

**(Abstract)**

B.Sc Food Technology (LRP) programme- Scheme , Syllabus and Pattern of of question paper of Core, General Awareness and Generic Elective Courses under Choice Based Credit and Semester System - OBE- w.e.f 2022 admission - Implemented -Orders issued.

**ACADEMIC C SECTION**

Acad/C2/16588/FT/2022

Dated: 31.12.2022

- Read:-1. G.O (Ms) 383/2022/HEDN dated 08.08.2022  
2. U.O No Acad A/ASO A2/14768/2022 dated 09.12.2022  
3. NO.IGASC/syl/2022-23 dated 20.10.2022

**ORDER**

1. As per paper read (1)) above, the Government has granted NOC for starting B.Sc Food Technology programme CBCSS-OBE at Sir Syed Institute for Technical Studies, Karimbam and WMO Imam Gazzali Arts & Science College, Kappunchal, during the academic year 2022-23.
2. As per paper read (2) above, provisional affiliation was granted for conducting the B.Sc.Food Technology programme CBCSS-OBE at Sir Syed Institute for Technical Studies, Karimbam and WMO Imam Gazzali Arts & Science College, Kappunchal during the academic year 2022-23
3. As the Board functioning of Board of Studies is kept in abeyance in the light of the judgement in WA No. 1530/2021 dated 22.03.2022, the Principal WMO Imam Gazzali Arts & Science College, Kappunchal submitted the draft Scheme, syllabus and Pattern of Question paper of Core, General awareness and Generic Elective Courses of B.Sc. Food Technology Programme CBCSS-OBE, duly scrutinised by an external subject expert, for implementation w.e.f 2022 admission as per paper read (3) above.
4. The Vice-Chancellor after considering the matter in detail and in exercise of the power of the Academic Council conferred under section 11 (1) Chapter III of Kannur University Act 1996 accorded sanction to implement the Scheme, Syllabus and Pattern of Question paper of Core, General awareness and Generic Elective Courses of B.Sc. Food Technology (LRP) Programme CBCSS-OBE, at Sir Syed Institute for Technical Studies, Karimbam and WMO Imam Gazzali Arts & Science College, Kappunchal. w.e.f 2022 admission , & to report the same to the Academic Council.
5. Scheme, Syllabus and Pattern of question paper of B.Sc.Food Technology programmeCBCSS-OBEare uploaded on the University website (www.kannuruniversity.ac.in)
6. Orders are issued accordingly.


Sd/-

**BALACHANDRAN V K**  
**DEPUTY REGISTRAR (ACAD)**  
For REGISTRAR

To: The Principal  
1.WMO Imam Gazzali Arts & Science College,Wynad  
2. Sir Syed Institute for Technical Studies, Karimbam

Copy To: 1. The Examination Branch (through PA to CE)  
2. PS to VC/PA to PVC/PA to Registrar  
3. DR/ARI Academic, EXCI  
4.The Computer Programmer  
5. Web manager (For uploading in the website)  
6. SF/DF/FC



Forwarded / By Order  
  
SECTION OFFICER



## **KANNUR UNIVERSITY**

**B.Sc FOOD TECHNOLOGY**  
(UNDER THE FACULTY OF SCIENCE, KANNUR UNIVERSITY)

AS PER THE REGULATIONS FOR  
CHOICE BASED CREDIT AND SEMESTER SYSTEM  
FOR UNDER GRADUATE PROGRAMME  
IN AFFILIATED COLLEGES-2019  
(OBE- OUTCOME BASED EDUCATION SYSTEM)

**LANGUAGE REDUCED PATTERN**

**SYLLABUS FOR  
B.Sc. FOOD TECHNOLOGY CORE,  
GENERAL AWARENESS AND  
GENERIC ELECTIVE COURSES**

**CHOICE BASED CREDIT AND SEMESTER SYSTEM  
(2022 ADMISSION ONWARDS)**

Prepared by

Safeera Kannoli, HOD, Department of Food Technology

WMO IG Arts and Science College, Koolivayal

## **KANNUR UNIVERSITY VISION AND MISSION STATEMENTS**

**Vision:** To establish a teaching, residential and affiliating University and to provide equitable and just access to quality higher education involving the generation, dissemination and a critical application of knowledge with special focus on the development of higher education in Kasargode and Kannur Revenue Districts and the Mananthavady Taluk of Wayanad Revenue District.

**Mission:**

- To produce and disseminate new knowledge and to find novel avenues for application of such knowledge.
- To adopt critical pedagogic practices, which uphold scientific temper, the uncompromised spirit of enquiry and the right to dissent.
- To uphold democratic, multicultural, secular, environmental and gender sensitive values as the foundational principles of higher education and to cater to the modern notions of equity, social justice and merit in all educational endeavors.
- To affiliate colleges and other institutions of higher learning and to monitor academic, ethical, administrative and infrastructural standards in such institutions.
- To build stronger community networks based on the values and principles of higher education and to ensure the region's intellectual integration with national vision and international standards.
- To associate with the local self-governing bodies and other statutory as well as non-governmental organizations for continuing education and also for building public awareness on important social, cultural and other policy issues.

## **KANNUR UNIVERSITY PROGRAMME OUTCOMES (PO)**

### **PO 1.Critical Thinking:**

Acquire the ability to apply the basic tenets of logic and science to thoughts, actions and interventions.

Develop the ability to chart out a progressive direction for actions and interventions by learning to recognize the presence of hegemonic ideology within certain dominant notions.

1.3 Develop self-critical abilities and also the ability to view positions, problems and social issues from plural perspectives.

### **PO 2.Effective Citizenship:**

Learn to participate in nation building by adhering to the principles of sovereignty of the nation, socialism, secularism, democracy and the values that guide a republic.

Develop and practice gender sensitive attitudes, environmental awareness, and empathetic social awareness about various kinds of marginalization and the ability to understand and resist various kinds of discriminations.

Internalise certain highlights of the nation's and region's history. Especially of the freedom movement, the renaissance within native societies and the project of modernisation of the post-colonial society.

### **PO 3. Effective Communication:**

Acquire the ability to speak, write, read and listen clearly in person and through electronic media in both English and in one Modern Indian Language

Learn to articulate, analyse, synthesise, and evaluate ideas and situations in a well- informed manner.

Generate hypotheses and articulate assent or dissent by employing both reason and creative thinking.

### **PO 4. Inter disciplinarity:**

Perceive knowledge as an organic, comprehensive, interrelated and integrated faculty of the human mind.

Understand the issues of environmental contexts and sustainable development as a basic interdisciplinary concern of all disciplines.

Develop aesthetic, social, humanistic and artistic sensibilities for problem solving and evolving a comprehensive perspective.

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# **B.Sc. FOOD TECHNOLOGY**

## **Regulation, Scheme & Syllabus**

### **INTRODUCTION**

The food industry is one of the fast-growing industries today across the world. There is a huge demand for a highly trained man power in operational, supervisory, and managerial levels of various sectors of the Food Industry. The 3-year degree programme in Food technology is designed to impart adequate knowledge and training to the students to meet the requirements of the different segments of the Food Industry and to face the challenges of the dynamic industry.

In this course students will explore the wide array of disciplines in which engineering, biological, and physical sciences are used to study and produce food products. An overview of the relationship between food nutrition, chemistry, microbiology, safety, processing, engineering, sensory, and product development will be discussed. The food technology industry will be studied to understand food processing, food safety, quality and packaging of specific categories of foods. The course also provides a brief introduction to different career opportunities within the food and technology industry.

### **PSO STATEMENTS**

PSO1. To provide adequate knowledge and skills necessary for all levels of positions in the various sectors of the food industry across the world

PSO2. To provide required operational and managerial skills in Food Production, Distribution and Marketing.

PSO3. To develop the required skills in Accounts, Management, Entrepreneurship, Research Methodology

PSO4. To impart necessary skills to do the research

PSO5. To enhance the communication skills for a better career in the Food Industry.

PSO6. To provide basic working skills in Food industry.

PSO7. To provide the basic knowledge in food safety, food science and nutrition

PSO8. To create an awareness on the importance of protecting the environment

PSO9. To provide an opportunity to start own business

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

## **1.0 TITLE OF THE PROGRAMME**

This DEGREE shall be called BACHELOR OF SCIENCE IN FOOD TECHNOLOGY (Language Reduced Pattern –LRP) under the Faculty of Science.

## **2.0 ELIGIBILITY FOR ADMISSION**

A pass in Higher Secondary Examination of the state or an Examination accepted by the University as equivalent thereto with Physics, Chemistry, Biology/ Mathematics as subjects.

### **Reservation of Seats to SC/ST and other reservation categories**

The rules for reservation of seats for SC/ST candidates and other reservation categories as laid down by the State Government from time to time will be followed.

## **3.0 DURATION OF THE PROGRAMME**

The programme shall be of six semesters, distributed over a period of 3 Academic years. The odd semesters (1, 3, 5) shall be from June to October and the even semesters (2, 4, 6) shall be from October/November to March. Each semester shall have 90 working days of 5 hours each inclusive of all examinations.

## **4.0 MEDIUM OF INSTRUCTION**

The medium of instruction and examination shall be in English.

## **STRUCTURE OF THE PROGRAM**

Total number of courses for the entire BSc FT Programme is 42 which are spread through 120 credits. The courses of the program are grouped into 4 categories as follows.

1. Common courses
2. Core courses
3. Complementary Elective Courses and
4. Generic Elective Course



### **Common Courses**

Common 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, Malayalam or Urdu. Additional language may be chosen by the students according to their wish. Code assigned to all the common courses is -A

### **Core Courses**

Core courses are the main courses of the programme. These are offered by the parent department. The number of core courses are 21 including Industrial Training and Project work. Core courses are taught in all the semesters. Code assigned to all the Core courses is -B

### **Complementary Elective Courses**

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. This is taught by Physics and Chemistry teacher respectively. Code assigned to Complementary Elective Courses is -C.

### **Generic Elective Courses**

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.

## **Credit and Marks Distribution for Various Categories of Courses**

<b>CATEGORIES OF COURSE</b>		<b>NO. OF PAPER S</b>	<b>CREDITS</b>	<b>MARKS</b>
Common Courses(CODE A)	Common Course English	4	14	200
	Additional Common Course	2	8	100
	General Awareness Course	4	16	400
Core Courses (CODE B)		21	56	2100
Complementary Elective Course (CODE C)		10	24	400
Generic Elective Course (CODE D)		1	2	25
TOTAL		42	120	3225

### Number of Papers in Each Category and Semester Assigned

Category of Course and Code	Theory	Practical	Project & IET Report	Total Papers	Total Marks	Credit	Semester Assigned
Common English Course Code A	4			4	200	14	I,II
Addl. Common Course Code A	2			2	100	8	I,II
General awareness Course Code A	4			4	400	16	III,IV
Core Course Code B	12	7	2	21	2100	56	I,II,III,IV,V,VI
Complementary Elective Course. Code C	4	1		5	200	12	I,II,III,IV
Complementary Elective Course. Code C	4	1		5	200	12	I,II,III,IV
Generic Elective Course Code D	1			1	25	2	V
<b>TOTAL</b>	<b>30</b>	<b>8</b>	<b>2</b>	<b>42</b>	<b>3225</b>	<b>120</b>	

Semester	Course	credit	Hours/ week	Total Credits	Total Hours
I	Common Course English I	4	5	18	25
	Common Course English II	3	4		
	Additional Common Course I	4	5		
	Core course 1	3	3		
	Core course practical		2		
	complementary Elective course 1	2	2		
	complementary Elective course 2	2	2		
	complementary Elective course 1 practical		2		
II	Common Course English III	4	5	20	25
	Common Course English IV	3	4		
	Additional Common Course II	4	5		
	Core course 2	3	3		
	Core course practical	2	2		
	complementary Elective course 1	2	2		
	complementary Elective course 2	2	2		
	complementary Elective course 1 practical		2		
III	General Awareness Course 1	4	4	20	25
	General Awareness Course 2	4	3		
	Core course 3	3	4		
	Core course 3 practical		2		
	Core course 4	2	3		
	Core course 4 practical	3	2		
	complementary Elective course 1	2	3		
	complementary Elective course 2	2	2		
	complementary Elective course 1 practical		2		
IV	General Awareness Course 3	4	3	31	25
	General Awareness Course 4	4	3		
	Core course 5	2	3		
	Core course 5 practical	3	2		
	Core course 6	3	3		
	Core course 6 practical	3	2		
	complementary Elective course 1	2	3		
	complementary Elective course 2	2	2		
	complementary Elective course 1 practical	4	2		
	complementary Elective course 2 practical	4	2		

Semester	Course	credit	Hours/ week	Total Credits	Total Hours
V	Core Course-7	2	3	19	25
	Core Course-7 practical	3	3		
	Core Course-8	2	3		
	Core Course-9	3	3		
	Core Course-9 practical	2	3		
	Core Course-10	3	3		
	Core Course-10 practical	2	3		
	Project		2		
	Generic Elective Course	2	2		
VI	Core Course-11	2	3	12	25
	Discipline Specific Elective Course	2	3		
	Project	3			
	Industrial Training	5	19		
	TOTAL			120	150

Students will be undergoing 14 weeks (14\*6= 84 days) training in a food industry during the sixth Semesters

### **SCHEME OF EXAMINATION** **SEMESTER I**

No	Course Code	Title	Marks			Duration of Exam	Contact Hrs / Wk	Credit
			Internal	External	Total			
1	1A01ENG	Common Course English I	10	40	50	3hrs	5	4
2	1A02ENG	Common Course English II	10	40	50	3hrs	4	3
3	1A07 MAL/HIN	Common Course Additional Language Paper I	10	40	50	3hrs	5	4
4	1B01FT	Fundamentals of Food science Theory – 1	20	80	100	3hrs	3	3
	2B03FT	Food Preservation Practical I (Part 1)					2	
5	1C01CHE	Complementary I Chemistry Theory I	8	32	40	3hrs	2	2
	4C07CHE	Chemistry Practical					2	
6	1C01PHY	Complementary II Physics Theory I	8	32	40	3hrs	2	2
Total			66	264	330		25	18

## SEMESTER II

No	Course Code	Title	Marks			Duration of Exam	Contact Hrs / Wk	Credit
			Internal	External	Total			
1	2A03EN G	Common Course English III	10	40	50	3	5	4
2	2A04EN G	Common Course English IV	10	40	50	3	4	3
3	2A08 MAL/ HIN	Common course Additional Language Paper II	10	40	50	3	5	4
4	2B02FT Core	Food Preservation Theory – 2	20	80	100	3	3	3
	2B03FT	Food Preservation Practical 1 (Part 2)	20	80	100		2	2
5	2C02CH E	Complementary I Chemistry - Theory II	8	32	40	3	2	2
	4C07CH E	Chemistry Practical					2	
6	2C02PH Y	Complementary II Physics- Theory II	8	32	40	3	2	2
		TOTAL	86	344	430		25	20

### SEMESTER III

No	Course Code	Title	Marks			Duration of Exam	Contact Hrs / Wk	Credit
			Internal	External	Total			
1	3A01FT	Entrepreneurial Development	20	80	100	3	4	4
2	3A02FT	Packaging	20	80	100	3	3	4
3	3B04FT	Food Microbiology I Theory 3	20	80	100	3	4	3
	4B08FT	Food Microbiology I Practical 2					2	
4	3B05FT	Food Chemistry and Nutrition Theory 4	20	80	100	3	3	2
	3B06FT	Food Chemistry and Nutrition practical 3	20	80	100	3	2	3
5	3C03CHE	Complementary I Chemistry - Theory III	8	32	40	3	3	2
	4C07CHE	Chemistry Practical					2	
6	3C03PHY	Complementary II Physics- Theory III	8	32	40	3	2	2
TOTAL			116	464	580		25	20

### SEMESTER IV

No	Course Code	Title	Marks			Duration of Exam	Contact Hrs /Wk	Credit
			Internal	External	Total			
1	4A03FT	Management Concepts and Principles	20	80	100	3	3	4
2	4A04FT	Nutraceuticals, Food Allergies, Intolerances and consumer science	20	80	100	3	3	4
3	4B07FT	Food Microbiology I Theory 5	20	80	100	3	3	2
	4B08FT	Food Microbiology II Practical 2	20	80	100	3	2	3
4	4B09FT	Food Analysis & Instrumentation Theory 6	20	80	100	3	3	3
	4B10FT	Food Analysis & Instrumentation Practical 4	20	80	100	3	2	3
5	3C03CHE	Complementary I Chemistry - Theory IV	8	32	40	3	3	2
	4C07CHE	Chemistry Practical	8	32	40		2	4
6	3C03PHY	Complementary II Physics- Theory IV	8	32	40	3	2	2
	4C05PHY	Physics Practical	8	32	40		2	4
TOTAL			152	608	760		25	31

## SEMESTER V

Si. No	Course Code	Title	Marks			Duration of Exam	Contact Hrs /Wk	Credit
			Internal	External	Total			
1	5B11FT	Technology of cereals, pulses and oilseeds Theory 7	20	80	100	3	3	2
	5B12FT	Technology of cereals, pulses and oilseeds Practical 5	20	80	100	3	3	3
2	5B13FT	Technology of Meat, Fish, Poultry & Egg Theory 8	20	80	100	3	3	2
	5B14FT	Technology of meat, Fish, Poultry & Egg Practical 6	20	80	100	3	3	3
3	5B15FT	Technology of Fruits, Vegetables, Spices & Plantation Crops Theory 9	20	80	100	3	3	2
	5B16FT	Technology of Fruits, Vegetables, Spices & Plantation Crops Practical 7	20	80	100	3	3	3
4	5B17FT	Food Safety & Food Laws Theory 10	20	80	100	3	3	2
5	6B20FT	Project				2	2	
6	5D01 FT 5D02 FT 5D03 FT	Generic Elective Course	5	20	25	2	2	2
TOTAL			145	580	725		25	19



## SEMESTER VI

SI. No	Course Code	Title	Marks			Duration of Exam	Contact Hrs /Wk	Credit
			Internal	External	Total			
1	6B18FT	Dairy Technology Theory 11	20	80	100	3	3	2
2	6B19FT	Food Engineering Theory 12	20	80	100	3	3	2
3	6B20FT	Project	20	80	100			3
4	6B21FT	Industrial Training	20	80	100	2	19	5
		TOTAL	80	320	400		25	12

**GENERIC ELECTIVE COURSES**  
(Offered to the students of other disciplines)

SI. No.	Course Code	Course name	Marks			Duration of Exam	Contact Hrs / Wk	Credit
			Internal	External	Total			
1.	5D01FT	Dairy Science	5	20	25	2	2	2
2.	5D02FT	Fruits &Vegetables	5	20	25	2	2	2
3.	5D03FT	Technology of Spices	5	20	25	2	2	2

**General Awareness Course**

SI. No.	Course Code	Course name	Credit	Semester
1.	3A01FT	Entrepreneurial development	4	III
2.	3A02FT	Packaging	4	III
3.	4A03FT	Management Concepts and principles	4	IV
4.	4A04FT	Nutraceuticals, Food Allergies, Intolerances and consumer science	4	IV

## 7. INDUSTRIAL TRAINING

Industrial Exposure training for a duration of 14 weeks in a Food Industry is introduced in the sixth semester as a part of the curriculum requirement.

The primary objective of this training is to provide an opportunity to the students to understand the actual work environment in the food industry. Students will be able to observe the latest technology applied and the latest trends followed in the industry. The students will be able to work in production department and quality control department. At the end of the training, the student's confidence level and overall personality will improve.

Training arrangement will be made by the Training Coordinator of the Institute. Once the student has been selected / deputed for Industrial Training by the institute, he/she shall not be permitted to undergo IT elsewhere. In case students make direct arrangements with the Industry for Industrial Training, these will necessarily have to be approved by the institute. Students selected through campus interviews will not seek Industrial Training on their own. The students should undergo training from the date announced by the Institute. No student is allowed to deviate from the training schedule unless approved by the Principal of the Institute for a valid reason.

Industrial Training will require an input of 84 days i.e. (14 weeks x 06 days = 84 days). A student can avail leave to a maximum of 15% (12 days) only with prior permission of the company/ institute authorities. Minimum 75 % of attendance is required to appear for the end term examination. The Vice-Chancellor of the University can condone the shortage of attendance maximum of fourteen days on Medical grounds, if eligible, as per the University regulations.

Any student having less than the required percentage of attendance i.e. 75% will have to compensate the attendance shortage during the summer vacation of the second year and to appear for the examination in the next academic year at the end of sixth semester. Only one chance will be given to compensate the attendance shortage. It is mandatory that every student complete the Industrial Training before he appears for 6th Semester examination. Students on training will be contacted frequently by the Training coordinator of the Institute. During the training, each student should maintain a log book. They should enter the daily activities, skills acquired and the observations in the log book and get it signed by the immediate supervisor.

At the end of the training, each student should prepare a training report. The content of the training report will include the Certificate page of the Institute, Certificate page of the Examiners, Copy of the Certificate issued by the Food Industry, Introduction, Profile of the Industry, Organization structure of the industry, Functions of the departments, Duties Performed, skills acquired in each department, Observations on technology / latest trend and any other relevant information pertaining to learning outcome.

## **8. PROJECT**

Every student will have to undertake a research project on any topic from Food science and Technology and related courses in the curriculum. The research project is intended to serve the student develop the ability to apply multidisciplinary concepts, tools and techniques to deal with any subject related to Food industry. The topics shall either be allotted by the supervising teacher or selected by the students in consultation with the supervising teacher. The topics chosen should provide solution/suggestions for the existing problems faced by the Food industry.

The Project work will be done under the supervision and guidance of the teachers of the Department. Repeated projects and downloaded materials shall not be considered for external evaluation.

The project work shall have the following stages:

Project proposal presentation and literature review –4th

semester Field work and data analysis - 5th Semester

Report writing and draft report presentation -6th

Semester Final report submission - 6th Semester

The project report shall be printed in A4 size paper and spiral bound

The layout is:

Font : Times New Roman Size

12Line Spacing : 1.5

Margin: Left - 1.25; Right-1; Top-1; Bottom-1

The project report should be submitted to the Department in the last week of February of the sixth semester without fail.

Belated and incomplete Project will not be entertained. The candidate shall prepare three copies of the report: two copies for submission to the Department and one copy for the student to bring at the time of viva-voce

Structure of the Report

Title Pages

Certificate of the supervising Teacher with signature

Contents List of Tables, Figures, Charts etc.

Chapter 1- Introduction, Objectives of the study, Review of literature, Statement of the problem, Need and Significance of the study, Research Methodology, scheme etc.

Chapter II - Theoretical Back ground Chapter III- Data Analysis and Interpretation

Chapter) IV Summary, Findings and Recommendations Appendix Questionnaire,

Specimen copies of forms, other exhibits

Bibliography (Books, journal articles, website etc. used for the project work)

## **9.0 CREDITS**

The student is required to achieve a minimum of 120 credits of which 38 credits (14 for

common English courses + 8 for additional Language+ 16 credits for general awareness courses) shall be from common courses, 56 credits from core courses, 24 credits from complimentary elective courses and 2 from Generic elective course.

### **10.0 ATTENDANCE**

A student shall be permitted to appear for the semester examination, only if she/he secures not less than 75% attendance in all courses of a semester put together. Only those students who are registered for the university examination with eligible attendance (including those under condonable limit) alone are eligible to be promoted to next semester.

Students are eligible for the condonation of shortage of attendance for a maximum of 14 days in a semester subject to a maximum two times during the whole period of BSc FT. Condonation of shortage of attendance may be granted by the Vice Chancellor on production of the medical certificate from a registered medical practitioner for the days absent. Students who attend, with prior permission from the Head of the department/ institution are eligible to get their lost days treated as Present on submission of an application to the Principal through the head the Department with a certificate of participation / attendance certificate in such activities, provided the student concerned attend the required course of instruction in lieu of the days/ hours lost as may be decided by the Head of The Department/ Principal.

A student who is not eligible for condonation of shortage of attendance shall repeat the semester along with the subsequent batch by availing re admission.

### **11. EVALUATION**

The evaluation scheme for each course comprises of

- a. Continuous Evaluation (CE)
- b. End Semester Evaluation (ESE)

20 % weightage is given to the Continuous Evaluation and 80% weightage for the EndSemester Evaluation.

Continuous evaluation will be done by the staff handling the course and the EndSemester Evaluation by the University.

#### **Continuous Evaluation**

Continuous Evaluation should be carried out in a very transparent manner. The marks awarded to the students in each component of the courses shall be notified on the notice one week before the commencement of End semester Examination.

#### **a) Theory Course**

Continuous Evaluation for 100 marks and 50 Marks theory courses will be 20 marks and 10marks respectively.

The components for continuous evaluation for theory course are as give below

Components	20% of 50 Marks 10 Marks	20% Of 100 Marks 20
Assignments	2.5 Marks	05 Marks
Viva-Voce	2.5 Marks	05 Marks
Tests	05 Marks	10 Marks
Total	10 Marks	20 Marks

*i. Assignment*

Teachers handling the courses should identify the topic/s for the assignments relevant to the course. The assignments given to the students should provide additional information. Teachers should also guide the students in doing the assignment work qualitatively. The assignments should be evaluated and returned to the students.

*ii. Viva-Voce*

Viva voce will be conducted on the topics covered and also on the assignments done by the students.

*iii. Tests*

Two class tests will be conducted during the semester- one covering the portions of first 2 ½ units and the second covering the rest of the units. Each Test may be conducted for 50 marks for a duration of one and half hour. The corrected answer scripts must be distributed to students for marks verification and feedback within five working days from the date of examination. The answer scripts should be collected with the signatures of the students and retained in the department. The marks scored will be converted to -out of ten|| for 20 Marks CE and -out of five|| for 10 Marks CE. The average marks of the two tests will be taken for Continuous evaluation

**a) Practical Course**

B.Sc. FT program emphasis more on the practical. All the practical courses have 100 Marks. Hence the marks for Continuous evaluation will be 20. The components for the Continuous evaluation for practical courses are as follows

<b>Components</b>	<b>Marks</b>
Personal Hygiene	02
Assignments - relevant to course	05
Product Knowledge / Viva	03
Performance	07
Record	03
Total	20

**a) Industrial Training**

20 Marks is given for continuous Evaluation for Industrial Training. Continuous evaluation marks will be awarded by the Training Manager or Personnel Manager or any competent authority of the Food Industry at the end of the training who is closely monitoring the performance of the trainees. The parameters for continuous evaluation are given below.

Components	Marks
Attendance	03
Punctuality	04
Attitude	03
Performance at work	10
<b>TOTAL</b>	<b>20</b>

The authority awarding the internal marks will sign the Internal Mark statement with name, date and the seal of the Industry. The marks awarded to the students should be notified by the authority who awarded the marks. Upon receiving the mark statement from the Industry, the training coordinator will enter the marks and send it to the University.

#### **a) Project**

Following are the components for the Continuous Evaluation

for Project Punctuality	3 Marks
Involvement	3 Marks
Data Collection	4 Marks
Organization of Report	5 Marks
Viva-Voce	5 Marks
Total	20 Marks

Submission of the Project Report and presence of the student for viva are compulsory for internal evaluation.

### **End Semester Evaluation**

End Semester Evaluation is conducted by the University for 80% of the Total marks.

#### **a) Theory Courses**

The end semester evaluation for theory courses is conducted with question papers set by the external experts. The evaluation of answer scripts shall be done by the examiners appointed by the University, based on a well-defined scheme of valuation and answer keys provided by the University. After the End semester Evaluation external evaluation, only marks are to be entered in the answer scripts. All other calculations including grading are done by the University.

### **Question Paper Pattern**

Questions for End Semester Evaluation are grouped into parts A, B, C and D. Questions should be asked from all the units of the syllabus.

## Pattern for 80 Marks

Time : 3 Hrs

Mark 80

	Total Questions	No. Of Questions to be answered	Mark for each Question	Total Marks
Very short answer	10	10	1	10
Short answer	6	5	2	10
Short essay/ Problems	7	6	5	30
Essay	4	3	10	30
	27	24		80

### a) Practical Course

End Semester Evaluation for Practical courses will be conducted by a Board of two examiners (One Internal and One External) appointed by the University.

Evaluation of practical should involve submission of record certified by the course teacher and the Principal.

A viva voce based on the practical shall be conducted individually by the Board of Examiners. The common components for the external evaluation of practical courses are given below.

Record:	10 Marks
Viva-Voce	20 Marks
Practical	50 Marks

### Question Pattern of Practical Exam (Core)

Record	Procedure	Work done	Viva-voce	Total
10	10*2	15*2	20	80



## Pattern for 80 Marks

Time : 5 Hrs

Mark 50

Si.No	Type of Question	No. of Questions	Mark
1	Procedure Writing	2 <i>Questions to be asked.</i>	20(10 mark each)
2	Experiment	2 <i>Questions to be asked.</i>	30(15 Mark each)
Total			50

Food Preservation Practical (2B03FT), Food Chemistry and Nutrition practical (3B06FT), Food Microbiology I&II (4B08FT) and Food Analysis and Instrumentation (4B10FT) will be combined and examination will be conducted at the end of second year, similarly, Technology of Cereals, Pulses and Oilseeds (5B12FT), Technology of Meat, Fish & Poultry (5B14FT) and Technology of Fruits, Vegetables Spices & Plantation Crops (5B16FT) courses practical examination will be combined, will be conducted at the end of third year including Project work & In Plant training evaluation.

### a. Industrial Training

Out of 80 External marks, 10 marks is assigned for log book, 20 for the training report and 50 marks for the seminar/presentation before the panel of examiners. The students should do power point presentation

Panel of examiners will consist of one internal examiner and one external examiner appointed by the University. The presentation would be limited to only one key area of the student's interest.

During the external examination, every student must produce the following compulsorily.

1. Training certificate -original along with attested photo copy
2. Log Book
3. Training report- 2 copies

After the examination, original training certificate, one copy of the training report and the log book will be returned to the students.

Not more than 15 students will be evaluated per day.

### b. Project

A Board of two examiners, internal and external, appointed by the University shall evaluate the project.

The components for External Evaluation of 80 Marks for project are:

- Statement of Problems/Objectives 5 Marks
- Review of Topic 5 Marks
- Methodology 5 Marks
- Statistical tools 5 Marks
- Analysis and Interpretations 10 Marks
- Presentation 10 Marks
- Viva-Voce 40 Marks

No marks shall be awarded to a candidate if she/he fails to submit the Project Report for external evaluation.

The student should get a minimum of 40 % marks of the aggregate and 40 % separately for ESE and 10% marks CE for pass in the project. In an instance of inability of obtaining a minimum of 40% marks, the project work will be redone and the report may be re-submitted as per university regulations

There shall be no improvement chance for the Marks obtained in the Project report. The Board of examiners shall evaluate not more than 15 projects per day.

### **GRADING**

Indirect grading system shall be adopted for the assessment of a student's performance in a course (both CE and ESE). Each course is evaluated by assigning marks with a letter grade (A<sup>+</sup>, A, B, C, D, E and F) to that course by the method of indirect grading.

Mark system is followed instead of direct grading for each question. For each course in the semester, letter grade, grade point and percentage of marks are introduced in the indirect grading system with scale as per guidelines given below:

<b>% of Marks(CE+ESE)</b>	<b>Grade</b>	<b>Interpretation</b>
90 and above	A+	Outstanding
80 to below 90	A	Excellent
70 to below 80	B	Very Good
60 to below 70	C	Good
50 to below 60	D	Satisfactory
40 to below 50	E	Pass
Below 40	F	Failure

Evaluation (both CE and ESE) is carried out using Mark system .The grading on the basis of a total CE and ESE marks will be indicated for each course. Each letter grade is assigned a **'Grade point'** (GP) which is obtained using the formula:

$$\text{Grade Point} = (\text{Total marks awarded} / \text{Total Maximum marks}) \times 10.$$

**'Credit point'** (CP) of a course is the value obtained by multiplying the grade point (GP) by the credit (C) of the course.

$$\text{CP} = \text{GP} \times \text{C}$$

A candidate securing not less than 40% of aggregate marks of a course with not less than 40% in End Semester Evaluation (ESE )and not less than 10% in Continuous Evaluation (CE ) separately shall be declared to have passed in that course. A minimum of grade point 4 with letter grade E is needed for the successful completion of a course.

Appearance for Continuous Evaluation (CE) and End Semester Evaluation (ESE) are compulsory and no grade shall be awarded to a candidate if she/he is absent for CE/ESE or both.

After the successful completion of a semester, Semester Grade Point Average (SGPA) of a student in that semester is calculated using the formula given below.

$$\text{SGPA} = \text{Sum of the Credit Points of all courses in a semester} / \text{Total Credits in that semester}$$

**'Semester Grade Point Average'** (SGPA) is the value obtained by dividing the sum of credit points obtained by a student in the various courses taken in a semester by the total number of credits in that semester. SGPA determines the overall performance of a student at the end of a semester.

For the successful completion of a semester, a student should pass all courses in that semester. However, a student is permitted to move to the next semester irrespective of SGPA obtained.

SGPA shall be rounded off to three decimal places.

The **Cumulative Grade Point Average** (CGPA) of the student is calculated at the end of each semester. The CGPA of a student determines the overall academic level of the student in each stage of the programme. CGPA can be calculated by the following formula:

$$\text{CGPA} = \text{Sum of Credit Points of all completed semesters} / \text{Total Credits acquired}$$

CGPA shall be rounded off to three decimal places.

At the end of the programme, the overall performance of a candidate is indicated by the Overall Grade Point Average. Overall **Grade Point Average (OGPA)** of the student is calculated at the end of the programme. The OGPA of a student determines the overall academic level the student in a programme and is the criterion for classification and ranking the students. OGPA can be calculated by the following formula

$$\text{OGPA} = \frac{\text{Sum of Credit Points obtained in all semesters of the programme}}{\text{Total Credits (120)}}$$

OGPA shall be rounded off to three decimal places.

An overall letter grade for **OGPA** for the entire programme shall be awarded to a student after completing the entire programme successfully. Over all letter grade based on OGPA and conversion of Grades into classification shall be in the following way.

<b>Grade range OGPA</b>	<b>Overall Letter Grade</b>	<b>Classification</b>
9 – 10	A+	First class with Distinction
8 - 8.999	A	
7 - 7.999	B	First class
6 - 6.999	C	
5 - 5.999	D	Second class
4 - 4.999	E	Pass
Below 4	F	Fail

The Percentage of marks based on OGPA is calculated by multiplying them by 10.

**Percentage in two decimal places = [OGPA in three decimal places] x 10%**

Those candidates who pass all the courses prescribed for a programme shall be

declared to have successfully completed the programme and eligible for the degree.

A student who fails to secure a minimum mark for a pass in a course is permitted to write the examination along with the subsequent batch.

**Revaluation:** In the new system revaluation is permissible. The prevailing rules and regulations of revaluation are applicable to KUCBCSSUG2019.

## **AWARD OF DEGREE**

For the successful completion of all the courses (common, core, complementary elective and generic elective courses) a candidate has to secure minimum E grade. Satisfying the minimum credit 120 and securing minimum OGPA 4 shall be the minimum requirement for the award of degree.

In all other matters regarding the B.Sc. FT programme under Choice Based Credit Semester which is not specified in this regulation, the common regulation KUCBCSSUG 2019 will be applicable.

**B.Sc. FOOD TECHNOLOGY SYLLABUS****KANNUR UNIVERSITY****SEMESTER I****SCHEME OF EXAMINATION AND SYLLABUS**

No	Course Code	Title	Marks			Duration of Exam	Contact Hrs /wk	Credit
			Internal	External	Total			
1	1A01ENG	Common Course English I	10	40	50	3hrs	5	4
2	1A02ENG	Common Course English II	10	40	50	3hrs	4	3
3	1A07 MAL/HI N	Common Course Additional Language Paper I	10	40	50	3hrs	5	4
4	1B01FT	Fundamentals of food science Theory – 1	20	80	100	3hrs	3	3
	2B03FT	Food Preservation Practical I (Part 1)					2	
5	1C01CHE	Complementary I Chemistry Theory I	8	32	40	3hrs	2	2
	4C07CHE	Chemistry Practical					2	
6	1C01PHY	Complementary II Physics Theory I	8	32	40	3hrs	2	2
Total			66	264	330		25	18

## SEMESTER 1

### Fundamentals of food science

Course Category	Core Course
Code	1B01FT
Credit	3
Hours/week	3
Total Hours	54
Max Marks	100 Marks (Internal 20 Marks + External 80 Marks)
Exam Hours	3 Hours

#### **Unit 1**

##### **Food science**

Definition and Possibility of Food science and technology, Functions of food, Food Groups.

##### **Food and nutrition**

Food as a source of nutrition, Nutrients: water, Carbohydrates, Proteins, lipids, vitamins and minerals. Food is more than nutrients

#### **UNIT 2**

##### **Composition and nutritive value**

Cereals, pulses, nuts and oilseeds, milk, egg, flesh foods (meat, poultry and fish), fruits and vegetables.

Structure of wheat and rice, Classification of Fruits, Vegetables and spices.

#### **Unit 3**

##### **Quality factors in food and Evaluation of food quality**

Quality factors in food: Appearance factors, textural factors, flavor factors.

Sensory evaluation, sensitivity tests, types of tests, threshold value, paired comparison test, duo trio test, triangle test, hedonic scale, objective evaluation, instruments used for texture evaluation.

#### **Unit 4**

##### **Food and the future**

GM foods, organic food, Functional foods, Prebiotics, Probiotics, Nutraceuticals, New Product Development (NPD) - Food needs, consumer preference and Market survey, Steps in new product development.

#### **Unit 5**

##### **Food research centers in India**

Major centers of food research in India –CFTRI, DFRL, NIFTEM, NIFTEM-T & CIFT. AFST (I). Major Food Industries in India. Journals of Food Science & Technology, Indian Food Industry, Agriculture and Food Science Journal, Indian journal of Dairy Science.

**SEMESTER II**  
**SCHEME OF EXAMINATION AND SYLLABUS**

Si.No	Course Code	Title	Marks			Duration of Exam	Contact Hrs / Wk	Credit
			Internal	External	Total			
1	2A03ENG	Common Course English III	10	40	50	3	5	4
2	2A04ENG	Common Course English IV	10	40	50	3	4	3
3	2A08 MAL/HI N	Common Course Additional Language Paper II	10	40	50	3	5	4
4	2B02FT Core	Food Preservation Theory – 2	20	80	100	3	3	3
	2B03FT	Food Preservation Practical1 (Part 2)	20	80	100		2	2
5	2C02CHE	Complementary I Chemistry - Theory II	8	32	40	3	2	2
	4C07CHE	Chemistry Practical					2	
6	2C02PHY	Complementary II Physics- Theory II	8	32	40	3	2	2
<b>TOTAL</b>			86	344	430		25	20



## SEMESTER 1& SEMESTER 1I

### Food Preservation Practical

Course Category	Core Course practical
Code	2B03FT
Credit	2
Hours/week	2
Total Hours	36
Max Marks	100 Marks (Internal 20 Marks + External 80 Marks)
Exam Hours	3 Hours

- 1) Determination of Moisture using
  - a) Hot air oven b) Distillation method c). Infrared method
- 2) Determination of Acidity & pH
- 3) Determination of TSS
- 4) Qualitative test for carbohydrates – Molisch’s test, Benedict’s test, Iodine test, Anthrone test, Selivanoff’s test.
- 5) Qualitative Test of Proteins
- 6) Qualitative determination of benzoic acid
- 7) Sensory evaluation
- 8) Dehydration of fruits in sugar syrup
- 9) Drying Kinetics of vegetables using cabinet drier
- 10) Qualitative determination of SO<sub>2</sub>

#### **Reference**

- Potter N, Hotchkiss JH. Food Science. CBS publishers and distributors
- 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 Dietetics. 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
- Journa

## **FOOD PRESERVATION**

Course Category	Core Course
Code	2B02FT
Credit	3
Hours/week	3
Total Hours	36
Max Marks	100 Marks (Internal 20 Marks + External 80 Marks)
Exam Hours	3 Hours

### **UNIT 1**

#### **Preservation by altering temperature**

Introduction to food preservation, – Importance of food preservation. – Aims, principles and methods of food preservation.

Preservation by high temperature:

Principles and application – Heat processing, Pasteurization, sterilization, UHT,

Advantages and disadvantages. Aseptic preservation, blanching, microwave processing.

Preservation by low temperature:

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.

### **UNIT 2**

#### **Chemical preservatives**

Natural preservatives- Mode of action. Chemical Preservatives - Sulphur dioxide, Benzoic acid, Sorbic acid, Propionic acid, Acetic acid.

### **UNIT 3**

#### **Dehydration and Irradiation**

Preservation by dehydration: Principles – sun drying, mechanical drying, Hot air drying, Drum drying, Spray drying, Dehydrofreezing, Freeze drying, Drying pre-treatments – blanching & sulphuring, osmotic drying and Smoking -Advantages and disadvantages.

Preservation by irradiation: Principles(mode of action) – Application of irradiation – Specific types of radiation treatment. Measurement & Uses of radiation.

### **UNIT 4**

#### **Fermentation and Canning**

Fermentation Principles, Significance, Types of fermentation- Acetic, Lactic and Alcoholic.

Canning: Canning of fruits- Pineapple, Oranges, Canning of vegetables - Peas, Carrots, syrups & brines for canning.

### **Unit 5**

#### **Novel & Non Thermal Preservation**

Hurdle technology, hydrostatic pressure technology, , microfiltration, bacto-fugation, ultra high voltage electric fields, pulse electric fields, high pressure processing, thermosonication, ohmic heating, dielectric heating, infrared, induction heating, antibacterial, bacteriocins.

### **References**

- ❑ Fennema Owen R. Principles of food Science. Marcel Dekkar, Inc
- ❑ Murano, Peter S. Understanding Food Science and Technology .Thomson
- ❑ Khader, Vijaya Textbook on Food Storage and Preservation Kalyani Publishers
- ❑ Pruthi JS Quick Freezing Preservation of Foods Allied publishers Limited
- ❑ Potter N N.& Hotchkiss 1997 Food Science CBS Publishers
- ❑ 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

**SEMESTER III**  
**SCHEME OF EXAMINATION AND SYLLABUS**

No	Course Code	Title	Marks			Duration of Exam	Contact Hrs / Wk	Credit
			Internal	External	Total			
1	3A01FT	Entrepreneurial Development	20	80	100	3	4	4
2	3A02FT	Packaging	20	80	100	3	3	4
3	3B04FT	Food Microbiology I Theory 3	20	80	100	3	4	3
	4B08FT	Food Microbiology I Practical 2					2	
4	3B05FT	Food Chemistry and Nutrition Theory 4	20	80	100	3	3	2
	3B06FT	Food Chemistry and Nutrition practical 3	20	80	100	3	2	3
5	3C03CHE	Complementary I Chemistry - Theory III	8	32	40	3	3	2
	4C07CHE	Chemistry Practical					2	
6	3C03PHY	Complementary II Physics- Theory III	8	32	40	3	2	2
		<b>TOTAL</b>	116	464	580		25	20

## **ENTREPRENEURIAL DEVELOPMENT**

Course Category	General Awareness Course
Code	3A01FT
Credit	4
Hours/week	4
Total Hours	72
Max Marks	100 Marks (Internal 20 Marks + External 80 Marks)
Exam Hours	3 Hours

### **UNIT 1**

Introduction to Entrepreneurship Development

Need, scope and characteristics of entrepreneurship, types of entrepreneurs,

Qualities of successful Entrepreneurs

Steps in Establishing Entrepreneurial systems

### **UNIT 2**

Project Design

Steps in project formulation, plant and process layout, network techniques, SWOT analysis

### **UNIT 3**

Financial Issues of an Enterprise

Financial institutions, banking and types of banking, financial incentives and subsidies, financial ratios and their significance, book keeping, financial statements.

### **UNIT 4**

Quality Control and Sales Management

Meaning and importance of quality control, quality standards, market survey techniques, pricing, packaging, advertising, and sales promotion.

### **UNIT 5**

Management of Small-Scale Industries

Characteristics of small-scale industries, social responsibilities

And business ethics, sickness and remedial measures in small scale industries

### **Reference:**

- Hand book of entrepreneurship, Rathore B.S. and Sinin .F.S. , AApga Publications
- Text book of entrepreneurship Development, Gopal. J.Kalantri, Vision Publications,
- Entrepreneurship Development, Gupta C. B. Srinivasan, Sultan Chand and Sons
- Entrepreneurship Development, Kavil Ramachandran, Mc Graw Hill

## **PACKAGING**

Course Category	General Awareness Course
Code	3A02FT
Credit	4
Hours/week	3
Total Hours	54
Max Marks	100 Marks (Internal 20 Marks + External 80 Marks)
Exam Hours	3 Hours

### **UNIT 1**

#### **Introduction to food packaging**

Definitions, functions, & properties. Classification of packaging- primary, secondary, tertiary packaging. Flexible, rigid and semi rigid materials.

### **UNIT2**

#### **Different types of packaging materials used**

**Paper/paperboard:** Pulp, Pulping Methods, Mechanical Pulping, Chemical pulping, Beating and Refining, Fourdriener machine, Cylindrical machine, Twin wire formers, Presser and Driers.

**Corrugated Fiber Board (CFB):** Material, components of corrugated board, liners, fluting, adhesive, Board and box manufacture.

**Metal:** Tin plate containers, Aluminium foil, composite can.

**Glass:** Manufacturing methods, Types of glass packages and Uses in Food industry,

**Plastic:** Physical and chemical characteristics, LDPE,LLDPE,HDPE,PE, PP, Metallocene, EVA, EVAOH,EAA,PS(HIPS,EPS),PVOH, PVC, PVdC, PET, PEN, PC, PA, Acrylonitriles., other packaging materials

### **UNIT 3**

#### **Different forms of packaging:**

Retortable pouches, CAP, MAP, smart, Active and Intelligent packaging, aseptic, biodegradable, edible packages, Shrink and Stretch packaging, Insect resistant packaging, Vacuum packaging.

### **UNIT 4**

#### **Package testing**

Determination of parameters of different packaging materials

Mechanical Tests: Bursting Strength, Tearing resistance, Impact strength of glass bottles,

Thermal shock Climatic Tests: Salt Spray Test, sand and Dust Test

Visual Test, Tear Test, Burning Test, Solubility Test, Determination of density, Melt Test,Water Test, Shrink Test Drip Test, Flame hot wire Test.

### **Unit 5**

#### **Packaging symbols, nutritional labelling.**

Packaging symbols, nutritional labelling.

Suggesting readings:

- Food Packaging Technology: Mr. Harsh Sharma, AAU, Anand AAU, Anand
- Food Packaging Technology Hand book NIIR New Delhi
- Food packaging – Principles & Practice Gordon L Robertson

## **Food Microbiology I**

Course Category	Core Course
Code	3B04FT
Credit	3
Hours/week	4
Total Hours	72
Max Marks	100 Marks (Internal 20 Marks + External 80 Marks)
Exam Hours	3 Hours

### **UNIT 1 History**

History, Development & Scope of Microbiology -Theories & Concepts - Spontaneous generation versus biogenesis, Germ theory of disease. Contributions of Louis Pasteur, Robert Koch, Antony Van Leuven Hooke, Alexander Fleming, Jenner and Joseph Lister. Pure culture concepts.

### **UNIT 2 Microscopy**

Microscopy – Bright field, Dark field, Phase contrast, Fluorescent, Scanning and Transmission electron microscopy (principle, methodology, specimen preparation and Use) and atomic force microscopy.

### **UNIT 3 Microorganisms**

Bacteria: morphology, shape, arrangement of bacteria, structure

Physiology of bacteria: bacterial growth.

Reproduction – Binary fission, Transformation, Transduction and Conjugation.

Nutritional requirements- Phototrophs, Chemotrophs, Autotrophs,

Heterotrophs.

VIRUS: Morphology, shape, structure, classification (DNA Viruses, RNA viruses)

Replication of viruses.

FUNGI: characteristics, classification, yeast and mold. Ascomycetes, Basidiomycetes,

Deutromycetes. Yeasts-Reproduction-Sexual and Asexual

### **UNIT 4 Staining**

Staining - types of stains used for bacteria with examples. Staining techniques - Simple, Negative, Differential (Gram & Ziehl Nielsen), special (Capsule, flagella & endospore) and fungal staining (LPCB). Wet mount for motility study.

### **UNIT 5 Culture Techniques**

Bacteriological Media – classification- solid, liquid, semi-solid (consistency) Selective, Differential, Enrichment Media.

Methods of isolating pure culture: Serial dilution, Pour plate, streak plate, stroke Culture.

## References

- Banwart G J ,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



## **FOOD CHEMISTRY AND NUTRITION**

Course Category	Core Course
Code	3B05FT
Credit	2
Hours/week	3
Total Hours	54
Max Marks	100 Marks (Internal 20 Marks + External 80 Marks)
Exam Hours	3 Hours

### **UNIT 1**

#### **LIPIDS**

Lipids in food, Classification, fatty acids, saturated, unsaturated, polyunsaturated fatty acids, chemical properties, reactions, rancidity, auto-oxidation, antioxidants, plasticity of fat, emulsion.

#### **Proteins**

Food protein, protein structure, properties of protein, physicochemical properties, denaturation, reactions, protein determination. Amino acids.

#### **Carbohydrates**

Classification, properties and reactions of Monosaccharides: Glucose & Fructose

Oligosaccharides: Maltose, lactose. Sucrose properties- crystallization and inversion.

Polysaccharides: starch: components of starch, gelatinization, retrogradation, modified starch. Cellulose, hemicellulose, pectic substances gums, dietary fibre.

### **UNIT 2**

#### **Water**

Introduction, physical & chemical properties of water, moisture in foods, methods of moisture determination, hydrogen bonding, Free & bound water.

#### **Emulsion**

Emulsion, Types, Emulsifying Agents

### **UNIT 3**

**Pigments** - Properties and Occurrence: Chlorophyll, Carotenoids, Flavanoids, Anthocyanins, Anthoxanthins, Myoglobin.

**Enzymes** Introduction, Definition, Occurrence, Classification. Properties of Enzymes- Specificity, Factors affecting enzyme activity. Enzymes in food Industry.

**Colloids:** Colloidal chemistry, Properties of solutions, Sols & Suspensions, Food colloids.

### **UNIT 4**

#### **Food Additives**

Definition, antioxidants, chelating agents, coloring agents, curing agents, flavors and flavor enhancers, humectants and anti-caking agents, preservatives, sweeteners, stabilizers, thickening agents, surface active agents, emulsifiers.

#### **Browning**

Enzyme activity, enzymatic browning Non enzymatic browning, its prevention.

### **UNIT 5 Nutrition**

Biological value of proteins (BV), Protein efficiency ratio (PER), Digestibility coefficient, Net protein Utilization, Net Protein Ratio(NPR), Chemical Score, Free Radicals and Antioxidants. Energy value of foods, Respiratory Quotient (RQ), Determination of Basal Metabolic Rate (BMR), Determination of energy metabolism during work, Energy expenditure for various types of activities, Recommended Daily Allowance (RDA), Specific Dynamic Action (SDA) offoods, Balanced diet formulation. Food fortification

## **FOOD CHEMISTRY AND NUTRITION PRACTICAL**

Course Category	Practical
Code	3B06FT
Credit	3
Hours/week	2
Total Hours	36
Max Marks	100 Marks (Internal 20 Marks + External 80 Marks)
Exam Hours	3 Hours

### Chemical Analysis of Lipids

- a) Determination of Iodine value
- b) Determination of saponification value
- c) Determination of peroxide value
- d) Determination of Free Fatty Acid

### 2 Analysis of Protein

Kjeldahl's methods

### 3 Analysis of Water

Total solids, Acidity of water,  
Alkalinity of water,  
Determination of Chloride,  
Hardness of water.

### 4 Paper chromatography

### 5 Ash content

### 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.

**SEMESTER IV**  
**SCHEME OF EXAMINATION AND SYLLABUS**

No	Course Code	Title	Marks			Duration of Exam	Contact Hrs /wk	Credit
			Internal	External	Total			
1	4A03FT	Management Concepts and Principles	20	80	100	3	3	4
2	4A04FT	Nutraceuticals, Food Allergies, Intolerances and consumer science	20	80	100	3	3	4
3	4B07FT	Food Microbiology II Theory 5	20	80	100	3	3	2
	4B08FT	Food Microbiology II Practical 2	20	80	100	3	2	3
4	4B09FT	Food Analysis & Instrumentation Theory 6	20	80	100	3	3	3
	4B10FT	Food Analysis & Instrumentation Practical 4	20	80	100	3	2	3
5	3C03CHE	Complementary I Chemistry – Theory IV	8	32	40	3	3	2
	4C07CHE	Chemistry Practical	8	32	40		2	4
6	3C03PHY	Complementary II Physics- Theory IV	8	32	40	3	2	2
	4C05PHY	Physics Practical	8	32	40		2	4
		<b>TOTAL</b>	<b>152</b>	<b>608</b>	<b>760</b>		<b>25</b>	<b>31</b>

## **MANAGEMENT CONCEPTS AND PRINCIPLES**

Course Category	General Awareness Course
Code	4A03FT
Credit	4
Hours/week	3
Total Hours	54
Max Marks	100 Marks (Internal 20 Marks + External 80 Marks)
Exam Hours	3 Hours

### **Unit 1**

Management Concepts: Evolution of Management thoughts: Classical approaches - Scientific management, administrative management and bureaucracy- Neo classical approaches – Human relations and Behavioral approach - Modern approaches Quantitative approach, systems approach, and contingency approach.

### **Unit 2**

Functions of management-: Planning-concept and importance - Planning process- Steps in Planning— barriers to effective planning-- Organizing- Nature and purpose of organization- Types of organization –line, functional, line and staff - Staffing: Concepts - manpower planning – process and importance

### **Unit3**

Functions of management -: Directing: Meaning-definition- principles –techniques of direction. Motivation:- concept and importance – Theories : Maslow’s Need Hierarchy – Herzberg – Theory X and Theory Y – Leadership: concept – styles – leadership and management— Controlling: meaning- definition-essentials of effective control system

### **Unit 4**

Business Ethics: Meaning and scope – Types of ethics – Characteristics – Factors influencing business ethics – Arguments for and against business ethics – Basics of business ethics - Corporate social responsibility - Environmental issues in business-Ethics in advertising- Globalization and business ethics .

### **Unit 5**

Emerging concepts in management – Kaizen – TQM – TPM – MIS – ISO – Change management – Stressmanagement – Fish bone (ISHIKAWA) Diagram – Business eco system – Logistic management.

## References:

- Boatwright. John R: Ethics and the Conduct of Business, Pearson Education, New Delhi.
- Gupta. CB; Business management, Sultan Chand & sons
- Koontz, H and Wechrick, H: Management, McGraw Hill Inc, New York.
- Prasad. LM; Principles and Practice of Management; Sultan Chand & sons
- Stoner. AF and Freeman RE; Management; Prentice Hall of India 6. Drucker, Peter, F., Management: Tasks, Responsibilities and Practices, Allied Publishers, New Delhi. 5. R.S Davar;Management Process
- Rustum & Davan, Principles and Practice of Management.
- Srinivasan & Chunawalla, Management Principles and Practice. 8. S. V. S. Murthy. Essentials ofManagement.

## **Nutraceuticals, Food Allergies, Intolerances and consumer science**

Course Category	General Awareness Course
Code	4A04FT
Credit	4
Hours/week	3
Total Hours	54
Max Marks	100 Marks (Internal 20 Marks + External 80 Marks)
Exam Hours	3 Hours

### **Unit –1**

#### **Nutraceuticals**

Nutraceuticals and functional Foods –Definition, concept. Classification of nutraceuticals and functional foods. Significance and relevance of nutraceuticals and functional foods in the management of diseases and disorders.

### **Unit 2**

#### **Food allergy**

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

### **Unit 3**

#### **Food toxins**

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

### **Unit 4**

#### **Common food intolerances**

Gluten sensitivity and Lactose intolerance Fructose intolerance, Glucose intolerance, Wheat intolerance, Alcohol intolerance, Yeast intolerance, Histamine intolerance.

### **Unit 5**

#### **Consumer science**

Socio-cultural, psychological and economical consideration for food appearance, domestic and export marketing. Consumer trends and their impact on new product development.

## References

1. Wildman, Robert. *Nutraceuticals and Functional Foods*, second edition. Taylor and Francis Group. 2007.
2. Klaassen, Curtis; Watkins III, John B. (2015), *Casarett & Doull's Essentials of Toxicology*, Third Edition, McGraw-Hill Medical, ISBN 10: 0071847081 ISBN 13: 9780071847087.
3. Tõnu Püssa (2013), *Principles of Food Toxicology*, Second Edition, CRC Press, ISBN 9781466504103. 3. S.S. Deshpande Ed (2013), *Handbook of Food Toxicology*, CRC Press, ISBN 9780824707606



## **Food Microbiology II**

Course Category	Core Course
Code	4B07FT
Credit	2
Hours/week	3
Total Hours	54
Max Marks	100 Marks (Internal 20 Marks + External 80 Marks)
Exam Hours	3 Hours

### **UNIT 1**

#### **Sources of microorganisms**

Sources of microorganisms in food, perishable, semi perishable and non- perishable foods, factors influencing microbial growth, growth curve, thermal death time and thermal death points, D-value, Z-value

### **UNIT 2**

#### **Beneficial uses of microorganisms in food**

Food fermentation: lactococcus , streptococcus, lactobacillus, propionibacterium , yeast and mold Fermented vegetable products, Sauer Kraut, Pickles, soy sauces, idli Fermented dairy Products – Cheese, yoghurt

### **UNIT 3**

#### **Food spoilage**

Sources of contamination, factors responsible for spoilage, factors affecting kinds and number of microorganisms in food. Chemical changes due to spoilage.

#### **Effect of spoilage**

Contamination and spoilage of Fruits and Vegetables, Meat & Meat products, Milk & Cream, Cereal & Cereal products, Spoilage of canned food.

### **UNIT 4**

#### **Food Borne Diseases**

Food Borne Diseases: Definition , Classification ( Food borne intoxications & Food borne infections), neurotoxicity, aflatoxins, E. coli, Epidemic dropsy, Typhoid fever, Salmonellosis, Staphylococcal intoxication, Botulism, Bacillus cereus food poisoning, E.coli diarrhea, Cholera, Shigellosis, Brucellosis.

### **UNIT 5**

#### **Control of microorganisms**

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.

Food sanitation, surveillance.

## **Food Microbiology I &II Practical**

Course Category	Common Course Additional Language
Code	4B08FT
Credit	3
Hours/week	2
Total Hours	36
Max Marks	100 Marks (Internal 20 Marks + External 80 Marks)
Exam Hours	3 Hours

### **Food Microbiology I &II Practical**

1. Introduction to equipments and glassware used in microbiology
2. Sterilization techniques:  
    Dry heat and moist heat
3. Staining techniques –  
    simple staining, gram staining
4. Isolation of pure culture:  
    Pour plate, Streak plate
5. Microbial analysis of meats –  
    Total plate count – *Staphylococcus*
6. Microbial analysis of Milk-  
    Total plate count, Spices-Yeast and Mold, TPC
7. Microbial analysis of water and milk

### **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 PressPvt 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

## **Food Analysis & Instrumentation**

Course Category	Core Course
Code	4B09FT
Credit	3
Hours/week	3
Total Hours	36
Max Marks	100 Marks (Internal 20 Marks + External 80 Marks)
Exam Hours	3 Hours

### **UNIT 1**

#### **Methods of Food Analysis.**

Moisture in foods - determination by different methods - ash content of foods, wet, dry ashing, microwave ashing methods; Significance of Sulphated Ash, water soluble ash and acid insoluble ash in foods; titratable Acidity in foods, determination of dietary fiber and crude fiber.

### **UNIT II**

#### **Lipids, protein and carbohydrate analysis**

Determination of Total fat in foods by different methods; Analysis of oils and fats for physical and chemical parameters, different methods of determination of protein and amino acids in foods; determination of total carbohydrates, starch, disaccharides and simple sugars in foods.

### **UNIT III**

#### **Spectroscopic techniques**

Basic Principles- Spectrophotometric analysis of food additives and food Components Principles, Instrumentation, Parts of Spectrophotometers. Atomic Absorption spectrophotometry

### **UNIT IV**

#### **Chromatographic techniques**

Basic Principles, Classification- Adsorption chromatography, Partition chromatography, Ion exchange, Paper chromatography, Column chromatography, Thin layer chromatography, Gas chromatography, High Pressure Liquid Chromatography. GCMS

### **UNIT V**

#### **Electrophoresis**

Basic Principles, Introduction of Electrophoresis Types of Electrophoresis Thin Layer Electrophoresis Cellulose acetate electrophoresis , Agarose Gel Electrophoresis [AGE] , SDS-Polyacrylamide Gel Electrophoresis [PAGE] , 2D Gel Electrophoresis, Immunoelectrophoresis ,Capillary Electrophoresis

## **FOOD ANALYSIS AND INSTRUMENTATION PRACTICAL**

Course Category	Practical
Code	4B10FT
Credit	3
Hours/week	3
Total Hours	36
Max Marks	100 Marks (Internal 20 Marks + External 80 Marks)
Exam Hours	3 Hours

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 extractionmethod)
- 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 food

### **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

## SEMESTER V

### SCHEME OF EXAMINATION AND SYLLABUS

No	Course Code	Title	Marks			Duration of Exam	Contact Hrs /Wk	Credit
			Internal	External	Total			
1	5B11FT	Technology of cereals,pulses and oilseeds Theory 7	20	80	100	3	3	2
	5B12FT	Technology of cereals, pulses and oilseeds Practical 5	20	80	100	3	3	3
2	5B13FT	Technology of Meat, Fish &Poultry Theory 8	20	80	100	3	3	2
	5B14FT	Technology of Meat, Fish & PoultryPractical 6	20	80	100	3	3	3
3	5B15FT	Technology of Fruits, Vegetables, Spices & Plantation CropsTheory 9	20	80	100	3	3	2
	5B16FT	Technology of Fruits, Vegetables, Spices & Plantation Crops Practical 7	20	80	100	3	3	3
4	5B17FT	Food Safety & Food Laws Theory 10	20	80	100	3	3	2
5	6B20FT	Project	20	80	100	2	2	3
6	5D01 FT	Generic Elective Course	5	20	25	2	2	2
		TOTAL	165	660	825		25	22

## **Technology of cereals, pulses and oilseeds**

Course Category	Corse Course
Code	5B11FT
Credit	2
Hours/week	3
Total Hours	54
Max Marks	100 Marks (Internal 20 Marks + External 80 Marks)
Exam Hours	3 Hours

### **UNIT 1**

#### **Cereals.**

Wheat: Milling of wheat, wheat types, Maida, semolina, Gluten.

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.

Technology of oats and Barley.

#### **Unit 2**

#### **MILLETS**

Sorghum, pearl and finger millet

### **UNIT 3**

#### **Bakery and confectionary**

Baking Principles of baking, classification of baked foods.

Bread: Bread making – Role of ingredients, Bread faults & remedies, staling of bread.

Cake: Cake making, Role of ingredients, Types of making, cake faults and remedies. Biscuit: Biscuits & Cookies, Crackers and Wafers, technology of Biscuits, faults & Remedies. Confectionary: Raw materials, hard candy, Toffee, Caramel.

### **UNIT 4**

#### **PULSES**

Processing- Soaking, Germination, Decortication, Cooking and Fermentation.

Changes during germination, Anti nutritional factors, Factors affecting cooking time.

### **UNIT 5**

Nuts & Oil seeds Sources, Processing of oil seeds – Soya bean, coconut. Hydrogenation.

Refining of fats & oils, bleaching, de-odourising, hydroxylation, shortening, margarine.

Protein isolates, Texturized vegetable protein.

## **Technology of cereals, pulses and oilseeds -Practical**

Course Category	Practical
Code	5B12FT
Credit	3
Hours/week	3
Total Hours	54
Max Marks	100 Marks (Internal 20 Marks + External 80 Marks)
Exam Hours	3 Hours

1 Determination of Moisture

2Determination 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

### **References**

- Hui, Y.H, Bakery products, Science and Technology , Black Well publishing, 2006
- Matz S.A; Bakery Technology and Engineering; 3 edn, CBS Publishers anddistributers
- Faridi H, The science of cookie and cracker production; CBS Publishers anddistributers
- Dendy D A V & Dobraszczyk BJ Cereals and cereal products, Aspen
- Kent NL 1983Technology 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 andPractices. Interntional Book Distributors
- Srilakshmi B. Food Science . New Age International Publishers
- Sahay KM &. Singh KK, 1994. Unit operations of Agricultural processing VikasPublishing House
- Vijaya khader.Text book of Food Science and Technology. ICAR

## **TECHNOLOGY OF MEAT, FISH, POULTRY AND EGG**

Course Category	Corse Course
Code	5B13FT
Credit	2
Hours/week	3
Total Hours	54
Max Marks	100 Marks (Internal 20 Marks + External 80 Marks)
Exam Hours	3 Hours

### **UNIT 1**

#### **Technology of meat**

Structure of meat, Factors affecting tenderness of meat, Effect of cooking on texture, colour and flavour. Slaughter, inspection and grading, Ante mortem examination of meat animals, slaughter of buffalo, sheep/ goat, poultry, pig, dressing of carcasses, post-mortem examination of meat.

### **UNIT 2**

#### **Meat quality**

Effects of feed, breed and environment on production of meat animals and their quality  
Meat Quality-color, flavor, texture, Water-Holding Capacity (WHC), Emulsification capacity of meat

### **Unit 3**

#### **Preservation of meat**

Refrigeration and freezing, thermal processing- canning of meat, retort pouch, dehydration, and irradiation.

Meat products - RTE meat products, meat curing (Role of ingredients, Methods of curing). Sausages-processing, types and defects.

By-products - Importance, classification and uses, Manufacture of Natural casings

### **UNIT 4**

#### **EGG**

Structure of egg. Grading, Changes during storage.

Preservation of eggs - Refrigeration and freezing, thermal processing, dehydration, coating. Quality Factors affecting quality. Quality measurement, Effect of cooking.

### **UNIT 5**

#### **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.



## **TECHNOLOGY OF MEAT, FISH, POULTRY AND EGG PRACTICAL**

Course Category	Corse Course
Code	5B14FT
Credit	3
Hours/week	3
Total Hours	54
Max Marks	100 Marks (Internal 20 Marks + External 80 Marks)
Exam Hours	3 Hours

- 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

### **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 CBSPublishers
- 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

## **Technology of Fruits, Vegetables, Spices & Plantation Crops**

Course Category	Corse Course
Code	5B15FT
Credit	2
Hours/week	3
Total Hours	54
Max Marks	100 Marks (Internal 20 Marks + External 80 Marks)
Exam Hours	3 Hours

### **Technology of Fruits, Vegetables, Spices & Plantation Crops**

#### **UNIT 1**

##### **Post-harvest handling**

Physiology of maturity, ripening and senescence in fruits and vegetables. Maturity indices, Climacteric & Non-Climacteric fruits. Storage, types of storage structures-traditional, improved and modern storage structures.

#### **UNIT 2**

##### **Fruit Products & preservation**

Introduction, Processing of fruit juices (selection, juice extraction, deaeration, straining, filtration and clarification).

Processing of squashes, cordials, nectars, concentrates and powder. Fruit preparations: Preserves, Candies Crystallized fruits & Glazed fruits.

Dehydration of fruits and vegetables: Enzyme Inactivation, Sulphuring Sun drying - grapes and dates. Dehydration of vegetables and Fruits. Tunnel & cabinet drier

#### **UNIT 3**

##### **Jams, jellies and marmalades**

Introduction, Jam: Constituents, selection of fruits, processing & technology,

Jelly: Essential constituents (Role of pectin, ratio), Theory of jelly formation, Processing & technology, defects in jelly, Marmalade: Types, processing & technology, defects.

#### **UNIT 4**

##### **Pickles, chutneys and sauces**

Pickles: Processing, Types, Action of preservatives, defects.

Chutneys: Processing, Types

Tomato products: Selection of tomatoes, pulping & processing of tomato juice, tomato puree, paste, ketchup, sauce and soup, specifications of above products.

#### **UNIT 5**

##### **Technology of plantation products:**

SPICES: Definition, Chemical composition, Use of Spices. Spice oil and Oleoresins—Definition, Technology of Manufacturing.

Refining and processing of pepper. Pepper products – white pepper, dehydrated green pepper.

Processing of Turmeric, Ginger, Chillies and Cardamom.

TEA, COFFEE AND COCOA - Processing, Variety and Products.

## **Technology of fruits, vegetables, Spices & Plantation Crops practical**

Course Category	Practical
Code	5B16FT
Credit	3
Hours/week	3
Total Hours	54
Max Marks	100 Marks (Internal 20 Marks + External 80 Marks)
Exam Hours	3 Hours

- 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 squashes

### **References**

- Pandey PH Principle of Practices of post harvest Technology Kalyani publication
- Cruess WV., 1997. Commercial fruit and vegetables Products. Anees 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 Publishers
- 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

## **Food safety and Food laws**

Course Category	Core Course
Code	5B17FT
Credit	2
Hours/week	3
Total Hours	54
Max Marks	100 Marks (Internal 20 Marks + External 80 Marks)
Exam Hours	3 Hours

### **Food safety and Food laws**

#### **UNIT 1**

Concept and meaning of Food Safety, newer approaches to foodsafety. FDA, Evolution in Food laws and regulations- PFA, FPO, AGMARK, BIS. Food Safety and Standards Bill 2005,

#### **UNIT 2**

##### **Food Safety & Hygiene**

Importance of Food Safety, Food Hygiene, High risk food, Low risk food, Danger Zone, Personal hygiene.

#### **UNIT 3**

##### **Food Safety and Quality Management**

GHP, GMP, SOP, HACCP (Food contaminants- Physical, Chemical, Biological and Allergens), ISO22000, ISO 9001, Codex Alimentarius Commission (Codex), FAO

#### **UNIT 4**

##### **HYGIENE AND SANITATION IN FOOD INDUSTRY**

Hygiene and sanitation requirement in food processing industries; Cleaning, sanitizing and pest control in food processing; storage and service areas. SSOP, CIP, Chlorination, Detergents, Disinfectants and Sanitizers,

#### **UNIT 5**

##### **FSSAI**

The Food Safety and Standards Act, 2006; Rules and Regulations : Definitions - Authorities and Officers Constitution, Functions and Powers –General Provisions as to Articles of Food, Ch. IV , SS.19 to 24- Prohibition Orders- Procedure for Investigation and Launching Prosecutions - Analysis of Food – Offences and Penalties – Defenses – Adjudication .

### **References**

- Richard A Sprenger, Hygiene for Management, Highfield.
- Larousse, Jean Food Canning Technology Wiley-VCH
- FSSAI

**SEMESTER VI**  
**SCHEME OF EXAMINATION AND SYLLABUS**

Si.No	Course Code	Title	Marks			Duration of Exam	Contact Hrs /wk	Credit
			Internal	External	Total			
1	6B18FT	Dairy Technology Theory 11	20	80	100	3	3	2
2	6B19FT	Food Engineering Theory 12	20	80	100	3	3	2
3	6B21FT	Industrial Training	20	80	100	2	19	5
		<b>TOTAL</b>	<b>60</b>	<b>240</b>	<b>300</b>		<b>25</b>	<b>9</b>

## **DAIRY TECHNOLOGY**

Course Category	Core Course
Code	6B18FT
Credit	2
Hours/week	3
Total Hours	54
Max Marks	100 Marks (Internal 20 Marks + External 80 Marks)
Exam Hours	3 Hours

### **UNIT 1**

#### **Milk**

Milk: Definition, composition of milk from various sources,  
Major and minor constituents of milk.

### **UNIT 2**

#### **Properties**

Factors affecting quality and quantity of milk, Physical and chemical properties of milk,  
Sources of contamination in milk, Clean milk production.

### **UNIT 3**

#### **Market milk**

Market milk: collection of milk- cooling and transportation– filtration/clarification-  
standardization-homogenization - pasteurization- UHT – sterilization packaging.

Types of Milk

Toned, Double toned milk, Standardized milk, Homogenized milk, and Recombined milk.

### **UNIT 4**

#### **Milk products**

milk products: Cream, Malai, Dahi /Curd, yoghurt, Acidophilus milk, Kefir, koumiss, Channa / Paneer,  
Cheese,

Ice cream , Frozen desserts, Evaporated milk, Condensed milk, Milk powder, Butter, Ghee,  
Chakka and Shrikhand, Indigenous milk products. Foods for infant nutrition . Whey products,  
Edible casein products

### **UNIT 5**

#### **Dairy plant sanitation**

Tests for milk quality and detection of adulterants- dairy plant and equipment hygiene and  
sanitation. CIP, Sanitizers.

## 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, CBSPublishers and Distributers
- Atherton, Henry V. Chemistry and Testing of Dairy Products CBS Publishers andDistributers
- Johnson, Webb Fundamentals of Dairy Chemistry CBS Publishers
- Ananthakrishnan 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

## **FOOD ENGINEERING**

Course Category	Core Course
Code	6B19FT
Credit	2
Hours/week	3
Total Hours	54
Max Marks	100 Marks (Internal 20 Marks + External 80 Marks)
Exam Hours	3 Hours

### **Unit 1**

#### **Unit operations & Heat transfer**

Mode of heat transfer– Conduction, Convection, Radiation.

#### **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 equipment.

### **Unit 2**

#### **Refrigeration & Freezing**

**Refrigeration** Principle of refrigeration, Vapour compression refrigeration cycle.

**Freezing** Principle of freezing & freezing rate.

### **Unit 3**

#### **Evaporation**

Principle, single effect evaporation, multiple effect evaporation.

Types of evaporators - Horizontal tube, Vertical tube, falling film evaporator, Raising film Evaporator.

### **Unit 4**

#### **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.

### **Unit 5**

**Rheology** Definition, Rheological characteristics of foods, viscosity, apparent viscosity- Newtonian and Non Newtonian.



## 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.

## **PROJECT**

Course Category	Core
Code	6B20FT
Credit	3
Hours/week	2
Total Hours	54
Max Marks	100 Marks (Internal 20 Marks + External 80 Marks)
Exam Hours	3 Hours

Students should complete the Project work on time.

The project report shall be printed in A4 size paper and spiral bound

The layout is:

Font : Times New Roman Size 12

Line Spacing: 1.5

Margin: Left - 1.25; Right-1; Top-1; Bottom-1

The project report should be submitted to the Department in the last week of February of the sixth semester without fail.

Belated and incomplete Project will not be entertained. The candidate shall prepare three copies of the report: two copies for submission to the Department and one copy for the student to bring at the time of viva-voce

Structure of the Report

Title Pages

Certificate of the supervising Teacher with signature  
Certificate Page of the Examiners

**Contents**

List of Tables, Figures, Charts etc.

Chapter 1- Introduction, Objectives of the study, Review of literature, Statement of the problem, Need and Significance of the study, Research Methodology, scheme etc

Chapter II - Theoretical Back ground

Chapter III- Data Analysis and

Interpretation

Chapter) IV Summary, Findings and Recommendations Appendix Questionnaire, Specimen copies of forms, other exhibits

Bibliography (Books, journal articles, website etc. used for the project work)

**Components for the Continuous Evaluation**

Following are the components for the Continuous Evaluation for Project

Punctuality	3 Marks
Involvement	3 Marks
Data Collection	4 marks
Organization of Report	5 Marks
Viva-Voce	5 Marks
Total	20 Marks

Submission of the Project Report and presence of the student for viva are compulsory for internal evaluation.

### **End Semester Evaluation**

A Board of two examiners, internal and external, appointed by the University shall evaluate the project

The components for End semester Evaluation of 80 Marks for project are:

- Statement of Problems/Objectives      5 Marks
- Review of Topic                              5 Marks
- Methodology                                   5 Marks
- Statistical tools                                5 Marks
- Analysis and Interpretations            10 Marks
- Presentation                                   10 Marks
- Viva-Voce                                      40 Marks

No marks shall be awarded to a candidate if she/he fails to submit the Project Report for external evaluation.

The student should get a minimum of 40 % marks of the aggregate and 40 % separately for ESE and 10% marks CE for pass in the project

## **INDUSTRIAL TRAINING**

Course Category	Core
Code	6B21FT
Credit	5
Weeks / Days of Training	14 weeks
Max Marks	100 Marks (Internal 20 Marks + External 80 Marks)
Exam Hours	3 Hours

### **Objective**

1. *To understand the real work environment of the industry*
2. *To observe and learn the new technology and latest trends used in various departments*
3. *To impart confidence in handling the guests*
4. *To improve their communication skills and overall personality development.*

Industrial Exposure training for a duration of 14 weeks in Food Industry is introduced in the sixth semester as a part of the curriculum requirement.

The primary objective of this training is to provide an opportunity to the students to understand the actual work environment in the four core departments of the Industry. Students will be able to observe the latest technology applied and the latest trends followed in the Food industry. At the end of the training, the students communication skills, confidence level and overall personality will improve.

Training arrangement will be made by the Training Coordinator of the Institute. Once the student has been selected / deputed for Industrial Training by the institute, he/she shall not be permitted to undergo IT elsewhere. In case students make direct arrangements with the hotel for Industrial Training, these will necessarily have to be approved by the institute. Students selected through campus interviews will not seek Industrial Training on their own.

The students should undergo training from the date announced by the Institute. No student is allowed to deviate from the training schedule unless approved by the Principal of the Institute for a valid reason.

Industrial Training will require an input of 84 days i.e. (14 weeks x 06 days = 84days).

A student can avail leave to a maximum of 15% (15 days) only with prior permission of the hotel authorities. Minimum 75 % of attendance is required to appear for the end term examination. The Vice-Chancellor of the University can condone the shortage of attendance maximum of fourteen days on Medical grounds, if eligible, as per the University regulations.

Any student having less than the required percentage of attendance i.e 75% will have to compensate the attendance shortage during the summer vacation of the second year and to appear for the examination in the next academic year at the end of fourth semester. Only one chance will be given to compensate the attendance shortage. It is mandatory that every student complete the Industrial Training before he appears for 6<sup>th</sup> Semester examination.

All the students will be contacted frequently by the Training coordinator of the Institute.

During the training, each student should maintain a log book. Students should enter the daily activities, skills acquired and the observations in the log book and get it signed by the immediate supervisor.

At the end of the training, each student should prepare a training report. The content of the training report will include the Certificate page for the Institute, Certificate page to be signed by the Examiners, Copy of the Certificate issued by the Industry, Introduction, Profile of the Industry, Organization structure of the industry, Functions of the departments, Duties Performed, skills acquired in each department, Observations on technology / latest trend and any other relevant information pertaining to leaning outcome.

Out total 100 marks, 20 marks will be for internal and 80 marks for external. The internal marks will be awarded at the end of the training by the Training Manager or Personnel Manager or any competent authority of the Hotel who is closely monitoring the trainees based on the parameters given below

Attendance	3 Marks
Punctuality	4 Marks
Attitude	3 Marks
Performance	10 Marks

The Internal Mark statement (format enclosed) will be signed by the authority awarded the marks with name and the seal of the Hotel

### **End Semester Evaluation**

Out of 80 marks for end semester evaluation, 10 marks is assigned for log book, 20 for the training report and 50 marks for the seminar/presentation before the panel of examiners. Panel of examiners will consist of one internal examiner and one external examiner appointed by the University. The presentation would be limited to only one

key area of the student's interest.

During the external examination, every student must produce the following compulsorily.

1. Training certificate -original along with attested photo copy
2. Log Book
3. Training report- 2 copies

After the examination, Original training certificate, one copy of the training report and the log book will be returned to the students.

FORMAT FOR INTERNAL MARKS  
STATEMENT NAME OF THE FOOD INDUSTRY  
AND ADDRESS CONTINUOUS EVALUATION  
MARK STATEMENT

COURSE: BSc Food Technology  
SUBJECT: Industrial Training 6B21FT  
SEMESTER: 6  
ACADEMIC YEAR: \_\_\_\_\_

MAX MARKS: 20

SNO	NAME	REGD NO	TRAINING		DAYS PRESE NT	MARKS AWARDE D
			FROM	TO		

DATE:

signature

Name:

Designation

Seal

**GENERIC ELECTIVE (OPEN) COURSE**

Si. No.	Course Code	Course name	Credit	Semester
1.	5D01FT	Dairy Science	2	V
2.	5D02FT	Fruits &Vegetables	2	V
3.	5D03FT	Technology of Spices	2	V



## **Dairy science**

Course Category	Generic Elective Course
Code	5D01FT
Credit	2
Hours/week	2
Total Hours	36
Max Marks	25 Marks (Internal 5Marks + External 20 Marks)
Exam Hours	2 Hours

### **Milk**

Composition of milk- Physico - chemical properties of milk- milk hygiene

### **Market milk**

Market milk: collection of milk- cooling and transportation– filtration/clarification- standardization- homogenization - pasteurization- UHT – sterilization, packaging.

### **Milk products**

Milk products: Cream, Malai, Dahi /Curd, yoghurt, Channa / Paneer, Cheese, Ice cream , Frozen desserts, Evaporated milk, Condensed milk, Milk powder, Butter, Ghee, Chakka and Shrikhand,

### References

- Sukumar D E. Outlines of Dairy Technology, Oxford University Press

## **Fruits and Vegetables**

Course Category	Generic Elective Course
Code	5D02FT
Credit	2
Hours/week	2
Total Hours	36
Max Marks	25 Marks (Internal 5Marks + External 20 Marks)
Exam Hours	2 Hours

### **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

### **Preservation of Fruits and Vegetables**

Heat, Salt, Sugar, Freezing , Food additives and Preservatives.

### **Fruit and Vegetable Products Tomato Products**

Fruit Juice, Squashes, Cordials, Nectar, Concentrates, Fruit juice Powder, Jam, Jelly. Different types of Pickles and Chutneys. Product Specification

#### **Tomato Products**

Fruit Juice, Squashes, Cordials, Nectar, Concentrates, Fruit juice Powder, Jam, Jelly. Different types of Pickles and Chutneys. Product Specification Tomato juice, Puree, Paste, Ketchup

### **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.

## **TECHNOLOGY OF SPICES**

Course Category	Generic Elective Course
Code	5D03FT
Credit	2
Hours/week	2
Total Hours	36
Max Marks	25 Marks (Internal 5Marks + External 20 Marks)
Exam Hours	2 Hours

### **Spices, Spice oils & Oleoresin**

Definition, Classification, Chemical composition, Use of Spices.

Spice oil and Oleoresins—Definition, Technology of Manufacturing

### **Major Spices: Pepper**

Refining and processing of pepper, Pepper products:- White pepper, dehydrated green pepper, Pepper oil, Oleoresin.

### **Chilies**

Drying of chilies, quality attributes of chilies and paprika

**Cardamom** Composition, Drying of fruits, Bleaching, Grading, Cardamom products, Essential oil and oleoresins

**Ginger** Curing, Bleaching, Grading Ginger Products, Ginger oils, Ginger oleoresin, Dehydrated Ginger, Bleached Ginger

**Turmeric** Curing, Grading, Turmeric powder, Essential oil, oleoresin.

### **References**

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