaging. Blackie Academic
- Stanley S & Roger CG 1970 FoodPackaging AVIPubl
- Srinivasa Gopal TK Sea Food Packaging CIFT.Cochin
- Robertson, Gordon L. Food Packaging Marcel Dekker Inc.
- Gupta, Ajay KR Handbook on Modern Packaging Industries Asia Pacific Business Press Inc.
- Hand book of Packaging Technology. Engineering India Research Institute.



**FTL 6 B 18 Technology of Fruits, Vegetables, Spices & Plantation Crops
(3 Credits)**

SI No:	Topic	Course outline	Hrs
1	Post harvest management	Maturity indices, Ripening, Changes during ripening-Climacteric & Non-Climacteric, storage-Controlled Atmospheric & Modified Atmospheric Storage	4
2	Pectin , Jam, Jelly and Marmalade	Pectin Definition of pectin, classification, Pectic enzymes, Properties, jelly grade of pectin, Testing of pectin. Jam, Jelly and Marmalade Definition, jam making, jelly making, Defects.	6
3	Fruits juices & Fruit preparations	Fruit Juices Ready to serve beverages, Squashes Cordials, Nectars, Concentrates Fruit juice powder- Freeze drying, Foam mat drying. Fruit preparations Preserves, Candies Crystallized fruits & Glazed fruits. Pickle and chutneys - Action of preservatives Pickling process, defects.	8
4	Tomato products	Tomato juice, puree, paste & Ketchup specification of the above products.	6
5	Canning	Classification of canning of fruits- Pineapple, Oranges, Canning of vegetables - Peas, Carrots, syrups & brines for canning.	6
6	Drying & Dehydration	Enzyme Inactivation, Sulphuring Sun drying - grapes and dates. Dehydration of vegetables and Fruits. Tunnel & cabinet drier	2
7	Browning	Enzyme activity, enzymatic browning Non enzymatic browning, its prevention.	2
8	Spices	Definition, classification, chemical composition, uses of spices.	4
9	Major Spices	Refining and processing of pepper. Pepper products – white pepper, dehydrated green pepper. Processing of Turmeric, Ginger, Chillies and Cardamom. Spice oils & oleoresins.	8

10	Tea, coffee & Cocoa	Chemical composition, processing & grading	8
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FTL 6 B 19 P Technology of Fruits, Vegetables, Spices & Plantation Crops**(3+3=6 Credits)**

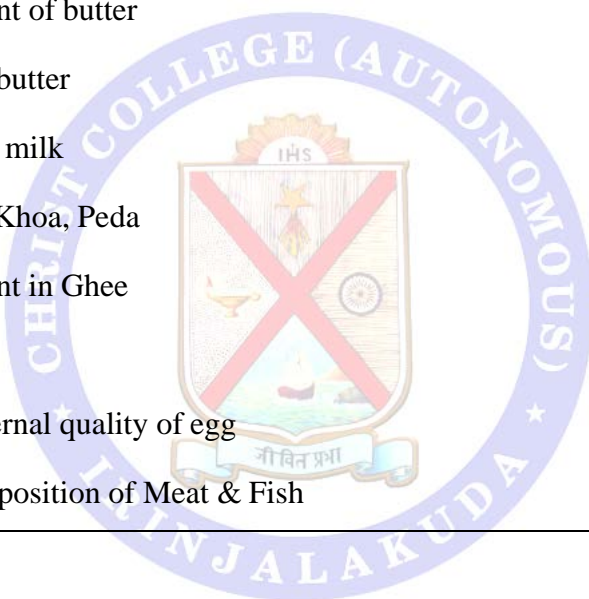
SI No:	Practicals
1	Determination of Sulphur dioxide
2	Estimation of Vitamin C
3	Estimation of tannin – colorimetric method
4	Estimation of alcohol content
5	Determination of salt content in pickles
6	Determination of reducing sugar
7	Lye peeling
8	Adequacy of blanching
9	Preparation of ketchup
10	Preparation of Jam & Jelly
11	Preparation of squash

References

- Pandey PH Principle of Practices of post harvest Technology Kalyani publication
- Cruess WV., 1997. Commercial fruit and vegetables Products. Anes offset press, New delhi.
- Lal,G Siddappa S and Tandon GL. Preservation of fruit and vegetables. ICAR
- Thompson AK 1995 Post harvest Technology of Fruits and Vegetables Black well Sci
- Verma LR& Joshi V.K .,2000 Post Harvest Technology of Fruits & Vegetables. Indus Publ
- Potter NN , Hotchkiss JH. Food Science. CBS Publishers
- Manany S, N S. Swamy Food Facts and Principles. New Age International Publishers
- Srivastava RP & Kumar S .2003 Fruit and Vegetable preservation Principles and Practices. International Book Distributor

FTL 6 B 20 P Technology of Animal Foods (6 Credits)

SI No:	Practicals
1	Acidity of Milk & curd
2	Fat content in Milk
3	Determination of total solids, SNF and specific gravity of milk
4	Determination of Total ash in milk
5	Acidity of butter
6	Moisture content of butter
7	Salt content in butter
8	Adulteration in milk
9	Preparation of Khoa, Peda
10	Moisture content in Ghee
11	FFA of Ghee
12	Internal & External quality of egg
13	Proximate composition of Meat & Fish



OPEN COURSE**FTL 5 D 01 Technology of Spices (2 Credits)**

SI No:	Topic	Course outline	Hrs
1	Spices, Spice oils & Oleoresin	Definition, Classification, Chemical composition, Use of Spices. Spice oil and Oleoresins—Definition, Technology of Manufacturing	8
2	Major Spices: Pepper	Refining and processing of pepper Pepper products:- White pepper, dehydrated green pepper, Pepper oil, Oleoresin.	8
	Chillies	Drying of chillies, quality attributes of chillies and paprika	5
	Cardamom	Composition, Drying of fruits, Bleaching, Grading, Cardamom products, Essential oil and oleoresins	5
	Ginger	Curing, Bleaching, Grading Ginger Products, Ginger oils, Ginger oleoresin, Dehydrated Ginger, Bleached Ginger	5
	Turmeric	Curing, Grading, Turmeric powder, Essential oil, oleoresin	5

References

- Major spices of India J S Pruthi
- Quality assurance in spices and spice products J S Pruthi



FTL 5 D 02 Fruits and Vegetables Processing (2 Credits)

SI No:	Topic	Course outline	Hrs
1	Fruits and Vegetables	Definition, Composition, Classification, Nutritive value, changes during ripening. Flavors of Fruits and Vegetables. Vegetable cookery, changes during cooking Browning and its prevention	12
2	Preservation of Fruits and Vegetables	Heat, Salt, Sugar, Freezing , Food additives and Preservatives.	6
3	Fruit and Vegetable Products	Fruit Juice, Squashes, Cordials, Nectar, Concentrates, Fruit juice Powder, Jam, Jelly. Different types of Pickles and Chutneys. Product Specification	12
4	Tomato Products	Tomato juice, Puree, Paste, Ketchup	6

References

- Commercial Fruits and Vegetable Products: WVCruess
- Preservation of Fruits & Vegetables: Girdharilal, G S Siddappa, & G LTandon.
- Fruit and Vegetable Preservation and Practice: Kumar Sanjeev & RPSrivastava.
- Fruit and Vegetable Processing: Suman Bhatti.
- Food Science: Norman. N. Potter, Joseph H Hotchkis.

FTL 5 D 03 Food & Health (2 credits)

SI No:	Topic	Course outline	Hrs
1	Introduction to Food	Definition, Types and classification of Food-food, functional food, Nutritional Food-Carbohydrate, Protein, Fat, Water, Vitamins, Food Groups. Sources of Food carbohydrate, protein, fat. Recommended allowance of nutrients. Types of work and requirements. Body Mass Index	10
2	Life style and Food related	Obesity, Diabetics , cardio vascular Disease, constipation, Intolerance-Lactose & Chinese syndrome	8
3	Food Additives	Definition, importance in food preparation, functions of Food preservatives, coloring agent, flavours, and emulsifiers.	6
4	Food Adulteration	Definition, common adulterants found in food.	6
5	Food allergens and food poison	Common food allergens. Food poisoning, symptoms and control , <i>Botulism, Staphylococcus, E.coli and salmonella</i>	6

References

- Swaminathan,M.Essential of Food & Nutrition,1974.Bappco,Bangalore
- Jussawalla,JM.Natural Dietics,A hand book on Food,Nutrition and Health.Wikas publishing house
- Sumati R Mudambi,Rajogopal,M.V.Fundamentals Food,nutrition & Diet Therapy,1982.New Age PLtd.
- Education planning group.Food & Nutrition,1980.Arya publishing group, New Delhi
- National Institute of Nutrition, Food & Health,I.C.M.R,Hydrabad
- Yashpal Bedi,Hygeine and public health,Atmaram & Sons,New Delhi
- V.N.Bhave and et.al,You and your Health,1969.National Book Trust,India

A 014 Nutrition and Health (4 credits)

Unit	Topic	Course outline	Hrs
1	Concept of Health	Definition of physical health, mental health, social health, spiritual health-determinants of health, indication of health	4
2	Concept of Nutrition	Definition of terms: Nutrition, under nutrition, Malnutrition, Health & Nutritional status – adequate, optimum & good nutrition. Relation of good nutrition to normal physical development & sound health	6
3	Energy	Definition of Caloric & Joule. Measurement of calorific values of food, basal metabolism, specific dynamic action of foods, energy needs of body, measurement of energy balance of body	6
4	Food Guide	Nutrients supplied by foods. Basic food groups	4
5	Carbohydrates	Sources, Classification, digestion, absorption, transportation & utilization, functions, sources, requirements and effect of deficiency. Dietary Fibre- Definition, classification, sources, role of fibre in human nutrition	10
6	Proteins	Classification, digestion, absorption, transportation & utilization, functions, sources & requirements. Essential aminoacids, evaluation of protein quality, supplementation and deficiency.	10
7	Lipids	Classification, saturated and unsaturated fatty acids, digestion, absorption, transportation & utilization, functions, sources & requirements and effect of deficiency	10

8	Minerals	Functions, sources, absorption and factors affecting the utilization of Calcium, Phosphorus, Iron, Iodine, Copper and Flouride, effects of deficiency	6
9	Vitamins	Classification, functions, sources, factors affecting destruction, factors enhancing vitamins in foods, absorption, requirements & deficiency conditions – Vit A, D, E, K, Ascorbic acid, Thiamine, Riboflavin, Niacin, Pyridoxine, Folic acid, Pantothenic acid	8 6
10	Water	Importance, distribution in body, function sources, requirements, water balance	

References

1. Essential of food & Nutrition –Vol. 1 M. Swaminathan,Bappco,Bangalore.
2. Human Nutrition and Dietetics –Davidson S. Passmore
3. Normal and Therapeutic Nutrition- Corinne .H.Robinson & Marilyn Lawler
4. Contemporary Nutrition - Gordon M. Wardlaw, Paul Insel et, al., (2000) Mosby,Chicago.
5. Nutrition- concepts and controversies- Eleanor Whitney –Eighth Edition (2000)
6. Basic principles of Nutrition- Seema Yadav, First edition (1997)
7. Essentials of Nutrition and Diet therapy -Sue Rodwell Williams, fifth edition, Times Mirror Mosby College Publishing, 1990.
8. Understanding Nutrition -Whitney P.N. and Roes S.R., West Publication Co, 1996.
9. Swaminathan,M.Essential of Food & Nutrition,1974.Bappco,Bangalore.
10. Jussawalla, JM.Natural Dietics,A hand book on Food,Nutrion and Health.Wikas publishing house.
- 11.Sumati R Mudambi,Rajogopal,M.V.Fundamentals Food,nutrition & Diet Therapy,1982.New Age PLtd.
12. Education planning group.Food & Nutrition,1980.Arya publishing group, New Delhi
13. National Institute of Nutrition, Food & Health,I.C.M.R,Hydrabad

MODEL QUESTION PAPERS
FTL 1 B 01 Perspectives of Food Science & Technology

Time 3 Hours

Total 80 Marks

PART A

Answer all the questions

10x1= 10

Multiple Choice

1. Glucose belongs to
[a) Monosaccharide, b. Disaccharide, c. Oligosaccharide, d. Polysaccharide]
2. GM foods means
[a) General Main Foods, b. General Major Foods, c. General Modified Foods, d. Genetically modified foods]
3. Which is not a major spice
[a. Ginger, b. Turmeric, c. Pepper d. Cumin]
4. Average weight of an egg is (a. 50g b.100g c.150g d. 200g)

Name the following

5. Proteins are made up of
6. Name one anti -oxidant
7. Expand IICPT.
8. The linkage between two amino acids in a protein

Fill in the blanks

9. CIFT stands for _____
10. pH of water is _____

PART B

Answer Any Five questions

5x2 = 10

11. What are amino acids? Give example
12. What you mean by organic foods?
13. Write the importance of pulses in nutrition
14. Classify spices.
15. Name any four oil seeds
16. Give two flavour enhancer?
17. Define Anti-Oxidant?

PART C

Answer any Six questions

6X5 = 30 Marks

18. What are GM Foods? What is its importance?
19. Write a note on structure of Rice Kernel
20. Outline the importance of fish in human nutrition
21. Write a note on Carbohydrates.
22. Write a note on anti-nutritional factors
23. Write a short note on health foods?
24. Composition of Egg
25. Discuss in detail about food research centres CFTRI & DFRL

PART D

Answer any two of the following

2x15 = 30 Marks

26. . Write the Classification of Fruits. Write the importance of Fruits and vegetables in human nutrition.
27. Briefly explain the structure of meat? What is the nutritional significance?
28. Explain the term health foods.
29. Explain the structure of Egg with the help of a neat diagram.



FTL 2 B 03 Food Microbiology – I**Time 3 Hours****Total 80 Marks****PART A****Answer all the questions****10x1= 10 Marks****Multiple Choice**

- Pure culture concept was first introduced by
[a) Pastuer, b) Koch, c) Fleming, d) Jenner]
- Agar solidifies at
[a). 30⁰C b). 0⁰C c) 45⁰C d) 100⁰C]
- Rod shaped bacteria are called
[a) *Bacilli* b) *Cocci*, c) *Vibrio* d) *spiral*
- The body of fungi is known as
[a) filament b). thallus c). spore d). conidia]

Name the following

- Who is the father of microbiology?
- Method of reproduction in Yeast.
- Who disproved the spontaneous generation theory?
- Name an anaerobic bacteria

Fill in the blanks

- Sexual spore of ascomycetes is -----
- Virus that infect bacteria is -----

PART B**Answer any Five questions****5x2 = 10 Marks**

- What is fungi imperfecti?
- What you mean by resolving power of a microscope?
- What is autotroph?
- What are Koch's postulate?
- Write Germ theory of disease
- Classify bacteria based on temperature.
- Define water activity

PART C**Answer any Six questions****6X5 = 30 Marks**

- Differentiate Transformation and Transduction
- Briefly write on parts of a microscope.
- Differentiate Prokaryotes and eukaryotes
- What are contributions of Pasteur?
- Explain Growth Curve.
- Write a note Morphology of Virus.
- Differentiate Bright field and dark field microscopy.
- Classify fungi.

PART D

Answer any two of the following

2x15 = 30 Marks

26. What are the characteristic features of viruses? Differentiate lytic & lysogenic cycle in virus
27. Describe the internal and external structure of bacteria with a neat diagram.
28. Write in detail the sexual and asexual reproduction of fungi.
29. What is electron microscope? Differentiate TEM & SEM?



FTL 3 B 05 Technology of Food Preservation**Time 3 Hours****Total 80 Marks****PART A****Answer all the questions****10x1= 10 Marks****Multiple Choice**

- Examples for class II preservative is
i. [a] Pepper b) Salt c) Oil d) Benzoic acid
- Syruping is performed in
i. [a] Vegetables b) Fruits c) Fruits & vegetables d) None
- HTST pasteurization stands for
[a] High Time slow Treatment b) High temperature slow treatment
c) High Temperature short Time d) High Thermal slow time]
- Which among the following is not a fermented food
[a] Beer b) Bread c) Jam d) Idli]

Name the following

- Preservation method for foods below zero degree is known as-----
- Bleached appearance on frozen food is -----
- Combination of preservation method is -----
- Irradiation is known as-----
- The active component of the preservative potassium Meta bisulphate is-----
- Method used for inactivation of enzyme.

PART B**Answer Any Five questions****5x2 = 10 Marks**

- Differentiate between quick and slow freezing.
- Importance of Blanching in fruit processing
- . What are food preservatives? Give one example
- . What you meant by chill injury?
- What is fermentation and give example?
- Principle of microwave heating
- Write a note on Ultrasonics.

PART C**Answer any Six questions****6X5 = 30 Marks**

- Give an outline of food irradiation
- Write a note on ohmic heating
- Write a note on high pressure technology
- Explain drum drying process
- What do you mean by cryogenic freezing
- Write a note on freeze drying
- Differentiate acetic and lactic fermentation
- Action of sulphur dioxide as a preservative

PART D

Answer any two of the following

2x15 = 30 Marks

26. Explain the principle of drying. Differentiate between spray and drum driers?
27. What you mean by freezing of foods? What are different methods of freezing
28. What are you mean by thermal processing? Explain the canning of foods?
29. Write in detail(i)Aseptic method of food preservation.(ii)UHT sterilization(iii) Dehydro freezing



FTL 4 B 07 Food Chemistry & Analytical Instrumentation**Time 3 Hours****Total 80 Marks****PART A****Answer all the questions****10x1= 10 Marks****Multiple Choice**

1. Kjeldhal's method is for estimation of
a) Carbohydrate b) Fat c) Protein d) Minerals
2. Pectin belongs to
a) Monosaccharide b) disaccharide c) Polysaccharide d) Peptone
3. Pigment present in meat
a) Hemoglobin b) Myoglobin c) Anthocyanin d) Carotenoids
4. Emulsion is a type of colloid with
a) Gas in solid b) Solid in gas c) Liquid in solid d) Liquid in Liquid
5. Paper chromatography is based on
a) Ion exchange chromatography b) Size exclusion chromatography
c) Partition chromatography d) Adsorption chromatography

Name the following

6. Enzymes involved in inter conversion of various isomers are -----
7. _____ is used as an adsorbent in thin layer chromatography
8. The basic units of proteins are called as _____
9. PUFA stands for _____
10. Solid dispersed in liquid is called -----

PART B**Answer Any Five questions****5x2 = 10 Marks**

11. What you mean by emulsion?
12. How are proteins classified?
13. Mention different gases used in gas chromatography
14. Write down the principles of TLC
15. State Beer-lamberts law
16. Mention the important part of HPLC
17. What are essential amino acids? Give any two examples.

PART C**Answer any Six questions****6X5 = 30 Marks**

18. Kjeldahl's Methods for estimation of Protein
19. Classification of Carbohydrates
20. Hydrogenation
21. Discuss the steps in Thin layer chromatography.
22. Non-Enzymatic browning reaction
23. Write the principle of HPLC
24. Write a note on Column Chromatography
25. Classify fatty acids. Give examples.

PART D

Answer any two of the following

2x15 = 30 Marks

26. What are enzymes? What are the uses of enzymes in food industry?
27. Explain in detail about the determination of moisture?
28. Discuss briefly about chromatography techniques? How paper chromatography is applicable in food analysis?
29. Explain in detail of working of Atomic Absorption Spectrophotometer ?



FTL 5 B 09 Food Microbiology II

Time 3 Hours

Total 80 Marks

PART A

Answer all the questions

10x1= 10 Marks

Multiple Choice

1. Micro-organism associated with food poisoning
[a) *Streptococcus*, b) *C. Tetanii*, c) *C. botulinum*, d). Lactic acid bacteria)
2. MPN test is used for the analysis of
[a). Meat b). Water c). Blood d). Fish]
3. Psychrophiles grow at a temperature of
[a). 0oC, b). 45oC, c). 70oC, d). 100oC]
4. Sauerkraut is fermented by
[a). *Acetobacter*, b). *Pediococcus*, c). *Pseudomonas*, d).*Salmonella*]

Name the following

5. Study of fungi?
6. Name a chemical used for the control of micro-organisms
7. Which is the bread mold?
8. Which is the organism responsible for fermentation of yoghurt?

Fill in the blanks

9. Fermentation of grape juice is brought about by _____
10. Decomposition of protein under anaerobic condition is _____

PART B

Answer Any Five questions

5x2 = 10 Marks

11. What do you mean by Asepsis?
12. What is food intoxication? Give an example
13. Name any three viruses associated with food poisoning
14. Differentiate between exotoxin and endotoxin.
15. Differentiate yeast and mold
16. Name any two bacteria and two molds involved in spoilage of meat
17. Define coli forms

PART C

Answer any Six questions

6X5 = 30 Marks

18. Explain food poisoning caused by *C. Botulinum*
19. Explain preservation by high temperature
20. What is sauerkraut? Describe the process involved in the production of sauerkraut
21. Differentiate pour plate and streak plate
22. Explain microbiological testing of milk
23. Describe the spoilage caused by thermophillic spore forming bacteria in canned foods.
24. What is serial dilution?
25. Differentiate selective and differential media.

PART D

Answer any two of the following

2x15 = 30 Marks

26. Explain food poisoning caused by bacteria
27. What is MPN? Describe the methods involved in testing of water
28. Physical and chemical agents used for controlling micro-organism
29. Explain the spoilage in canned food.



FTL 5 B 10 Cereals, Pulses & Oil Seeds & Technology**Time 3 Hours****Total 80 Marks****PART A****Answer all the questions****10x1= 10 Marks****Multiple choice questions**

- The ratio of ----- to----- in bread is about 3:1
a) Flour : Water. b) Gluten : Water c) Water : Gluten d) Water : Flour
- Which sequence is the correct one for bread making? a) Mixing, Sheeting, Panning, Fermentation. b) Mixing, Fermenting, Proofing, and Baking. c) Mixing, Proofing, Fermentation, Baking. d) Moulding, Kneading, Proofing, Panning.
- Which term does not belong to wheat?
a) Gluten, b) Glutamine, c) Glutelin, d) Glutenin.
- Parboiled rice is superior than Raw Rice because.
a) Milling recovery is more. b) Retains more protein, vitamins, minerals.
c) More digestible. d) Increased shelf life. e) All the above.

Name the following.

- Which is the variety suitable for the production of biscuit from wheat?
- Which is the vitamin available more in rice bran?
- Pulses are deficient in -----amino acid.
- Give an example for a bread improver.
- is an example of a biological leavening agent.
- Tempering of Wheat refers to the addition of ----- to bran and endosperm.

PART B**Answer any Five questions****5x2 = 10 Marks**

- What do you mean by leavening action.
- What is Gluten? Give its importance.
- Name the Anti nutritional Factors in pulses.
- What is parboiling, write its advantages.
- What do you mean by curing of rice?
- Give the principle of baking.
- What is liquid glucose? Give its importance in candy preparation.

PART C**Answer any Six questions****6X5 = 30 Marks**

- What is staling of bread?
- Write the importance of role of ingredients in bread.
- Explain toffee manufacturing briefly.
- What is the impact of ageing of wheat flour? How ageing could be Minimized by using chemicals?
- Write on TVP
- Explain the action of fast acting baking powder with suitable example.
- Crackers and Wafers.
- Cookies and Biscuits.

PART D

Answer any two of the following

2x15 = 30 Marks

26. Explain the milling of wheat in detail.
27. What is parboiling and differentiate between single boiled and double boiled rice. Write the merits and demerits of Parboiling.
28. Write in detail about various processing steps of bread manufacture.
29. Describe in detail on the processing of oil seeds.



FTL 5 B 11 Technology of Animal Foods**Time 3 Hours****Total 80 Marks****PART A****Answer all the questions****10x1= 10 Marks****Multiple Choice**

1. Temperature for cold storage of eggs
[a) 0 to -1⁰C b) 10⁰C c) -18 to -23⁰C]
2. Fish liver oil is rich in
[a) Vit A, b) Vit C, c) Vit B]
3. AA quality egg has Haugh unit
(a. above 72, b. 60-72, c. 31-60)
4. Fish Fat is composed of
(a. PUFA, b. Unsaturated Fatty acid, c. Cholesterol, d Saturated Fatty acid)
5. _____ acid is formed during Rigor Mortis
6. _____ portion of pig is Bacon
7. Egg shell is rich in _____.
8. Bone meal is rich in _____ and _____.
9. Distribution of fat in Meat is called _____.
10. _____ is removed during drying of egg to prevent Millard reaction.

PART B**Answer all the questions****5x2 = 10 Marks**

11. What is humane method of slaughter?
12. What is the role of nitrite in curing of meat?
13. How is egg preserved by coating?
14. What is candling?
15. What is ageing of meat?
16. What are the changes that occur during storage of eggs?
17. What is ultimate pH.

PART C**Answer any Six questions****6X5 = 30 Marks**

18. Egg quality determination
19. Post Mortem Inspection
20. Fish Meal
21. Meat curing Method
22. Freezing of eggs
23. Write a note on canning of fish
24. Explain any two by products in fish processing industry
25. Factors affecting tenderness of meat

PART D

2x15 = 30 Marks

Answer any two of the following

26. Explain steps in slaughter of pig.
27. Explain the Technology of sausage preparation.
28. What is industrial importance of eggs?
29. Write notes on;
 - a) Fish protein concentrate
 - b) Fish ensilage
 - c) Chitosan



FTL 6 B 16 Dairy Technology**Time 3 Hours****Total 80 Marks****PART A****Answer all the questions****10x1= 10 Marks****Multiple Choice**

- Percentage of fat present in cow milk
[a) 3% b) 5% c) 7% d) 8%]
- pH of fresh cow milk
[a) Below 4, b) 5, c) 6.5 - 6.6 d) 7]
- Pigment responsible for yellow color of milk
[a) carotene, b) Riboflavin c) xanthophyll, d) Calcium Caseinate]

Name the following

- The carbohydrate present in milk
- Acid form during fermentation of milk
- Organism added in manufacture of Yoghurt
- Enzyme added for coagulation of cheese

Fill in the blanks

- The protein present in milk is _____.
- Milk is rich in _____ mineral.
- Write colour of milk is due to _____

PART B**Answer Any five questions****5x2 = 10 Marks**

- What is SNF
- What is table butter?
- Which are the importance fermented milk products?
- What is homogenized milk?
- Define whey of milk.
- What is CIP?
- Write the classification of cheese?

PART C**Answer any Six questions****6X5 = 30 Marks**

- What are the factors affecting composition of milk?
- How is skim milk powder different from whole milk powder
- Write short note on Yoghurt
- What are the major components of milk?
- Steps in manufacture of instant milk powder.
- Write a note on the cleaning of dairy equipments
- List different types of milk based on fat content
- Define cream, what is neutralisation of cream?

PART D

2x15 = 30 Marks

Answer any two of the following

26. Explain the technology of butter
27. Describe the production of skim milk powder with flow chart
28. Explain the process of cheddar cheese.
29. Write the steps in manufacture of Ice-cream.



FTL 6 B 15 E Food Engineering**Time 3 Hours****Total 80 Marks****PART A****Answer all the questions****10x1= 10 Marks****Multiple Choice**

- Heat Exchanges are used to-----a) Heat the product b) Cool the product c) Heat or cool the product d) Maintain constant temperature
- Freezing temperature of brine is-----a) Lower than water b) Higher than water c) Equal d) Less than equal to water
- Solid food materials are generally---a) Elastic b) Viscoplastic c) Visco elastic d) Plastic
- Thermal energy is transmitted by conduction in a solid medium by
 - Collision between free Molecules
 - Vibration of bound Molecules
 - Collision between free electrons
 - None of these

Name the following

- Temperature for UHT pasteurization is-----?
- The heat of pasteurized milk was used to warm up cold incoming raw milk. What is the Method called?
- What is the nature of curve between shear stress (Y-axis) and rate of shear (x-axis) for Bingham plastic liquid?
- What is the equation for the Fourier's law of conduction?

Fill in the blanks

- An example for non- contact type heat exchanger is-----.
- The difference between a pasteurizer sterilizer is only in -----

PART B**Answer all the questions****5x2 = 20 Marks**

- Differentiate driers and Evaporators
- Differentiate Newtonian and Non Newtonian fluid?
- What are the laws involved in conduction and convection.
- Differentiate Sterilization & pasteurization process
- Define Rheology?
- Which evaporator is having more steam economy? Why?
- What do you mean by the term heat transfer coefficient?

PART C**Answer any Six questions****6X5 = 30 Marks**

- Explain the working at plate heat exchanger with Diagram
- Explain Single and Multiple effect evaporator schematically?
- Differentiate water tube & fire tube boilers.
- Explain different drying rate period involved in grain drying?
- Explain different methods of drying? Brief any one
- Differentiate Quick freezing & slow freezing
- Explain Vapour compression refrigeration cycle.
- Explain about HTST and UHT.

PART D

Answer any two of the following

2x15= 30 Marks

26. Describe the classification of heat exchangers?
27. Describe different types of driers employed in food industries.
28. Explain single and multiple effect evaporators schematically.
29. What is refrigeration, Ton of refrigeration and Explain the application of refrigeration in food industries?



FTL 6 B 17 Food Safety Regulations and Packaging

Time 3 Hours

Total 80 Marks

PART A

Answer all the questions

10x1= 10 Marks

Multiple Choice

1. HACCP stands for _____
2. Expand SSOP
3. _____ is a common adulterant in Tea.
4. Give example for a high risk food.
5. GMP stands for _____
- 6 HDPE stands for _____
7. FAO constituted in the year _____
8. Mention any two tools used for sampling.
9. CAP stands for _____
10. Asepsis means _____

PART B

Answer Any Five questions

5x2 = 10 Marks

11. Differentiate Primary and Secondary packaging.
12. What you mean by physical hazards? Give Examples.
13. Name the different phases in a bacterial growth curve.
14. What do you mean by biodegradable packaging?
15. List four important functions of packaging.
16. What do you understand by traceability and recalling?
17. What do you meant by active packaging?

PART C

Answer any Six questions

6X5 = 30 Marks

18. Write a note on AGMARK
19. Write short note on Food poisoning.
20. Discuss briefly on food allergens.
21. Describe CAP and MAP.
22. Outline the structural requirements of a food plant.
23. Differentiate between sanitizers and disinfectants.
24. BIS
25. Write a note on aseptic packaging.

PART D

Answer any two of the following

2x15 = 30 Marks

26. What are high risk and low risk foods? Discuss the significance of food safety and hygiene.
27. What do you meant by food adulteration? Briefly discuss any four common food

adulterants and their tests?

28. Briefly discuss food sampling techniques.

29. Briefly discuss the recent trends in packaging?



FTL 6 B 18 Technology of Fruits , Vegetables,spices & plantation Crops**Time 3 Hours****Total 80 Marks****PART A****Answer all the questions****10x1= 10 Marks****Multiple Choice**

1. PH of High acid food
[a) above 5.0, b) 5.0-4.5, c. 4.5-3.7, d) 3.7 and below]
2. Which acid is present in apple
[a. Malic acid, b. Citric acid, c. Tartaric acid, d.. Oxalic acid]
3. Which instrument is used for measuring total soluble solids
[a. Hydrometer, b. Refractometer, c. pH meter d. Salinometer]
4. FPO specification for total soluble solids in Jam
[a. 68.5o B b. 70oB c. 75oB d. 65o B]

Name the following

5. Name the pungent principle present in spices.
6. Acid formed during fermentation of pickle
7. Instrument used to measure salt content
8. _____ gives stimulating effect of coffee.

Fill in the blanks

9. Pigment present in Tomato _____
10. Enzyme responsible for browning of fruits

PART B**Answer Any Five questions****5x2 = 10 Marks**

11. What is blanching ?
12. What is Cocoa Butter?
13. What is the function of salt in pickling
14. Differentiate between squash and cordials.
15. What are the factors affecting gel formation
16. How is browning prevented?
17. What are spice oils?

PART C**Answer any Six questions****6X5 = 30 Marks**

18. Describe the process preparation of fruit cordial
19. Describe the steps in processing of black Tea.
20. What are pectic enzymes? Discuss their importance in ripening of fruits.
21. What are all the steps in manufacture of oleoresins?
22. Which are the different methods of peeling?
23. Explain manufacture of Chocolate.
24. Differentiate glazed fruit and candied fruit
25. Briefly explain preparation of tomato ketchup. Give the specification.

PART D

Answer any two of the following

2x15 = 30 Marks

26. What are the steps involved in canning of fruits.
27. Steps involved in manufacture of Jams. Discuss defects in Jam preparation.
28. Give the different steps involved in Cocoa bean processing? Discuss the steps involved in coffee processing.
29. Discuss browning of fruits and vegetables and its prevention.



Open course

FTL 5 D 01 Technology of Spices

Time 2 Hours

Total 40 Marks

PART A

Answer all the questions

5x1= 5 Marks

Name the following.

1. Name an Aromatic spice.
2. Name a Pungent spice.
3. Chemical used for bleaching Cardamom.
4. Name the alkaloid responsible for biting taste of Pepper.
- 5 King of Spices.

PART B

Answer Any Five questions

5x2 = 10 Marks

6. Name the major spices of India.
7. What do you mean by “Garbling”?.
8. Define Spice.
9. What is the important use of Paprika?.
10. Mention the uses of Ginger oils.
11. Mention the important factors that affect quality of Chillies
12. What is function of “Aspirator” in processing Spices?.

PART C

Answer any three questions

3X5 = 15 Marks

13. What are Spice oils?.
14. How are Spices classified?.
15. Briefly explain production of Oleoresin.
16. Explain steps in curing of Turmeric.
17. Explain the processing of cardamom

PART D

Answer any one of the following

1x10 =10 Mark.

18. Explain the different steps involved in processing of Black Pepper.
19. Explain important steps in extraction of Oleoresin.

FTL 5 D 02 Fruit and Vegetable Processing**Time 2 Hours****Total 40 Marks****PART A****Answer all the questions****5x1= 5 Marks****Name the following:**

1. Name a Tomato based product.
2. Instruments to measure sugar
3. Type of browning reaction in cut surface of Apples.
4. Name a fruit coming under the group Drupe.
5. Name a food additive.

PART B**Answer Any Five questions****5x2 = 10 Marks**

6. What are Non-climatic Fruits ? (Give example)
7. What do you mean by Enzymatic browning ?
8. Write any four changes during ripening of fruits.
9. What do you mean by fermentation? Name a fermented fruit based product.
10. Name four mango based products available in market.
11. What do you mean by blanching of vegetables.
12. What are class 11 preservatives.

PART C**Answer any three questions****3X5 = 15 Marks**

13. Write the Ph of low acid and High acid foods.
14. Which are the different methods of peeling.
15. Browning of fruits.
16. Ripening of Fruits.
17. Composition of leafy vegetables.

PART D**Answer any one of the following****1x10 = 10 Marks.**

18. Write a note on classification of fruits. Discuss the general
19. Write a note on pickling. Give the function of ingredients.

FTL 5 D 03 Food & Health

Time 3 Hours

Total 40 Marks

PART A

Answer all the questions

5x1= 5 Marks

Name the following

1. Name a water soluble vitamin
2. Which food group is known as body builders
3. Example for cereal crop is -----
4. Name one chemical preservative
5. Lack of lactase leads to -----

PART B

Answer Any Five questions

5x2 = 10 Marks

6. What are carbohydrates? Give example.
7. What are fat soluble vitamins? Give example.
8. Name any four food source for fat.
9. What are nutrients? Name any two.
10. What do you mean by Body Mass Index?
11. What are preservatives? Give example.
12. Define Adulterants?

Answer any three questions

Write on

13. Common food Allergens.
14. Common adulterants in food
15. Functions of Preservatives
16. Vitamins
17. Functions of protein in body?

PART C

3X5 = 15 Marks

Answer any one of the following

18. Explain briefly about the Digestion and absorption of nutrients?
19. What are Life style diseases? Briefly discuss each of them?

1x10 = 10 Mark.

A014 Nutrition & Health**Time 3 Hours****Total 80 Marks****PART A****Answer all the questions****10x1= 10****Multiple Choice**

1. Glucose belongs to _____
2. [a) Monosaccharide, b. Disaccharide, c. Oligosaccharide, d. Polysaccharide]
3. Deficiency of iodine leads to _____
4. [a) Night Blindness b. Scurvy, c. Beri-Beri d. Goitre]
5. Vitamine responsible for clotting of blood is _____
6. [a. Vit.-K b. Vit.-E, c. Vit.-B d. Vit.-C)

Name the following

7. The linkage between two amino acids in a protein
8. Milk protein is called

Fill in the blanks

9. Cellulose cannot be digested in human intestine because _____
10. Cellulose cannot be digested in human intestine because _____

PART B**Answer Any Five questions****5x2 = 10**

11. Essential Amino acids
12. What is the Energy value of carbohydrate and fats
13. Define Under Nutrition
14. Define Protein Efficiency Ratio.
15. Classify the type of water
16. What is saturated fatty acids and Give one example.
17. Two important factors affecting BMR

PART C**Answer any Six questions****6x5 = 30 Marks**

18. Classify the carbohydrates and give one example to each
19. Specific dynamic action of Food
20. How protein quality will calculate?
21. Role of Iodine in Diet
22. Write the functions of fats
23. Write a short note on BMR?
24. Write a note on dietary fibre
25. Write the digestive enzymes present in Gastro Intestinal Tract.

PART D**Answer any two of the following****2x15 = 30 Marks**

26. How minerals are classified. Explain in detail the role of any two minerals in human nutrition
27. How are fats digested and absorbed in the body .Mention the role of bile juice in fat digestion

28. Explain in detail the role of water soluble vitamins in the human system. Give any four deficiency disease
29. How nutrients are important to human health? Discuss in detail.



COMPLIMENTARY COURSE FOOD SCIENCE AND QUALITY CONTROL**FTL 1 C 01 Principles of Nutrition (2 credits)**

SI No:	Topic	Course outline	Hrs
1	Concept of nutrition: Definition of terms	Nutrition, under nutrition, malnutrition, symptoms and remedy, Health and nutritional status-adequate optimum and good nutrition Energy – Definition of calorie and Joule, Energy value of foods, Basal Metabolic Rate (BMR), factors affecting BMR	10
2	Food Guide	Nutrients supplied by foods. Basic five food groups – Cereals, pulses, fruits and vegetables, milk and meat, fats and sugar.	5
3	Nutrients and Health: Water	Importance, distribution in body, function, sources, water balance, regulation and requirement, abnormalities in water balance.	5
4	Carbohydrates	Functions, sources, requirement digestion and absorption, effects of deficiency.	5
5	Fibers	Definition, classification, sources, role of fiber in human nutrition	5
6	Protein	Functions, sources, requirement, essential amino acids, determination of nutritional quality of proteins, digestion and absorption.	4
7	Lipids	Functions, sources, digestion and absorption, role of essential fatty acids, Health concerns in lipid nutrition-obesity, hypertension, atherosclerosis, requirements and effects of deficiency,	5
8	Vitamins	Classification, sources, requirement, deficiency of Vitamin A, D, E,K, Ascorbic acid, Thiamine, Riboflavin, Niacin, Pyridoxine, Folic acid Pantothenic acid.	7

9	Minerals	Functions, sources, deficiency of calcium, phosphorus, sodium, potassium, iron, iodine and fluorine.	4
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10	Balanced diet	Meal planning, factors affecting meal planning, principles of meal planning.	3
11	RDA	Factors affecting RDA, principles deriving RDA	3

References

- Fundamentals of Food & Nutrition S R Mudambi & M V Rajagopal
- A text book of foods, Nutrition and Dietetics M Raheena Begum
- Handbook of Food and Nutrition M Swaminathan

FTL 2 C 02 Food Chemistry (2 credits)

SI No:	Topic	Course outline	Hrs
1	Carbohydrates	Classification, Structure, browning reaction, changes during cooking	5
2	Pectin	Composition & structure	2
3	Protein	Introduction to food proteins, classification, structure, physico chemical properties, denaturation, reactions, protein determination, changes during cooking	8
4	Fats & Oils	Classification, saturated, unsaturated, polyunsaturated fatty acids physical and chemical properties, refining of fats and oils, -bleaching, deodorizing, hydroxylation, shortening, Products of fat - margarine, vanaspati, lard, tallow.	10
5	Enzymes	Classification, nomenclature, enzyme specificity, factors affecting enzyme activity, enzyme inhibition, role in food processing	5
6	Water	Introduction, physical and chemical properties of water, moisture in foods, hydrogen bonding, bound water	6
7	Pigments	Pigments in foods, chlorophyll, flavanoids, anthocyanin, anthoxanthins, quinines, xanthones, betalains, Effect of processing and storage on pigments, physical and chemical properties	7

8	Flavours	Flavour compounds in foods - terpenoids, flavanoids, and sulphur compounds, effect of processing and storage on flavours	6
9	Properties of foods	Colloids – Properties, sols, gels, foam, emulsion and suspension	5

FTL 2 C 03 P Food Chemistry

Practicals	
<ol style="list-style-type: none"> 1) Colour reactions of carbohydrates 2) Colour reactions of proteins 3) Determination of acid value and free fatty acid. 4) Determination of acidity in fruit juices. 5) Determination of ascorbic acid 	<ol style="list-style-type: none"> b) Estimation of reducing sugar b) Estimation of protein.

References

- Food Chemistry Owen R Fennema
- Food Chemistry Lillian Hoagland Meyer
- Foods Facts and Principles N Shakuntalamanay
- M Shadaksharaswamy
- Food science Norman N. Potter

FTL 3 C 04 Principles of Food Science (2 credits)

SI No:	Topic	Course outline	Hrs
1	Plant Foods	Introduction to food science.	3
2	Cereals, pulses and legumes	Composition, nutritive value, antinutritional factors, changes during cooking. Germination and changes Germination.	5
3	Fruits and vegetables	classification, composition, nutritive value, changes during cooking of vegetables, ripening of fruits	7
4	Spices and condiments	Classification, composition and use	5
5	Animal Foods: Milk and milk products	Composition, nutritive value, effect of acid, heat, enzyme, salt on milk, Processing of milk – clarification, pasteurization and homogenization, cheese, butter, skim milk powder, whole milk powder, condensed milk, yoghurt.	8
6	Egg	Structure, composition, nutritive value, grading, changes during storage, role of egg in food industry.	6
7	Meat	Structure, composition, nutritive value, post mortem changes, changes during cooking, ageing.	6
8	Fish and poultry	Composition and nutritive value, fish products – fish meal, fish flour and fish oils.	5
9	Sugars	Liquid sweeteners, properties of sugar, reactions of sugar, stages of heating.	9

FTL 3 C 05 P – Principles of Food Science (2 credits)**Practicals**

1. Determination of Moisture content – Hot air oven method.
2. Determination of Ash content.
3. Determination of Gluten content in wheat flour.
4. Determination of Water absorption power of Maida
5. Preparation of jam.

References

- Foods : Facts and principles N Shakuntalamanay & M S Swamy
- Food Science - B Srilakshmi
- Food science, Chemistry & Experimental foods M Swaminathan
- Text Book on Foods storage And preservation Vijayakhader

FTL 4 C 06 Food Preservation and Quality Control (2 credits)

SI No:	Topic	Course outline	Hrs
1	Food Preservation	Significance of preservation, Methods of food preservation - low temperature, high temperature, preservatives, osmotic pressure, dehydration, irradiation.	20
2	Food Additives	Food additives – Role of food additives, antioxidants, chelating agents, colouring agents, curing agents, emulsifiers, flavour enhancers, flavour improvers, humectants and ant caking agents, leavening agents, stabilizers and thickeners, artificial sweeteners, preservatives, food fortifiers.	15
3	Food Adulteration	Food adulteration – types of adulterants, common adulterants in foods, toxicants in foods, impact of food adulteration in humans.	10
4	Food Laws and Quality	Food laws and quality control – HACCP, Codex alimentarius, PFA, FPO, MFPO, BIS, AGMARK.	10

FTL 4 C 07 (P) Food Preservation and Quality Control
Practicals 4 credits

SI No:	Practicals
1	Detection of adulterants in foods such as milk, honey etc.
2	Estimation of SO ₂ in fruit products.
3	Estimation of purity of potassium metabisulphite
4	Qualitative determination of benzoic acid



Model Question Paper

FTL 1 C 01 Principles of Nutrition

Time 3 Hours

Total 64 Marks

PART A

Answer all the questions

10x1= 10 Marks

1. Deficiency of iodine leads to ----a) Night blindness b) Scurvy c) Beriberi d) Goiter
2. Fat soluble vitamins are vit A D E &-----a) Vit B b) Vit K c) Vit B d) Vit B
3. Calorific value of protein is-----a) 4.1 b) 9.5 c) 5.7 d) 3.0
4. Energy Value of food is expressed in----- (a) Calories b) Kilo calories c) Joule d) Celsius

Name the following

5. Chemical name of Vitamin E is
6. Mineral present in haemoglobin?
7. Name two flavin coenzymes.
8. Mineral required for growth of bones

Fill in the blanks

9. _____ is the hormone which regulate water balance.
10. RDA stands for _____

PART B

Answer All questions

7x2 = 14 Marks

11. What is the daily energy requirement for a man and woman?
12. What is fluorosis?
13. What is PER?
14. Name the hormones in which iodine plays an important role.
15. Write two sources of calcium.
16. What is Kwashiorkor?
17. Write two sources of Vitamin B6.

PART C

Answer any five questions

5X4 = 20 Marks

18. What are the functions of sodium?
19. What is Osteoporosis? Why it occurs?
20. What are the functions of protein?
21. What is the role of bile in fat digestion?
22. What are micro minerals? Give two examples.
23. What are the deficiency symptoms of riboflavin?
24. Define balanced diet.
25. Briefly indicate their importance in human nutrition

PART D

Answer any two of the following

2x10 = 20 Mark.

26. Write the basic five food groups. Write the principles of meal planning.
27. How is nutritive value of protein determined? Compare animal and plant protein quality .
28. Name the vitamins which come under the category of Vitamin B complex.

FTL 2 C 02 Food Chemistry

Time 3 Hours

Total 64 Marks

PART A

Answer all the questions

10x1= 10 Marks

1. Percentage of protein present in Cow's milk-----a) 3.5% b). 6% c).7% d).2%
2. Which is an example for a complete protein.---a). Egg b) Milk c).Fish d) Meat
3. Which is the storage polysaccharide in animals.----a) Glucose b) Glycogen
c) Starch d) Cellulose
4. Which pigments are responsible for the red, purple and blue colour of Fruits & Vegetables-----a). Anthocyanins b).Anthoxanthins c) Carotenoids d) Chlorophyll

Name the following

5. Name a reducing sugar
6. W which is the simplest amino acid?
7. What is wood sugar?
8. Name the ester responsible for the flavour of banana.

Fill in the blanks

9. Enzymatic browning in fruits is due to the action of the enzyme _____
10. _____ is the enzyme that hydrolyses sucrose to glucose and fructose.

PART B

Answer All questions

7x2 = 14 Marks

11. Give an example for competitive inhibition of an enzyme.
12. Name the element and four rings present in chlorophyll
13. Which is the prosthetic group in haemoglobin?
14. What is citral?
15. What is meant by enzyme specificity?
16. What are essential amino acids? Give 2 examples.
17. Define iodine value of oils.

PART C

Answer any five questions

5X4 = 20 Marks

18. What are suspensions
19. Why sucrose is a non-reducing sugar
20. What are betalains?
21. Write the structural difference between chlorophyll a and b.
22. Write the role of fibre?
23. What is native protein?
24. Write the composition of butter.
25. reaction involved in the identification of sugars

PART D

Answer any two of the following

2x10 = 20 Mark.

26. Write the effect of processing and storage on chlorophyll pigments in foods.
27. Write nomenclature and method of classification of enzymes and discuss
28. any four important enzymes of metabolic importance.

28. Explain the composition of milk and effect of heat on it. Explain in detail the production of any one milk product of commercial importance.

FT 4 C 06 Food preservation and Quality Control

Time 3 Hours

Total 64 Marks

PART A

Answer all the questions

10x1= 10 Marks

1. Sodium nitrate is
 - a). anticaking agent
 - b) antioxidant
 - c) curing agent
 - d) colorant
2. Which of the following is a sequesterant?
 - a) EDTA
 - b) Pectin
 - c) Hydrogen peroxide
 - d) vinegar
3. Preservative used in tomato products
 - a) ascorbic acid
 - b) benzoic acid
 - c) sodium chloride
 - d) sorbic acid]
4. World food day is celebrated on
 - a) Oct 16
 - b) Oct 10
 - c) March 8
 - d) April 23]

Name the following

5. A food emulsifier
6. Anticaking agent
7. Antimicrobioial agent
8. Leavening agent

Fill in the blanks

9. Botulism is caused by the toxins of _____
10. _____ is a substance which is used to enhance the flavour

PART B

Answer All questions

7x2 = 14 Marks

11. What does GRAS stands for?
12. What is MFPO?
13. What is sharp freezing?
14. Name two foods which are preserved by the principle of osmosis.
15. What is the unit of radiation?
16. Name the only permitted inorganic preservative in fruits and vegetable
17. products?

PART C

Answer any five questions

5X4 = 20 Marks

18. Name the pathogen commonly found in cereal products
19. What is food adulteration?
20. What are the causes of food spoilage?
21. What are artificial sweeteners? Name any two.
22. What is codex Alimentarius?
23. What is food fortification?
24. Explain how salt acts as a preservative?
25. Note on natural colours

PART D

Answer any two of the following

2x10 = 20 Mark.

26. Describe food additives with suitable examples? How are they classified?
27. How do you classify preservatives? Give two examples for each category.
28. Write in detail different methods of preservation



