ROYAL GLOBAL UNIVERSITY

GUWAHATI

ROYAL SCHOOL OF BIO - SCIENCES

(RSBSC)

(Department of Food Technology)

Learning Outcomes-based Curriculum Framework (LOCF) for

Undergraduate Programme in BSc Food Technology

W.E.F. 2022-23

TABLE OF CONTENTS

1. Preamble

The following aspects have been taken into cognizance by faculty members and members of Board of Studies while framing the B.Sc. Food Technology (Honours) syllabus:

i Higher education plays an extremely important role in promoting human as well as societal well-being and in developing India as envisioned in its Constitution - a democratic, just, socially conscious, cultured, and humane nation upholding liberty, equality, fraternity, and justice for all.

ii A holistic and multidisciplinary education would aim to develop all capacities of human beings - intellectual, aesthetic, social, physical, emotional, and moral in an integrated manner. Such an education will help develop well-rounded individuals that possess

iii The objective of any programme at Higher Education Institute is to prepare their students for the society at large. The Royal Global University envisions all its programmes in the best interest of their students and in this endeavour it offers a new vision to all its Under-Graduate courses. It imbibes a Learning Outcome-based Curriculum Framework (LOCF) for all its Under Graduate programmes.

iv The LOCF approach is envisioned to provide a focused, outcome-based syllabus at the undergraduate level with an agenda to structure the teaching-learning experiences in a more student-centric manner. The LOCF approach has been adopted to strengthen students' experiences as they engage themselves in the programme of their choice. The Under-Graduate Programmes will prepare the students for both, academia and employability.

v Each programme vividly elaborates its nature and promises the outcomes that are to be accomplished by studying the courses. The programmes also state the attributes that it offers to inculcate at the graduation level. The graduate attributes encompass values related to well-being, emotional stability, critical thinking, social justice and also skills for employability. In short, each programme prepares students for sustainability and life-long learning.

vi The new curriculum of B.Sc. (Hons) Food Technology offers the students to gain the requisite knowledge, skills and aptitude for the field of food technology. The efforts are made to measure cognitive as well as applied learning. Students are not only trained on the core components but also in areas which are need based, innovative and relevant keeping in pace with the fast growing food industry. The course is internationally competitive.

vii The Royal Global University hopes the LOCF approach of the programme B.Sc. (Hons) Food Technology will help students in making an informed decision regarding the goals that they wish to pursue in further education and life, at large.

1.1 INTRODUCTION

The B.Sc Food Technology course at the Royal Global University since the academic year 2020-21 . The new course has been prepared keeping in view, the unique requirements of B.Sc. (H) Food Technology students. The Food Technology course in LOCF format is of 4-year duration which comprises of 8 semesters, divided into 16 Core papers, 8 Discipline Specific Elective courses (DSE), 4 Skill Enhancement Elective Courses (SEC) , 5 Value Added Course (VAC) and 8 Generic Elective (GE) Courses. Each year consists of 2 semesters. This course has been prepared keeping in view, the unique requirements of B.Sc. Hons Food Technology students.

1.2 Learning Outcomes-Based Approach to Curricular Planning:

The fundamental premise underlying the learning outcomes-based approach to curriculum planning and development is that higher education qualifications such as a Bachelor's Degree (Hons) programmes are earned and awarded on the basis of (a) demonstrated achievement of outcomes (expressed in terms of knowledge, understanding, skills, attitudes and values) and (b) academic standards expected of graduates of a programme of study.

The expected learning outcomes are used as reference points that would help formulate graduate attributes, qualification descriptors, programme learning outcomes and course learning outcomes which in turn will help in curriculum planning and development, and in the design, delivery, and review of academic programmes.

Learning outcomes-based frameworks in any subject must specify what graduates completing a particular programme of study are (a) expected to know, (b) understand and (c) be able to do at the end of their programme of study. To this extent, LOCF in Food Technology is committed to allowing for flexibility and innovation in (i) programme design and syllabi development by higher education institutions (HEIs), (ii) teaching-learning process, (iii) assessment of student learning levels, and (iv) periodic programme review within institutional parameters as well as LOCF guidelines, (v) generating framework(s) of agreed expected graduate attributes, qualification descriptors, programme learning outcomes and course learning outcomes.

The key outcomes that underpin curriculum planning and development at the undergraduate level include Graduate Attributes, Qualification Descriptors, Programme Learning Outcomes, and Course Learning Outcomes.

The LOCF for undergraduate education is based on specific learning outcomes and academic standards expected to be attained by graduates of a programme of study. However, an outcome-based approach identifies moves way from the emphasis on what is to be taught to focus on what is learnt by way of demonstrable outcomes. This approach provides greater flexibility to the teachers to develop—and the students to accept and adopt—different learning and teaching pedagogy in an interactive and participatory ecosystem. The idea is to integrate social needs and teaching practices in a manner that is responsive to the need of the community. HEIs, on their turn, shall address to the situations of their students by identifying relevant and common outcomes and by developing such outcomes that not only match the specific needs of the students but also expands their outlook and values.

1.2.1 Nature and Extent of the Programme in B.Sc. (Hons) Food Technology

The learning outcomes-based curriculum framework is based on the premise that every student and graduate is unique. Each student or graduate has his/her own characteristics in terms of previous learning levels and experiences, life experiences, learning styles and approaches to future career- 2 related actions. The quality, depth and breadth of the learning experiences made available to the students while at the higher education institutions help develop their characteristic attributes.

A bachelor's degree in Food Technology with Research is a 4 years degree course which is divided into 8 semesters as under.

SL. No	Year	Mandatory Credits to be secured for the Award
1	1st	48
2	2nd	48
3	3rd	52
Total Credits		148

i A student pursuing 4 years undergraduate programme with research in a specific discipline shall be awarded an appropriate Degree in that discipline on completion of 8th Semester if he/she secures 180 Credits. Similarly, for certificate, diploma and degree, a student needs to fulfill the associated credits. An illustration of credits requirements in relation to the type of award is illustrated below:

ii Bachelor's Degree (Honours) is a well-recognized, structured, and specialized graduate level qualification in tertiary, collegiate education. The contents of this degree are determined in terms of knowledge, understanding, qualification, skills, and values that a student intends to acquire to look for professional avenues or move to higher education at the postgraduate level.

iii Bachelor's Degree (Honours) programmes attract entrants from the secondary level or equivalent, often with subject knowledge that may or may not be directly relevant to the field of study/profession. Thus, BSc (Honours) Course in Food Technology aims to equip students to qualify for joining a profession or to provide opportunities in food processing industries. Graduates are enabled to enter a variety of jobs or to continue academic study at a higher level

1.2.2 Aims of Bachelor's Degree (Honours) Programme in Food Technology:

The key objectives that underpin curriculum planning and development at the undergraduate level include Programme Learning Outcomes, and Course Learning Outcomes.

For the B.Sc. (H) Food Technology course it includes:

- To demonstrate comprehensive knowledge and understanding of the food technology curriculum.
- To apply the principles of food science to preserve, process and package to assure the quality and safety of food products.
- To understand that the real-world problems in the food industry requires continuous acquisition of knowledge and its application to improve the safety and quality of a given food or process.
- To analyse, interpret and draw conclusions from quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.
- To acquire knowledge and skills, including ―learning how to learn", that are necessary for participating in learning activities throughout life, through self-paced and self-directed learning aimed at personal development, and adapting to changing trades and demands of work place through knowledge/skill development/reskilling.
- To use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources.
- To acquire professional competency and entrepreneurial skills for economic empowerment. To demonstrate the ability to acquire, analyze, interpret and appropriately present laboratory data

1.3 Graduate Attributes in B.Sc. (Hons) Food Technology

GA 1: Disciplinary knowledge
Students are able to demonstrate comprehensive knowledge and understanding of one or more disciplines such as chemistry, bio-chemistry, mathematics, statistics, microbiology, engineering, management; regulations with support of different allied subjects of Life Science; Physical Science.

GA 2: Practical Skills
Students will be able to apply the skills belonging to Food Technology in industrial applications, research and development, analysis and testing purpose which are some important sectors of Food industry

GA 3: Research-related skills
Students develop a scientific temper and a sense of enquiry through various food technology papers. They have capabilities in asking relevant questions relating to current issues and themes and state hypothesis and rationale for inquiry. Students are capable of using appropriate research methodology especially for understanding safety issues in Food Technology and reporting the results in different formats.

GA 4: Cooperation/Team work
Students are capable of effective working in diverse contexts and teams in classrooms laboratories, student societies, industry and the community. They have basic management skills for independently organizing events, resource mobilization and leading community based projects, initiatives; cultural shows.

GA 5: Self-directed learning
Students are capable of working independently and are able to apply the concepts of Food Technology in an original; creative manner to solve and manage real life issues for the customers and industry. Students develop customized products as per the requirements of customers eg. Sugar free jams; sweets for diabetics, gluten free products for celiacs etc.

GA 6: Multicultural competence

Students are confident of working in diverse socio-cultural contexts. They are able to effectively engage with multicultural groups and teams. They have sensitivities of cross cultural and ethnic diversity which they can apply to different settings. College through a student and faculty exchange program with foreign university helps them to acquire multicultural competency. They are competent to seek higher education in foreign universities.

GA 7: Moral and ethical awareness/reasoning

Student has awareness of ethical conduct in different situations (academic and personal). They have skills in understanding and avoiding unethical behavior such as misrepresentation, plagiarism and environmental misuse and violence. They are formally taught ethics of research and human interventions.

GA 8: Communication Skills

Development of students' communication skills is planned through an AECC paper (English) which is compulsory for each student. Besides that the students do various assignments that enable them to develop skills in public speaking writing and effective's interpersonal skills. Presentations in each paper enhances their confidence, ability to express themselves; presentation skills.

GA 9: Leadership readiness/qualities

Students have leadership qualities in organizing teams and their mobilization for effective problem solving in different Food Technology aspects. Students apply creative leadership for realization of various goals. As a leader, they are trained to have greater customer sensitivity and connect. They can organize food courts and design business plans.

GA 10: Lifelong learning

Students acquire ability to gain knowledge and skills which are necessary in life for the holistic development for meeting their professional and personal needs in varying environment and changing contexts.

1.4. Qualification descriptors for bachelor's degree with Food Technology Honours

The following descriptors indicate the expectations from B.Sc. Hons Food Technology:

- Demonstrate
  (i) A systematic understanding of Food Technology, applications of the practical and theoretical skills in different learning areas.
  (i i) An overall knowledge mechanism that creates professionals in Food Industries, govt sectors belonging to food, teaching, scientific research etc.
  (iii) Ever developing Skills related to future developments in the field of Food Technology.

- A sound knowledge of Food Science and Technology.
- Understanding the technologies of food processing and preservations of all food groups.
- Identifying food composition, nutritional, microbiological and sensory aspects.
- Quality knowledge of food safety and standards, both nationally and internationally
- Versant with key principles of food engineering and packaging.
- Develop analytical power and logical approach to problem-solving
- Good oral and written communication abilities
- Able to work independently or with team members

1.5 Programme Learning Outcomes relating to B.Sc (Honours) degree programme in Food Technology

Students graduating with the degree B. Sc (Food technology) will be able to achieve the following:

PO-1.**Knowledge of Food Technology**: Bachelor degree in Food Technology helps to apply the knowledge of science, engineering fundamentals, and mathematical concepts to the solution in the field of food technology, science and other allied subjects

PO-2.CommunicationSkills: Communicate effectively and write effective reports and design documentation, make effective presentations through seminars, project dissertations

PO-3.**Critical thinking and analytical reasoning:** Recognize the need for, and have thepreparationandabilitytoengageinindependent/asanentrepreneurandlife-longlearninginthebroadestcontextoftechnologicalchangelogicalreasoningandcapabilityofrecognizingand distinguishing the various aspects of real-life problems.

PO-4.Problem Solving: Identify, formulate, review research literature, and analyze complex. Food Technology/applications problems and Design solutions for complex problemsanddesignsystemcomponentsorprocessesthatmeetthespecifiedneedswithappropriate consideration for the food sustainability

PO-5.Researchrelatedskills: Acquire the practical knowledge and demonstrate the ability to design, conduct/trouble shoot experiments and analyze data in the field of food technology

PO-6 Information/digital Literacy: The completion of this programme will enable the learner to use appropriate software's to apply for bulk scale/industrial production of technology-based food products

PO-7.Self-directed learning: The student completing this program will develop an ability of working independently and to make an in-depth study of various disciplines of food technology.

PO-8.**Moral and ethical awareness/reasoning:** Understand the impact of the professional food technology solutions in societal and environmental contexts, and apply ethical principles and commit to professional ethics and responsibilities

PO-9.Cooperation/Teamwork: Capable of working effectively in diverse teams in both classroom and field based situations

PO-10.Lifelong learning: This programme provides self-directed learning and lifelong learning skills to think independently and develop problem solving skills with respect to food industry

1.6 B.Sc. Food Technology Programme Specific Outcomes

The programme specific outcomes of the course are-

PSO 1: Knowledge of various areas related to Food science and technology,

PSO 2: Understanding of the food composition and its physico-chemical, nutritional, microbiological and sensory aspects,

PSO 3: Knowledge of processing and preservation techniques of pulses, oilseeds, spices, fruits and vegetables, meat, fish, poultry, milk & milk products,

PSO 4: Relevance and significance of food safety, food quality, food plant sanitation, food laws and regulations, food engineering and packaging in food industry.

1.7 Teaching Learning Process

Teaching and learning in this programme involves classroom lectures as well as tutorial and remedial classes.

Tutorial classes: Tutorials allow closer interaction between students and teacher as each student gets individual attention. The tutorials are conducted for students who are unable to achieve average grades in their weekly assessments. Tutorials are divided into three categories, viz. discussion-based tutorials (focusing on deeper exploration of course content through discussions and debates), problem-solving tutorials (focusing on problem solving processes and quantitative reasoning), and Q&A tutorials (students ask questions about course content and assignments and consolidate their learning in the guiding presence of the tutor).

Remedial classes: The remedial classes are conducted for students who achieve average and above average grades in their weekly assessments. The focus is laid to equip the students to perform better in the exams/assessments. The students are divided into small groups to provide dedicated learning support. Tutors are assigned to provide extra time and resources to help them understand concepts with advanced nuances. Small groups allow tutors to address their specific needs and monitor them. Following methods are adopted for tutorial and remedial classes:

- Written assignments and projects submitted by students
- Project-based learning
- Group discussions
- Home assignments
- Class tests, quizzes, debates organised in the department
- PPT (Presentation), Seminars and conferences
- Extra-curricular activities like cultural activities, community outreach programmes etc.
- Industrial tour / field visit

1.8 Assessment Methods

	Component of Evaluation	Marks	Frequency	Code	Weightage (%)
A	**Continuous Evaluation**				
I	Analysis/Class test	Combination of any three from (i) to (v) with 5 marks each	1-3	C	25%
ii	Home Assignment		1-3	H	
iii	Project		1	P	
iv	Seminar		1-2	S	
V	Viva-Voce/Presentation		1-2	V	
vi	MSE	MSE shall be of 10 Marks	1-3	Q/CT	
vii	Attendance	Attendance shall be of 5 marks	100%	A	5%
B	Semester End Examination		1	SEE	70%
	Project				**100%**

Course Structure
B.Sc. in Food Technology

1st semester							
Sl. No.	**Subject Code**	**Names of subjects**	**L**	**T**	**P**	**C**	**TCP**
Core Subjects							
1	FTC152C101	Principles of Food Processing	3	1	0	4	4
2	FTC152C102	Food Safety and Quality Management	3	1	0	4	4
3	FTC152C113	Practical on Food Processing and Food Safety	0	0	8	4	8
Skill Enhancement Elective Courses (SEC)							
4	FTC152S111	Food Hygiene and Handling Practices	0	0	4	2	4
Value Addition Course							
5		Basket Course	2	0	0	2	2
Ability Enhancement Compulsory Courses (AECC)							
6	CEN982A101	Communicative English-I	1	0	0	1	1
7	BHS982A102	Behavioural Science-I	1	0	0	1	1
Generic Elective							
8	FTC152G101	GE-I (Basket courses)	3	0	0	3	3
9	FTC152G102	GE II (Basket courses)	3	0	0	3	3
		Total Credit	**16**	**2**	**12**	**24**	**30**
2nd semester							
Sl. No.	**Subject Code**	**Names of subjects**	**L**	**T**	**P**	**C**	**TCP**
Core Subjects							
1	FTC152C201	Food Chemistry	3	1	0	4	4
2	FTC152C202	Fruits and Vegetable Products Technology	3	1	0	4	4
3	FTC152C213	Practical on Food Chemistry and Fruits and Vegetables Processing)	0	0	8	4	8
Skill Enhancement Elective Courses (SEC)							
4	FTC152S211	Bakery and Confectionery	0	0	4	2	4
Value Addition Course							
5		Basket Course	2	0	0	2	2
Ability Enhancement Compulsory Courses (AECC)							
6	CEN982A201	Communicative English-II	1	0	0	1	1
7	BHS982A202	Behavioural Science –II	1	0	0	1	1
Generic Elective							
8	FTC152G201	GE- I (Basket courses)	3	0	0	3	3
9	FTC152G202	GE -II (Basket courses)	3	0	0	3	3
		Total Credit	**16**	**2**	**12**	**24**	**30**

3rd semester							
Sl. No.	**Subject Code**	**Names of subjects**	**L**	**T**	**P**	**C**	**TCP**
Core Subjects							
1	FTC152C301	Cereals, Pulses and Oilseeds Product Technology	3	1	0	4	4
2	FTC152C313	Practical on Cereals, Pulses and Oilseeds Processing	0	0	8	4	8
Discipline Specific Elective (DSE) any one							
3	FTC152D301	DSE-I (Food Ingredients and Additives)	3	1	0	4	4
	FTC152D302	DSE-II (Technology of Plantation Crops)					
INTERNSHIP							
4		4 WEEKS INTERNSHIP AFTER 2ND SEM EXAM	0	0	8	4	8
Ability Enhancement Compulsory Courses (AECC)							
5	CEN982A301	Communicative English –III	1	0	0	1	1
6	ILD992S303	ILD	1	0	0	1	1
Generic Elective							
7	FTC152G301	GE-I (Basket courses)	3	0	0	3	3
8	FTC152G302	GE-II (Basket courses)	3	0	0	3	3
		Total Credit	**14**	**2**	**16**	**24**	**32**
4th semester							
Sl. No.	**Subject Code**	**Names of subjects**	**L**	**T**	**P**	**C**	**TCP**
Core Subjects							
1	FTC152C401	Food Microbiology and Fermentation Technology	3	1	0	4	4
2	FTC152C413	Practical on Food Microbiology	0	0	8	4	8
Discipline Specific Elective (DSE) any one							
3	FTC152D401	DSE-III (Animal Product Technology)	3	1	0	4	4
	FTC152D402	DSE-IV (Food Analysis)					
Skill Enhancement Elective Courses (SEC)							
4	FTC152S411	Food Product Development	0	0	4	2	4
Value Addition Course							
5		Basket Course	2	0	0	2	2
Ability Enhancement Compulsory Courses (AECC)							
6	CEN982A401	Communicative English-IV	1	0	0	1	1
7		Functional Language	1	0	0	1	1
Generic Elective							
8	FTC152G401	GE-I (Basket courses)	3	0	0	3	3
9	FTC152G402	GE-II (Basket courses)	3	0	0	3	3
		Total Credit	**16**	**2**	**12**	**24**	**30**

5th semester							
Sl. No.	**Subject Code**	**Names of subjects**	**L**	**T**	**P**	**C**	**TCP**
Core Subjects							
1	FTC152C501	Food Preservation Technology	3	1	0	4	4
2	FTC152C513	Practical on Food Preservation Technology	0	0	8	4	8
Discipline Specific Elective (DSE) any two							
3	FTC152D501	DSE-V (Entrepreneurship and Management)	3	1	0	4	4
4	FTC152D502	DSE-VI (Basic Computer Applications)	3	1	0	4	4
5	FTC152D503	DSE-VII (Food Packaging Technology)	3	1	0	4	4
6	FTC152D504	DSE-VIII (Technology of Sugar Confectionery and Chocolate Processing)	3	1	0	4	4
Value Addition Course							
7		Basket Course	2	0	0	2	2
INTERNSHIP							
8		6 WEEKS INTERNSHIP AFTER 4TH SEM EXAM	0	0	12	6	1
Ability Enhancement Compulsory Courses (AECC)							
9		Communicative English-V	1	0	0	1	1
10		Environmental Studies and Sustainable Development	1	0	0	1	1
		Total Credit	**13**	**3**	**20**	**26**	**36**
6th semester							
Sl. No.	**Subject Code**	**Names of subjects**	**L**	**T**	**P**	**C**	**TCP**
Core Subjects							
1	FTC152C601	Concepts of Food Engineering	3	1	0	4	4
2	FTC152C613	Practical on Concepts of Food Engineering	0	0	8	4	8
3	FTC152R601	Research Project	0	0	16	8	32
Discipline Specific Elective (DSE) (any one)							
3	FTC152D601	DSE-IX (Food Sensory Evaluation)	3	1	0	4	4
4	FTC152D602	DSE-X (Nutraceutical and Functional Foods)	3	1	0	4	4
Skill Enhancement Elective Courses (SEC)							
5	FTC152S611	Food Fermentation Technology	0	0	4	2	4
Value Addition Course							
6		Basket Course	2	0	0	2	2
Ability Enhancement Compulsory Courses (AECC)							
7		Communicative English-VI	1	0	0	1	1
8		Human Values and Gender Sensitization	1	0	0	1	1
		Total Credit	**10**	**2**	**28**	**26**	**40**

Level: Semester I

Course: C-1 **Scheme of Evaluation: (T)**

Title of the Paper: Principles of Food Processing

Subject Code: FTC152C101

L-T-P-C : 3-1-0-4 **Total credits: 4**

Course Objectives

To train the students with various types of processing techniques used in food industry and to understand how processing can lead to increase in food shelf life and palatability.

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**relate** the principle of food processing techniques, its function and application	**BT 1**
CO 2	**explain** the interaction of food and water, different water treatment methods and sanitation processes, role of food additives in food processing	**BT 2**
CO 3	**develop** of different types of thermal processing techniques (microwaveheating, canning, irradiation etc.), used in food Industry	**BT 3**
CO 4	**analyse** different techniques of refrigeration, freezing and drying in food processing	**BT 4**

Course Outline

Modules	**Topics (if applicable) & Course Contents**	**Periods**
I.	**Introduction:** Definition of Food Processing, Functions, Benefits and Drawbacks of Food Processing, Primary Processing Techniques – *dicing, slicing, mincing, macerating, liquefaction, emulsification,* Novel Food Processing – *mushrooms, algae, leaf protein co protein from petroleum yeast, food analogues, edible insect,* Parameters for Food Processing. L	**12**
II.	**Water and Food Additives**: Waste water ,hardness of water, break point chlorination, physical and chemical nature of impurities, BOD, COD, waste water treatment, milk plant sanitation, CIP system, sanitizers used in food industry. Food Additives - Introduction, need of food additives in food processing, Characteristics and classification of food additives.	**12**
III.	**Thermal Processing:** Classification of thermal processes, Principles of thermal processing, commercial canning operations, Aseptic Processing, UHT. Irradiation and microwave heating, Principles, Dosage, Applications of Irradiation, Mechanism of microwave heating and applications.	**12**
IV.	**Refrigeration and Freezing:** Requirements of refrigerated storage - controlled low temperature, air circulation and humidity, changes in food during refrigerated storage, Freezing methods -direct and indirect. Dehydration: Normal drying curve ,	**12**

	effect of food properties on dehydration ,change in food during drying, drying methods and equipment.	
TOTAL		**48**
Pedagogy: Lectures, Assignments, Seminars		

Texts:

1. Potter NH,5th edition, Food Science, CBS Publication, New Delhi.
2. RamSaswamy H and Marcotte M,1st edition, Food Processing Principles and Applications CRC Press

References:

1. Manay NS and Shadaksharaswamy M,Latest edition, Food-Facts and Principles, New Age International (P) Ltd. Publishers, New Delhi
2. Fellows PJ. 2016. *Food Processing Technology Principles and Practice*. Fourth Edition. Woodhead Publishing.
3. Sivasankar B. Latest edition. *Food Processing and Preservation*. First Edition. PHI Learning

Level: Semester I

Course: C-2 **Scheme of Evaluation: (T)**

Title of the Paper: Food Safety and Quality Management

Subject Code: FTC152C102

L-T-P-C : 3-1-0-4 **Total credits: 4**

Course Objectives

Understanding the role of various safety measurements to be taken in food industries, have the basic knowledge of safety and hygiene, its various rules and regulations.

Course Outcomes

On successful completion of the course the students will be able to:		
SI No.	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**define** the food hazards (physical, chemical and biological), importance of food safety and its control measures to be taken in food industry	**BT 1**
CO 2	**classify** the various food borne pathogens, basic steps in detection of foodborne pathogens and its control parameters	**BT 2**
CO 3	**apply** knowledge on different tools used for food safety and quality management	**BT 3**
CO 4	**analyze** various safety measurements to be taken in food industries.	**BT 4**

Course outline

Modules	**Topics (if applicable) & Course Contents**	**Periods**
I.	**Definition of food safety: Types and examples of hazards**: biological, chemical, physical hazards, Factors affecting Food Safety, Importance of Safe Foods. Food hazards, Impact of food safety on health. Control measures.	**12**
II.	**Hazards of biological origin, Indicator organisms, Food borne pathogens:** Bacteria, Viruses, Eukaryotes, Mycotoxins, Sea food and shell fish poisoning. Hazard management: Control parameters, Temperature control, food storage, Product design., Microbiological Assessment and categories of food based on microbial quality, Basic steps in detection of food borne pathogens, Water analysis.	**12**
III.	**Tools of food safety management:** Food certification, prerequisites- GHPs, GMPs, SSOPs, HACCP, ISO series, TQM - concept and need for quality, components of TQM, Kaizen. Risk Analysis, Accreditation and Auditing, Definition – Methods to detect adulterant of various foods, Objective of Food Laws, Major Food Laws and	**12**

	Regulations of India and Regulation of Food Sanitation, Idea of PFA, FPO, MPO, Agmark, BIS, FSSAI, GMO	
IV	**Introduction to food quality management:** Definition, quality concepts, quality, quality perception, quality attributes, safety, health, sensory, shelf life, convenience, extrinsic attributes, factors affecting food behaviour and quality.	**12**
TOTAL		**48**
Pedagogy: Lectures, Assignments, Seminars		

Texts:

1. Pieternel A, Luning, Willem J. Marcelis, Food Quality Management Technological and Managerial principles and practices, Wageningen, 2020.
2. Lawley, R., Curtis L. and Davis,J. The Food Safety Hazard Guidebook , RSC publishing, latest edition

References:

1. Food Quality Assurance: Principles and Practices, InteazAlli, by CRC Press, latest edition
2. Forsythe, S J. Microbiology of Safe Food, Blackwell Science, Oxford, 2020
3. De Vries. Food Safety and Toxicity, CRC, New York, 2021
4. Marriott, Norman G. Principles of Food Sanitation, Springer, latest edition

Level: Semester I

Course: C-3 **Scheme of Evaluation: (P)**

Title of the Paper: Practical on Food Processing and Food Safety

Subject Code: FTC152C113

L-T-P-C : 0-0-8-4 **Total credits: 4**

Course Objectives

Understanding the application of various laboratory equipment's used in food technology in terms of food processing and food safety

Course Outcomes

On successful completion of the course the students will be able to:		
SI No.	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**define** basic food technology laboratory equipment's, pH of the food products, moisture change analysis and heating mechanism of different food products	**BT 1**
CO 2	**classify** the various methods used for the preparation of food products(dicing, mincing, slicing, grating), freeze drying and emulsification	**BT 2**
CO 3	**construct** the HACCP Plan, ISO :22000 implementation in food industryand various sanitary methods	**BT 3**
CO 4	**survey** and report on food quality analysis and its storage , detection of adulterants in different food samples and microbiological testing	**BT 4**

Course Outline

Modules	**Topics (if applicable) & Course Contents**	**Periods**
I.	1. Introduction to Basic Food Technology Laboratory Equipments 2. Determination of pH of the food products using pH meter 3. Moisture change during sun drying of vegetables 4. Microwave heating of different food products	**24**
II	1. Sanitization of Food Technology Lab 2. Identification of edible insects 3. Dicing /slicing/mincing of potato 4. Freeze drying of Egg white and egg yolk	**24**
III	1. Bacteriological Analysis of Water 2. Assessment of personal hygiene 3. Scheme for the detection of food borne pathogens 4. Implementation of FSMS-HACCP, IS0:22000	**24**

	5. Assessment of surface sanitation by swab/rinse method	
IV	1. Microbiological Examination of different food samples 2. Detection of adulteration in turmeric 3. Detection of adulteration in black powder 4. Survey and analysis of the quality of food storages in commercial kitchens 5. Wet salting and dry salting of fruits and vegetables	**24**
TOTAL		**96**
Pedagogy: Lectures, Experiments, Laboratory sessions		

Recommended Texts:

- As suggested under the theory papers

AECC - 1 (1ST SEMESTER)
AECC-1/Subject Name: Communicative English- I: Developing Oral Communication and Listening Skills
Subject Code: CEN982A101
L-T-P-C – 1-0-0-1
Credit Units: 1
Scheme of Evaluation: Theory + Viva-Voce + Extempore Speech **Continuous Evaluation: 30 Marks** **Semester End Examination:** **Component A – Written Examination = 30 Marks** **Component B +C – Viva-Voce + Extempore speech = 40 Marks**

Course Objective

The objective of the course is to introduce students to oral communication skills in English by engaging them to meaningful discussion and interactive activities.

Course Outcomes

On successful completion of the course the students will be able to:		
SI No.	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**demonstrate** Communication process, verbal and non verbal communication	**BT 2**
CO 2	**understand** the skill of listening processes	**BT 2**
CO 3	**develop** a life skill on oral group communication-group discussion leadership skills, team management	**BT 3**
CO 4	**make** use of language styles-oral and written communication	**BT 3**

Course Outline

Modules	Topics (if applicable) & Course Contents	Periods
I.	**Basics of Communication- Introduction** Communication - definition – meaning – elements - basics of communication - communication process - importance of communication Components of Communication Types/forms of Communication (Oral-written, Formal-Informal	**3**

	(Grapevine), Interpersonal-Intrapersonal, Mass- Group, Verbal-Non Verbal External communication, Organizational Communication- Upward, Downward, horizontal, Diagonal) Non-verbal Communication - Introduction; Body language- Personal Appearance, Postures, Gestures, Eye Contact, Facial expressions Paralinguistic Features-Rate, Pause, Volume, Pitch/Intonation/ Voice/ modulation Proxemics , Haptics, Artifactics, Chronemics	
II.	**The Listening Process** Types of Listening – Superficial, Appreciative, Focused, Evaluative, Attentive, Emphatic, Listening with a Purpose , Barriers to Communication, Barriers to Listening	**3**
III.	**Focus on Oral Group Communication** Nature of group communication, Characteristics of successful Group Communication Selection of group discussion-subject knowledge, leadership skills, team management Group Discussion Strategies	**3**
IV	**Language Styles- Oral and Written Communication** Technical Style, ABC of technical communication- accuracy, using exact words and phrases, brevity, clarity, Objectivity of Technical Writing - Impersonal language, Objectivity in professional speaking.	**3**
TOTAL		**12**

Textbooks:

1. Rizvi, M. Ashraf. (2008). *Effective Technical Communication* (11 reprint). New Delhi: Tata McGraw Hill.

Reference Books:

1. Koneru, Aruna.(2017) *Professional Communication*. New Delhi: Tata McGraw Hill ISBN-13: 978-0070660021
2. Hair, Dan O., Rubenstein, Hannah and Stewart, Rob. (2015).A *Pocket Guide to Public Speaking*. (5th edition). St. Martin's. ISBN-13:978-1457670404

AECC – 2 (1st Semester)

AECC-2/Subject Name: Behavioural Science – I
Subject Code: BHS982A102
L-T-P-C – 1-0-0-1
Credit Units: 1
Scheme of Evaluation: Theory + Viva-Voce + Extempore Speech **Continuous Evaluation: 30 Marks** **Semester End Examination:** **Component A – Written Examination = 30 Marks** **Component B +C – Viva-Voce + Extempore speech = 40 Marks**

Course objectives

To increase one's ability to draw conclusions and develop inferences about attitudes and behaviour, when confronted with different situations that are common in modern organizations

Course Outcomes

On successful completion of the course the students will be able to:		
SI No.	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**understand** self-identity and identity crisis	**BT 2**
CO 2	**demonstrate** self-esteem	**BT 2**
CO 3	**develop** in depth knowledge of foundation of individualbehavior	**BT 3**
CO 4	**develop** a life skill on Time management	**BT 3**

Course Outline

Module S	Course Contents	Periods
I	**Understanding Self** Understanding of Self ,What is self?, Components of Self-self identity, Identity crisis, Definition self confidence, self image, Johari Window, Self Esteem, High and Low Self-esteem, Erikson's model.	**3**

II	**Foundations of individual behavior** Personality- structure, determinants, personality traits, Perception- Perceptual Process, Attribution, Errors in perception, Stereotyping, Racial Profiling, Learning- Theories of learning.	**3**
III	**Managing self** Time management: Introduction-the 80:20, sense of time management, Three secrets of time management, Effective scheduling, Stress management, effects of stress, kinds of stress-sources of stress, Signs of stress, Stress management tips.	**3**
IV	**Behaviour and communication.** Behaviour as a barrier to Communication , ways to overcome the barriers, Non-verbal communication-body language (voluntary and involuntary body language) forms of body language, Interpreting body language	**3**
		12

Text books

1. Soft skills by Dr.K.Alex, S.Chand.
2. Organisational behaviour by S.P Robbins, Judge ,Vohra 18th Ed.

Level: Semester II

Course: C-1 **Scheme of Evaluation: (T)**

Title of the Paper: Food Chemistry

Subject Code: FTC152C201

L-T-P-C : 3-1-0-4 **Total credits: 4**

Course Objectives

Understanding the composition of different chemicals present in foods and their relation to its taste and to gain basic knowledge on metabolic roles and functional aspects of food components.

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**explain** the functions, properties, structure, classification of different metabolic pathways, browning reactions, sources and functions of dietary fibre	**BT 2**
CO 2	**identify** the role of food constituents, nutrients, techniques used for sensory evaluation of food	**BT 3**
CO 3	**apply** the knowledge on denaturation and evaluation of protein quality, metabolic pathways etc	**BT 3**
CO 4	**analyse** the structural and functional properties of lipids, fats and oil, its deficiencies and excess, role of vitamins and minerals and their recommended dietary allowances	**BT 4**

Course Outline:

Modules	**Topics (if applicable) & Course Contents**	**Periods**
I.	**Food And Its Constituents: Food and Nutrients - Definition, Classification, and Functions:** Role of Water in Food and Human Health, Pigments, Phytonutrients, Antioxidants, Flavour Components – Definition, Classification, and Functions, Sensory Evaluation of foods – Organoleptic Analysis, Methods and Tests of Sensory Evaluation, Anti-nutritional Factors in Foods, Digestion, Absorption, and Transport of Foods and Nutrients	**12**
II.	**Carbohydrates:** Definition, Structure, Properties, Functions, Classification, Dietary Sources, Chemical Reactions, Deficiencies and Excess, Recommended Dietary Allowances, Metabolic Pathways - Glycolysis, Gluconeogenesis, Glycogenesis, Glycogenolysis, Citric Acid Cycle, Browning Reactions in Foods, Resistant Starches and Dietary Fibre – Definition, Sources and Functions	**12**

III.	**Proteins and amino acids:** Definition, Structure, Properties, Functions, Classification, Dietary Sources, Chemical Reactions, Deficiencies and Excess, Recommended Dietary Allowances, Metabolic Pathways- Transamination, Deamination, Decarboxylation, Urea Cycle, Stress and Anti-freeze Proteins; Protein Isolates and Concentrates, Denaturation of Proteins, Evaluation of Protein Quality	**12**
IV	**Lipids, Fats And Oils:** Definition, Structure, Properties, Functions, Classification, Dietary Sources, Chemical Reactions, Deficiencies and Excess, Recommended Dietary Allowances, Metabolic Pathways - Fatty Acid Oxidation, Biosynthesis of Fatty Acids, Synthesis and Functions of Cholesterol; Ketogenesis, Rancidity of Fats,Emulsions. **Vitamins And Minerals:** Classification, Functions, Dietary Sources, Deficiencies and Excess, Recommended Dietary Allowances	**12**
TOTAL		**48**
Pedagogy: Lectures, Assignments, Seminars		

Texts:

1. Agarwal A and Udipi SA. 2014. Textbook of Human Nutrition. JaypeeBrothers Medical Publishers (P) Ltd.
2. Bamji MS, Krishnaswamy K, and Brahmam GNV. 2009. Textbook of Human Nutrition. ThirdEdition. Oxford and IBH Publishing Co. Pvt.Ltd.

References:

1. Belitz H.-D, Grosch W, and Schieberle P. 1st edition. Food Chemistry. FourthEdition. Springer.
2. Civille GV and Carr BT. 2016. Sensory Evaluation Techniques. Fifth Edition.CRC Press.
3. Rodwell VW, Bender DA, Botham KM, Kennelly PJ, Weil PA. 2015.Harper's Illustrated Biochemistry. 30th Edition. McGraw Hill Education.

Level: Semester II

Course: C-2 **Scheme of Evaluation: (T)**

Title of the Paper: Fruits and

Vegetable Products Technology

Subject Code: FTC152C202

L-T-P-C: 3-1-0-4 **Total credits: 4**

Course Objectives

To understand the processing of fruits and vegetables, maturity indices and processing of plantation crops.

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**explain** the processing and preservation techniques of different fruits and vegetable products (Jam, Jelly and Marmalade)	**BT 2**
CO 2	**identify** the causes and effects of different post-harvest changes in fruits andvegetables	**BT 3**
CO 3	**apply** different pickling and dehydration processes in fruits and vegetables,their packaging and storage methods	**BT 3**
CO 4	**analyse** the processing of spices and production of different food condiments	**BT 4**

Course Outline

Modules	**Topics (if applicable) & Course Contents**	**Periods**
I.	Fruits and Vegetables-Classification of fruits and vegetables, general composition, enzymatic browning, names and sources of pigments, Dietary fibre. Post-harvest changes in fruits and vegetables – Climacteric rise, horticultural maturity, physiological maturity, physiological changes, physical changes, chemical changes, pathological changes during the storage of fruits and vegetables.	**12**
II.	Fruits beverages: Introduction, Processing of fruit juices, preservation of fruit juices, processing of squashes, cordials, nectars, concentrates and powder. Jams, jellies and marmalades: Jam: Constituents, selection of fruits, processing & technology, Jelly: Essential constituents (Role of pectin, ratio), Theory of jelly formation, Processing & technology, defects in jelly, Marmalade: Types, processing & technology, defects	**12**

III.	Pickles, chutneys and sauces: processing, types, causes of spoilage pickling. Tomato products: Selection of tomatoes, pulping& processing of tomato juice, tomato puree, paste, ketchup, sauce and soup. Dehydration of foods and vegetables: Sun drying & mechanical dehydration, process variation for fruits and vegetables, packing and	**12**

	storage.	
IV	Spices: Processing and properties of major and minor spices, essential oils & oleoresins, adulteration. Tea, coffee and cocoa: Processing and properties of tea leaves, coffee cherries and cocoa beans	**12**
TOTAL		**48**
Pedagogy: Lectures, Assignments, Seminars		

Texts:

1. Manay, S. &Shadaksharaswami, M.2004. Foods: Facts and Principles, New Age Publishers

2. Srivastava, R.P. and Kumar, S. 2006 .Fruits and Vegetables Preservation- Principles and Practices. 3rd Ed. International Book DistributingCo

References:

1. Girdharilal, Siddappaa, G.S and Tandon, G.L.latest edition. Preservation of fruits & vegetables, ICAR,NewDelhi

2. Ranganna S.latest edition. Handbook of analysis and quality control for fruits and vegetable products, TataMcGraw-Hill publishing company limited, Second edition.

Level: Semester II

Course: C-3 **Scheme of Evaluation: (P)**

Title of the Paper: Practical on Food Chemistry and Fruits and Vegetables Processing

Subject Code: FTC152C213

L-T-P-C : 0-0-8-4 **Total credits: 4**

Course Objectives

To gain knowledge about proximate analysis of food samples and their manufacturing techniques

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**find** the estimation for total protein, lipid, reducing and non-reducing sugar content in food samples	**BT 1**
CO 2	**demonstrate** the ash, moisture, gluten, iodine value determination in foodsamples	**BT 2**
CO 3	**apply** the techniques of dehydration and rehydration of fruits and vegetables and its manufacturing practices	**BT 3**
CO 4	**list** preparation methods for fruits and vegetable samples (Jam, jelly, ketchup, pickles)	**BT 4**

Course Outline

Modules	**Topics (if applicable) & Course Contents**	**Periods**
I.	1 Estimation of Total Protein Content of Food Sample 2. Estimation of Total Lipid Content in Food Sample 3.Estimation of Total Ash 4.Estimation of Moisture Content	**24**
II.	1. Dehydration of Fruits and Vegetables 2. Rehydration of Fruits and Vegetables 3. Estimation of Gluten Content 4. Estimation of Iodine Value	**24**
III.	1.Manufacture of candied fruits 2.Manufacture of potato chips 3.Preparation of Dried and Powdered Green Leaves	**24**

IV	1. Preparation of orange squash 2. Preparation of Jam 3. Preparation of guava jelly 4. Preparation of tomato ketchup 5. Preparation of Pickle	**24**
TOTAL		**96**
Pedagogy: Lectures, Experiments, Laboratory sessions		

References: As suggested under the theory papers.

AECC-3 (2nd Semester)

AECC-3/Subject Name:	Communicative English- II: Conversation and Public Speaking
Subject Code: CEN982A201	
L-T-P-C – 1-0-0-1	
Credit Units: 1	
Scheme of Evaluation: Theory + Viva-Voce + Extempore Speech **Continuous Evaluation: 30 Marks** **Semester End Examination:** **Component A = Written Examination = 30 Marks** **Component B + C = Viva-Voce + Extempore speech = 40 Marks**	

Course Objective:

The objective of the course is to give students a platform to enhance their speaking and conversational skills in English by engaging them in meaningful discussions andinteractive activities.

Course Outcomes

On successful completion of the course the students will be able to:		
SI No.	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**demonstrate** speaking skills	**BT 2**
CO 2	**develop** a life skill on conversation	**BT 3**
CO 3	**develop** the skill of public speaking.	**BT 3**

.

Course Outline:

Modules	Topics (if applicable) & Course Contents	Periods
I.	**Speaking Skills** Speaking – The Art of Speaking, Goals, Speaking Styles, The Speaking Process Importance of Oral Communication, Choosing the form of Communication, Principles & Guidelines of Successful Oral Communication, Barriers to Effective Oral Communication Three aspects of Oral Communication – Conversing, Listening and Body Language Intercultural Oral Communication	**3**

II.	**Conversational Skills : Listening and Persuasive Speaking** Conversation – Types of Conversation, Strategies for Effectiveness, Conversation Practice, Persuasive Functions in Conversation, Telephonic Conversation and Etiquette Dialogue Writing, Conversation Control	**3**
III.	**Transactional Analysis** The Role of Intonation , Strokes, Psychological Characteristics of Ego States (The Parent, The Adult, The Child), Structure and Aspects of Human Personality Analysing Transactions – Complementary Transactions, Crossed Transactions, Duplex or Ulterior Transactions, How to Identify the Ego States of Interacting Individuals, How to Manage Conversations, Structural Analysis, Certain Habits of Ineffective Conversationalists	**3**
IV	**Public Speaking** Business Presentation and Speeches – Difference Elements of a Good Speech – Planning, Occasion, Audience, Purpose, Thesis, Material Organising and Outlining a Speech Outline, Types of Delivery Guidelines for Delivery – Verbal Elements, Non-Verbal Elements, Vocal Elements, Visual Elements, Controlling Nervousness and Stage Fright	**3**
TOTAL		**12**

Text/Reference Books:

1. Mehra, Payal. (2012). *Business Communication for Managers*: Dorling Kindersley (India) Pvt. Ltd. Page 75 – 83. ISBN 978-81-317-5865-6
2. Raman, Meenakshi and Singh, Prakash.(2012). *Business Communication* (2nd Edition): Oxford University Press. Page 123 – 165.ISBN-13:978-0-19-807705-03
3. Raman, Meenakshi and Sharma, Sangeeta. (2011). *Technical Communication: Principles and Practice* (2nd Edition): Oxford University Press. Page 137 – 148 ISBN-13:978-0-19-806529-6
4. Sengupta, Sailesh.(2011) *Business and Managerial Communication.* New Delhi *: PHI Learning Pvt. Ltd*. Page 136-153.ISBN-978-81-203-4435-8

AECC-4 (2nd Semester)

AECC-4/Subject Name: Behavioural Science – II
Subject Code: BHS982A202
L-T-P-C – 1-0-0-1
Credit Units: 1
Scheme of Evaluation: Theory + Viva-Voce + Extempore Speech **Continuous Evaluation: 30 Marks** **Semester End Examination:** **Component A – Written Examination = 30 Marks** **Component B +C – Viva-Voce + Extempore speech = 40 Marks**

Course objectives:

To increase one's ability to draw conclusions and develop inferences about attitudes and behaviour, when confronted with different situations that are common in modern organizations

Course Outcomes

On successful completion of the course the students will be able to:		
SI No.	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**understand** culture and personality	**BT 2**
CO 2	**understand** Value.	**BT 2**
CO 3	**demonstrate** leadership.	**BT 2**
CO 4	**develop** a life skill on motivation	**BT 3**

Course Outline

Module S	Course Contents	Periods
I	**Culture and Personality** Relation Between Culture and Personality with Relevant Examples, Cultural Iceberg, Overview of Hofstede's Framework, Discussion of the four dimensions of Hofstede's Framework.	**3**
II	**Attitudes and Values** Attitude's definition: changing our own attitudes, Process of cognitive dissonance Types of Values, Value conflicts, Merging personal and Organisational values, changes of values with time, male & female values differences.	**3**

III	**Leadership** Definition of leadership, types of leadership, Leadership Continuum Transformational & transactional Leadership, Ethical Leadership.	**3**
IV	**Motivation** Definition of motivation with example, Theories of Motivation (Maslow & X and Y) Applications of motivation.	**3**
		12

Text books:

1. Organizational Behaviour by Kavita Singh (Vikas publishers, 3rd Edition).
2. Organisational behaviour by S.P Robbins, Judge , Vohra 18th Ed

Level: Semester III

Course: C-1 **Scheme of Evaluation: (T)**

Title of the Paper: Cereals, Pulses and Oilseeds Product Technology

Subject Code: FTC152C302

L-T-P-C: 3-1-0-4 **Total credits: 4**

Course Objectives

To understand the technology of milling of various cereals, processing of pulses and oilseeds. To gain knowledge on importance and processing of protein rich products and to introduce concepts of manufacturing alcoholic beverages

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**define** the milling techniques for wheat, rice, corn, barley, oats, sorghum , millets and comparision between modern and traditional milling techniques	**BT 1**
CO 2	**explain** the processing of pulses, milling procedures and antinutritional factors	**BT 2**
CO 3	**apply** the knowledge of processing of oilseeds (Soyabean, Coconut), refining of fats and oil, concepts of protein isolates, their sources, properties and uses	**BT 3**
CO 4	**categorize** the alcoholic beverages and their production processes	**BT 4**

Course Outline

Modules	Topics (if applicable) & Course Contents	Periods
I	**Wheat other cereals technology**: Wheat-Types, milling, flour grade, flour treatments (bleaching, maturing), flour for various purposes, Products and By- products. Corn–Milling (wet & dry), cornflakes, corn flour. Barley-Milling (pearl barley, barley flakes & flour) Oats–Milling (oatmeal, oat flour & oat flakes) Sorghum and millets – Traditional & commercial milling (dry&wet)	12
II	**Rice technology:** Rice – Physicochemical properties, milling (mechanical & solvent extraction), parboiling, ageing of rice, utilization of byproducts.	12
III	**Pulse technology:** Processing- Soaking, Germination, Decortication, Cooking and Fermentation. Changes during germination, Milling-decortication and splitting (dry and wet milling). Antinutritional factors, Factors affecting cooking time**.**	12
IV	**Oil seeds Technology of:** Sources, Composition, Processing of oil seeds – Soya bean, coconut. Hydrogenation. Refining of fats & oils, bleaching, de-odourising, hydroxylation, Protein isolates, Sources of protein (defatted flour, protein concentrates and isolates), properties and uses, protein texturization, fibre spinning	12
	TOTAL	48
PEDAGOGY: Lectures, Assignments and Seminars		

Texts:

1. Chakraverty. 2019. Post-Harvest Technology of Cereals, Pulses and Oilseeds, revisedEd., Oxford & IBH Publishing Co. Pvt Ltd.

2. Manay, S. and Sharaswamy, M. 2004. Food Facts and Priniciples. Wiley Eastern Limited

References:

1. Kent, N.L. 2003. Technology of Cereal, 5th Ed. Pergamon Press.

2. Marshall, Rice Science and Technology. 1st edition,. Wadsworth Ed., Marcel Dekker, New York

Level: Semester III

Course: C-2 **Scheme of Evaluation: (P)**

Title of the Paper: Practical on Cereals, Pulses and Oilseeds Processing

Subject Code: FTC152C313

L-T-P-C: 0-0-8-4 **Total credits: 4**

Course Objectives

Application and analytical knowledge of various laboratory equipment's used in terms of bakery and cereals

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**list** the names of instruments and equipment's used in cereals, pulses and oilseeds processing	**BT 1**
CO 2	**compare** the physical dimensions of cereals, pulses and millets	**BT 2**
CO 3	**develop** malt from cereals and millets	**BT 3**
CO 4	**analyse** the proximate and cooking characteristics of wheat and rice	**BT 4**

Course Outline

Modules	**Topics (if applicable) & Course Contents**	**Periods**
I.	1. Introduction to laboratory equipments 2. Physical parameters of wheat 3. Determination of moisture content of the given sample of wheat flour. 4. Determination of gluten percentage in wheat flour 5. Determination of ash content of wheat flour	**28**

II.	1. Measurement of Physical parameters of rice 2. Determination of Milling quality of rice (head rice yield, broken rice yield) 3. Determination of cooking quality of rice (alkali test, cooking time/glass slide method) 4. Preparation of malt from cereals	**28**
III.	1. Measurement of physical parameters of pulses 2. Estimation of infestation of green gram 3. Determination of germination percentage	**20**
IV	1. Identification of millets 2. Measurement of physical parameters of different millets 3. Preparation of malts from millets	**20**
TOTAL		**96**
Pedagogy: Lectures, Experiments, Laboratory sessions		

<u>References</u>: As suggested under the theory papers

Level: Semester III

Course: DSE-I **Scheme of Evaluation: (T)**

Title of the Paper: Food Ingredients and Additives

Subject Code: FTC152D301

L-T-P-C: 3-1-0-4 **Total credits: 4**

Course Objectives

The students should be well versed with basic knowledge of the type of food, chemistry and microbiology

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**define** properties of food and various ingredients	**BT 1**
CO 2	**explain** the role of food ingredients in food product	**BT 2**
CO 3	**apply** knowledge with the additives relevant to the processed food industry for shelf-life extension, processing support and sensory appeal	**BT 3**
CO 4	**categorize** the microbial, chemical and natural toxicants and allergens indigenously present and developed during food processing	**BT 4**

Course Outline

Modules	**Topics (if applicable) & Course Contents**	**Periods**
I	**Introduction to Food Ingredients:** Food Additives and its importance, need of food additives in food processing and preservation, Characteristics and classification of food additives, major categories of food additives, functions and uses of different types of food additives	12
II	**Food Preservatives:** Different categories of food preservatives, its properties and uses and its toxic effect, Sorbic Acid, Benzoic Acid, propyl-4-hydroxybenzoate, Sulphur dioxide, Nisin, Sodium nitrate, Acetic acid, Propionic Acid. **Sweeteners**: Introduction, importance, classification-Natural and artificial, toxicity and consideration for choosing sweetening agents	12
III	**Colours and flavours:** Different types of food colours, its importance and toxicity, classification (Natural and synthetic colours), permitted and	12

	non-permitted synthetic colours Flavouring agents and its importance in the food industry	
IV	**Uses and Toxicity:** Antioxidants, emulsifiers, stabilizers, chelating agents, hydrocolloids, thickeners, acidulants, curing agents, government rules and regulations on food additives	12
	TOTAL	**48**
	PEDAGOGY: Lectures, Assignments and Seminars	

Texts:

1. A Larry Branen, P Michael Davidson and Seppo Salminen ,Food Additives :CRC Book Press. USA.
2. S.N. Mahindru ,Food Additives :APH Publishing Corporation, Drya Ganj, New Delhi.

References:

1. Food Facts and Principles -N. ShakuntalaManay& M. Shadaksharaswamy, New Age International (P) Limited, New Delhi.
2. Branen AL, Davidson PM &Salminen S. 2001. Food Additives. 2nd Ed.Marcel Dekker.
3. Gerorge AB. 2004. Fenaroli's Handbook of Flavor Ingredients. 5th Ed.CRC Press

Level: Semester III

Course: DSE-II **Scheme of Evaluation: (T)**

Title of the Paper: Technology of Plantation Crops

Subject Code: FTC152D302

L-T-P-C: 3-1-0-4 **Total credits: 4**

Course Objectives

To understand the basic knowledge of agriculture and botany

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**define** basic processing of different plantation crops	**BT 1**
CO 2	**explain** different types of manufacturing technologies of different plantation Crops	**BT 2**
CO 3	**apply** knowledge of chemical and physical composition of different plantation crops	**BT 3**
CO 4	**categorize** the different processing methods (Cashew, Sugarcane, and Cocoa)	**BT 4**

Course Outline

Modules	**Topics (if applicable) & Course Contents**	**Periods**
I	**Tea:** Production and processing of Tea leaves, Black tea, Green tea and Oolong tea. chemistry of tea manufacturing and tea quality; tea aroma precursors; tea flavour; tea grades; storing of tea Instant tea, tea concentrates, decaffeinated tea, flavoured tea; herbal tea.	12
II	**Coffee:** Production and processing of coffee cherries by wet and dry methods to obtain coffee beans, grinding, storage and preparation of brew, Soluble /Instant coffee, Use of chicory in coffee, decaffeinated coffee	12

III	**Plantation crops-cashew processing:** Composition, Structure and characteristics cashew nut, uses, Traditional method of cashew processing, General processing, Cashew apple processing , cashew by product – CNSL. Composition, structure and characteristics of almond, walnut, pistachio etc. and product technology of dried nuts	12
IV	**Sugarcane and Cocoa processing:** Production and processing of sugarcane, Cocoa: varieties, Processing of cocoa – Fermentation and Drying, storage. Manufacture of chocolate-conching, enrobing, milk chocolate, white chocolate, dark chocolate, cocoa butter, wafer coated chocolate, cocoa powder	12
	TOTAL	**48**
	PEDAGOGY: Lectures, Assignments and Seminars	

Texts:

1. Banerjee, B. Tea Production and Processing, (Oxford & IBH Pub. Co., 1st edition)

2.Purthi, J. S. MinorSpices and Condiments: Crop Management and Post Harvest Technology, (ICAR publication, 2001)

References:

1. Purthi, J. S. Major Spices of India: Crop Management and Post Harvest Technology, (ICAR publication, 2003)
2. Handbook of Postharvest Technology: Cereals, Fruits, Vegetables, Tea, and Spices by A. Chakraverty, A. S. Mujumdar, H. S. Ramaswamy
3. Handbook of Herbs and Spices by K. V. Peter, Woodhead Publishing, 2012

Level: Semester IV

Course: C-1 **Scheme of Evaluation: (T)**

Title of the Paper: Food Microbiology and Fermentation Technology

Subject Code: FTC152C401

L-T-P-C: 3-1-0-4 **Total credits: 4**

Course Objectives

To gain knowledge about genera of microorganisms associated with food and their characteristics, to understand the role of microbes in fermentation, spoilage and food borne diseases

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**define** the types of microorganisms, their characteristics, association with food, their growth pattern and parameters	**BT 1**
CO 2	**explain** the role of microorganisms in spoilage of food and methods fortheir control	**BT 2**
CO 3	**identify** about the beneficial role of microorganisms in fermented foodproducts and their health benefits	**BT 3**
CO 4	**examine** the various food borne infections, intoxication, with their methods of isolation and cultivation	**BT 4**

Course Outline

Modules	**Topics (if applicable) & Course Contents**	**Periods**
I	**History and Development of Food Microbiology:** Definition and Scope of food microbiology, Types of microorganisms associated with food, their morphology and structure, Significance of spores in food microbiology, Factors affecting the growth of micro-organisms in food	12
II	**Bacterial growth curve and microbial growth in food**: Sources of Microorganisms in foods, Some important food spoilage microorganisms, Spoilage of specific food groups- Milk and dairy products, Meat, poultry and seafoods, Cereal and cereal products, Fruits and vegetables and Canned products	12

III	**Fermentation:** Definition and types, Microorganisms used in food fermentations, Dairy Fermentations-starter cultures and their types, concept of probiotics, Lactic acid and aroma compounds production, Health benefits of LAB, probiotics, prebiotics and synbiotics, Fermented Foods-types, methods of manufacture for vinegar, sauerkraut, tempeh, miso , soya sauce, beer, wine and traditional Indian foods	12
IV	**Food borne illness:** Foodborne infections, foodborne intoxications and toxin infections, Pure culture technique, Methods of isolation and cultivation, Enumeration of Microorganisms- qualitative and quantitative	12
	TOTAL	**48**
	PEDAGOGY: Lectures, Assignments and Seminars	

Texts:

1. Frazier William C and Westhoff, Dennis C. Food Microbiology, TMH, New Delhi, 2004

2. Jay, James M. Modern Food Microbiology, CBS Publication, New Delhi, 2000

References:

1. Garbutt, John. Essentials of Food Microbiology, Arnold, London, latest edition

2. Pelczar MJ, Chan E.C.S and Krieg, Noel R. Microbiology, 5th Ed., TMH, New Delhi

Level: Semester IV

Course: C-2 **Scheme of Evaluation: (P)**

Title of the Paper: Practical on Food Microbiology

Subject Code: FTC152C413

L-T-P-C: 0-0-8-4 **Total credits: 4**

Course Objectives

Analysis and application of the various laboratory equipment's and the procedures used for the detection of microbes in food samples

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**define** the basic Microbiological laboratory practices and equipment's with their functioning.	**BT 1**
CO 2	**explain** the different staining and plating techniques used for detection ofmicrobes in food samples, detailed study on morphological study on bacteria and fungi using permanent slides, preparation of various fermented food products and beverages	**BT 2**
CO 3	**identify** the quality evaluation in meat using different estimation techniques	**BT 3**
CO 4	**analyse** the quality parameters for evaluation of eggs, different methods of preservation for increasing the shelf life of eggs	**BT 4**

Course Outline

Modules	**Topics (if applicable) & Course Contents**	**Periods**
I.	1. Introduction to the basic Microbiology laboratory Practices and Equipment's 2. Functioning and use of compound microscope 3. Cleaning and sterilization of glassware	**24**
II.	1. Morphological study of bacteria and fungi using permanent slides 2. Simple staining 3. Gram staining	**24**

III.	1. Preparation of cereal based fermentation products (Idli batter, Dhokla batter) 2. Preparation of legume-based fermentation product (Tofu, Tempeh) 3. Preparation of milk based fermentation products (paneer, curd) 4. Preparation of alcoholic beverages from local ingredients.	**24**
IV	1Evaluation of eggs for quality parameters (Market eggs, branded eggs) 2To study the shelf life of eggs by different methods of preservation 3Preparation and sterilization of nutrient broth 4. Stand Plate Count Method	
	TOTAL	**96**
	Pedagogy: Lectures, Experiments, Laboratory sessions	

References: As suggested under the theory papers.

Level: Semester IV

Course: DSE-III **Scheme of Evaluation(T)**

Title of the Paper: Animal Products Technology

Subject Code: FTC152D401

L-T-P-C: 3-1-0-4 **Total credits: 4**

Course Objectives

The students are expected to have basic knowledge about the concepts and methods of processing and preservation of animal foods and byproduct utilization

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**define** the compositional and technological aspects of meat and meat products	**BT 1**
CO 2	**explain** the slaughtering processes and meat quality for meat animals and poultry	**BT 2**
CO 3	**apply** the methods of processing and preservation of fish and its by products	**BT 3**
CO 4	**categorize** the egg production practices, egg preservation methods, factors affecting egg quality and measures of egg quality	**BT 4**

Course Outline

Modules	**Topics (if applicable) & Course Contents**	**Periods**
I	Classification, composition and nutritional value of poultry meat, Effects of feed breed and stress on production of meat animals and their quality, Meat Quality-color, flavor, texture, Water-Holding Capacity (WHC), Emulsification capacity of meat	12
II	Slaughtering of animals: buffalo, sheep/ goat, poultry, pig; Antemortem examination of meat animals, post-mortem examination of meat, Grading, Post-mortem changes of meat; Importance of by-products utilization, classification and uses of by-products Refrigeration and freezing, thermal processing- canning of meat, retort pouch, dehydration, irradiation, meat curing, Sausages-processing, types and defects, Packaging of meat	12
III	**Processing of market milk**: Flowchart of milk processing, Reception, Different types of cooling systems. Clarification and filtration process, standardization- Pearson's square method, pasteurization-LTLT, HTST and UHT process- continuous pasteuriser, Sterilisation and Homogenisation, Cream separation- centrifugal cream separator,	12

	bactofugation	
IV	**Egg Processing**: Structure, composition and nutritional value of egg, egg processing, byproducts, egg powder manufacture, egg coatings, Factors affecting egg quality and measures of egg quality, processing of lecithin	12
	TOTAL	**48**
	PEDAGOGY: Lectures, Assignments and Seminars	

Texts:

1. Stadelman, W. J., Newkirk, D., & Newby, L. 1st edition. Egg science and technology. 4th ed. New Delhi: CBS Publication.

2. Sen, D.P. (2005).Advances in Fish Processing Technology. Allied Publishers Pvt.Limited.

References:

1. Shai, Barbut. latest edition. Poultry Products Processing. CRC Press

2. Parkhurst, C., &Mountney, G. J. latest edition,. Poultry meat and egg production. New Delhi: CBS Publishers.

Level: Semester IV

Course: DSE-IV **Scheme of Evaluation: (T)**

Title of the Paper: Food Analysis

Subject Code: FTC152D402

L-T-P-C: 3-1-0-4 **Total credits: 4**

Course Objectives

The students are expected to have basic idea of food analysis and improve working ability in analytical laboratory

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Define** fundamentals in analysis	**BT 1**
CO 2	**explain** test methods and procedures used to evaluate the quality of food	**BT 2**
CO 3	**apply** skills for laboratory management and routine analysis of , water and food	**BT 3**
CO 4	**analyze** different testing methods used in food industry	**BT 4**

Course Outline

Modules	**Topics (if applicable) & Course Contents**	**Periods**
I	**Introduction**: Basic fundamentals in Analysis, Laboratory safety protocols and handling, Analytical Chemistry: Titrimetric, gravimetric, instrumental analysis, Analytical Physics, Physical tests, Analytical Biology.	12
II	**Principles of sophisticated analytical tools:** Types, Principles, Maintenance, Operation, Working, G.C., H.P.L.C., G.L.C., A.A.S.	12
III	**Mathematical calculations for evaluation:** Concentration calculations, (2) PPm, PPb, mg/1, Kg/ha, % normal, Molar Ug/100 gm calculations	12
IV	**Subjective and objective methods**: Texture analyser- mechanical characteristics- chewiness, brittleness, and geometric characteristics, Sensory panel-	12

	types-criteria for panel selection	
	TOTAL	**48**
	PEDAGOGY: Lectures, Assignments and Seminars	

Texts:

1. Morten C Meilgaard, Gail Vance Civille, B. Thomas Carr, Sensory Evaluation Techniques: Apple Academic Press Inc, CRC Press
2. Cecilla Y. Saint Denis, Consumer and Sensory Evaluation Techniques: John Wiley and Sons Ltd

References:

1. Herbert Stone, Joel L. Sidel, (2012), "Sensory Evaluation Practices", Academic Press Publishers.
2. Maynard A. Amerine, Rose Marie Pangborn, Edward B. Roessler, (2013), "Principles of Sensory Evaluation of Food", Elsevier Publications.
3. Harry T. Lawless, Hildegarde Heymann, (2010), "Sensory Evaluation of Food: Principles and Practices", Springer Science & Business Media.

Level: Semester V

Course: C-1 **Scheme of Evaluation: (T)**

Title of the Paper: Food Preservation Technology

Subject Code: FTC152C501

L-T-P-C: 3-1-0-4 **Total credits: 4**

Course Objectives

The students are expected to have basic knowledge about the various preservation techniques available and to make them understand the need for preservation

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**define** the objectives and different techniques of food preservation	**BT 1**
CO 2	**explain** the various principles and methods of preservation	**BT 2**
CO 3	**apply** knowledge about the principle of evaporation, evaporators used in food industry and its mechanism	**BT 3**
CO 4	**categorize** natural and chemical preservative techniques used in food industry	**BT 4**

Course Outline:

Modules	**Topics (if applicable) & Course Contents**	**Periods**
I.	Principle, objectives and techniques of food preservation, Water activity of food and its significance in food preservation, microbial and autolytic degradation of food items, oxidative degradation. Classification of food based on pH, Food infection, food intoxication, definition of shelf life, perishable foods, semi perishable foods, shelf stable foods.	**12**
II.	Introduction to refrigeration, cool storage and freezing, definition, principle of freezing, freezing curve, changes occurring during freezing, types of freezing i.e. slow freezing, quick freezing, introduction to thawing, changes during thawing and its effect on food. Principle and application of heat preservation methods: Sterilization, commercial sterilization, Pasteurization, ultrahigh temperature sterilization, aseptic processing and blanching. Drying as a means of preservation.	**12**

	factors affecting rate of drying, normal drying curve, names of types of driers used in the food industry	
III.	Definition and principle of evaporation, factors affecting evaporation, names of evaporators used in food industry. Irradiation, units of radiation, kinds of ionizing radiations used in food irradiation, mechanism of action, uses of radiation processing in food industry. Fermentation as a mode of food preservation.	**12**
IV	History of Controlled Atmosphere Storage, Modified Atmosphere Packaging techniques, Equilibrium Modified Atmosphere Packaging techniques, gas-flushing and compensated vacuum techniques, Natural Preservatives-Mode of action, Chemical preservatives- Sulphur dioxide, Benzoic acid, Sorbic acid, Antioxidants, Biopreservatives, Pulsed electric fields, High pressure technology, Ohmic heating, Microwave heating.	**12**
TOTAL		**48**
Pedagogy: Lectures, Assignments, Seminars		

Texts:

1. Srilakshmi, B. Food science, New Age Publishers, 7th edition
2. Meyer, Food Chemistry, New Age, 2004

References:

1. Krishna Prasad Nooralabettu, Downstream processing-A new horizon in biotechnology, PHI publication, New Delhi, 2010
2. Bawa, A.S, Chauhan O.P. Food Science. New India Publishing agency, 2013
3. Robertson, G. L., Food Packaging: Principles and Practice, 3rd edition, 2013

Level: Semester V

Course: C-2 **Scheme of Evaluation: (P)**

Title of the Paper: Practical on Food Preservation Technology

Subject Code: FTC152C513

L-T-P-C: 0-0-8-4 **Total credits: 4**

Course Objectives

The students are expected to gather knowledge with the basics of laboratory techniques and instrumentation used in preservation of food

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**demonstrate** the class I and class II preservatives and their role in preservation of various food samples	**BT 2**
CO 2	**explain** the different methods of fermented food products	**BT 2**
CO 3	**apply** the techniques and methods of various food preservation	**BT 3**
CO 4	**analyse** and examine the antioxidants used in food preparation and prepare a survey report	**BT 4**

Course Outline

Modules	**Topics (if applicable) & Course Contents**	**Periods**
I.	1.Identification of Lab equipments 2.Identification of class I AND class II Preservatives 3.Identification of spoiled food. 4. Iced and chilled storage	**24**
II.	1.Preparation of product by using salt as preservative (any two) 2.Preparation of product by using sugar as preservative (any two) 3. Preparation of product by using oil as preservative(any two) 4.Preparation of product by using chemical preservative(any two)	**24**

III.	1. Concept of shelf life of different foods and packaging materials used. 2. Concept of Asepsis and sterilization and aseptic packaging. 3. To perform blanching of different plant foods. 4. To perform pasteurization of fluids using different methods and understanding the concept of tetra packaging.	**24**
IV	1.Use of antioxidants in food preservation 2.Preparation of cold pressed juices 3.Visit to the food preservation and irradiation unit 4.Survey report	**24**
TOTAL		**96**
Pedagogy: Lectures, Experiments, Laboratory sessions		

References:

- As suggested under the theory papers.

Level: Semester V

Course: DSE-V **Scheme of Evaluation: (T)**

Title of the Paper: Entrepreneurship and Management

Subject Code: FTC152D501

L-T-P-C: 3-1-0-4 **Total credits: 4**

Course Objectives

The students are expected to have basic leadership and management skills to maintain any food service and food processing units

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**define** entrepreneurship and its characteristics	**BT 1**
CO 2	**explain** the role and scope of entrepreneur qualities and its importance in food industry	**BT 2**
CO 3	**apply** the knowledge about purchasing and mode of purchasing in food management	**BT 3**
CO 4	**categorize** leadership qualities, its attitude and behavior	**BT 4**

Course Outline

Modules	**Topics (if applicable) & Course Contents**	**Periods**
I	**Introduction to Entrepreneurship:** Concepts of Entrepreneurship, Entrepreneur, Characteristics of a successful Entrepreneur, Creativity and Innovation of an Entrepreneur, Entrepreneurship Development and Training, Business Requirement for Food Products	12
II	**Duties and Qualities of an Entrepreneur**: Merchandising skills, understanding of the Client and market, Role of Advertising in Food Industry, Client Feedback and its importance, Compeitition	12
III	**Introduction to Food Management**: Purchasing in Food Management, Mode of Purchasing, The Buyer, The Supplier, Method of Purchasing, Identification of needs and buying requirements, Storage areas, Store room management, Record and control in Food Management	12
IV	**Leadership:** Personal Management, Leadership and its compounds,	12

	Qualities, attitude and behaviour of a leader, Values and task of a leader, Application of Leadership to Food Management	
	TOTAL	**48**
	PEDAGOGY: Lectures, Assignments and Seminars	

Texts:

1. K.P. Sudhur , V. Indira(), Entrepreneurship Development in Food Processing. Ingram short title Publication
2. Dr. K.P. Singhal(), Entrepreneurship Development and Management. SK Kataria and Sons Publication

References:

1. Vasant Desai , latest edition, Fundamentals of Entrepreneurship and Small Business Management, Himalya Publishing House Pvt. Ltd., Mumbai

2. D. David and S Erickson , latest edition, Principles of Agri Business Management , Mc Graw Hill Book Co., New Delhi.

.

Level: Semester V

Course: DSE-VI **Scheme of Evaluation: (T)**

Title of the Paper: Basic Computer Applications

Subject Code: FTC152D502

L-T-P-C: 3-1-0-4 **Total credits: 4**

Course Objectives

To familiarize students with handling of MS Office particularly for calculations, report writing and presentations.

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**understand** the operations of windows operating system.	**BT 1**
CO 2	**apply** operations of MS WORD-(Editing , Formatting, inserting) in preparing project report	**BT 2**
CO 3	**apply**. operations of MS Excel for statistics and graph	**BT 3**
CO 4	**apply**. operations of MS PowerPoint for presentation	**BT 4**

Course Outline

Modules	**Topics (if applicable) & Course Contents**	**Periods**
I	**Introduction to computer**: office Automation: Introduction- Tools, Windows 8, desktop, files and folders, printers, Microsoft Office button, Quick access tool bar	12
II	**MS Word**: Introduction- Typing text, Saving, opening, Closing, common edit functions (cut copy paste, change case). Text Editing - Inserting text, spell check, correcting mistakes, common formatting functions. Formatting paragraph, tables, bullets & numbering, inserting clipart & word art, picture & Drawing tool bar, Header & footer	12
III	**MS Excel:** Introduction- Parts of MS Excel windows, opening, saving and closing, workbook, entering data and numbers, Texts, date & time, formatting data, tool bar, drawing in MS Excel, Drawing tool bar, formatting &	12

	editing worksheet. Format cells, row , column, work sheet (Inserting, deleting, renaming) Formulas, functions, charts.	
IV	**MS Powerpoint**: DBMS, Internet and E-mail : Introduction- Parts of power point windows. Features, background design, word art, clipart, 3D settings. Animations, sound views, types of views, inserting, deleting, arranging slides, slide shows, DBMS Intro & basic concepts, Internet introduction, Creating Email- Inbox, compose, draft, attachments.	12
	TOTAL	**48**
	PEDAGOGY: Lectures, Assignments and Seminars	

Text Books:

1. Priti Sinha, Pradeep K., Sinha, Computer Fundamentals : Concepts, Systems & Applications :BPB Publications

2. Soumya Ranjan Behera, Computer Application: B. K. Publications Private Limited

Reference Books:

- Reema Thareja, Fundamentals of Computers :Oxford
- RS Salaria, Computer Fundamentals : Khanna Publishing House

.

Level: Semester V

Course: DSE-VII **Scheme of Evaluation: (P)**

Title of the Paper: Food Packaging Technology

Subject Code: FTC152D503

L-T-P-C: 3-1-0-4 **Total credits: 4**

Course Objectives

The students are expected to have basic knowledge about various food packaging materials used in food industry for storage and preservation

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**define** packaging methods and types of food packaging	**BT 1**
CO 2	**explain** the various deteriorative reactions in food , study of various factors impacting shelf life of food	**BT 2**
CO 3	apply knowledge on various packaging materials and its properties	**BT 3**
CO 4	**categorize** various packaging methods and its role in food preservation	**BT 4**

Course Outline

Modules	**Topics (if applicable) & Course Contents**	**Periods**

I	**Introduction to packaging**: Definition, Functions of packaging – Containment, Protection, Preservation, Promotion, Convenience, Communication. Requirements of effective package, Types of food packaging- primary, secondary and tertiary packaging	12
II	**Deteoriative Reactions and Shelf Life of Food**: Introduction, deteriorative Reactions in food- factors affecting deterioration of foods physical changes, biological changes, chemical changes. Shelf life of foods – Definition, intrinsic and extrinsic factors controlling the rate of reactions. Shelf life determination tests	12
III	**Packaging materials and their properties:** Rigid containers- Glass, Wooden boxes, metal cans- Aluminium and tin plate containers, Semi rigid containers- paperboard cartons, Flexible packaging- paper, plastic pouches- Low density polyethylene, High density polyethylene and Polypropylene.	12
IV	**Special Packaging:** Aseptic packaging, Active packaging, Intelligent packaging, Modified atmospheric packaging and controlled atmospheric packaging, Shrink packaging, stretch packaging, Biodegradable packaging, Edible packaging, Tetrapacks.	12
	TOTAL	**48**
	PEDAGOGY: Lectures, Assignments and Seminars	

Texts:

1. Robertson GL, Food Packaging – Principles and Practice, CRC Press Taylor and Francis Group, 2012
2. Coles R, McDowell D, Kirwan MJ Food Packaging Technology. Blackwell, latest edition

References:

1. F.A. Paine, Fundamentals of Packaging. Institute of Packaging, latest edition
2. Culter JD and Hernandez RJ Hanser, 2004 ,Plastic Packaging: Properties, Processing and Applications
3. Richard C, Derek M, Mark J.K, Food Packaging Technology CRC Press, 1st edition

Level: Semester V

Course: DSE-VIII **Scheme of Evaluation: (T)**

Title of the Paper: Technology of Sugar Confectionery and Chocolate Processing

Subject Code: FTC152D504

L-T-P-C: 3-1-0-4 **Total credits: 4**

Course Objectives

The students are expected to have a basic idea of the status of the confectionery industry in India and to learn the technologies of confectionery products, its innovations in this sector

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**define** the raw materials used in confectionery products and its properties	**BT 1**
CO 2	**explain** the different manufacturing techniques of different confectionery products	**BT 2**
CO 3	**apply** knowledge on sugar confectionery and its manufacturing process for different products	**BT 3**
CO 4	**categorize** the different types of chocolate and its processing techniques	**BT 4**

Course Outline

Modules	**Topics (if applicable) & Course Contents**	**Periods**
I	**Introduction to Confectionery Industry**: Raw Materials for Confectionery Manufacture o Important properties – Sugar, glucose syrup, Dried milk products, cocoa, Speciality fats, Emulsifiers, Nut kernels, Alcoholic ingredients and other minor ingredients. General technical aspects of industrial sugar confectionery manufacture. Confectionery – composition, structure , Quality aspects.	12
II	**Manufacture of Confectionery I :** Manufacture of Caramel ,Manufacture of Toffee and fudge , Manufacture of Liquorices paste , Manufacture of Count Lines Manufacture of Aerated confectionery ,High boiled sweets– Ingredients, Methods of manufacture– Product types.	12
III	**Manufacture of Confectionery II:** Manufacture of Lozenges ,Manufacture of Fruit confections ,Manufacture of sugar panned sweets ,Manufacture of gums & jellies , Chewing gum Technology , Flour	12

	confectionary).	
IV	**Chocolate Processing :** Chocolate Processing Technology: o Cocoa bean – harvesting, processing , production of cocoa liquor , cocoa butter processing ,cocoa butter substitutes. Manufacture of chocolate bars and covered confectionary Molding, enrobing, panning, tempering Other chocolate processes , Quality control of chocolates.	12
	TOTAL	**48**
	PEDAGOGY: Lectures, Assignments and Seminars	

Texts:

1. Jackson, E.B. 1st edition. Sugar Confectionery Manufacture. 2nd Edition. New york: Aspen Publication.

2. Junk, W.R. and Pancost, H.M. latest edition. Hand Book of Sugars for Processors. Chemists and Technologists. New Delhi: AVI Publications..

References:

1. Francis, F.J. latest edition. Wiley Encyclopaedia of Food Science & Technology. India: John Wiley & Sons

Level: Semester VI

Course: C-1 **Scheme of Evaluation: (T)**

Title of the Paper: Concepts of Food Engineering

Subject Code: FTC152C601

L-T-P-C: 3-1-0-4 **Total credits: 4**

Course Objective:

- To acquaint with the fundamentals of food engineering and its process.
- To understand the basics of designing food plants and systems

Course Outcomes

On successful completion of the course, the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Understand** the basic laws of engineering.	**BT 1**
CO 2	**explain** heat, mass and momentum transfer	**BT 2**
CO 3	**apply** transport phenomenon in food processing operations	**BT 3**
CO 4	**solve** problems related to transport phenomenon	**BT 4**

Detailed Syllabus

Modules	Topics (if applicable) & Course Contents	Periods
I	**Physical properties of Foods:** Methods of Estimation of Shape-Roundness, sphericity, roundness ratio, size, volume- platform scale method, density, specific gravity-apparatus, porosity and surface area	12
II	**Thermal Properties of Foods**: Definitions-Specific heat, enthalpy, conductivity and diffusivity, surface heat transfer coefficient. Measurement of thermal properties like specific heat, thermal conductivity and thermal diffusivity	12
III	**Aerodynamic properties and Frictional properties of Foods**: Aerodynamic Property- definition- drag coefficient, terminal velocity-application in handling and separation of food materials. Frictional property-coefficient of friction, angle of repose, angle of internal	12

	friction, application in food handling and storage	
IV	**Rheology and texture of Foods**: Rheology-Rheological classification-viscoelasticity-viscometers, Hookean Body, St Venant body and Newtonian Body. Texture of foods-Methods of textural evaluation, Subjective and objective Method-texture profile method	12
	TOTAL	**48**
	PEDAGOGY: Lectures, Assignments and Seminars	

Text Books:

1. Rao, M. A., Rizvi, S. S. H. and Datta A.K. latest edition. Engineering Properties of Foods: CRC Press.
2. Heldman, D. R. latest edition. Food Process Engineering: AVI Publications.
3. Toledo, R. T. latest edition. Fundamentals of Food Process Engineering (2 ed.): CBS Publications, New Delhi.

Course: C-2 **Scheme of Evaluation: (T)**

Title of the Paper: Practical on Concepts of Food Engineering

Subject Code: FTC152C613

L-T-P-C: 3-1-0-4 **Total credits: 4**

Course Objective:

- Understanding the role of instrumentation and techniques in Food Engineering and Dairy Technology.
- Understanding their importance for food industrial management

Course Outcomes

On successful completion of the course, the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**Understand** physical parameters	**BT 1**
CO 2	**explain** the sensory test methods and their tools and techniques	**BT 2**
CO 3	**apply** the methodologies and tools for planning of sensory analysis	**BT 3**
CO 4	**categorize** quality and non-quality products	**BT 4**

Detailed Syllabus:

Modules	Topics (if applicable) & Course Contents	Periods
I.	1. Introduction to measuring tools for physical parameters 2. Estimation of physical dimensions of food product 3. Estimation of shape and size (sphericity, aspect ratio) 4. Estimation of porosity, bulk density, and true density 5. Estimation of the angle of repose of grains	**24**
II.	1. Measurement of heat flow rate in a composite slab 2. Measurement of viscosity of fluids using viscometer 3. Measurement of fluid flow rate using venturi meter 4. Measurement of Reynold's number and determining the type of flow.	**24**

III.	1.Market survey and screening of products 2.Guidance to the implementation of food safety protocols(HACCP/GMP/GHP) 3.Industrial visit and introduction to plant layout and design 4.Study of Shelf life estimation models	**24**
IV	1. Estimation of specific gravity of milk 2. Clot on Boiling Test of Milk for determining the heat stability 3. Detection of adulteration of starch and urea in milk 4. Alcohol Test of milk for determining the heat stability	**24**
TOTAL		**96**
Pedagogy: Lectures, Experiments, Laboratory sessions		

Reference Books:

- **As suggested under the theory papers.**

Level: Semester VI

Course: DSE-IX **Scheme of Evaluation: (T)**

Title of the Paper: Food Sensory Evaluation

Subject Code: FTC152D601

L-T-P-C: 3-1-0-4 **Total credits: 4**

Course Objectives

To expose undergraduates on sensory testing of foods by providing an understanding of the senses, learn sensory techniques and sensory measurement of foods and design appropriate methods for the sensory testing.

Course Outcomes

On successful completion of the course, the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**define** sensory analysis and its importances	**BT 1**
CO 2	**explain** the sensory test methods and their tools and techniques	**BT 2**
CO 3	**apply** the methodologies and tools for planning of sensory analysis	**BT 3**
CO 4	**categorize** quality and non-quality products	**BT 4**

Course Outline

Modules	**Topics (if applicable) & Course Contents**	**Periods**
I	**Introduction**: Definition of sensory evaluation; basic tastes; human senses and sensory perception; threshold; psychophysics, Tongue surface	16
II	**Arrangements for Sensory Evaluation Test controls:** Environment and test room design; product controls: sample preparation and presentation; panelist controls; factors influencing measurements: psychological and physiological errors	16
III	**Statistical Methods for Sensory Evaluation:** Classification of test methods; discrimination tests: paired-comparison, duo-trio and triangle tests; affective tests: qualitative (interview and focus group) and quantitative tests (paired preference and acceptance tests); Two sample test, Ranking test, Two sample difference test, numeric scoring test, hedonic ranking test	16
IV	**Subjective and objective methods**: Texture analyser- mechanical characteristics-	16

	chewiness, brittleness, and geometric characteristics, Sensory panel-types-criteria for panel selection	
	TOTAL	**64**
	PEDAGOGY: Lectures, Assignments and Seminars	

Texts:

1. Morten C Meilgaard, Gail Vance Civille, B. Thomas Carr, Sensory Evaluation Techniques: Apple Academic Press Inc, CRC Press
2. Cecilla Y. Saint Denis, Consumer and Sensory Evaluation Techniques: John Wiley and Sons Ltd

References:

- Herbert Stone, Joel L. Sidel, (2012), "Sensory Evaluation Practices", Academic Press Publishers.
- Maynard A. Amerine, Rose Marie Pangborn, Edward B. Roessler, (2013), "Principles of Sensory Evaluation of Food", Elsevier Publications.

Level: Semester VI

Course: DSE-X **Scheme of Evaluation: (T)**

Title of the Paper: Nutraceutical and Functional Foods

Subject Code: FTC152D602

L-T-P-C: 3-1-0-4 **Total credits: 4**

Course Objectives

The students are expected to have knowledge with biology, and basic idea of human physiology and chemistry

Course Outcomes

On successful completion of the course the students will be able to:		
SI No	**Course Outcome**	**Blooms Taxonomy Level**
CO 1	**define** the nutraceutical and functional compounds and their role in health and disease	**BT 1**
CO 2	**explain** about various phytochemicals, their sources, functions and usefulness	**BT 2**
CO 3	**apply** methods used for extraction of phytochemicals and development of functional foods	**BT 3**
CO 4	**categorize** the probiotics and prebiotics and their effects in gastrointestinal health	**BT 4**

Course Outline

Modules	**Topics (if applicable) & Course Contents**	**Periods**
I	**Nutraceuticals and functional foods**: definition, types and scope, need, food applications and their health benefits, Nutraceutical compounds and their classification, Nutraceuticals for specific situations such as cancer, heart disease, stress, osteoarthritis, hypertension etc.	12
II	**Photochemical and their usefulness:** Antioxidants and Flavonoids,Omega-3 Fatty Acids, Carotenoids, Dietary fibres, Phytoestrogens, Glucosinolates, Organosulphur Compounds etc. their effectiveness in specific disease conditions; other functional ingredients in foods such as peptides, fatty acids, Cereal products as functional foods – oats, wheat bran, rice bran etc, Functional vegetable products, oil seeds, sea foods and sea weeds, antimicrobial compounds, Coffee, tea and other beverages as functional foods/drinks and their protective effect, Effects of processing, storage and interactions of various environmental	12

	factors on the potentials of such foods, health benefits.	
III	**Extraction of Phyto-chemicals and development of functional foods**: Extraction methods for maximum recovery, Stability studies, Developing functional foods, Use of bioactive compound in appropriate form with protective substances and activators, Effect of environmental conditions in food matrix on activity of bioactive compound, Effects of processing conditions and storage, Development of biomarkersto indicate efficacy of functional ingredients, delivery of immune-modulators/vaccines in functional foods	12
IV	**Prebiotics and Probiotics**: Usefulness of Probiotics & Prebiotics in gastrointestinal health and other benefits, Examples of useful microbes and their benefits, Prebiotic ingredients in foods, types of prebiotics and their effects on gut microbes, Probiotic foods and their functional role, Marketing and regulatory issues for functional foods and Nutraceuticals	12
	TOTAL	**48**
	PEDAGOGY: Lectures, Assignments and Seminars	

Texts:

1. Mine, Y and Fereidoon, S. 1st edition. Nutraceutical Proteins and Peptides in Health and Disease: TF, Bocaraton.
2. Bagchi, D. (2008). Nutraceutical and Functional Food Regulations in United States and Around the World: Elsevier, London.

References:

1. Guo, M. (2009). Functional Food: Principles and Technology: WP, New Delhi.
2. B. Srilakshmi , Food Science: New Age International Publishers, New Delhi
3. Shi, J. latest edition. Functional Food Ingredients and Nutraceuticals: Processing Technologies: CRC Press, London