KANNUR UNIVERSITY

(Abstract)

B.Sc Food Technology (LRP) programme under CBCSS-OBE -Course Code correction and shifting of Courses - Scheme, Syllabus modified w.e.f 2022 admission - Implemented -Orders issued.

ACADEMIC C SECTION

Acad/C2/16588/FT/2022 (I) Dated: 18.03.2023

Read:-1. U.O No Acad/C2/16588/FT/2022 dated 31.12.2022
2. U O No. Acad C3/12286/2019(i) Dated 21.06.2019
3. U O No Acad C3/12300/2019 (iii) dated 20.06.2019
4. No.Acad/C2/12380/2019 Dated20/0612019
5. No IGASC/2022-23 dated 17.01.2023 letter from Principal WMO IMAM GAZZALI ARTS & SCIENCE COLLEGE, KOOLIVAYAL

ORDER

1. 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, was implemented as per the paper read as (1) above.

2. As per paper read(2) and (3) above, the Course Code of Additional Common Language in 1st and 2nd semesters in Malayalam and Hindi for LRP Pattern Programmes are 1A07–2MAL , 2A08–2MAL 1A07-2HIN, 2A08-2HIN respectively, where as in the already approved Syllabus submitted by the Principal WMO Imam Gazali Arts and Science College, the Course Codes are given wrongly as 1A07MAL/HIN, 2A08MAL/HIN.

3. Further, the Course Code of Practical Course for Complementary Elective Course in Chemistry in the Syllabus of BSc Chemistry, as per Paper read (4) above is 4C05CHE where as in the already approved Syllabus submitted by the Principal WMO Imam Gazali Arts and Science College, the Course Codes is given wrongly as 4C07CHE.

4. As per paper read (5) above the Principal, WMO Imam Gazali Arts and Science College submitted the modified scheme, Syllabus of B.Sc. Food Technology (LRP) Programme CBCSS-OBE with the following corrections and modifications.

i. Course Code of Additional Common language (Malayalam and Hindi) corrected as 1A07 – 2 MAL / 2HIN and 2A08 – 2 MAL / 2HIN for 1st and 2nd semesters respectively.

ii. Course Code of Practical Course of Complementary Elective Course in Chemistry corrected as 4C05CHE

iii. Hours per week of Courses modified and 2 subjects shifted from 6^{th} to 5^{th} Semester and one subject from 5^{th} to 3^{rd} semester

5.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 correction effected and Modified Scheme, Syllabus of B.Sc. Food Technology (LRP) Programme CBCSS-OBE, w.e.f 2022 Admissions.

6.The correction effected and modified Scheme, Syllabus of B.Sc. Food Technology (LRP) Programme CBCSS-OBE, w.e.f 2022 are uploaded on the University Website (www.kannuruniversity.ac.in)

7. The U.O read (1) above stands modified to this extent.

8. Orders are issued accordingly.

Sd/-
Narayanadas K
DEPUTY REGISTRAR (ACAD)
For REGISTRAR

To: The Principal
1.WMO Imam Gazzali Arts & Science College, Koolivayal, Wayanad
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.

B.Sc. FOOD TECHNILOGY
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 or Malayalam. 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

CATEGORIES OF COURSE		NO. OF PAPERS	CREDITS	MARKS
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
TOTAL	30	8	2	42	3225	120	

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 2 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	3	22	25
	General Awareness Course 2	4	3		
	Core course 4	3	3		
	Core course 5	2	3		
	Core course 6	2	3		
	Core course 6 practical	3	2		
	complementary Elective course 1	2	3		
	complementary Elective course 2	2	3		
	complementary Elective course 1 practical		2		
IV	General Awareness Course 3	4	2	31	25
	General Awareness Course 4	4	3		
	Core course 8	2	3		
	Core course 8 practical	3	2		
	Core course 10	3	3		
	Core course 10 practical	3	2		
	complementary Elective course 1	2	3		
	complementary Elective course2	2	3		
	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-12	2	3	21	25
	Core Course-12 practical	3	2		
	Core Course-14	2	3		
	Core Course-14 practical	3	2		
	Core Course-16	2	3		
	Core Course-16 practical	3	2		
	Core Course-18	2	3		
	Core Course-19	2	3		
	Project		2		
	Generic Elective Course	2	2		
VI	Project	3		8	25
	Industrial Training	5	25		
	TOTAL			120	150

Students will be undergoing 15 weeks (15*6= 90 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	1A07-2MAL/HIN	Common Course Additional Language Paper I	10	40	50	3hrs	5	4
4	1B01FT	Fundamentals of Food science	20	80	100	3hrs	3	3
	2B03FT	Food Preservation Practical					2	
5	1C01CHE/PCH	Chemistry (For physical & Biological Sciences)	8	32	40	3hrs	2	2
	4C05CHE*/PCH	Complementary elective course Practical					2	
6	1C01PHY	Mechanics	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	2A03ENG	Common Course English III	10	40	50	3	5	4
2	2A04ENG	Common Course English IV	10	40	50	3	4	3
3	2A08-2MAL/ HIN	Common course Additional Language Paper II	10	40	50	3	5	4
4	2B02FT	Food Preservation	20	80	100	3	3	3
	2B03FT	Food Preservation Practical	20	80	100		2	2
5	2C02CHE/PCH	Chemistry (For physical & Biological Sciences)	8	32	40	3	2	2
	4C05CHE*/PCH	Complementary elective course Practical					2	
6	2C02PHY	Electricity, Magnetism, and Thermodynamics	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	3	4
2	3A02FT	Packaging	20	80	100	3	3	4
3	3B04FT	Food Microbiology I	20	80	100	3	3	3
4	3B05FT	Food Safety & Food Laws	20	80	100	3	3	2
5	3B06FT	Food Chemistry and Nutrition	20	80	100	3	3	2
	3B07FT	Food Chemistry and Nutrition practical	20	80	100	3	2	3
6	3C03CHE /PCH(BS)	Chemistry (For Biological Sciences)	8	32	40	3	3	2
	4C05CHE */PCH	Complementary elective course Practical					2	
7	3C03PHY	Optics and Photonics	8	32	40	3	3	2
		TOTAL	136	544	680		25	22

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	2	4
2	4A04FT	Nutraceuticals, Food Allergies, Intolerances and consumer science	20	80	100	3	3	4
3	4B08FT	Food Microbiology II	20	80	100	3	3	2
	4B09FT	Food Microbiology Practical	20	80	100	3	2	3
4	4B10FT	Food Analysis &Instrumentation	20	80	100	3	3	3
	4B11FT	Food Analysis &Instrumentation Practical	20	80	100	3	2	3
5	4C04CHE/PCH(BS)	Chemistry (For Biological Sciences)	8	32	40	3	3	2
	4C05CHE */PCH	Complementary elective course Practical	8	32	40		2	4
6	4C04PHY	Electronics and Modern physics	8	32	40	3	3	2
	4C05PHY	Physics Practical	8	32	40	3	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	5B12FT	Technology of cereals, pulses and Oilseeds	20	80	100	3	3	2
	5B13FT	Technology of cereals, pulses and oilseeds Practical	20	80	100	3	2	3
2	5B14FT	Technology of Meat, Fish, Poultry & Egg	20	80	100	3	3	2
	5B15FT	Technology of meat, Fish, Poultry & Egg Practical	20	80	100	3	2	3
3	5B16FT	Technology of Fruits, Vegetables, Spices &Plantation Crops	20	80	100	3	3	2
	5B17FT	Technology of Fruits, Vegetables, Spices &Plantation Crops Practical	20	80	100	3	2	3
4	5B18FT	Food Engineering	20	80	100	3	3	2
5	5B19FT	Dairy Technology	20	80	100	3	3	2
6	6B20FT	Project				2	2	
7	5D01 FT 5D02 FT 5D03 FT	Generic Elective Course	5	20	25	2	2	2
		TOTAL	165	660	825		25	21

SEMESTER VI

SI. No	Course Code	Title	Marks			Duration of Exam	Contact Hrs /Wk	Credit
			Internal	External	Total			
2	6B20FT	Project	20	80	100	3		3
3	6B21FT	Industrial Training	20	80	100	3	25	5
		TOTAL	40	160	200		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 duration of 15 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 90 days i.e. (15 weeks x 06 days = 90 days). A student can avail leave to a maximum of 15% (14 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.

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 leaning outcome.

8. PROJECT

Every student will have to undertake a research project on any topic from Food 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 shouldprovide 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 Size12
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
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 B.Sc. 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 End Semester Evaluation.

Continuous evaluation will be done by the staff handling the course and the End Semester 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% 0f 100 Marks 20
Assignments	2.5 Marks	05 Marks
Viva-Voce/Seminar	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

Components	**Marks**
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
TOTAL	20

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 that 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*Questions to be asked.*	20(10 mark each)
2	Experiment	2*Questions to be asked.*	30(15 Mark each)
Total			50

Food Preservation Practical (2B03FT),Food Chemistry and Nutrition practical (3B07FT), Food Microbiology Practical (4B09FT) and Food Analysis and Instrumentation (4B11FT) will be combined and examination will be conducted at the end of second year, similarly, Technology of Cereals, Pulses and Oilseeds (5B13FT), Technology of Meat, Fish & Poultry (5B15FT) and Technology of Fruits, Vegetables Spices & Plantation Crops (5B17FT) 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 literature 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 and10% 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^+, 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:

% of Marks(CE+ESE)	**Grade**	**Interpretation**
90 and above	A+	Outstanding
80 to below90	A	Excellent
70 to below80	B	Very Good
60 to below 70	C	Good
50 to below 60	D	Satisfactory
40 to below50	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:

Grade Point = (Total marks awarded / Total Maximum marks) x 10.

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

C**P = GP x 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.

SGPA = Sum of the Credit Points of all courses in a semester / 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:

CGPA = Sum of Credit Points of all completed semesters / 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

OGPA = Sum of Credit Points obtained in all semesters of the programme / 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.

Grade range OGPA	Overall Letter Grade	Classification
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 by10.

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	1A07-2MAL/ HIN	Common Course Additional Language Paper I	10	40	50	3hrs	5	4
4	1B01FT	Fundamentals of food science	20	80	100	3hrs	3	3
	2B03FT	Food Preservation Practical					2	
5	1C01CHE /PCH	Chemistry(For Physical and Biological Science)	8	32	40	3hrs	2	2
	4C05CHE */PCH	Complementary elective course Practical					2	
6	1C01PHY	Mechanics	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	2A08-2MAL/ HIN	Common Course Additional Language Paper II	10	40	50	3	5	4
4	2B02FT	Food Preservation	20	80	100	3	3	3
	2B03FT	Food Preservation Practical	20	80	100		2	2
5	2C02CHE /PCH	Chemistry(For Physical and Biological Science)	8	32	40	3	2	2
	4C05CHE */PCH	Complementary elective course Practical					2	
6	2C02PHY	Electricity, Magnetism and Thermodynamics	8	32	40	3	2	2
		TOTAL	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 SO2

Reference

- Potter N, Hotchkiss JH. Food Science. CBS publishers and distributers
- 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 EducationPrivate Limited
- Vijaya Khader. Text Book of Food Science and Technology. ICAR
- Swaminathan M. Food Science Chemistry and Experimental Foods. Bappco
- Journals

FOOD PRESERVATION

Course Category	Core Course
Code	2B02FT
Credit	3
Hours/week	3
Total Hours	54
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 –Pasteurization, blanching, sterilization, UHT. Aseptic preservation, 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, Sorbicacid, 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 irradiation.

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, ultra high voltage electric fields, pulse electric fields, thermosonication, ohmicheating, dielectric heating, infrared, induction heating, antibacterial; bacteriocins, microfiltration, bactofugation.

References

- Fennema Owen R. Princi[les 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 PreservstionI 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	3	4
2	3A02FT	Packaging	20	80	100	3	3	4
3	3B04FT	Food Microbiology I	20	80	100	3	3	3
4	3B05FT	Food Safety & Food Laws	20	80	100	3	3	2
5	3B06FT	Food Chemistry and Nutrition	20	80	100	3	3	2
	3B07FT	Food Chemistry and Nutrition practical	20	80	100	3	2	3
6	3C03CHE /PCH(BS)	Chemistry(For Biological Science)	8	32	40	3	3	2
	4C05CHE */PCH	Complementary elective course Practical					2	
7	3C03PHY	Optics and Photonics	8	32	40	3	3	2
		TOTAL	136	544	680		25	22

ENTREPRENEURIAL DEVELOPMENT

Course Category	General Awareness Course
Code	3A01FT
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 Entrepreneurship Development

Need, scope and characteristics of entrepreneurship, types of entrepreneurs,Steps in Establishing Entrepreneurial systems

UNIT 2

Project Design

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

UNIT 3

Institutional support and incentives to entrepreneurs- Functions of Department of Industries and Commerce (DIC) - Activities of Small Industrial Development Corporation (SIDCO)- Functions of National Small Industries Corporation(NSIC)- Functions of Small Industries Development Bank of India (SIDBI) - Khadi Village Industry Commission (KVIC)-Small Industries Service Institute (SISI)- Functions and services of Kerala Industrial Technical Consultancy Organisation (KITCO)-Activities of Science and Technology Entrepreneurship Development Project (STEDP)-Strategies of National entrepreneurship Development Board (NEDB) -Objectives of National Institute for entrepreneurship and small business development (NIESBUD) - Techno park-Functions of techno park Incentives- ImportanceClassification of incentives – Subsidy - Types of Subsidy

UNIT 4

Management of Small-Scale Industries

Characteristics of small-scale industries, 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.

UNIT 3

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.

UNIT 4

Different forms of packaging:

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

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	3
Total Hours	54
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.

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).

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 safety and Food laws

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

Food safety and Food laws

UNIT 1

Concept and meaning of Food Safety, newer approaches to food safety. 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

FOOD CHEMISTRY AND NUTRITION

Course Category	Core Course
Code	3B06FT
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 Monosaccharaides: Glucose & Fructose

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

Polysaccharides: starch: components of starch, gelatization, 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) of foods, Balanced diet formulation. Food fortification

FOOD CHEMISTRY AND NUTRITION PRACTICAL

Course Category	Practical
Code	3B07FT
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 andPrinciples 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	2	4
2	4A04FT	Nutraceuticals, Food Allergies, Intolerances and consumer science	20	80	100	3	3	4
3	4B08FT	Food Microbiology II	20	80	100	3	3	2
	4B09FT	Food Microbiology II Practical	20	80	100	3	2	3
4	4B10FT	Food Analysis &Instrumentation	20	80	100	3	3	3
	4B11FT	Food Analysis &Instrumentation Practical	20	80	100	3	2	3
5	4C04CHE/PCH(BS)	Chemistry(For Biologiical Science)	8	32	40	3	3	2
	4C05CHE*/PCH	Complementary elective course Practical	8	32	40		2	4
6	4C04PHY	Electronics and Modern Physics	8	32	40	3	3	2
	4C05PHY	Physics Practical	8	32	40		2	4
		TOTAL	152	608	760		25	31

MANAGEMENT CONCEPTS AND PRINCIPLES

Course Category	General Awareness Course
Code	4A03FT
Credit	4
Hours/week	2
Total Hours	36
Max Marks	100 Marks (Internal 20 Marks + External 80 Marks)
Exam Hours	3 Hours

Unit 1

Functions of management-: Planning-concept and importance - Planning process- Steps in Planning— barriers to effective planning.

UNIT 2

Organizing- Nature and purpose of organization-Types of organization –line, functional, line and staff.

UNIT 3

Staffing: Concepts - manpower planning – process and importance. Functions of management -: Directing: Meaning-definition- principles –techniques of direction.

Unit3

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 5

Emerging concepts in management – Kaizen – TQM – TPM – MIS – ISO – Change management – Stress management – Fish bone (ISHIKAWA) Diagram –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. Safety of genetically modified food: potential toxicity andallergenisity 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.

Refferences

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.
4. S.S. Deshpande Ed (2013), Handbook of Food Toxicology, CRC Press, ISBN 9780824707606

Food Microbiology II

Course Category	Core Course
Code	4B08FT
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.

Fermenteddairy Products – Cheese, yoghurt

UNIT 3

Food spoilage

Sources of contamination, factors responsible for 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), neurolathyrism, aflatoxins, Egotism, 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	4B09FT
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	4B010FT
Credit	3
Hours/week	3
Total Hours	54
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	4B11FT
Credit	3
Hours/week	2
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 (Iodiometry).
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 (Soxhletextraction method)
7 Estimation of crude fibre in fruits
8 Estimation of starch content in vegetables
9 Estimation of Protein (Colorimetric method) content in food10 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

Si. No	Course Code	Title	Marks			Duration of Exam	Contact Hrs /Wk	Credit
			Internal	External	Total			
1	5B12FT	Technology of cereals, pulses and Oilseeds	20	80	100	3	3	2
	5B13FT	Technology of cereals, pulses and oilseeds Practical	20	80	100	3	2	3
2	5B14FT	Technology of Meat, Fish, Poultry & Egg	20	80	100	3	3	2
	5B15FT	Technology of meat, Fish, Poultry & Egg Practical	20	80	100	3	2	3
3	5B16FT	Technology of Fruits, Vegetables, Spices &Plantation Crops	20	80	100	3	3	2
	5B17FT	Technology of Fruits, Vegetables, Spices &Plantation Crops Practical	20	80	100	3	2	3
4	5B18FT	Food Engineering	20	80	100	3	3	2
5	5B19FT	Dairy Technology	20	80	100	3	3	2
6	6B20FT	Project				2	2	
7	5D01 FT 5D02 FT 5D03 FT	Generic Elective Course	5	20	25	2	2	2
		TOTAL	165	660	825		25	21

Technology of cereals, pulses and oilseeds

Course Category	Corse Course
Code	5B12FT
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	5B13FT
Credit	3
Hours/week	2
Total Hours	36
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 and distributers
- Faridi H, The science of cookie and cracker production; CBS Publishers and distributers
- 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 and Practices. Interntional Book Distributors
- Srilakshmi B. Food Science . New Age International Publishers
- Sahay KM &. Singh KK, 1994. Unit operations of Agricultural processing Vikas Publishing House
- Vijaya khader.Text book of Food Science and Technology. ICAR

TECHNOLOGY OF MEAT, FISH, POULTRY AND EGG

Course Category	Corse Course
Code	5B14FT
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. QualityFactors 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	5B15FT
Credit	3
Hours/week	2
Total Hours	36
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	5B16FT
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, defectsin 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	5B17FT
Credit	3
Hours/week	2
Total Hours	36
Max Marks	100 Marks (Internal 20 Marks + External 80 Marks)
Exam Hours	3 Hours

1 Determination of Sulphur dioxide

2Estimation of Vitamin C

3 Estimation of tannin – colorimetric method

4Estimation of alcohol content

5 Determination of salt content in pickles

6Determination 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. Presrvation 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. Interntional Book Distributor

FOOD ENGINEERING

Course Category	Core Course
Code	5B18FT
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.

Unit3

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.

DAIRY TECHNOLOGY

Course Category	Core Course
Code	5B19FT
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 andShrikhand, 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

SEMESTER VI
SCHEME OF EXAMINATION AND SYLLABUS

SI. No	Course Code	Title	Marks			Duration of Exam	Contact Hrs /Wk	Credit
			Internal	External	Total			
2	6B20FT	Project	20	80	100	3		3
3	6B21FT	Industrial Training	20	80	100	3	25	5
		TOTAL	40	160	200		25	12

PROJECT

Course Category	Core
Code	6B20FT
Credit	3
Hours/week	2
Total Hours	36
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, Needand 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 oftwo examiners, internal and external, appointed bythe University shall evaluatethe project

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

- Statement of Problems/Objectives 5 Marks
- Review of Literature 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	15 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 15 weeks in a Food Industry isintroduced 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 90 days i.e. (15 weeks x 06 days = 90days).

A student can avail leave to a maximum of 15% (14 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.

It is mandatorythat every student complete the Industrial Training before he appears for 6th 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 bythe 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 authorityawarded 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 producethe 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 PRESENT	MARKS AWARDED
			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 duringcooking Browning and its prevention

Preservation of Fruits and Vegetables

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

Fruit and Vegetable ProductsTomato 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, dehydratedgreen 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

KANNUR UNIVERSITY

(Abstract)

Complementary Elective Course (Chemistry) for B.Sc Food Technology (LRP) programme under CBCSS-OBE - Scheme, Syllabus and Pattern of Question Papers -Implemented -Orders issued.

ACADEMIC C SECTION

Acad/C2/16588/FT/2022 (II) Dated: 18.03.2023

Read:-1. U.O No Acad/C2/16588/FT/2022 dated 31.12.2022

2. U.O .No. Acad/C2/12380/2019 dated 20/06/2019

3. Letter No.Acad C2/16588/FT/2022 dated 10.01.2023

4. Letter from the former Chairperson ,Board of Studies in Chemistry (UG-2018-20) dated 17.01.2023

ORDER

1. As per paper read (1) above, the Scheme and Syllabus of B.Sc Food Technology (LRP) programme under CBCSS-OBE was implemented w.e.f 2022 admission.

2. One of the Complementary Elective Courses for B.Sc Food Technology (LRP) programme under CBCSS-OBE, is Chemistry.

3. The Syllabus of B.Sc. Chemistry Programme CBCSS-OBE Programme offers Complementary Elective Course for Physical and Biological Science Programmes only, as the same was already revised w.e.f 2019 admission, as per paper read (2) above.

4. As the reconstitution of Board of Studies is still under consideration of the Hon'ble Chancellor, remarks of the former Chairperson, Board of Studies in Chemistry (UG -2018-20) (Cd) were sought, regarding the Syllabus of Chemistry to be followed for Complementary Course in Chemistry for B.Sc Food Technology (LRP) programme under CBCSS-OBE .

5. As per paper read (4), the former Chairperson, Board of Studies, Chemistry (UG-2018-20), recommended to follow the same Scheme & Syllabus of the Complementary Elective Course in Chemistry being followed for Physical and Biological Science Programmes as stated in the Syllabus of B.Sc Chemistry Program [which has been revised w.e.f 2019], for B.Sc Food Technology (LRP) programme under CBCSS-OBE w.e.f 2022 also.

6. The Vice-Chancellor after considering the matter in detail and exercise of the powers of the Academic Council conferred under section 11(1), Chapter III of Kannur University Act 1996, accorded sanction to implement the Scheme, Syllabus and the Pattern of Question Papers of the Complementary Elective Course (Chemistry) for the B.Sc Food Technology (LRP) programme under CBCSS-OBE w.e.f 2022 admissions.

7. The Scheme, Syllabus and Pattern of Question Papers of the Complementary Elective Course (Chemistry) for B.Sc Food Technology (LRP) programme under CBCSS-OBE w.e.f 2022 , are uploaded on the University web site (www.kannuruniversity.ac.in).

8. The U.O read (1) above stands modified to this extent.
9. Orders are issued accordingly.

Sd/-

Narayanadas K

DEPUTY REGISTRAR (ACAD)

For REGISTRAR

To: The Principal

1.WMO Imam Gazzali Arts & Science College, Koolivayal, Wayanad

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

(Abstract)

B.Sc Food Technology (LRP) programme under CBCSS-OBE - Eligibility Criteria and Index Mark calculation for admission- Implemented w.e.f 2022-Orders issued.

ACADEMIC C SECTION

Acad/C2/16588/FT/2022 Dated: 18.03.2023

Read:-1. U.O No Acad/C2/16588/FT/2022 dated 31.12.2022
2. E Mail form HoD, Dept. of Food technology, WMO Imam Gazzali Arts & Science College Dated 05.01.2023

ORDER

1. The Scheme and Syllabus of B Sc Food Technology (LRP) programme under CBCSS-OBE was implemented w.e.f 2022 admission as per paper read (1) above. But the aforementioned Syllabus is silent regarding the Eligibility Criteria and Index mark calculation for admission to the programme.
2. The HoD, Dept. of Food Technology, WMO Imam Gazzali Arts & Science College, Koolivayal submitted the eligibility Criteria and Index mark calculation for admission to B Sc Food Technology (LRP) programme under CBCSS-OBE, for implementation w.e.f 2022, as detailed below.

Sl No	Name of Programme	Eligibility for admission	Calculation of Index Mark
1	B Sc Food Technology (LRP) programme under CBCSS-OBE	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.	Total marks of the qualifying examination + Marks secured for Physics and Chemistry

3. The Vice Chancellor after considering the matter in detail and in exercise of the powers of the Academic Council conferred under section 11(1) Chapter III of Kannur University Act 1996, accorded sanction to implement the Eligibility Criteria and Index mark calculation for admission to B.Sc Food Technology (LRP) programme under CBCSS-OBE, w.e f 2022 admissions, as detailed in para (2) above, and to report the same to the Academic Council.
4. The U O read (1) above, stands modified to this extent.
5. Orders are issued accordingly.

Sd/-
Narayanadas K
DEPUTY REGISTRAR (ACAD)
For REGISTRAR

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

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SECTION OFFICER