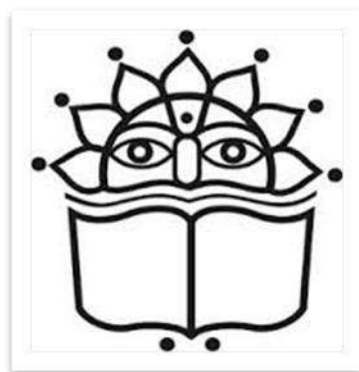


**VIDYA PRATISHTHAN'S
ARTS, SCIENCE AND COMMERCE COLLEGE,
BARAMATI (DIST. PUNE)**



Affiliated to Savitribai Phule Pune University

**CURRICULUM
FOR
BACHELOR'S PROGRAM
IN
B. Voc. FOOD TECHNOLOGY**

**UGC Approved
Under Choice Based Credit and Semester Based System
(2018-19)**

UGC Sponsored B. Voc. Program

The University Grants Commission (UGC) had launched a scheme on 27 February, 2014 for skills development based higher education as a part of college/university education, leading to Bachelor of Vocation (B.Voc.) degree with multiple entry and exit points. Considering the implementation modalities, the guidelines of the scheme have been revised in the year 2015. The B.Voc. program is focused on universities and colleges providing undergraduate studies which would also incorporate specific job roles and their NOSs along with broad based general education. This would enable the graduates completing B. Voc to make a meaningful participation in accelerating India's economy by gaining appropriate employment, becoming entrepreneurs and creating appropriate knowledge.

1. Objectives

- To provide judicious mix of skills relating to a profession and appropriate content of general education.
- To ensure that the students have adequate knowledge and skills, so that they are work ready at each exit point of the program.
- To provide flexibility to students by means of pre-defined entry and multiple exit points.
- To integrate NSQF within the undergraduate level of higher education in order to enhance employability of the graduates and meet industry requirements. Such graduates apart from meeting the needs of local and national industry are also expected to be equipped to become part of the global workforce.
- To provide vertical mobility to students coming out of:
 - i) 10+2 with vocational subjects
 - ii) Community Colleges.

2. Governance and Coordination

An Advisory Committee will be set-up for effective governance and coordination of the courses under the scheme. The Advisory Committee will include the representative(s) of the affiliating university, relevant industries, relevant Sector Skills Council(s), and Nodal Officer of B. Voc Scheme. The Vice Chancellor of the university or his Nominee or Principal of the college, as the case may be, will be the Chairman of the Advisory Committee and the Nodal Officer will be the Member-Secretary. The Committee will meet periodically to review the functioning of the courses, as and when required, but at least once in six months. The Advisory Committee will also ensure the timely submission information to UGC and uploading of data in Skill Development Monitoring System (SDMS). Nodal Officer will submit quarterly progress report to UGC and copy of the same may also be endorsed to Head, Standards & Q.A., National Skill Development Corporation, Block A, Clarion Collection, Shaheed Jeet Singh Marg, New Delhi - 110016.

3. Curricular Aspects and Level of Awards

Awards	Duration
Certificate	6Months
Diploma	2 Semesters (after 1 st year)
Advanced Diploma	4 Semesters (after 2 nd year)
Degree	6Semesters

10+2 Students
of Category - 2 & 3

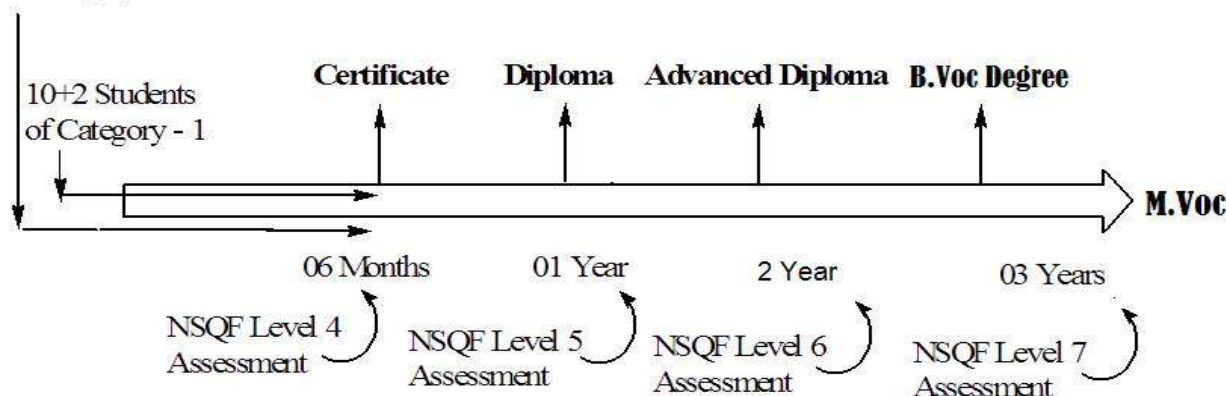


Figure 1 : Assessment of Skill Component under NSQF in Vocational Courses

Cumulative credits awarded to the learners in skill based vocational courses

NSQF Level	Skill Component Credits	General Education Credits	Total Credits for Award	Normal Duration	Exit Points/ Awards
4	18	12	30	One sem.	Certificate
5	36	24	60	Two sem.	Diploma
6	72	48	120	Four sem.	Advanced Diploma
7	108	72	180	Six sem.	B.Voc. Degree

The curriculum in each of the years of the program would be a suitable mix of general education and skill development components. As is evident from Table 2 above, the General Education Component shall have 40 % of the total credits and balance 60% credits will be of Skill Component. The Curriculum details should be finalized before introduction of the courses.

4. Assessment

- a. The Skill component of the course will be assessed and certified by the respective Sector skill Councils. In case, there is no Sector Skill Council for a specific trade, the assessment may be done by an allied Sector Council or the Industry partner. The certifying bodies may comply with and obtain accreditation from the National Accreditation Board for Certification Bodies (NABCB) set up under Quality Council of India (QCI). Wherever the university/college may deem fit, it may issue a joint certificate for the course(s) with the respective Sector Skill Council(s).
- b. The credits for the skill component will be awarded in terms of NSQF level certification which will have 60% weightage of total credits of the course in the following manner.

Name of the Course	NSQF Level Certificate	Cumulative Credits
Certificate	Level – 4	18 credits
Diploma	Level – 5	36 credits
Advanced Diploma	Level – 6	72 credits
B.Voc Degree	Level – 7	108 credits

c. The general education component will be assessed by the concerned university as per the prevailing standards and procedures. The following formula may be used for the credit calculation in general education component of the courses:

- i. General Education credit refers to a unit by which the course work is measured. It determines the number of hours of instructions required per week. One credit is equivalent to one hour of teaching (lecture or tutorial) or two hours of practical work/field work per week. Accordingly, one Credit would mean equivalent of 14-15 periods of 60 minutes each or 28 – 30 hrs of workshops / labs.
- ii. For internship / field work, the credit weightage for equivalent hours shall be 50% of that for lectures /tutorials.
- iii. For self-learning, based on e-content or otherwise, the credit weightage for equivalent hours of study shall be 50% of that for lectures /tutorials.

d. Letter grades and grade points

Letter Grades and Grade Points: The UGC recommends a 10-point grading system with the following Letter grades as given below:

Letter Grade	Grade Point
O (Outstanding)	10
A ⁺ (Excellent)	9
A (Very Good)	8
B ⁺ (Good)	7
B (Above Average)	6
C (Average)	5
P (Pass)	4
F (Fail)	0
Ab (Absent)	0

A student obtaining Grade F shall be considered failed and will be required to reappear in the examination.

Computation of SGPA and CGPA

Following procedure to compute the Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA) may be adopted:

- i. The SGPA is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the course components taken by a student and the sum of the number of credits of all the courses undergone by a student in a semester,

$$i.e.; \text{SGPA} (S_i) = \frac{\sum(C_i \times G_i)}{\sum C_i}$$

Where, 'C_i' is the number of credits of the ith course component and 'G_i' is the grade point scored by the student in the ith course component.

- ii. The CGPA is also calculated in the same manner taking into account all the courses undergone by a student over all the semesters of a programme,

$$i.e.; \text{CGPA} = \frac{\sum (C_i \times S_i)}{\sum C_i}$$

Where 'S_i' is the SGPA of the ith semester and 'C_i' is the total number of credits in that semester.

- iii. The SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

**Reference: UGC B.Voc. Guidelines.*

B. Voc. In FOOD TECHNOLOGY

Food processing involves a combination of procedures to achieve the intended changes to the raw materials. These are conveniently categorized as unit operations, each of which has a specific, identifiable and predictable effect on a food. Unit operations are grouped together to form a process. The combination and sequence of operations determines the nature of the final product.

Food technologists, technicians, bio technologists and engineers are required in this industry for the practical application of the principles of many disciplines of science in the manufacturing or production, preservation and packaging, processing and canning of various food products.

1.

Graduate Attributes

Job Roles proposed to be covered in each year (Along with NSQF level)

Semester /Year	NSQF Level
First semester	<p><u>Level 4</u></p> <p>1. Baking Technician / Operative: Reference ID:FIC/Q5005 A baking technician/ operative is responsible for baking of products, maintaining their consistency and quality, while meeting defines SOPs and leveraging his/ her skill to operate ovens in synchronization with proof box/ rest of the plant or unit.</p> <p>2. Plant biscuit production specialist : Reference ID:FIC/Q5005 A plant biscuit production specialist produces biscuits in industrial units as per defines SOPs in synchronization with rest of the plant/ unit by weighing, mixing, kneading, rolling, sheeting, cutting, moulding, baking, cooling etc. either manually or using machineries following the defines SOPs of the plant/unit.</p> <p>3. Craft baker: Reference ID: FIC/Q5002 A craft baker produces baked products (breads, puffs, cookies,cakes/ pastries, desserts, speciality baked products etc.) in artisan bakeries and patisseries by measuring raw materials and ingredients, mixing, kneading, fermenting, shaping and baking in order to achieve the desired quality and quantity of products.</p> <p>4. Plant baker: Reference ID: FIC/Q5001 A plant baker produces or supervises the production of baked products (breads, biscuits, cakes etc.) in industrial unit by weighing, mixing, kneading, fermenting, shaping, rolling, sheeting, cutting, moulding, baking, cooling etc. using various industrial equipments.</p> <p>5. Mixing technician: Reference ID: FIC/Q5004 A mixing technician prepares different types of dough used in baking baked products by using various methods such as weighing, mixing, kneading, fermenting following the defined Sops of the plant or unit while maintaining food safety and hygiene in the work environment.</p>

Semester /Year	NSQF Level
Second Semester	<p><u>Level 5</u></p> <p>1. Dairy Products Processor: Reference ID : FIC/Q2001</p> <p>A dairy products processor is responsible for processing milk to produce various types of dairy products. He / she is responsible for carrying out processes such as homogenizing, pasteurizing, cooling, mixing, curdling, foaming, cutting churning, fermenting, freezing, condensing, drying and flavoring of milk.</p> <p>2. Dairy Processing Equipment Operator: Reference ID : FIC/Q2002</p> <p>A dairy processing equipment operator is responsible for operating various types of dairy processing machineries for producing dairy products such as filters, separators, homogenizers, pasteurizers, chiller, churner, clarifier, freezer to filter, separate, homogenize, pasteurize, cool, churn, clarify and freeze milk.</p> <p>3. Ice Cream Processing Technician: Reference ID:FIC/Q2004</p> <p>A Ice Cream Processing Technician is responsible for producing ice cream by operating various ice cream processing machineries. He or she is responsible for homogenizing, pasteurizing, freezing, cutting, hardening, storing, filling and packing following the specifications and standards of the organization.</p> <p>4. Butter and Ghee processing operator: Reference ID:FIC/Q2004</p> <p>A Butter and Ghee processing operator is responsible for operating various dairy processing machineries (filter, separator, pasteurizer etc.) to produce butter and ghee following specifications and standards of the organizations.</p> <p>5. Food Products Packaging Technician: Reference ID:FIC/Q7001</p> <p>A Food Products Packaging Technician performs various packaging functions and handles all categories of packaging such as primary, secondary and tertiary packaging for food products.</p>

Semester /Year	NSQF Level
Second Year	<p><u>Level 6</u></p> <p>1. Fish and Sea food Processing Technician : Reference ID: FIC/ Q4001</p> <p>A fish and seafood processing technician is responsible for processing fish and sea foods to achieve quality and quantity of products along with maintain food safety and hygiene in work environment.</p> <p>2. Grain Mill Operator : Reference ID: FIC/Q1003</p> <p>A grain mill operator carries out processes such as cleaning, de- stoning, hulling, polishing and grinding to produce milled grains and flour(s).</p> <p>3. Chief Miller : Reference ID: FIC/Q1001</p> <p>A chief miller manages a milling process for all types of grains overseeing activities such as handling of various milling machineries, maintenance of process parameters, inspection of raw materials and finished goods to achieve the desired quality and quality of products.</p> <p>4. Pulse Processing Technician : Reference ID: FIC/Q1004</p> <p>A pulse processing Technician is responsible for milling various types of pulses (Red gram, black gram, Bengal gram, green gram, green peas etc.) through processes such as cleaning, destining, conditioning, dehusking, splitting, sorting, polishing, grinding.</p>

Semester /Year	NSQF Level
Third Year	<p><u>Level 7</u></p> <p>1. Fruit and vegetable selection in -charge : Reference ID:FIC/Q0108</p> <p>A fruit and vegetable selection in-charge is responsible for sorting and grading produce such as fruits, vegetables, nuts etc. based on their colour, size, appearance, feel and smell.</p> <p>2. Jam/Jelly/ Ketchup Processing Technician : Reference ID: FIC/Q0103</p> <p>A jam, jelly, ketchup operating technician is responsible for processing fruits and vegetables to make jam/ jelly and ketchup by receiving, checking raw material quality, sorting, pulping, pasteurizing, cooking, juice extracting, clarifying, filtering, sampling for quality analysis, cooling, packing and store.</p> <p>3. Fruit ripening Technician : Reference ID:FIC/Q0104</p> <p>A fruit ripening technician is responsible for ripening of all types of fruits in the ripening chamber and maintaining cleanliness, hygiene and safety of the fruit and ripening chamber.</p> <p>4. Pickle making Technician : Reference ID:FIC/Q0102</p> <p>A pickle making technician is responsible for preparation of all types of pickles from various fruits and vegetables through the process of washing, peeling, cutting, slicing, curing, brining, blending, filling, oil topping, packing and storage.</p> <p>5. Fruit Pulp Processing Technician: Reference ID:FIC/Q0106</p> <p>A Fruit Pulp Processing Technician is responsible for pulping/ producing fruit pulp through the process of receiving, ripening, checking raw material quality, sorting, washing, cutting/ slicing, deseeding/ destining, pulping, pre-cooking, sterilizing, aseptic packaging or canning, sampling for quality analysis and sorting.</p> <p>6. Assistant Lab Technician – Food and Agricultural Commodities: Reference ID:FIC/Q7006</p> <p>An Assistant Lab Technician – Food and Agricultural Commodities is responsible for ensuring quality products through sampling of raw materials, packaging material, finished products and shelf life samples for quantitative and qualitative analysis.</p>

2. STRUCTURE OF B. Voc FOOD TECHNOLOGY

a) Title

Regulations for conducting B. Voc Program under Savitribai Phule Pune University

b) Scope

The regulations stated in this document shall apply to all B.Voc Programs conducted by colleges affiliated to Savitribai Phule Pune University, sanctioned by University Grants Commission with effect from 2014 admission.

c) Definitions

3.1 B. Voc: Bachelor of Vocation- is a scheme introduced by UGC for skill development based higher education as part of college/university education.

3.2 NSQF : National Skills Qualifications Framework

3.3 Program: A Program refers to the entire course of study and examinations for the award of the B. Voc degree.

3.4 Semester: A term consisting of a minimum of 450 contact hours distributed over 90 working days, inclusive of examination days, within 18 five- day academic weeks.

3.5 Course: Refers to the conventional paper, which is portion of the subject matter to be covered in a semester. A semester shall contain many such courses from general and skill development areas.

3.6 Credit: B. Voc program follows a credit semester system and each Course has an associated credit.

3.7 Grade: Uses seven point grading system suggested by Hridayakumari Commission to assess the students.

3.8 Words and expressions used and not defined in this regulation shall have the same meaning assigned to them in the Act and Statutes.

3. Eligibility for Admission

Eligibility for admissions and reservation of seats for B. Voc. Food Technology shall be according to the rules that no student shall be eligible for admission to B. Voc. Food Technology unless he/she has successfully completed the examination conducted by a Board/ University at the +2 level of schooling with subjects including Chemistry/ Biology/ Home Science or its equivalent in stream. The total no. of seats allotted is 50.

4. Levels of Awards

B. Voc. Food Technology is a program with multiple exit points.

Awards	Duration
Certificate	6 Months
Diploma	2 Semesters (after 1 st year)
Advanced Diploma	4 Semesters (after 2 nd year)
Degree	6 Semesters

5. Duration of the Course

Duration of B. Voc. Food Technology program shall be 6 semesters distributed over a period of 3 academic years. Each semester shall have 90 working days inclusive of all examinations.

5.1 The duration of B. Voc program shall be **6 Semesters**.

5.2 The duration of odd semesters shall be from **June to October** and that of even semesters from **November to March**. There shall be three days semester break after odd semesters and two months vacation during April and May in every academic year.

5.3 A Student may be permitted to complete the Program, on valid reasons, within a period of 12 continuous semesters from the date of commencement of the first semester of the program.

5.4 The certification levels will lead to Diploma /Advanced Diploma /B. Voc. Degree and will be offered under the aegis of the University as outlined in the Table given below

Awards	Duration
Certificate	1 Semester
Diploma	2 semester
Advanced Diploma	4 semester
B. Voc. Degree	6 semester

6. Nature of the Course

- a) No open course is envisaged
- b) No Electives are included
- c) Total credits is 180
- d) Working hours per week is 30 hours
- e) All vocational subjects are treated as core course.
- f) Multiple exit points are permitted.
- g) A candidate who failed in a semester may get two supplementary chances. Only failed papers are to be written in the supplementary examination.

7. Readmission

Readmission will be allowed as per the prevailing rules and regulations of the university.

There shall be 3 level monitoring committees for the successful conduct of the scheme.

They are -

1. Department Level Monitoring Committee (DLMC), comprising HOD and two senior-most teachers as members.
2. College Level Monitoring Committee (CLMC), comprising Principal, Dept. Coordinator and A.O/Superintendent as members.
3. University Level Monitoring Committee (ULMC), headed by the Vice – Chancellor and Pro –Vice – Chancellor, Conveners of Syndicate subcommittees on Examination, Academic Affairs and Staff and Registrar as members and the Controller of Examinations as member-secretary.

8. Program Structure

The B. Voc. Food Technology shall include:

- a) Language courses(English)
- b) General Education Components
- c) Skill Components
- d) Internship
- e) Field Visits
- f) Project
- g) Soft Skills and Personality Development Programs
- h) Study tours

9. Scheme of Courses

Scheme of distribution of credits for courses

Sr. No.	Courses	No. of Papers	Credits
1.	General Education Components	18	72
2.	Skill Components	15	90
3.	Project	2	12
4.	Internship	1	6
Total		36	180

10. Course Code

A nine character Course code is assigned to each course. The first character indicates the discipline, second and third character indicates the program, fourth for semester, fifth for course category, next two characters for serial no of the course, eighth character specifies the type of course, ninth specifies the degree.

Eg: VFT1S01TB

V	→→	Vocational Studies
FT	→→	Food Technology
1	→→	Semester
G / S	→→	General Component (G) / Skill Component(S)
01	→→	Serial number of the course
T / P	→→	Theory / Practical
B / M	→→	Bachelor's / Master's

11. Detailed Distribution of Courses

Semester – I						Marks		
Course code	Title	Credits	L	P	Hours/ week	CIA	ESE	Total
General Component								
VFT1G01TB	Communication skills in English	4	4	-	4	50	50	100
VFT1G02TB	Entrepreneurship Development and Project Management	4	4	-	4	50	50	100
VFT1G03TB	Food Science and Nutrition – I	4	4	-	4	50	50	100
Skill Component								
VFT1S01TB	Bakery and Confectionery Technology	6	2	-	2	25	25	50
VFT1S01PB	Bakery and Confectionery Technology		-	4	4	50	50	100
VFT1S02TB	Principles of Food processing	6	2	-	2	25	25	50
VFT1S02PB	Principles of Food processing		-	4	4	50	50	100
VFT1S03TB	Food Chemistry	6	2	-	2	25	25	50
VFT1S03PB	Food Chemistry		-	4	4	50	50	100
Total		30	18	12	30	375	375	750
Semester – II						Marks		
Course code	Title	Credits	L	P	Hours/ week	CIA	ESE	Total
General Component								
VFT2G04TB	Critical Thinking, Academic Writing and Presentation Skills	4	4	-	4	50	50	100
VFT2G05TB	Business Communication	4	4	-	4	50	50	100
VFT2G06TB	Sanitation and Hygiene	4	4	-	4	50	50	100
Skill Component								
VFT2S04TB	Dairy Technology	6	2	-	2	25	25	50
VFT2S04PB	Dairy Technology		-	4	4	50	50	100
VFT2S05TB	Packaging Technology	6	2	-	2	25	25	50
VFT2S05PB	Packaging Technology		-	4	4	50	50	100
VFT2S06TB	Food Science and Nutrition - II	6	2	-	2	25	25	50
VFT2S06PB	Food Science and Nutrition - II		-	4	4	50	50	100
Total		30	18	12	30	375	375	750

L: Lectures

CIA: Continuous Internal Assessment

P: Practical

ESE: End Semester Examination

Semester - III						Marks		
Course code	Title	Credits	L	P	Hours/week	CIA	ESE	Total
General Component								
VFT3G07TB	Business Management	4	4	-	4	50	50	100
VFT3G08TB	Food Analytical Techniques	4	4	-	4	50	50	100
VFT3G09TB	Food additives and Flavoring Technology	4	4	-	4	50	50	100
Skill Component								
VFT3S07TB	Technology of Fish, Meat and Egg Processing	6	2	-	2	25	25	50
VFT3S07PB	Technology of Fish, Meat and Egg Processing		-	4	4	50	50	100
VFT3S08TB	Technology of Spices and plantation crop	6	2	-	2	25	25	50
VFT3S08PB	Technology of Spices and plantation crop		-	4	4	50	50	100
VFT3S09TB	Food Microbiology	6	2	-	2	25	25	50
VFT3S09PB	Food Microbiology		-	4	4	50	50	100
Total		30	18	12	30	375	375	750
Semester - IV						Marks		
Course code	Title	Credits	L	P	Hours/week	CIA	ESE	Total
General Component								
VFT4G10TB	Marketing Management	4	4	-	4	50	50	100
VFT4G11TB	Food Product Design and Development	4	4	-	4	50	50	100
VFT4G12TB	By-product utilization and Waste Management	4	4	-	4	50	50	100
Skill Component								
VFT4S10TB	Technology of Cereal, Pulses and Oilseeds	6	2	-	2	25	25	50
VFT4S10PB	Technology of Cereal, Pulses and Oilseeds		-	4	4	50	50	100
VFT4S11TB	Technology of Beverages	6	2	-	2	25	25	50
VFT4S11PB	Technology of Beverages		-	4	4	50	50	100
VFT4S12TB	Fermentation Technology	6	2	-	2	25	25	50
VFT4S12PB	Fermentation Technology		-	4	4	50	50	100
Total		30	18	12	30	375	375	750

L: Lectures

P: Practical

CIA: Continuous Internal Assessment

ESE: End Semester Examination

Semester – V						Marks		
Course code	Title	Credits	L	P	Hours/week	CIA	ESE	Total
General Component								
VFT5G13TB	Product and brand Management	4	4	-	4	50	50	100
VFT5G14TB	Computer Applications	4	4	-	4	50	50	100
VFT5G15TB	Food Processing equipments	4	4	-	4	50	50	100
Skill Component								
VFT5S13TB	Processing of Fruits and Vegetables	6	2	-	2	25	25	50
VFT5S13PB	Processing of Fruits and Vegetables		-	4	4	50	50	100
VFT5S14TB	Engineering properties of foods	6	2	-	2	25	25	50
VFT5S14PB	Engineering properties of foods		-	4	4	50	50	100
VFT5S15TB	Product Development & Sensory Evaluation of foods	6	3	-	3	30	45	75
VFT5S15PB	Sensory Evaluation of foods and Project		-	3	3	30	45	75
Total		30	19	11	30	360	390	750
Semester – VI						Marks		
Course code	Title	Credits	L	P	Hours/week	CIA	ESE	Total
General Component								
VFT6G16TB	Personality Development	4	4	-	4	50	50	100
VFT6G17TB	Emerging Technologies in food Industry	4	4	-	4	50	50	100
VFT6G18TB	Food Quality Assurance	4	4	-	4	50	50	100
Skill Component								
VFT6S16TB	Unit Operations in Food Industry	6	2	-	2	25	25	50
VFT6S16PB	Unit Operations in Food Industry		-	4	4	50	50	100
VFT6S17PB	Internship	6	-	6	6	75	75	150
VFT6S18PB	Project and Viva-Voce	6	-	6	6	75	75	150
Total		30	14	16	30	375	375	750

L: Lectures

P: Practical

CIA: Continuous Internal Assessment

ESE: End Semester Examination

12. Evaluation: Scheme of Examination, Assessment, Standard of Passing and Award of Class will be done according to the guidelines given by the SPPU (Circular no. 223/2014)

Criteria for Continuous Internal Assessment (CIA):

12.1 For General Component:

Components	Marks
Attendance	15
Assignment	15
Test paper	10
Seminar	10
Total	50

12.2 For Skill Component (Th):

Components	Marks
Attendance	10
Assignment	10
Test paper	5
Total	25

12.3 For Skill Component (Pr):

Components	Marks
Attendance	10
Journal	10
Internal Practical exam	10
Viva	10
Study tour	10
Total	50

The evaluation of all components shall be published by the department and shall be acknowledged by the candidate. All documents of the assessment will be retained in the department for 2 years and be made available for verification.

**Syllabi of
Skill and General
Courses**

Semester – I						Marks		
Course code	Title	Credits	L	P	Hours/ week	CIA	ESE	Total
General Component								
VFT1G01TB	Communication skills in English	4	4	-	4	50	50	100
VFT1G02TB	Entrepreneurship Development and Project Management	4	4	-	4	50	50	100
VFT1G03TB	Food Science and Nutrition – I	4	4	-	4	50	50	100
Skill Component								
VFT1S01TB	Bakery and Confectionery Technology	6	2	-	2	25	25	50
VFT1S01PB	Bakery and Confectionery Technology		-	4	4	50	50	100
VFT1S02TB	Principles of Food processing	6	2	-	2	25	25	50
VFT1S02PB	Principles of Food processing		-	4	4	50	50	100
VFT1S03TB	Food Chemistry	6	2	-	2	25	25	50
VFT1S03PB	Food Chemistry		-	4	4	50	50	100
Total		30	18	12	30	375	375	750

L: Lectures**CIA: Continuous Internal Assessment****P: Practical****ESE: End Semester Examination**

VFT1G01TB – Communication Skills in English
(GENERAL COMPONENT – 01)
Semester I

Total Credits: 4

Total Lecture Hours: 60 (4 Hours/ Week)

Aim of the course: To enhance LSWR skills so that students may effectively communicate in the English language

Course Outcomes:

- To students in the usage of English Language in various contexts and enable them to communicate effectively in English.
- To re-introduce students to the basics of English grammar so that they may comprehend, speak and write grammatical correct English.
- To enable the students to speak English confidently and effectively in a wide variety of situations.
- To help the students to improve their reading efficiency by refining their reading strategies.
- To develop the ability to compose pieces of literary writing.

Syllabus Content

Module I: Grammar

12Hours

Articles, Verbs, Active and Passive Voice, Tenses, Concord, Modal Auxiliaries, Adverb, The Prepositions, Conjunctions, Idioms, Phrasal Verbs, Direct and Indirect Speech.

Module II: Listening

10 Hours

Active listening, Barriers to listening, Listening and note taking, Listening to announcements, Listening to news on the radio and television.

Module III: Speaking

10Hours

Brief introduction to the Phonetic script, Falling and rising tones, Participating in conversations, Small Talk, Making a short formal speech, telephone skills ,Group Discussion, oral presentation, comparing.

Module IV: Reading

14Hours

Reading: Theory and Practice, Sharing Intensive reading, Reading for information, Understanding text structure, Locating main points, Making inferences, Reading graphics, Reading for research.

Module V: Writing

14 Hours

Describing people, place, events and things, Paragraph writing, Vocabulary and Report writing, Minutes, Resume, Letter and application writing.

Learning Resources References

1. Sasikumar V, Kiranmai Dutt, P and Geetha Rajeevan (2007), “Communication Skills in English”, Cambridge University Press, New Delhi.

2. Alec Fisher (2011), "Critical Thinking: An Introduction", Cambridge University Press, New Delhi.
3. Stephen Bailey, (2010), "Academic Writing: A Handbook for International Students", Routledge Publishers.
4. Ilona Leki (1998), "Academic Writing: Exploring Processes and Strategies", Cambridge University Press. New Delhi.
5. Patsy McCarthy, Caroline Hatcher (2002), "Presentation Skills: The Essential Guide for Students (Study Skills), SAGE Publishers.

**VFT1G02TB – Entrepreneurship Development and Project Management
(GENERAL COMPONENT - 02)
Semester I**

Total Credits: 4

Total Lecture Hours: 60 (4 Hours/ Week)

Aim of the course: To develop Entrepreneurial culture and encourage the students to become entrepreneurs.

Course Overview and Context

- To know about the various procedures for starting a small scale unit of production.
- To have a basic idea about how to prepare a project to start a small scale industry.
- To know about various agencies that can provide assistance for starting a new project.

Syllabus Content

Module I: Introduction to Entrepreneurship 18 Hours

Meaning, definition and concepts, characteristics, functions, entrepreneurial traits and motivation, role of entrepreneur in economic development, factors affecting entrepreneurial growth. Types of entrepreneurs - Intrapreneurship, Women entrepreneurship, significance, problems, solutions to the problems

Module II: Entrepreneurial Development Programme 10 Hours

Objectives, Steps, Need for training- target group- Contents of the training programme-Special Agencies for Entrepreneurial Development and Training-DIC.

Module III: Project 12 Hours

Meaning, Features, Classification, Project identification, Stages in project identification, Project Life Cycle, Project formulation- Elements, Feasibility Analysis- Network Analysis- Project Planning.

Module IV: Setting up of micro small and medium enterprises 10 Hours

Setting up of micro small and medium enterprises, location significance, Green channel, Bridge capital, Seed capital assistance, Margin money scheme, Sickness, Causes-Remedies.

Module V: Role of institutions/schemes in entrepreneurial development 10 Hours

SIDCO, SIDBI, NIESBUD, EDII, SISI, NREG Scheme- SWARNA JAYANTHI, Rozgar Yojana Schemes.

Learning Resources

Reference Books

1. Drucker, Peter (2014), "Innovation and Entrepreneurship", Routledge Publishers.
2. Abraham M.M, (2010), "Entrepreneurship Development and Project Management", Prakash Publications and Printers.
3. Desai,Vasant (2001), "Dynamics of entrepreneurial development and management". Himalaya Publishing House.

**VFT1G03TB – Food Science and Nutrition I
(GENERAL COURSE - 03)
Semester I**

Total Credits: 4

Total Lecture Hours: 60 (4 Hours/ Week)

Aim of the course: To understand the nutrient composition of foods, their functions, sources and to impart knowledge of concept of good health and its importance.

Course Overview and Context

- To know and understand the functions, importance of all nutrients present in foods.
- To know about the various types of nutrients and their functions in the body.
- To familiarize with the recent advances in field of nutrition
- To understand the different types of newly developed food products.

Syllabus Content

Module II: Food and water

15 Hours

Definition of food and nutrition, classification of foods based on origin, pH, nutritive value. Basic five food groups, nutrients, food guide pyramid. Functions of foods. New concepts of food: health foods, ethnic foods, organic foods, functional foods, nutraceuticals, fabricated foods, extruded foods, convenience foods, junk foods, GM foods and proprietary foods. Water: functions, sources, requirement, water balance, toxicity and deficiency.

Module II: Cereals, Pulses, nuts and oil seeds

15 Hours

Cereals: Structure, composition and nutritive value of wheat, rice and maize, cereal cookery, other important cereals.

Pulses: Composition and nutritive value, Pulse cookery

Nuts and oil seeds: Composition, nutritive value, important nuts and oil seeds, role of nuts and oil seeds in cookery

Module III: Fruits and Vegetables

15 Hours

Fruits: classification, composition and nutritive value, ripening and browning of fruits.

Vegetables: Classification, composition and nutritive value, vegetable cookery, algae, fungi as food, role of vegetables in cookery.

Module IV: Foods from Animal origin

15 Hours

Milk and milk products: Composition, nutritive value, physical properties of milk, milk cookery, milk substitutes.

Egg and Flesh foods: Egg structure, composition and nutritive value of egg, egg cookery, role of egg in cookery. Composition, nutritive value and cookery of meat, fish and poultry.

Learning Resources Reference Books

1. James L Groff and Sareen S Gropper, (2009) "Advanced Nutrition and Human Metabolism", Fourth Edition, Wadsworth Publishing Company.

2. Maurice B Shils, Moshe Shike A, Catherine Ross, Benjamin Cabellero, Robert J Cousins, (2006), "Modern Nutrition in Health and Disease", Lippincott Williams alWilkins.
3. Michael J Gibney, Ian A Macdonald and Helen M Roche (2003) "Nutrition and Metabolism", The Nutrition Society Textbook Series, Blackwell Publishing, First Edition.

VFT1S01TB – Bakery and Confectionery Technology
(SKILL COMPONENT - 01)
Semester I

Total Credits: 6

Credits for Theory : 2

Total Lecture Hours: 30 (2 Hours/ Week)

Aim of the course: To impart basic and applied technology of baking and confectionery and acquaint with the manufacturing technology of bakery and confectionery products.

Course Outcomes:

- To understand the processing methods used in baking and confectionery industries.
- To know about the various types of food products made using baking technology.
- To have a basic idea about baking and confectionery manufacture and quality control.
- To know about the importance of each ingredient in the bakery and how it effects the overall product and its sensory and quality parameters.
- To be able to start a small scale bakery and confectionery unit

Syllabus Content

Module I: Wheat and bakery ingredients:

06 Hours

Wheat – importance, production varieties used for cultivation, Types of wheat, Physico-chemical and Rheological properties, Conditioning of wheat, Quality – Hardness, Gluten strength, protein content, soundness. Products of wheat milling industry, flour, atta, etc. flour grades, supplementation, Fortification, Flour additives, flour improvers, Bleaching, Oxidizing agents, role of bakery ingredients (major and minor)

Module II: Bakery Products

09 Hours

Bakery products, from hard wheat: bread processes of bread making using straight and sponge dough methods role of each ingredient, quality control Testing of raw material testing of final product, Defects in bread; staleness, ropiness.

Baked products from soft wheat; cookies, crackers, biscuits, cakes – ingredients, process, fault causes and remedy

Other bakery products: using very hard wheat. Pizza, pastry and its types. Macaroni products: Including spaghetti, noodles, and vermicelli-process.

Setting of bakery unit, bakery norms, specifications for raw materials Packaging, marketing of products.

Module III: Introduction to Confectionery and raw materials

06 Hours

History, Traditional confectionary goods, Types of confectionary, classification of confectionery products. Sugar, Sugar qualities, Physical, Chemical, Optical properties. Dextrose, Invert sugar, Fructose, Lactose, maltose, caramel, Honey, maple syrup, Iso malt, Production of glucose syrup/ corn syrups, CSS, HFCS, Acid hydrolysis, enzyme hydrolysis. Sugarcane, jaggery, forms of sugar, beet sugar, manufacture of sugar from sugar cane.

Module IV: Confectionery

09 Hours

Cocoa and Chocolate Processing: Ingredients, Mixing, Refining, Conching, Tempering, Molding, Cooling, Coating, Fat bloom.

High Boiled Sweets: Introduction, Composition, Properties of high boiled sweets, preparation of high boiled sweets, Traditional, batch and continuous Method of preparation, Different types

of higher boiled sweets.

Caramel: Definition, Composition, Factors affecting quality of caramel, caramel Manufacture process, batch type, continuous types, checking of faults in caramel,

Toffee: Definition, Composition, types of toffee Ingredient and their role. Batch and Continuous method of toffee

Lozenges: Definition recipe, Method of Manufacture, Compositions, factors affecting quality, checklist of faults and remedy.

Tablets: Definitions, recipe, composition, wet granulation, Slugging, Manufacture of Tablet, and Checklist of tablet faults. Quality of confectionery, Standards and regulations, Packaging requirements of confectionary.

VFT1S01PB – Bakery and Confectionery Technology

Credits for Practical: 4

Total Practical: 16 (04 Hours each)

Sr. No	Name of Practicals	No. of Practical
1.	Quality evaluation of flour and yeast	1
2.	Processing of Cakes	1
3.	Processing of muffins	1
4.	Processing of lava cake	1
5.	Processing of sweet and salty biscuits	1
6.	Processing of bread	1
7.	Processing of Pizza	1
8.	Processing of pastry	1
9.	Processing of donuts	1
10.	Processing of groundnut chikki	1
11.	Processing of Fudge	1
12.	Processing of hard boiled candy	1
13.	Processing of chewy caramel	1
14.	Processing of molded chocolates	1
15.	Preparation of <i>shrikhand wadi</i>	1
16.	Visit to production unit of a bakery and confectionery.	1
	Total	16

Learning Resources Reference books:

1. Zhou. W, Hui Y,H; (2014), "Bakery Products Science and Technology", 2nd Edition, Wiley Blackwell Publishers,
2. Pyler, E. J. and Gorton, L.A.(2009), "Baking Science & Technology" Vol.1 Fourth Edition, Sosland Publications.
3. Stanley P. Cauvain, Linda S. Young, (2008), "Baked Products: Science Technology and Practice". John Wiley & Sons Publishers.
4. Matz S.A. (1985), "Snack Food Technology" Springer, ISBN: 9780870554605
5. Bernard W. Minifie (1999), "Chocolate, Cocoa and Confectionery: Science and Technology" Springer, ISBN: 9780834213012
6. Lusas EW and Rooney LW (2001), "Snack Food Processing" CRC Press, ISBN: 9781420012545

**VFT1S02TB – Principles of Food Processing
(SKILL COMPONENT - 02)**

Semester I

Total Credits: 6

Credits for Theory: 2

Total Lecture Hours: 30 (4 Hours/ Week)

Aim of the course: To make students understand about the food processing, mechanism of spoilage and deterioration in foods, the basic food preservation principles, and methods to preserve foods.

Course Outcomes:

- To study the different ways in which food spoilage occurs and the techniques to prevent it.
- To know the different spoilage agents and the ways in which they act on food.
- To understand the principles behind the various methods of food preservation.
- To know how to use these principles to preserve different types of foods.
- To study the method of action of different preservatives.

Syllabus Content

Module I: Food Processing

6 Hours

Introduction: Defining food; Classification of food; Cooking of foods: Objectives, methods of cooking, cooking media, modes of heat transfer

Module II: Food spoilage

6 Hours

Constituents of foods; Food processing; Food Spoilage Definition, types of spoilage - physical, enzymatic, chemical and biological spoilage. Food poisoning, Food-borne intoxication, Food-borne infection,

Module III Food Preservation by Heat and Cold

9 Hours

Principles and Methods of food preservation, High Temperature Preservation: Blanching; Pasteurization; Sterilization; Canning,
Low temperature preservation: Introduction; methods of low temperature preservation; chilling; refrigeration and cold storage

Module IV Food Preservation by Drying, Irradiation and Preservatives

9 Hours

Drying, dehydration and concentration: Introduction; purpose; water activity and relative humidity; factors affecting rate of drying and dehydration; drying methods;
Concentration- methods of concentration.

Food Irradiation: Introduction; Radiation sources; Measurement of radiation dose; Mechanism of Action; Type of irradiation; Factors affecting food irradiation; Effect of irradiation, applications

Preservation by Natural preservatives, Sugar, Salt and Acids: Sugar – Introduction, Factors affecting osmotic pressure of sugar solution, Foods preserved using sugar; Salt: Introduction, Antimicrobial activity of salt, Food products preserved using salt; Acid – Introduction, Mechanism, and Common foods preserved using acids

Preservation by Use of Chemical preservatives: Introduction; Objectives; Factors affecting antimicrobial activity of preservatives; Type of chemical preservatives; Sulphur dioxide, Benzoic acid, etc;

Food Fermentation: Introduction, methods, common fermented foods

VFT1S02PB – Principles of Food Processing**Credits for Practical : 4****Total Practical: 16 (04 Hours each)**

Sr. No	Names of Practical	No. of Practical
1.	Demonstration of various machineries used in food processing.	1
2.	Demonstration on effect of blanching on quality of foods.	1
3.	Demonstration on canning and bottling of fruits and vegetables.	1
4.	Preservation of food by high concentration of sugar i.e. preparation of jam	1
5.	Preservation of food by using salt e.g. Pickle	1
6.	Preservation of food by using acidulants i.e. pickling by acid, vinegar or acetic acid	1
7.	Preservation of food by using chemicals.	1
8.	Preservation of coconut shreds using humectants.	1
9.	Drying of fruit slices in cabinet drier	1
10.	Demonstration on drying of green leafy vegetables	1
11.	Osmotic dehydration of foods e.g. candy	1
12.	Drying of foods using freeze-drying & spray drying process.	1
13.	Preservation of milk by condensation/concentration.	1
14.	Demonstration of preserving foods under cold v/s freezing process.	1
15.	Preservation of food by fermentation (Sauerkraut, idli, curd, dhokla etc.)	1
16.	Visit to any food processing industry/unit.	1
	Total	16

Learning Resources Reference Books

1. Gould, G. W. (2012), "New Methods of food preservation", Springer Science & Business Media.
2. Manay, N.S. Shadaksharaswamy, M. (2004), "Foods- Facts and Principles", New age international publishers, New Delhi.
3. Subalakshmi, G and Udipi, S.A.(2001),"Food processing and preservation". New Age International Publishers, New Delhi.
4. P. Fellows (2000), "Food Processing Technology: Principles and Practice" CRC Press, SBN: 9780849308871.
5. Girdhari Lal, G. S. Siddappa, G. L. Tandon, (1986) "Preservation of Fruits & Vegetables" Indian Council of Agricultural Research, Publications.
6. Jelen P. (1985), "Introduction to Food Processing" Prentice Hall.

**VFT1S03TB – Food Chemistry
(SKILL COMPONENT - 03)
Semester I**

Total Credits: 6

Credits for Theory: 2

Total Lecture Hours: 30 (2 Hours/ Week)

Aim of the course: **To explain the chemical composition and functional properties of food.**

Course Outcomes:

- To study about the major and minor components of food and their properties
- To know about the changes that occurs in foods during processing.
- To study the classification, structure and chemistry of the various food components.
- To understand the changes that occurs in the different constituents during storage and ways and means to prevent it.

Syllabus Content

Module I: Water

5 Hours

Introduction to food chemistry, Role and type of water in foods; Functional properties of water; role of water in food spoilage; Water activity, estimation of moisture in foods, determination of moisture and water activity.

Module II: Carbohydrates and Proteins

9 Hours

Carbohydrates: Nomenclature, composition, sources, structure, functions, classification, Properties of Starch – gelatinisation, gel formation, syneresis, starch degradation, dextrinisation, retrogradation.

Proteins: Nomenclature, sources, structure, functions, classification, Physical, chemical and functional properties - denaturation, hydrolysis. Enzymes - Specificity, mechanism of enzyme action, factors influencing enzymatic activity, controlling enzyme action, enzymes added to food during processing, enzymatic and non enzymatic browning.

Module III: Fats and oils

9 Hours

Nomenclature, composition, sources, structure, functions, classification, Physical and chemical properties-hydrolysis, hydrogenation, rancidity and flavour reversion, emulsion and emulsifiers, saponification value, acid value and iodine value, smoke point.

Module IV: Pigments and colors in food

7Hours

Pigments indigenous to food, structure, chemical and physical properties, effect of processing and storage, colors added to foods, antinutritional factors their occurrence, effects and methods of elimination or inactivation- protease inhibitions, lectins, lathyrogens, phytates and flatulence factors.

VFT1S03PB – Food Chemistry**Credits for Practical: 4****Total Practical: 16 (04 Hours each)**

Sr. No	Names of Practicals	No. of Practical
1.	Principle and working of analytical instrument such as hot air oven, colorimeter, balances, muffle furnace, spectrophotometer, centrifuge	1
2.	Preparation of standard solutions	1
3.	Estimation of Moisture from food sample	1
4.	Estimation of ash from food sample	1
5.	Estimation of Protein from food sample	1
6.	Estimation of Fat from food sample	1
7.	Determination of acidity of juice sample	1
8.	Estimation of vitamin C	1
9.	Estimation of Fiber from food sample	1
10.	Qualitative test for carbohydrates	1
11.	Water analysis- P ^H and Hardness	1
12.	Determination of percent free fatty acids and Acid value of fat /oil	1
13.	Iodine value of fat / oil	1
14.	Estimation of saponification value	1
15.	Effect of Acid & alkali on colour of fruits & vegetables	1
16.	Visit to Food testing laboratory	1
	Total	16

Reference Books:

1. Yildiz, Fatih (2009), "Advances in Food Biochemistry", CRC Press, NewYork.
2. Damodaran,S., Parkin , K L.,Fennema, O R., (2008), "Fennema's Food Chemistry"- 4th edition, CRC press, NewYork
3. Campbell, M K and Farrell, S O (2006), "Biochemistry", 5th edition, Cengage LearningPublishers,USA.
4. Manay, N.S. Shadaksharaswamy, M. (2004), "Foods- Facts and Principles", New age international publishers, NewDelhi.
5. Meyer, L.H. (2002), "Food Chemistry". CBS publishers and Distributors, New Delhi

Semester – II						Marks		
Course code	Title	Credits	L	P	Hours/ week	CIA	ESE	Total
General Component								
VFT2G04TB	Critical Thinking, Academic Writing and Presentation Skills	4	4	-	4	50	50	100
VFT2G05TB	Business Communication	4	4	-	4	50	50	100
VFT2G06TB	Sanitation and Hygiene	4	4	-	4	50	50	100
Skill Component								
VFT2S04TB	Dairy Technology	6	2	-	2	25	25	50
VFT2S04PB	Dairy Technology		-	4	4	50	50	100
VFT2S05TB	Packaging Technology	6	2	-	2	25	25	50
VFT2S05PB	Packaging Technology		-	4	4	50	50	100
VFT2S06TB	Food Science and Nutrition – II	6	2	-	2	25	25	50
VFT2S06PB	Food Science and Nutrition – II		-	4	4	50	50	100
Total		30	18	12	30	375	375	750

L: Lectures

P: Practical

CIA: Continuous Internal Assessment

ESE: End Semester Examination

**VFT2G04TB– Critical Thinking, Academic Writing and Presentation Skills
(GENERAL COMPONENT-04)
Semester II**

Total Credits: 4

Total Lecture Hours: 60 (4 Hours/ Week)

Aim of the Course: To introduce students to the concept of critical thinking, help develop analytical skills and improve academic writing and presentation skills.

Course Outcomes:

- To introduce the students to the concept of critical thinking, enlighten students on academic writing and develop presentation skills.
- To make the students aware of the fundamental concepts of critical reasoning and to enable them to read and respond critically, drawing conclusions, generalizing, differentiating fact from opinion and creating their own arguments.
- To enable students to structure arguments and develop research papers/assignments that is free from fallacies.
- To assist the students in developing appropriate and impressive writing styles for various contexts.
- To help students rectify structural imperfections and to edit what they have written.
- To equip students for making academic presentations effectively and impressively.

Syllabus Content

MODULE I: Critical Thinking

20 Hours

Introduction to critical thinking, Benefits, Barriers, Reasoning, Arguments, Deductive and inductive arguments, Fallacies, Inferential comprehension, Critical thinking in academic writing, Elements: Clarity, Accuracy, Precision and Relevance.

MODULE II: Research for Academic writing

10 Hours

Data collection, Use of print, electronic sources and digital sources. Selecting key points, Note making, paraphrasing, summary.

MODULE III: Writing Process

10 Hours

Documentation, Plagiarism, Structure and Content: Title, Body paragraphs, Introduction and conclusion. Revising, Proof-reading.

MODULE IV: Writing Models

10 Hours

Letters, Letters to the editor, Resume and covering letters, e-mail, Seminar papers, Project reports, Notices, Filling application forms, Minutes, agenda, Essays

MODULE V: Presentation Skills

10 Hours

Soft skills for academic presentations, Effective communication skills, Structuring the presentation, Choosing appropriate medium, Flip charts, OHP, PowerPoint presentation, Clarity and brevity, Interaction and persuasion, Interview skills, Group Discussions

Learning Resources Reference

1. Anderson Marilyn, (2010), "Critical Thinking, Academic, Writing and Presentation Skills", Pearson Education and Mahatma Gandhi University.
2. Alec Fisher (2011), "Critical Thinking: An Introduction", Cambridge University Press, New Delhi.

3. Stephen Bailey, (2010), "Academic Writing: A Handbook for International Students", Routledge Publishers.
4. Ilona Leki (1998), "Academic Writing: Exploring Processes and Strategies", Cambridge University Press. New Delhi.
5. Patsy McCarthy, Caroline Hatcher (2002), "Presentation Skills: The Essential Guide for Students (Study Skills), SAGE Publishers.

**VFT2G05TB – Business Communication
(GENERAL COMPONENT - 05)
Semester II**

Total Credits: 4

Total Lecture Hours: 60 (4 Hours/ Week)

Aim of the course: To develop basic communication skills to communicate interpersonally and to study about to tools to overcome the barriers of communication.

Course Outcomes:

- To understand the basics of finance and marketing.
- To have a basic idea about mobilization of human and financial resources
- To know about the various consumer protection laws.
- To understand the legal, social, psychological factors that affect starting up a business venture

Course Content

Module I: Basis of Communication

13Hours

Meaning, importance and process, need and objectives of communication, 7Cs of communication, barriers of communication, How to overcome communication barrier.

Module II: Means/Media of Communication

10Hours

Verbal and nonverbal communication channel of formal and informal communication. Types of communication. downward, upward, Horizontal or lateral, Diagonal or cross.

Module III: Listening as a communication tool

15Hours

Importance types of listening, Barriers to effective listening. How to make listening effective. Speeches and presentation – characteristics of a good speech. How to make effective presentation- planning, preparation, organizing, rehearsing and delivery.

Module IV: Groups

12Hours

Importance of features, advantage and disadvantages techniques of group decision making- Brain storming sessions, Nominal group technique, Delphian Technique, solving problems in groups.

Module V : New Trends in Business communication

10Hours

E mail, teleconferencing, video conferencing, SMS.

Learning Resources

References

1. Mary Ellen Guffey, Dana Loewy, (2015), “Essentials of Business Communication”, Cengage Learning.
2. Carol M. Lehman, Debbie D. DuFrene, (2010), “Business Communication”, Cengage Learning.
3. Peter Hartley, Clive Bruckmann, (2008), “Business Communication”, Routledge Publishers.

**VFT2G06TB – Sanitation and Hygiene
(GENERAL COMPONENT -06)
Semester II**

Total Credits: 4

Total Lecture Hours: 60 (4 Hours/ Week)

Aim of the Course: To understand and impart knowledge of importance of food hygiene, sanitation, and safety during food processing unit.

Course Outcomes:

- To know the principles and applications of sanitation in food industry.
- To know about the various types of Sanitation techniques applicable in the food industry
- To gain an understanding of food hygiene, sanitation and safety during food processing unit operations.

Syllabus Content

Module I: Sanitation and Health

14 Hours

Definition, importance of sanitation, application of sanitation to food industry and food service establishments. Microorganisms and their characteristics, control of microbial growth in food. Food contamination and spoilage, food borne diseases.

Module II: Hygiene and food handling

14 Hours

Purchasing and receiving safe food, food storage, sanitary procedures in food preparation, serving and displaying of food, special food operations.

Module III: Environmental Sanitation

16 Hours

Location and layout of premises, constructional details, sanitary requirements for equipments, guidelines for cleaning equipments, cleaning procedures, pest control, water supply, storage and waste disposal, environmental pollution.

Module IV: Hygiene Practices in food industry

16 Hours

Introduction, necessity, personnel hygiene, sanitary practices, management and sanitation, safety at work place.

Sanitation regulations and Standards

Introduction, regulatory agencies, control of food quality, local health authority. Food sanitation check lists.

Learning Resources References

1. Marriott, Norman (2013), "Principles of Food Sanitation", Springer Science & Business MediaPublishing.
2. Roday S, (2011) (2002), "Food Hygiene and Sanitation", McGraw Hill Publishing Company Limited.
3. H. L. M. Lelieveld, John Holah, David Napper, (2014), "Hygiene in Food Processing: Principles and Practice", Elsevier Publications.

VFT2S04TB- Dairy Technology
(SKILL COMPONENT - 04)
Semester II

Total Credits: 6

Credits for Theory: 2

Total Lecture Hours: 30 (2 Hours/ Week)

Aim of the course: To inculcate the knowledge regarding various dairy products and its processing techniques.

Course Outcomes:

- To understand about the products that can be made from milk.
- To understand the processing and storage of dairy products.
- To know about the quality control measures applied in dairy industries.
- To have a basic idea about their processing and products which can be made at a small scale

Syllabus Content

Module I: Introduction

5 Hours

Milk - Definition, sources, and composition of milk, factors effecting composition of milk, physiochemical properties of milk, grading of milk-definition and types of grades, collection and transportation of milk.

Module II: Processing of market milk

12 Hours

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 pasteurizer, Sterilization and Homogenization, Cream separation-centrifugal cream separator, bactofugation.

Special milks

Skim milk, evaporated milk, condensed milk, standardized milk, toned milk, double toned milk, flavoured milk, reconstituted milk.

Module III: Indigenous and Fermented milk products

06 Hours

Product description, methods for manufacture of butter, cheese, ice cream, khoa, channa, paneer, shrikhand, ghee. Spray drying system: dried milk- whole milk and skim milk powder. Milk and milk products in India.

Module IV: In-Plant cleaning system

07 Hours

Introduction to Cleaning in- place (CIP) system - cleaning procedure, Cleaning efficiency, Methods of cleaning in food industry, cleaning solutions – Detergents, Sanitizers. SIP system of dairy plant, Personal hygiene in dairy plant.

VFT2S04PB- Dairy Technology

Credits for Practical: 4

Total Practical: 16 (04 Hours each)

No. of Units	Topics	No. of experiments
1	Physical examination of milk	1
2	Platform tests of milk	1
3	Determination of Adulteration in milk	1
4	Determination of Titratable Acidity of Milk.	1
5	Determination of fat content in milk.	1
6	Determination of SNF content in milk.	1
7	Preparation of coagulated milk product (paneer and	1

	channa)	
8	Preparation of channa based sweet (<i>Rasogulla</i>)	1
9	Preparation of dahi amd Lassi.	1
10	Preparation of khoa and Basundi.	1
11	Preparation of chakka	1
12	Preparation of shrikand and amrakhand.	1
13	Preparation of kalakand.	1
14	Preparation of cooking butter and ghee.	1
15	Preparation of flavoured milk.	1
16	Visit to milk product development centre.	1
	Total	16

Learning Resources

References

1. Joshi.V.K., (2015), "Indigenous Fermented Foods of South Asia", CRC Press.
2. Alan H. Varnam, (2012), "Milk and Milk Products: Technology, chemistry and microbiology", Springer Science & Business Media Publishers.
3. Robinson, R. K., (2012), "Modern Dairy Technology: Volume 2 Advances in Milk Products", Springer Science & Business Media Publishers.
4. Sukumar De, (2008) "Outline of Dairy Technology", Oxford University Press .

VFT2S05TB - Packaging Technology
(SKILL COMPONENT - 05)
Semester II

Total Credits: 6

Credits for Theory: 2

Total Lecture Hours: 30 (2 Hours/ Week)

Aim of the course: To provide knowledge about trends and development in food packaging technologies and materials.

Course Outcomes:

- To familiarize with the different materials and methods used for packaging.
- To understand the technology behind packaging and packaging materials
- To have a basic idea about the materials used for food packaging and their testing.
- To know about the different forms in which a food can be packed.

Syllabus Content

Module I: Introduction to packaging

4 Hours

Definition, Functions of packaging – Containment, Protection, Preservation, Promotion, Convenience, Communication. Requirements of effective package, Types of food packaging- primary, secondary and tertiary packaging.

Module II: Packaging Materials and their properties

10 Hours

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. Packaging materials for dairy products, bakery and confectionary, granular products, fruits and vegetables.

Module III: Special Packaging

8 Hours

Lamination, Coating and Aseptic packaging, Active packaging, Intelligent packaging, Modified atmospheric packaging and controlled atmospheric packaging, Shrink packaging, stretch packaging, Biodegradable packaging, Edible packaging, Tetrapacks.

Module IV: Labelling and safety concerns in food pack

8 Hours

Printing process, inks, adhesives, labelling, coding- bar codes, Food packaging closures of glass and plastic containers, Legislative and safety aspects of food packaging, Machineries used in Food Packaging, Package testing-Thickness – Paper density - Basis weight – Grammage - Tensile Strength - Gas Transmission Rate (GTR) - Water Vapour Transmission Rate(WVTR).

VFT2S05PB - Packaging Technology

Credits for Practical: 4

Total Practical: 16 (04 Hours each)

No. of Units	Topics	No. of experiments
1	Identification of packaging materials	1
2	Measurement of thickness of packaging films, papers and boards	1
3	Measurement of water absorption of paper, paper boards	1
4	Measurement of bursting strength of paper of paper boards	1
5	Measurement tear resistance of papers	2
6	Measurement of puncture resistance of paper and paperboard	1

7	Measurement of tensile strength of paper of paper boards	1
8	Determination of gas transmission rate of package films	1
9	Determination of WVTR of films	2
10	Determination of coating on package materials	1
11	Tests for identification of plastic films	2
12	Prepackaging practices followed for packing of fruits and vegetables	1
13	Visit to packaging industry	1
	Total	16

Learning Resources References

1. Gordon L. Robertson (2012), "Food Packaging: Principles and Practice", Third Edition, CRC Press.
2. Takashi Kadoya (2012), "Food Packaging", Academic Press.
3. Richard Coles, Derek McDowell, Mark J. Kirwan (2003), "Food Packaging Technology", CRC Press.

Sr. No.	Name of Book	Author	Publisher
1	Fundamentals of Packaging	F.A. Paine	Institute of Packaging, 1981 ISBN: 9780950756707
2	Plastic Packaging: Properties, Processing and Applications	Culter JD and Hernandez RJ	Hanser, 2004 ISBN: 9783446229082
3	Food Packaging Technology	Richard C, Derek M, Mark J.K.	CRC Press, 2003 ISBN: 9780849397882
4	Principles of Food Packaging	Sacharwo S and Griffin RC	AVI Publication, 1980
5	A Handbook of Food Packaging	Painy FA	Blackie Academics, 1992

VFT2S06TB – Food Science and Nutrition II
(SKILL COMPONENT - 06)
Semester II

Total Credits: 6**Credits for Theory: 2****Total Lecture Hours: 30 (2 Hours/ Week)**

Aim of the course: To understand about the macronutrients their functions, digest, absorption and storage mechanisms and their relationship with good health and sustenance of life.

Course Outcomes:

- To know and understand the functions, importance of all nutrients present in foods.
- To know about the various types of nutrients and their functions in the body.
- To familiarize with the recent advances in field of nutrition
- To gain knowledge about the latest laws relevant to the food industry

Syllabus Content**Module I: Nutrition, agencies and policies****5 Hours**

Concepts and content of nutrition: Nutrition agencies; Nutrition of community; Nutritional policies and their implementation

Module II: Metabolic function of nutrients**10 Hours**

Nutrients: Sources, functions, digestion, absorption, assimilation and transport of carbohydrates, proteins and fats in human beings.

Vitamins: Classification, functions, sources, general causes for loss in foods, bioavailability, enrichment, fortification and restoration. Units of measurement. Deficiency and toxicity disorders.

Minerals: Classification of minerals. Functions, sources, bioavailability and deficiency of the following minerals- Calcium, Iron, Iodine, Fluorine, Sodium, Potassium.

Module III: Energy and BMR**5 Hours**

Units of energy, food as a source of energy, Basal metabolism- BMR; Body surface area and factors affecting BMR Formulation of diets: Classification of balanced diet; Preparation of balanced diet

Module IV: Assessment of Nutritional status**10 Hours**

Malnutrition: Type of Malnutrition; Multi-factorial causes; Epidemiology of under nutrition and over nutrition; Nutrition infection and immunity; Nutrition education

Assessment of nutritional status: Diet surveys; Anthropometry; Clinical examination; Biochemical assessment; Additional medical information In-born error of metabolism: Blood constituents; Nutrients; Hormones and enzymes; Miscellaneous disorders Food fad and faddism Potentially toxic substance in human food.

VFT2S06PB – Food Science and Nutrition II

Credits for Practical: 4**Total Practical: 16 (04 Hours each)**

No. of Units	Topics	No. of Experiments
1	Role of various national and international agencies in field of human Nutrition	2
2	Nutritive value of different food groups	1
3	Nutritional labeling of food products	1
4	Calculation of BMR	1

5	Calculation of BMI	1
6	Anthropometric measurements	1
7	Preparation of balance diet and RDA of nutrients	1
8	Enrichment and fortification of daily diet.	1
9	Computation of energy requirements	1
10	Determination of energy value of food by bomb calorimeter	1
11	Clinical methods of assessing nutritional status (for calorific requirement)	1
12	Clinical methods of assessing nutritional status (for vitamin deficiency)	1
13	Clinical methods of assessing nutritional status (for mineral deficiency)	1
14	Diet for specific health condition (diabetic patient)	1
15	Diet for specific health condition (Obesity)	1
	Total	16

Learning Resources References

1. James L Groff and Sareen S Gropper, (2009) "Advanced Nutrition and Human Metabolism", Fourth Edition, Wadsworth Publishing Company.
2. Hui, Y H, (2007), " Handbook of Food Products Manufacturing" Vol. I , Wiley-Interscience, New Jersey Publishers.
3. Maurice B Shils, Moshe Shike A, Catherine Ross, Benjamin Cabellero, Robert J Cousins, (2006), "Modern Nutrition in Health and Disease", Lippincott Williams alWilkins.
4. Michael J Gibney, Ian A Macdonald and Helen M Roche (2003) "Nutrition and Metabolism", The Nutrition Society Textbook Series, Blackwell Publishing, First Edition.

Semester - III						Marks		
Course code	Title	Credits	L	P	Hours/week	CIA	ESE	Total
General Component								
VFT3G07TB	Business Management	4	4	-	4	50	50	100
VFT3G08TB	Food Analytical Techniques	4	4	-	4	50	50	100
VFT3G09TB	Food additives and Flavoring Technology	4	4	-	4	50	50	100
Skill Component								
VFT3S07TB	Technology of Fish, Meat and Egg Processing	6	2	-	2	25	25	50
VFT3S07PB	Technology of Fish, Meat and Egg Processing		-	4	4	50	50	100
VFT3S08TB	Technology of Spices and plantation crops	6	2	-	2	25	25	50
VFT3S08PB	Technology of Spices and plantation crops		-	4	4	50	50	100
VFT3S09TB	Food Microbiology	6	2	-	2	25	25	50
VFT3S09PB	Food Microbiology		-	4	4	50	50	100
Total		30	18	12	30	375	375	750

L: Lectures**CIA: Continuous Internal Assessment****P: Practical****ESE: End Semester Examination**

**VFT3G07TB- Business Management
(GENERAL COMPONENT -07)
Semester III**

Total Credits: 4

Total Lecture Hours: 60 (4 Hours/ Week)

Course Outcomes:

- To familiarize the students with concepts and principles of Management
- To understand Planning and Development Strategies

Syllabus Content

Module I: Management

12 Hours

Introduction, Meaning, nature and characteristics of Management - Scope and functional areas of management - Management as a science art or profession - Management & Administration – Principles of management - Social responsibility of management.-Contributions of F. W. Taylor and Henry Fayol - Emergence of Japan as an industrial giant.

Module II: Planning

10 Hours

Nature, importance and purpose of planning - Planning process, objectives - Types of plans MBO-Features-steps.

Module III: Organising and Staffing

18 Hours

Nature and purpose of organisation, Principles of organisation - Types of organization, Organisation Chart- Organisation manual-Departmentation, Committees Authority-Deligation of Authority- Responsibility and accountability-Centralisation Vs decentralisation of authority - Nature and importance of staffing - Process of selection & recruitment.

Module IV: Directing and Controlling

20 Hours

Meaning and nature of directing - Motivation- meaning - importance-Theories of Motivation (Maslow s, Herzberg, McGregor s, X & Y theory) Leadership-Meaning- Styles Managerial Grid by Blake and Mounon - Likerts Four level model- Coordination-Meaning and importance.

Controlling: Meaning and steps in controlling - Essentials of a sound control system - Methods of establishing control-Control by Exception.

Learning Resources References

1. Koontz & O Donnell, Management.
2. Appaniah & Reddy, Essentials of Management.
3. L M Prasad, Principles of management.
4. Rustum & Davan, Principles and practice of Management.

**VFT3G08TB- Food Analytical Techniques
(GENERAL COMPONENT -08)
Semester III**

Total Credits: 4

Total Lecture Hours: 60 (4 Hours/ Week)

Objectives:

- To study different techniques used in analysis of food.
- To develop an understanding of qualitative and quantitative isolation of various components from food resources.

Module I: Proximate analysis of food and types of solutions: 15 Hours

Sampling plan; Sample collection and preparation for analysis, Methods for estimation of moisture, protein, fat, fibre, ash and carbohydrate

Types of Solutions: Molar Solution, Normal solution, Colloidal solutions, Buffer solutions, Measurement of pH, Standard solutions, Blank solutions

Module II: Colorimetry, spectrophotometry & Atomic absorption spectroscopy 15 Hours

Principle, Beer's - Lambert's law, Construction, Working, Care of colorimeter and spectrophotometer,

Atomic absorption spectroscopy -Principle, Instrumentation, Applications

Module III: Electrophoresis: 15 Hours

Principle, Types of electrophoresis, Moving boundary electrophoresis, Zone electrophoresis, Isoelectric focusing, Factors affecting electrophoresis, applications

Module IV: Flame photometer and Fluorimetry: 15 Hours

Principle, Construction, Working, Applications Fluorimetric determination of thiamin & Riboflavin

Chromatographic Techniques: Principle, Classification, Partition chromatography, Adsorption chromatography, Gel chromatography, Ion exchange chromatography, Affinity chromatography, Paper chromatography, Column chromatography, HPLC

References:

1. Morris B. Jacobs The chemical analysis of foods and food products, III Edition, CBS Publishers and distributors New Delhi.
2. S. Ranganna, Hand book of analysis and quality control for fruit and vegetable products, II Ed., Tata McGraw Hill Publishing Co. New Delhi.
3. D.T.Plummer An introduction to practical biochemistry, III Ed. Tata McGraw Hill Publishing Co. New Delhi
4. Pomeranz Y., Meloan, Clifton E. 1994. Food Analysis : Theory and practice, 3rd Edn. IS: 6273 (Part-1& Part-2). Chapman and Hall. 8
5. Hand Book of analysis and quality control for fruit and Vegetable Products". IInd edition. Tata McGraw-Hill Publishing Company Ltd. New Delhi.

VFT3G09TB - Food Additives and Flavoring Technology
(GENERAL COMPONENT -09)
Semester III

Total Credits: 6

Credits for Theory: 2

Total Lecture Hours: 30 (2 Hours/ Week)

Aim of the course: To understand the importance of food additives in food processing technology also to study the merits and demerits of addition of food additives.

Course Outcomes:

- To get an insight in to the additives that are relevant to food industry
- To gain knowledge on shelf life extension, processing aids and sensory appeal of additives.
- To develop an understanding of isolation of various biopolymers from food resources and their relevant applications.

Syllabus Content

Module I: Introduction to Food Additives

12 Hours

Role of Food Additives in Food Processing, Scope of food additives, functions -Classification - Intentional & Unintentional Food Additives. Safety Evaluation of Food Additives, Beneficial and Toxic Effects. Food Additives - Generally recognized as safe (GRAS), Tolerance levels & Toxic levels in Foods.

Module II: Types of Food Additives

18 Hours

Preservatives, antioxidants, colours and flavours (synthetic and natural), sequestrants, humectants, hydrocolloids, sweeteners, acidulants, buffering salts, anticaking agents – uses and functions in formulations; indirect food additives, Role in food processing
Derived food additives: Proteins, starches and lipids as functional ingredient; isolation, modification, specifications, functional properties and applications in foods and as nutraceuticals. Manufacturing and applications of fibres from food sources, fructooligosaccharides.

Module III: Food additives as toxicants

15 Hours

Artificial colours, preservatives, sweeteners; toxicants formed during food processing such as nitrosamines, maillard reaction products acrylamide, benzene, heterocyclic amines and aromatic hydrocarbons; risk of genetically modified food, Food Supplements, persistent organic pollutants, toxicity implications of nanotechnology in food.

Module IV: Flavour technology

15 Hours

Types of flavours, flavours generated during processing – reaction flavours, flavour composites, stability of flavours during food processing, analysis of flavours, extraction techniques of flavours, flavour emulsions; essential oils and oleoresins.

Learning Resources

Reference Books

1. Titus A. M. Msagati, (2012), "The Chemistry of Food Additives and Preservatives", John Wiley & Sons Publishers.
2. Jim Smith, Lily Hong-Shum (2011), "Food Additives Data Book", John Wiley & Sons Publishers.
3. Deshpande, S.S. (2002). "Handbook of Food Toxicology", Marcel Dekker Publishers.
4. S.N. Mahindru "Food Additives" APH Publishing Corporation, Drya Ganj, New Delhi.
5. A Larry Branen, P Michael Davidson and Seppo Salminen, "Food Additives" CRC Book Press. USA.

VFT3S07TB– Technology of Fish, Meat and Egg Processing
(SKILL COMPONENT -07)
Semester III

Total Credits: 6

Credits for Theory: 2

Total Lecture Hours: 30 (2 Hours/ Week)

Aim of the course: To understand the technology for handling, processing, preservation of meat, poultry and fish products.

Course Outcomes:

- To understand need and importance of livestock, egg and poultry industry
- To study structure, composition and nutritional quality of animal products.
- To study processing and preservation of animal foods.
- To understand technology behind preparation of various animal food products and by product utilization

Syllabus Content

Module I : Fish Processing

08 Hours

Fish - Classification of fish (fresh water and marine), structure of fish, composition and characteristics of fresh fish **Preservation of fish** - Chilling, Freezing, drying, salting - salting methods: brining, pickling, curing and canning of fish. **Fishery products:** Surimi - Process, traditional and modern production lines, quality of surimi products. Fish protein concentrates (FPC), fish protein extracts (FPE).

Module II: Meat processing

08 Hours

Meat - Definition of carcass, classification of meat of concept of red meat and white meat, composition of meat, tenderization of meat, ageing of meat. Meat Quality - colour, flavour, texture, Water Holding Capacity (WHC), Emulsification capacity of meat. Tests for assessment of raw meat - TVN, FFA, PV, Nitrate and nitrite in cured meat. **Preservation of meat** - Refrigeration and freezing, thermal processing - canning of meat, dehydration, meat curing. **Meat products:** Sausages - processing, RTE meat products.

Module III: Egg processing

07 Hours

Egg- composition and nutritive value, egg proteins, characteristics of fresh egg, deterioration of egg quality. Factors affecting egg quality. Preservation of eggs - Refrigeration and freezing, thermal processing, dehydration, coating **Egg products**– Egg powder, frozen egg pulp, designer eggs.

Module IV: Poultry processing

07 Hours

Pre-slaughter care and consideration; Slaughtering of poultry, structure and composition and nutritive value of poultry meat: antimortem and post-mortem inspection, grading of poultry meat, processing and preservation of poultry meat, Manufacture of poultry products.

VFT3S07PB– Technology of Fish, Meat and Egg Processing

Credits for Practical: 4

Total Practical: 16 (04 Hours each)

Unit No.	Topics	Number of Experiments
1	Study of anatomy and dressing of fish	1
2	Preparation of fish protein concentrate (FPC)	1
3	Determination of water holding capacity of meat	1
4	Determination of meat pH	1
5	Estimation of total meat pigments	1

6	Preparation of meat products	1
7	To prepare different egg products	1
8	Preservation of internal quality of egg by different methods.	1
9	Determination of egg constituents such as ash, Total solid, moisture	1
10	Slaughtering and dressing of poultry bird	1
11	To determine meat to bone ratio of chicken	1
12	Preparation of cured chicken.	1
13	Preparation of tandoori chicken	1
14	Composition and structure of egg	1
15	Preparation of chicken pickle.	1
16	Visit to slaughter house	1
	Total	16

Learning Resources Reference

1. George M. Hall (2012), "Fish Processing Technology", Springer Science & Business Media Publication.
2. Fidel Toldra (2010), "Handbook of Meat Processing", John Wiley & Sons Publication.
3. Rao D.G. (2010), "Fundamentals of food engineering". PHI Learning Pvt. Ltd.
4. Isabel Guerrero- Legarreta (2010), "Handbook of Poultry Science and Technology, Secondary Processing", John Wiley and Sons Publication.
5. Casey M. Owens. (2010), "Poultry Meat Processing", Second Edition, CRC Press.
6. Leo M.L. Nollet and Fidel Toldra (2006), "Advanced Technologies For Meat Processing", CRC Press.

REFERENCE BOOKS

Sr. No.	Name of Book	Author	Publisher
1	Meat Science	Lawrie R. A.	Pergamon Press, New York ISBN: 080307906
2	Handbook of Meat Processing	Fidel Toldra	Wiley-Blackwell, Iowa, USA ISBN: 9780813821825
3	Meat Products Handbook – Practical Science and Technology	Gerhard Feiner	CRC Press, Boca Raton ISBN: 9780849380105
4	Outlines of Meat Science and Technology	Sharma B.D.	Jaypee Brother Medical Publishers, ISBN: 9789350254813

**VFT3S08TB – Technology of Spices and Plantation Crops
(SKILL COMPONENT - 08)
Semester III**

Total Credits: 6**Credits for Theory: 2****Total Lecture Hours: 30 (2 Hours/ Week)**

Aim of the course: To impart basic knowledge about the importance and production technology of spices and plantation crops.

Course Outcomes:

- To know about the importance of various types of spices which are used in the food industry and their applications
- To understand the processing steps involved in spice processing
- To know about value added products from spices
- To know various processing steps involved in plantation crop processing

Syllabus Content**Module I: Spice****05 Hours**

Status and scope of spice processing industries in India; Spices, Herbs and seasonings: sources, production, selection criteria; classification, composition and functions.

Module II: Processing technology of spices**10 Hours**

Chemical composition of spices; processing methods: equipments used in the processing of spices; spice encapsulation; recent developments in production, retention and recovery of spices; effect of processing on spice quality: contamination of spices with micro-organisms and insects. Spice Essential Oils: Definition, methods of extraction, isolation, separation equipments Major spices: Post harvest technology, composition, processed products of spices –ginger, chilli, turmeric, onion, garlic, pepper, cardamom, cashew nut and coconut

Minor spices, herbs and leafy vegetables: processing and utilization, All spice, annie seed, sweet basil, caraway seed, cassia, cinnamon, clove, coriander, cumin, dill seed, Fern seed nutmeg, mint, marjoram, Rose merry, saffron, sage, etc , savory, thyme, ajowan, curry leaves, asafoetida, , Vanilla and annatto; Processing spice oil and oleoresins.

Module III: Plantation crops-cashew processing**10 Hours**

Composition, Structure and characteristics of cashew nut, uses, Traditional method of cashew processing, General processing, Cashew apple processing , cashew by product -CNSL.

Module IV: Tea, coffee, Cocoa processing**05 Hours**

Types of Tea, processing, instant Tea, Processing of Coffee. 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.

VFT3S08PB– Technology of Spices and Plantation Crops

Credits for Practical: 4**Total Practical: 16 (04 Hours each)**

Number of units	Topics	Number of experiments
1.	Physicochemical properties of different spices	1
2.	Study of standard specification of spices	1
3.	Study on Curing of ginger	1
4.	Detection of adulteration in spices	1

5.	Determination of piperine content of black pepper	1
6.	Picrocrocin, safranal and crocin content	1
7.	Test for presence of chromate	1
8.	Extraction of oil/ oleoresins from spices	1
9.	Steam distillation of spices for essential oil	1
10.	Determination of curcumin content in turmeric	1
11.	Preparation of curry powder	1
12.	Preparation of Indian <i>Masala</i> for different foods	1
13.	Preparation of herbal tea mix	1
14.	Preparation of instant cold coffee mix	1
15.	Preparation of beverage mix from chocolate	1
16.	Visit to spice industry	1
	Total	16

Learning Resources References

1. J.S.Purthi, (2003) (2001), "Minor Spices and Condiments: Crop Management and Post Harvest Technology", ICAR publication, 1st Edition,
2. Handbook of Fruit Science and Technology: Production, Composition, Storage, and Processing. D. K. Salunkhe, S. S. Kadam, CRC Press, 1st Edition, 1995.
3. N.K.Jain, (1989), "Global Advances in Tea Science", Aravali Books International, 1st Edition.

REFERENCE BOOKS

Sr. No.	Name of Book	Author	Publisher
1	Handbook of Herbs and spices	Peter VK	Woodhead Publishing 2012
2	The Book of Spices	Rosengarten F.	Pyramid Books, 1973
3	Spices and Herbs for the Food Industry	Lewis YS	Food Trade Press, 1984
4	Food Flavourings	P.R. Ashust	Springer, 2012

**VFT3S09TB– Food Microbiology
(SKILL COMPONENT - 09)
Semester III**

Total Credits: 6

Credits for Theory: 2

Total Lecture Hours: 30 (2 Hours/ Week)

Aim of the Course: To make students understand the food and industrial microbiology and to make them aware about the importance of food quality control by avoiding pathogenic microbial attack.

Course Outcomes:

- Recognize and describe the characteristics of important pathogens and spoilage microorganisms in foods.
- Understand the role and significance of intrinsic and extrinsic factors on growth and response of microorganisms in foods.
- Identify ways to control microorganisms in foods.
- Describe the beneficial role of microorganisms

Syllabus Content

Module I: Introduction to food microbiology and microorganisms

8 Hours

Discovery, current status, role of food microbiology, sources of micro organisms in food, changes caused by microorganisms, Classification of microorganisms, nomenclature, morphology – yeast and moulds, bacterial cells, viruses. Important microbes in food, microbial growth characteristics – Microbial reproduction, nature of growth in food.

Module II: Spoilage in different food groups

6 Hours

Food spoilage – Introduction, spoilage in cereals, vegetables and fruits, meat, eggs, poultry, fish, milk and milk products, canned foods, nuts and oil seeds, fats and oil seeds. Definition - food infection and food intoxication.

Module III: Food preservation

8 Hours

Factors influencing microbial growth in food: Intrinsic and extrinsic factors - Hydrogen ion concentration, Moisture requirement, concept of water activity, temperature, oxidation reduction potential, inhibitory substances and biological structure. Principles of different food preservation methods.

Module IV: Cultivation of microorganisms

8 Hours

Composition and types of culture media, methods of Isolation and cultivation of microorganisms, Microscopy, Staining Techniques.

VFT3S09TB– Food Microbiology**Credits for Practical: 4****Total Practical: 16 (04 Hours each)**

Number of units	Topics	Number of experiments
1	Introduction to the Basic Microbiology Laboratory Equipments	1
2	Introduction to the Basic Microbiology Laboratory materials	1
3	Functioning and use of compound microscope	1
4	Cleaning and sterilization of glassware	1
5	Preparation and sterilization of nutrient broth and agar, Macckonkey's agar	1
6	Preparation of slant, stab and plates using nutrient agar.	1
7	Isolation of microorganisms using streak plate method	1
8	Isolation and enumeration of microorganisms using spread plate method	1
9	Isolation and enumeration of microorganisms using pout plate method	1
10	Study of <i>E coli</i> from beverages	1
11	Dye reduction tests for microorganisms	1
12	Simple Staining	1
13	Differential Staining	1
14	Negative Staining	1
15	Endospore staining	1
16	Visit Microbiology laboratory	1

References

1. Food sciences (Vth edition) - Norman N. Potter and Joseph H. Hotchkiss (CBS publishers and distributors, New Delhi, 1996)
2. Food microbiology (IVth edition) - William C. Frazier and Dennis C. Westoff- Tata McGraw Hill Pub. Co. Ltd, New Delhi, 1995)
3. Ray, Bibek; Arun Bhunia,(2013), "Fundamental Food Microbiology", CRC Press.
4. Adams, Martin R, Maurice O Moss, Peter McClure (2015), "Food Microbiology", Royal Society of Chemistry, Cambridge.
5. Jay, James M. (2012), "Modern Food Microbiology", Springer Science & Business Media.,Maryland.

Semester - IV						Marks		
Course code	Title	Credits	L	P	Hours/ week	CIA	ESE	Total
General Component								
VFT4G10TB	Marketing Management	4	4	-	4	50	50	100
VFT4G11TB	Food Product Design and Development	4	4	-	4	50	50	100
VFT4G12TB	By-product utilization and Waste Management	4	4	-	4	50	50	100
Skill Component								
VFT4S10TB	Technology of Cereal, Pulses and Oilseeds	6	2	-	2	25	25	50
VFT4S10PB	Technology of Cereal, Pulses and Oilseeds		-	4	4	50	50	100
VFT4S11TB	Technology of Beverages and snack foods	6	2	-	2	25	25	50
VFT4S11PB	Technology of Beverages and snack foods		-	4	4	50	50	100
VFT4S12TB	Fermentation Technology	6	2	-	2	25	25	50
VFT4S12PB	Fermentation Technology		-	4	4	50	50	100
Total		30	18	12	30	375	375	750

L: Lectures**CIA: Continuous Internal Assessment****P: Practical****ESE: End Semester Examination**

VFT4G10TB– Marketing Management
(GENERAL COMPONENT- 10)
Semester IV

Total Credits: 4

Total Lecture Hours: 60 (4 Hours/ Week)

Course Overview and Context

- To know about the various types marketing strategy involved in generating sales for a new product food products'
- To have a basic idea about different marketing skills,
- To know the different ways in which a food can be marketed to give optimum visibility,
- To understand the importance of packaging in improving sales and the latest marketing trends

Syllabus Content

Module I: Marketing management

10 Hours

Introduction- Definition of marketing and marketing management- Marketing concepts and functions-Marketing research – marketing mix.

Module II: Market segmentation

12 Hours

Concept-Need- Basis-Market targeting-Market Positioning -Understanding consumer behaviour- Buying motives- Factors influencing consumer buying decisions

Module III: Marketing of products

18 Hours

Product- Meaning- Product development- Product mix- PLC- Branding- brand equity- Brand loyalty-Trade mark. Packaging and labelling - Pricing of products-Factors influencing pricing- Pricing policies and Strategies-Types of pricing.

Module IV: Logistic and supply chain management

10 Hours

Its elements-Channel of distribution types- Factors affecting the choice of a channel of distribution.

Module V: Emerging trends in marketing

10 Hours

Modern marketing- Direct marketing- E Marketing- Tele marketing-Viral marketing - Relationship marketing-Social marketing-Demarketing - Remarketing- Synchro marketing- Service marketing.

REFERENCE BOOKS

Sr. No.	Name of Book	Author	Publisher
1	International Business	Aswathappa	Tata McGraw-Hill Education, New Delhi
2	Marketing Management	C.N. Sontakki	Kalyani Publishers, New Delhi.
3	International Business	Aswathappa	Tata McGraw-Hill Education, New Delhi
4	International Business: Text and Cases	Fransis Cherunilam	5th Ed. PHI Learning, New Delhi.
5	Marketing Management: A South Asian Perspective	Philip Kotler, Keller, Koshy and Jha	14th Ed. Pearson Education. 2013
6	Fundamentals of Marketing	William J. Stanton	Tata McGraw-Hill Publication, New Delhi, 1984

VFT4G11TB– Food Product Design and Development

(GENERAL COMPONENT - 11)

Semester IV

Total Credits: 4

Total Lecture Hours: 60 (4 Hours/ Week)

Aim of the course: To demonstrate a theoretical knowledge of the basic concepts of new food product development, and to understand the process involved in the production of a new product.

Course Outcomes:

- To understand the concept of a new product development.
- To understand the processing of a new product.
- To know the knowledge base required for accomplishing a product development.
- To know the ways to introduce a new product in the market.

Syllabus content

Module I: Concept of product development

15 Hours

Need, importance and objectives of formulation for new product development. Product success and failure, factors for success, process of product development, managing for product's success. Innovation strategy - possibilities for innovation, building up strategy, product development programme.

Module II: Product development process

15 Hours

Ideas, Formulation based on sources availability and cost competitiveness for concept developments of new products, Product strategy, product design and process development, product commercialization, product launch and evaluation.

Module III: Knowledge base for product development technology

15 Hours

Adaptable technology and sustainable technology for standardized formulation for process development. Knowledge and the food system, knowledge management, knowledge for conversion of product concept to new product, technological knowledge - product qualities, raw material properties, processing, packaging requirement, distribution and marketing. Process control parameters and scale up, production trials for new product development at lab and pilot scale

Module IV: Role of consumers in product development

15 Hours

Consumer behaviour, food preferences, avoiding acceptance, integration of consumer needs in product development and sensory needs.

Module V: Managing the product development process

15 Hours

Principles of product development management, people in product development management, designing the product development process, key decision points. Quality assessment: Quality assessment of new developed products. Market testing and marketing plan.

Learning Resources References

1. Howard R. Moskowitz, Jacqueline H. Beckley, Anna V. A. Resurreccion, (2012), "Sensory and Consumer Research in Food Product Design and Development", John Wiley & Sons Publishers.
2. Kenneth B. Kahn, (2012), "The PDMA Handbook of New Product Development", John Wiley & Sons Publishers.
3. Jacqueline H. Beckley, M. Michele Foley, Elizabeth J. Topp, Jack C. Huang, Witoon Prinyawiwatkul, (2008), "Accelerating New Food Product Design and Development", John Wiley & Sons Publishers.

VFT4G12TB – By-product utilization and Waste management

(GENERAL COMPONENT - 12)

Semester IV

Total Credits: 4

Total Lecture Hours: 60 (4 Hours/ Week)

Aim of the course: To understand about the ways for effective utilisation of the By-products obtained after food processing and also to gain knowledge about characterisation of waste products and effluent treatment methods.

Course Outcomes:

- To identify types of wastes in food industry
- To gain knowledge in different effluent treatment methods
- To utilize the By-product in the food industry

Syllabus Content

Module I: Introduction

10 hours

Types of waste and magnitude of waste generation in different food processing industries, concept, scope and importance of waste management and effluent treatment.

Module II: Waste characterization

12 Hours

Temperature, pH, Oxygen demands (BOD, COD, TOD), fat, oil and grease content, metal content, forms of phosphorous and sulphur in waste waters, microbiology of waste, other ingredients like insecticide, pesticides and fungicide residues

Module III: Effluent Treatment

20 Hours

Pretreatment of waste: sedimentation, coagulation, flocculation and floatation Secondary treatments: Biological oxidation (trickling filters, activated sludge process), industrial wastewater treatment: characteristics of industrial wastewater, treatment levels

Module IV: Waste utilization

18 Hours

Characterization and utilization of By-products from cereals (breweries), pulses, oilseeds, fruits & vegetables (wineries) and plantation crops (sugar industries).

Characterization and utilization of By-products from dairy, eggs, meat, fish and poultry

Learning Resources

Reference

1. Abbas Kazmi, Peter Shuttleworth, (2013), "The Economic Utilisation of Food Co-Products", Royal Society of Chemistry Publishing.
2. A.M.Martin,(2012),"Bioconversion ofWaste Materials to Industrial Products", Springer Science & Business Media Publishing.
3. Marcos von Sperling, (2007), "Basic Principles of Wastewater Treatment", IWA Publishing.

VFT4S10TB – Technology of Cereals, Pulses and Oilseeds**(SKILL COMPONENT - 10)****Semester IV****Total Credits: 6****Credits for Theory: 2****Total Lecture Hours: 30 (2 Hours/ Week)**

Aim of the course: To acquaint with production and consumption trends, structure, composition, quality evaluation, and processing technologies for product development and value addition of various cereals, pulses and oilseeds.

Course Outcomes:

- To create awareness about the processing of major cereals like paddy, maize.
- To study the storage and handling techniques of cereals, oilseed and pulses.
- To gain knowledge on processing and milling of pulses and extraction of oil.

Syllabus Content**Module I : Paddy Processing and Rice milling****10 Hours**

Composition and Quality characteristics. Curing of Paddy. Parboiling Processes- soaking, steaming, drying, Production of Flattened Rice and Puffed Rice from Paddy.

Rice milling: Paddy Dehusking Processes. Modern Rice Mills – Their Components - Pre Cleaners, rubber roll Shellers, Paddy Separators – Satake type, Polishers, Extraction of rice bran oil and uses of rice bran in food industry.

Module II: Wheat milling**6 Hours**

Wheat - wheat milling process, flour grade, flour treatment, flours for various purposes, milling-break roll and reduction rolls.

Module III: Milling of Pulses**6 Hours**

Varieties-chemical composition and structure-dry milling and wet milling process of pulses, processed products of pulses, Soaking and germination of pulses

Module IV: Oilseed processing**8 Hours**

Introduction- methods- hydraulic press- screw press – principle and working, solvent extraction methods, Clarification, degumming, neutralization, bleaching, deodorization techniques/process, blending of oils. Hydrogenation, Fractionation, Winterization.

VFT4S10PB – Technology of Cereals, Pulses and Oilseeds**Credits for Practical: 4****Total Practical: 16 (04 Hours each)**

Number of units	Topics	Number of experiments
1	Physical characteristics of cereal, pulses and oilseeds.	1
2	Determination of amylase content of rice	1
3	Determination of starch content of cereal	1
4	Phenol test for cereals	1
5	Estimation of Gluten Content of flour.	1
6	To study processing of ragi malt	1
7	To study processing of Corn flakes and pop corn	1
8	To study processing of Puffed rice	1

9	Cooking characteristics of rice.	1
10	Determination of sedimentation power of flour.	1
11	Determination of antinutritional factors in legumes	1
12	Cooking quality of dhal	1
13	Preparation of soy milk and soy paneer	1
14	Hydrogenation of oil	1
15	Visit to rice mill station.	1
16	Visit to oil expelling unit.	1

Learning Resources References

1. Dendy DAV & Dobraszczyk BJ. (2001), "Cereal and Cereal Products", Aspen Publications.
2. Chakraverty, A. (1995), "Post Harvest Technology of Cereals, Pulses and Oilseeds". Oxford and IBH Publishing Co, Calcutta
3. N.L.Kent and A.D.Evans: (1994) "Technology of Cereals" (4th Edition), Elsevier Science (Pergaman), Oxford, UK,
4. Samuel Matz: (1992), "The Chemistry and Technology of Cereals as Food and Feed, Chapman & Hall

VFT4S11TB– Technology of Beverages and snack foods**(SKILL COMPONENT - 11)****Semester IV****Total Credits: 6****Credits for Theory: 2****Total Lecture Hours: 30 (2 Hours/ Week)****Course Outcomes:**

- To study about the various beverages.
- To study about the products made out of them.
- To provide a technical view of beverages.
- To understand the manufacturing processes in the context of technology.

Syllabus content**Module I: Introduction and types of beverages****12 Hours**

Types of beverages and their importance, status of beverage industry in India, Non- alcoholic beverages: Manufacturing technology for juice-based beverages, synthetic beverages; technology of still, carbonated, low-calorie and dry beverages, isotonic and sports drinks; role of various ingredients of soft drinks, carbonation of soft drinks, dairy based beverages.

Alcoholic beverages: Types, manufacture and quality evaluation; the role of yeast in beer and other alcoholic beverages, ale type beer, lager type beer, technology of brewing process, equipments used for brewing and distillation, wine and related beverages, distilled spirits.

Module II: Packaged drinking water**6 Hours**

Definition, types, manufacturing processes, quality evaluation and raw and processed water, methods of water treatment, BIS quality standards of bottled water; mineral water, natural spring water, flavoured water, carbonated water.

Module III: Grain based Snack Foods**6 Hours**

Technology for grain based snack : whole grains- roasted, toasted, puffed, popped and flakes, coated grains, salted, sweetened, flour based- batter and dough based products; savoury and farsan, formulated chips and wafers, papads, instant premixes of traditional Indian snack foods.

Module IV: Other snack foods and equipments**6 Hours**

Technology for fruit and vegetable based snacks: chips and wafers; Technology of coated nuts- salted, spiced and sweetened, Extruded snack foods, equipments for frying, baking, drying, toasting, roasting and flaking, popping, coating and chipping.

VFT4S11PB– Technology of Beverages and snack foods**Credits for Practical: 4****Total Practical: 16 (04 Hours each)**

Number of units	Topics	Number of experiments
1	Formulation and processing of RTS	1
2	Formulation and processing of syrup	1
3	Formulation and processing of squash	1
4	Processing of carbonated beverage	1
5	Processing of whey based beverage	1
6	Processing of distilled spirit	1
7	Processing of multigrain papad	1

8	Processing of banana wafers	1
9	Processing of fruit or vegetables chips	1
10	Processing of dough based savoury product	1
11	Processing of batter based savoury product	1
12	Processing of extruded snack food	1
13	Processing of coated and fried peanuts	1
14	Processing of soya nuts	1
15	Visit to mineral water plant	1
16	Visit to Snack food industry	1

Learning Resources Reference Books

1. Manay, N.S, Shandaksharaswamy, M., (2004), "Foods- Facts and Principles", New Age International Publishers, NewDelhi,
2. Potter, N.N, Hotchkiss, J.H.(2000), "Food Science". CBS Publishers, NewDelhi.
3. Srilakshmi, B. Food Science (3rd Edition) (2003), New Age International (p) Limited Publishers, NewDelhi,
4. Nicholas Dege. (2011), "Technology of Bottled water". Blackwell publishing Ltd, UK.

**VFT4S12TB– Fermentation Technology
(SKILL COMPONENT - 12)
Semester IV**

Total Credits: 6

Credits for Theory: 2

Total Lecture Hours: 30 (2 Hours/ Week)

Aim of the course: To impart thorough knowledge about various aspects of food fermentation process and technologies involved.

Course Outcomes:

- To make students acquainted with principles of using of microorganisms in fermentation process.
- Attain knowledge of production equipment in fermentation industry, substrate preparation and control of fermentative process and isolation of products
- Substantial time is devoted to particular fermented products -- spirits industry, yeast industry, brewing industry, production of microbial biomass and selected organic acids.

Syllabus Content

Module I: Introduction to fermentation processes

6 Hours

Range of fermentation processes – Microbial biomass, Microbial enzymes, Microbial metabolites, Recombinant products. Classification of fermentation process– Lactic acid fermentation, alcoholic fermentation. Importance of fermentation in food industry - Flavour enhancement, Nutritional value, Preservation, Antibiotic properties.

Module II: Microbial growth kinetics

6 Hours

Batch culture, Continuous culture, Comparison of batch and continuous culture in industrial processes - Biomass productivity, Metabolite productivity, Continuous brewing, Fed-batch culture - variable volume fed- batch culture, Fixed volume fed- batch culture, Application of fed-batch culture, Examples of the use of fed-batch culture.

Module III: Media and Inoculum for fermentation

6 Hours

Typical media, medium formulation, water, energy sources - carbon sources, nitrogen sources, minerals. Growth factors, nutrient recycle oxygen requirements, antifoams, medium optimization. Inoculum – Criteria for transfer of inoculum, development of inocula for yeast, bacterial and mycelia process, aseptic inoculation of plant fermenters.

Module IV: Fermenter and sterilization process

6 Hours

Instrumentation of fermenter, basic functioning of fermenter, recovery and purification of fermented products. Sterilization – Introduction, Sterilization of fermenter, sterilization of feeds, sterilization of liquid wastes

Module V: Fermented food products

6 Hours

Fermented meat products – Cured- raw meat, semidry fermented sausages, dry – fermented sausages, mold ripened sausages. Fermented soy products – Soy sauce, fermented whole soy beans, fermented tofu, Tempeh. **Fermented vegetables** – Chinese pickles, Kimchi, Sauerkraut. **Fermented cereal products** –Sour dough bread, croissants, rye bread, hamburger bun, Danish pastry, beer.

VFT4S12PB– Fermentation Technology**Credits for Practical: 4****Total Practical: 16 (04 Hours each)**

Number of units	Topics	Number of experiments
1	Study of fermenter accessories	1
2	To study the types of starters used in Food Industry	1
3	Study of Bio fermentor – its design and operation, Down Stream Processing and Product recovery.	1
4	To study the production of yoghurt	1
5	To study Production of kefir	1
6	To study the production of cheese	1
7	To study Production of alcoholic beverage by fermentation - Wine	2
8	To study Production of alcoholic beverage by fermentation - Beer	2
9	To study Production of Baker's Yeast	1
10	To study Production of Whole wheat bread	1
11	To study Production of soya products like sauce, Miso, tempeh	1
12	To study Production of fermented pickle like sauerkraut, kimchi	1
13	To study Production of fermented meat products	1
14	Visit to winery/ brewery / distillery	1

References

1. Deirdre Rawlings, (2013), "Fermented Foods for Health", Fair Winds Press.
2. Robert W. Hutkins, (2008), "Microbiology and Technology of Fermented Foods", John Wiley & Sons.
3. Stanburry P.P. and Whitaker, A. (1984), "Principles of Fermentation Technology". Pergamon Press, OxfordUK.
4. Steinkraus, K.H. (1983). "Handbook of Indigenous Fermented Foods", Marcel Dekker, NewYork.

Semester - V						Marks		
Course code	Title	Credits	L	P	Hours/ week	CIA	ESE	Total
General Component								
VFT5G13TB	Product and brand Management	4	4	-	4	50	50	100
VFT5G14TB	Computer Applications	4	4	-	4	50	50	100
VFT5G15TB	Food Processing equipments	4	4	-	4	50	50	100
Skill Component								
VFT5S13TB	Processing of Fruits and Vegetables	6	2	-	2	25	25	50
VFT5S13PB	Processing of Fruits and Vegetables		-	4	4	50	50	100
VFT5S14TB	Engineering properties of foods	6	2	-	2	25	25	50
VFT5S14PB	Engineering properties of foods		-	4	4	50	50	100
VFT5S15TB	Product Development & Sensory Evaluation of foods	6	3	-	3	30	45	75
VFT5S15PB	Product Development & Sensory Evaluation of foods		-	3	3	30	45	75
Total		30	19	11	30	360	390	750

L: Lectures**P: Practical****CIA: Continuous Internal Assessment****ESE: End Semester Examination**

**VFT5G13TB – Product and Brand Management
(GENERAL COMPONENT - 13)
Semester V**

Total Credits: 4

Total Lecture Hours: 60 (4 Hours/ Week)

Course Outcomes:

- To know about the various factors to be kept in mind while managing a new product
- To know about the various types marketing strategy involved in generating sales for a new product food products'
- To have a basic idea about different marketing skills, the different ways in which a food can be marketed to give optimum visibility.
- To understand the importance of packaging in improving sales and the latest marketing trends.

Syllabus Content

Module I: Product management

13 Hours

Introduction and importance- role of product manager product plan and its components, product line-additions, alterations and its deletions.

Module II: Product positioning

13 Hours

Kinds-organizing the product teams-product policy-new product demand forecasting models-product portfolio model-perceptual mapping.

Module III: New product development

10 Hours

Stages-new product launch-strategies-mistakes success and failures.

Module IV: Brand management

12 Hours

Strategic issues in brand management-concepts principles-brand extension-brand stretching-brand equity and its components- its measurement

Module V: Co-branding

12 Hours

Brand positioning- product management audit-multi branding-Re-branding-packaging methods and strategies.

Reference Books

1. Tapan K. Panda, 2016, Product and Brand Management, first edition, Oxford University Press
2. Kevin Lane Keller, 1997, Strategic and Brand Management, Prentice Hall Financial Times
3. U. C. Mathur, 2010, Product and Brand Management, Excel books
4. Gary Lilien, Arvind Rangaswamy, New Product and Brand Management, Prentice Hall PTR

**VFT5G14TB – Computer Application
(GENERAL COMPONENT - 14)
Semester V**

Total Credits: 4

Total Lecture Hours: 60 (4 Hours/ Week)

Course Outcomes:

- To understand the operations of windows operating system, desktop, text editing and printouts in wordpad
- To understand the operations of MS WORD-(Editing , Formatting ,inserting)
- To understand the various operations in MS-Excel

Syllabus Content

Module I:Office Automation

10 Hours

Introduction-Tools, Windows 7, desktop, files and folders, printers, Microsoft Office button, Quick access tool bar

Module II: MSWord 7

15Hours

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.

Module III: MSEXcel7

15 Hours

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 & editing worksheet. Format cells, row , column, work sheet (Inserting, deleting, renaming) Formulas, functions, charts.

Module IV: MS PowerPoint 7

10 Hours

Introduction- Parts of power point windows. Features, background design, word art, clipart, 3D settings. Animations, sound views, types of views, inserting, deleting , arranging slides, slideshows

Module V: DBMS, Internet &Email

10 Hours

DBMS Intro & basic concepts, Internet introduction, Creating Email- Inbox, compose, draft, attachments.

Learning Resource References

1. Study material for Diploma in Computer Application, Centre for continuing Education,Kerala.
2. Tom Bunzel, MS Office Research Guide; InformationIT.com.

VFT5G15TB– Food Processing Equipments

(GENERAL COMPONENT - 15)

Semester V

Total Credits: 4

Total Lecture Hours: 60 (4 Hours/ Week)

Aim of the course: To introduce basic equipment design and various control mechanisms.

Course Outcomes:

- To enable the student to design and develop equipments used in Food Processing operations.
- To identify and discuss critical design of typical processing equipment.
- To Understand the relationship between process design and Safety

Syllabus Content

Module I: Introduction and mechanical equipments used in food industry 20 Hours

Equipments: Types, planning, factors affecting selection and purchase

Transport equipments: Fluid food transport equipment, mechanical conveyors. Storage

equipments: Solid and liquid food storage equipments. Processing equipments: Size reduction, homogenization, mixing and foaming equipments. Separation equipments: Grading and sorting equipments.

Module II: Heat exchangers, dryers and evaporators 15 Hours

Heat transfer equipments: Heat exchangers. Food evaporation equipments: food evaporators, evaporator components. Food dehydration equipment – Food dehydration principle, food dryers, hygiene and safety considerations.

Module III: Refrigeration and thermal processing equipments 15 Hours

Refrigeration and freezing equipments: Refrigerants, freezers, chillers. Thermal processing equipments: sterilizers, pasteurizers, blanchers.

Module IV: Food packaging Equipment 10 Hours

Introduction, preparation of food containers, filling equipment, closing equipments, group packaging.

Learning Resources

Reference Books

1. Saravacos, George, (2015), "Handbook of Food Processing Equipment", Springer Publishing.
2. H. L. M. Lelieveld, John Holah, David Napper, (2014), "Hygiene in Food Processing: Principles and Practice", Elsevier Publications.
3. Sue Azam-Ali, (2003), "Small-scale Food Processing: A Directory of Equipment and Methods", ITDG Publishing.

VFT5S13TB- Processing of Fruits and Vegetables**(SKILL COMPONENT - 13)****Semester V****Total Credits: 6****Credits for Theory: 2****Total Lecture Hours: 30 (2 Hours/ Week)**

Aim of the course: To understand about the proper postharvest handling technologies of fruits and vegetables and to know the process of development of fruit and vegetable processing products.

Course Outcomes:

- To know about the status of fruit and vegetable production in India with importance to losses.
- To study about the processing of fruits and vegetables.
- To impart knowledge about the various products from them.
- To study the various methods of drying of fruits and vegetables

Syllabus Content**Module I: Introduction****8 Hours**

Production and processing scenario of fruits and vegetables in India and World, Scope of fruit and vegetable preservation industry in India. Primary processing and pack house handling of fruits and vegetables; Peeling, slicing, cubing, cutting and other size reduction operations for fruits and vegetables, Minimal processing of fruits and vegetables Blanching operations and equipment,

Module II: Canning and beverages**8 Hours**

Canning: Definition, processing steps, and equipment, cans and containers, quality assurance and defects in canned products Preparation and preservation of juices, squashes, syrups, sherbets, nectars, cordials, etc; problems in squash and RTS; processing and equipment for above products and FSSAI specification

Module III: Manufacture of Fruit and vegetable products**9 Hours**

Preparation, preservation and machines for manufacture of crystallized fruits and preserves, jam, jelly and marmalades, problems, candies; Preparation, preservation and machines for manufacture of preserve, concentrate, fruit wine, sauerkraut, chutney, pickles, sauce, puree, paste, ketchup; toffee, cheese, lather, dehydrated, wafers and papads, soup powders; FSSAI specification

Module IV: Manufacture of value added processed products**5 Hours**

Production of pectin and vinegar; Commercial processing technology of selected fruits and vegetables for production of various value added processed products.

VFT5S13PB- Processing of Fruits and Vegetables**Credits for Practical: 4****Total Practical: 16 (04 Hours each)**

Number of units	Topics	Number of experiments
1	Studies on maturity indices of fruits and vegetables	1

2	Studies on use of chemicals for ripening of fruits and vegetables	1
3	Studies on physiological disorders - chilling injury of banana and custard apple	1
4	Preparation of natural and synthetic fruit juice	1
5	Preparation of nectar and cordial	1
6	Canning/bottling of mango/guava/papaya fruits	1
7	Preparation of fruit jam: Mixed/apple/mango/guava/papaya/ aonla/ strawberry.	1
8	Preparation of fruit jelly/marmalade: wood apple/ sweet orange/mandarin/guava/tamarind	1
9	Preparation of marmalade	1
10	Preparation of fruit preserve	1
11	Preparation of fruit candy	1
12	Preparation of petha/ tuti fruity	1
13	Preparation of grape raisin/ anardana/ dried fig	1
14	Preparation of ketchup or sauce from chilli/ tomato/ tamarind	1
15	Preparation of pickle/ mixed pickle	1
16	Visit to fruit and vegetable processing industrial	1
	Total	16

Learning Resources

Reference Books

1. Nirmal Sinha, Y. H. Hui, et al; (2010), "Handbook of Vegetables and Vegetable Processing", John Wiley & Sons.
2. Olga Martin-Belloso, Robert Soliva Fortuny, (2010), "Advances in Fresh-Cut Fruits and Vegetables Processing". CRC Press.
3. W Jongen (2002), "Fruit and Vegetable Processing: Improving Quality", Elsevier Publications.

VFT5S14TB– Engineering Properties of Foods**(SKILL COMPONENT - 14)****Semester V****Total Credits: 6****Credits for Theory: 2****Total Lecture Hours: 30 (2 Hours/ Week)**

Aim of the course: To understand the concept of rheological and thermal properties of foods on measuring the various engineering properties of food products.

Course Outcomes:

- To study the various engineering properties of food materials under different condition
- To study about the different methods of determining the quality and properties of different foods

Syllabus Content**Module I: Physical and thermal Properties of Foods****10 Hours**

Importance of engineering properties of biological materials. Methods of estimation of – shape, size, volume, density, roundness, sphericity, surface area, specific heat, thermal conductivity, thermal diffusivity, etc. measurement of colour, flavour, consistency, viscosity, texture and their relationship with food quality and composition

Module III: Aerodynamic properties and frictional properties of Foods**10 Hours**

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 friction, application in food handling and storage

Module IV: Rheology and texture of foods**05 Hours**

Rheology- rheological classification- viscoelasticity- viscometers. Hookean body, St Venant body and Newtonian body. Viscometry - Newtonian and Non-Newtonian fluids.

Module V: Electrical, optical properties and mechanical damage**05 Hours**

Electrical and optical property- importance and its application. Mechanical damage- causes of mechanical damage-methods for detection and evaluation of mechanical damage.

VFT5S14PB – Engineering Properties of Foods**Credits for Practical: 4****Total Practical: 16 (04 Hours each)**

Sr. No	Names of Practical	No of Experiments
1.	To find the shape and size of grains and fruits and vegetables.	2
2.	To determine bulk density and angle of repose of grains.	2
3.	To determine the particle density/true density of solid grains.	1
4.	To determine porosity of grains	1
5.	To find out the co-efficient of external and internal friction of different crops.	2
6.	To find the thermal conductivity of different grains	1
7.	To determine specific heat of some food grains	1
8.	To find the Roundness and sphericity of grains and fruits and vegetables	2

9.	Study of Hookean body, St Venant body and Newtonian body	1
10.	Experiment on determination of firmness	1
11.	Establishing the relationship between surface area and true volume	2
	Total	16

Learning Resources**References**

1. M.A. Rao, Syed S.H. Rizvi, Ashim K. Datta, Jasim Ahmed, (2014), "Engineering Properties of Foods", Fourth Edition, CRC Press.
2. M. Anandha Rao, (2010), "Rheology of Fluid and Semisolid Foods: Principles and Applications: Principles and Applications", Springer Science & Business Media Publishing.
3. Zeki Berk, (2008), "Food Process Engineering and Technology", Academic Press Publishers.

VFT5S15TB –Sensory Evaluation of foods and Project
(SKILL COMPONENT - 15)
Semester V

Total Credits: 6

Credits for Theory: 3

Total Lecture Hours: 45 (3 Hours/ Week)

Aim of the course: The course provides knowledge about Sensory test methods and procedures used to evaluate the flavor, color and texture of foods which helps to enhance acceptance of a product.

Course Outcomes:

- To study the appropriate sensory evaluation tests related to the sensory quality of foods.
- To understand the relationship between sensory and instrumental methods for the evaluation of food quality.
- To acquire knowledge on statistical methods for sensory evaluation.

Syllabus Content

Module I: Introduction to human senses

10 Hours

Definition of sensory evaluation; basic tastes; human senses and sensory perception; threshold; psychophysics, Tongue surface

Module II: Arrangements for Sensory Evaluation Test Controls

15 Hours

Environment and test room design; product controls: sample preparation and presentation; panelist controls; factors influencing measurements: psychological and physiological errors

Module III: Statistical Methods for Sensory Evaluation

20 Hours

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

Subjective and objective methods- Texture analyser- mechanical characteristics- chewiness, brittleness, and geometric characteristics, Sensory panel-types-criteria for panel selection

Module IV: Applications of Sensory Analysis in the Food Industry

10 Hours

Quality control; storage stability testing; product development and consumer acceptance testing

Learning Resources

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.

VFT5S15PB –Sensory Evaluation of foods & Project**Credits for Practical: 3****Total Practical: 12 (04 Hours each)**

Group of maximum four students shall undertake project work related to design and development of innovative food product, its quality evaluation, packaging, labeling and shelf life testing or development of any process, its feasibility and application under the guidance of expert. This project work is to be started in fifth semester and completed in sixth. In principle, the research /design work has to be carried out by the student himself/ herself taking advice from his/ her guide when problem arises. Students are supposed to prepare a report on synopsis, abstract, Review of Literature and Materials and Method to be used for the Project. They will undergo evaluation as under.

Sr. No.	Particular	Internal	External
1.	Selection of Topic	-	5
2.	Introduction and objectives	-	8
3.	Review of literature	-	8
4.	Materials and methods	-	8
5.	Presentation	-	8
6.	Viva-Voce	6	8
7.	Attendance	6	-
8.	Review I	6	-
9.	Review II	6	-
10.	Record	6	-
	Total	30	45

Semester - VI						Marks		
Course code	Title	Credits	L	P	Hours/ week	CIA	ESE	Total
General Component								
VFT6G16TB	Personality Development	4	4	-	4	50	50	100
VFT6G17TB	Emerging Technologies in food Industry	4	4	-	4	50	50	100
VFT6G18TB	Food Quality Assurance	4	4	-	4	50	50	100
Skill Component								
VFT6S16TB	Unit Operations in Food Industry	6	2	-	2	25	25	50
VFT6S16PB	Unit Operations in Food Industry		-	4	4	50	50	100
VFT6S17PB	Internship	6	-	6	6	75	75	150
VFT6S18PB	Project and Viva-Voce	6	-	6	6	75	75	150
Total		30	14	16	30	375	375	750

L: Lectures**CIA: Continuous Internal Assessment****P: Practical****ESE: End Semester Examination**

**VFT6G16TB – Personality Development
(GENERAL COMPONENT - 16)
Semester VI**

Total Credits: 4

Total Lecture Hours: 60 (4 Hours/ Week)

Aim of the course: To understand the strategies for the personality development and to improve the personality of the employees upon organizational effectiveness.

Course Outcomes:

- To bring about personality development with regard to the different behavioural dimensions.

Syllabus Content

Module I : Leadership

12 Hours

Introduction to Leadership, Leadership Power, Leadership Styles, Leadership in administration

Module II : Interpersonal Relations

12 Hours

Introduction to Interpersonal Relations, Analysis of different ego states, Analysis of Transactions, Analysis of Strokes, Analysis of Life position

Module III: Stress and Conflict Management

12 Hours

Introduction to Stress, Causes of Stress, Impact Stress, Managing Stress. Conflict: Introduction to Conflict, Causes of Conflict

Module IV: Time Management

12 Hours

Time as a Resource, Identify Important Time Management Wasters, Individual Time Management Styles, Techniques for better Time Management.

Module V: Motivation

12 Hours

Introduction to Motivation, Relevance and types of Motivation, Motivating the subordinates, Analysis of Motivation

REFERENCE BOOKS

Sr. No.	Name of Book	Author	Publisher
1	Technical Communication Principles and Practice	Meenakshi Raman, Sangeeta Sharma	
2	Personality Development	Harold Wallace and Ann Masters	Cengage Publishers.
3	Basic Communication Skills for Technology	Andrea J. Rutherford	Pearson Education.
4	Effective Communication and Soft Skills	Mamatha Bhatnagar and Nitin Bhatnagar	Person Education. 2013

**VFT6G17TB - Emerging Technologies in Food Industry
(GENERAL COMPONENT - 17)
Semester VI**

Total Credits: 4

Total Lecture Hours: 60 (4 Hours/ Week)

Aim of the course: To understand about new developments in food industry and to impart knowledge about the importance and applications of the technology.

Course Outcomes:

- To enable the student to understand: Emerging / alternative technologies applied to food processing.
- Relative advantages / disadvantages over existing technologies.
- Economics and commercialization of newer technologies.

Syllabus Content

Module I: Membrane separation process

10 Hours

Membrane Technology-process- Micro-filtration, Ultra-filtration, Nano-filtration and Reverse Osmosis-advantages-equipment

Module II: High pressure processing and microwave heating

15 Hours

Microwave heating of foods- Mechanism of Heat Generation-Working of microwave oven,High Pressure processing: Concept-Equipment for HPP Treatment-Mechanism of Microbial Inactivation and its Application in Food , dielectric heating of foods

Module III: Irradiation and PEF and ohmic heating

15 Hours

Pulsed electric field – equipment –mechanism of PEF-advantages, Ohmic heating of foods-mechanism- principle-advantages, applications. Irradiation- principle- types of irradiation-advantages-applications

Module IV: Osmotic dehydration of foods and minimal processing

20 Hours

Principle – Mechanism of osmotic dehydration – Effect of process parameters on mass transfer – Methods to increase the rate of mass transfer – Applications – Limitations of osmotic dehydration – Management of osmotic solutions. Minimal processing-principle- methods-advantages

Nanotechnology and antimicrobial technology: Role of Antimicrobial agents in food –Plant and animal derived antimicrobials – Antimicrobial enzymes, antimicrobial food packaging, nanotechnology-application of nanotechnology in food industry.

Learning Resources Reference Books

1. Leistner L. and Gould G. Hurdle Technologies – Combination treatments for food stability safety and quality, Kluwer Academics / Plenum Publishers, New York (2002)
2. Novel Food Processing Technologies (Food Science and Technology Series) by Gustavo V. Barbosa-Canovas, Maria S. Tapia, M. Soledad Tapia, M. Pilar Cano, Publisher: CRC Press, November 2004, ISBN-13:9780824753337,
3. P Richardson (2001), “Thermal Technologies in Food Processing”, Campden and Chorleywood Food Research Association, UK, Woodhead Publishing Limited.

**VFT6G18TB- Food Quality Assurance
(GENERAL COMPONENT - 18)
Semester VI**

Total Credits: 4

Total Lecture Hours: 60 (4 Hours/ Week)

Aim of the course: To acquaint with food quality parameters and control systems, food standards, regulations, specifications.

Course Outcomes:

- To understand the principles and framework of food safety.
- To understand food laws and regulations governing the quality of foods.
- To apply preventive measures and control methods to minimize microbiological hazards and maintain quality of foods.
- To identify the wide variety of parameters affecting food quality.
- To understand about Intellectual property rights.

Syllabus Content

Module I: Concept of Quality and Quality Management

18 hours

Quality attributes- physical, chemical, nutritional, microbial, and sensory; their measurement and evaluation; Sensory *vis-à-vis* instrumental methods for testing quality.

Quality Management : Objectives, importance and functions of quality control, Quality management systems in India, Sampling procedures and plans, Food Safety and Standards Act, 2006, Domestic regulations, Global Food safety Initiative, Various organizations dealing with inspection, traceability and authentication, certification and quality assurance - PFA, FPO, MMPO, MPO, AGMARK, BIS; Labeling issues, International food standards.

Module II: HACCP system

12 Hours

Hazard analysis Critical Control Point: Definition, principles, Guidelines for the application of HACCP system.

Module III: Food Quality Laws and Regulations

15 Hours

Quality assurance, Total Quality Management, GMP/GHP, GLP, GAP, Sanitary and hygienic practices, HACCP, Quality manuals, documentation and audits; Indian & International quality systems and standards like ISO and Food Codex, Export import policy, export documentation, Laboratory quality procedures and assessment of laboratory performance, Applications in different food industries, Food adulteration and food safety.

Module IV: Intellectual Property Rights

15 Hours

IPR – Introduction, History in India, Laws related to IPR, Copyright, patent, trademark, designs, geographical indications of food, World Intellectual Property Organization (WIPO), Commercialization of Intellectual Property Rights (IPR), important websites.

Reference Books

1. Yong-Jin Cho, Sukwon Kang.(2011), “Emerging Technologies for Food Quality and Food Safety Evaluation” ,CRC Press.
2. Alli Inteaz, (2003), “Food Quality Assurance: Principles and Practices”, CRC Press.
3. Vasconcellos J. Andres, (2003), “Quality Assurance for the Food Industry: A Practical Approach”, CRC Press.

VFT6S16TB- Unit Operations in Food Industry
(SKILL COMPONENT - 16)
Semester VI

Total Credits: 6

Credits for Theory: 2

Total Lecture Hours: 30 (2 Hours/ Week)

Aim of the course: To provide in-depth knowledge in basic concepts of various unit operations in a food industry.

Course Outcomes:

- To understand the different operations performed in food industry
- To know details of working of different equipments

Syllabus Content

Module I: Heat transfer and size reduction

08 Hours

Size reduction: Benefits, classification, sieve/screen analysis, principle and mechanisms of comminution of food, Rittinger's, Kick's and Bond's equations, work index, energy utilization; Size reduction equipment: Principal types, hammer mills, attrition mills, buhr mill, tumbling mills, tumbling mills, cutting machines (slicing, dicing, shredding, pulping).

Modes of heat transfer-conduction, convection and radiation- heat exchangers- plate heat exchanger-tubular heat-scraped surface heat exchanger.

Module II: Evaporation and Freezing

08 Hours

Basic principle, need for evaporation, single effect, multiple effect, heat economy, type of evaporator-long tube, short tube, agitated film evaporator. Food freezing: Introduction, Principles of food freezing, Freezing systems; Direct contact systems, air blast immersion; Changes in foods; Frozen food properties; freezing time, factors influencing freezing time, freezing/thawing time

Module III: Expression, Extraction, Distillation and crystallization

06 Hours

Expression and Extraction: liquid-liquid extraction processes, types of equipment and design for liquid-liquid extraction, continuous multistage counter current extraction; Crystallization and dissolution: Theory and principles, kinetics, applications in food industry, equipment for crystallization Distillation: Principles, vapour-liquid equilibrium, continuous flow distillation, batch/differential distillation, fractional distillation, steam distillation,.

Module IV: Mixing, Mechanical separation Pasteurization Sterilization and Blanching

06 Hours

Mixing: Theory of solids mixing, criteria of mixer effectiveness and mixing indices, rate of mixing, Theory of liquid mixing, power requirement for liquids mixing; Mixing equipment. Mechanical Separations: Theory, centrifugation, liquid-liquid centrifugation, liquid-solid centrifugation, clarifiers; Filtration: Theory of filtration, rate of filtration, pressure drop during filtration, applications Filtration equipment. Membrane separation: General considerations, Ultra-filtration, membrane fouling, App Membrane separation methods

VFT6S16PB- Unit Operations in Food Industry

Credits for Practical: 4

Total Practical: 16 (04 Hours each)

Sr. No	Names of Practical	No of practical
1	Study of Principle, working and demonstration of hammer mill and crushing roll	1

2	Study of Principle, working and demonstration of attrition mill	1
3	Study of Principle, working and demonstration of modern house mill/ magnum mill	1
4	Determination of reduction ratio of different size reduction machineries	1
5	Study of different disintegration operations (slicing, dicing, shredding and pulping)	1
6	Determination of mixing index of a food mixer	1
7	Power requirement in size reduction of grain using Rittinger's law, Kick's law and Bond's law	1
8	Study of graders for grains	1
9	Study of graders for fruits and vegetables	1
10	Study of different material handling equipments	1
11	Study of principle and working of spray dryer	1
12	Study of centrifugal separation (centrifugal cream separation, centrifugal machine)	1
13	Study on osmosis and reverse osmosis	1
14	Study of principle and working of roller dryer, cabinet dryer	1
15	Study of principle and working of freeze dryer and vacuum dryer	1
16	Study of washers for fruits and vegetables (soaking tank, belt washer)	1
	Total	16

Learning Resources

References

1. Sahay KM & Singh KK 1994. Unit Operation of Agricultural Processing. Vikash Publication House.
2. Fellos PJ 2005 Food Processing Technology: Principle & Practice 2nd Ed. CRC..
3. M.A.Rao, S.S.H.Rizvi and A.K.Dutta, (2005), "Engineering properties of Foods", 3rd ed., Marcel Dekker Publishers.
4. H.Pandey, H.K. Sharma, R.C.Chouhan, B.C. Sarkar and M.C. Bera, (2004), "Experiments in Food Process Engineering", CBS Publishers and Distributors.
5. R.P.Singh and D.R.Heldman, (2001), "Introduction to Food Engineering", 3rd ed., Academic Press.
6. S.K.Sharma, S.J.Mulvaney and S.S.H.Rizvi, (2000), "Food Process Engineering: Theory and Laboratory Experiments", Wiley and Sons Publishers.
7. Earle RL (2013) "Unit Operations in Food Processing" Elsevier
8. Albert Ibarz and Gustavo V. Barbosa-Cánovas (2003) "Unit Operations in Food Engineering" CRC Press, Boca Raton, FL, USA.

**VFT6S17PB- Internship
(SKILL COMPONENT - 17)
Semester VI**

Total Credits: 6**Total Marks: 150**

Students should undergo Internship in an industry involved in developing, processing and analyzing quality food for a period of 90 days, during course of three years. The purpose of the Internship is to get hands-on experience on various aspects of food industries that form the strong foundation for the young food technologists. The department will allot students to the industry, in consultation with the industry concerned. Student should report for the programme on the stipulated date. He/ she shall complete this period of 90 days In-plant training in either summer or winter vacation. On completion, each student should prepare a detailed training report duly certified by the supervisor in the industry. Consequently, a presentation should be conducted in the department to present the summary of the training/ project work, the knowledge gained and skills acquired by the students. The training/ project report attested by the head of the department will be evaluated by the external examiner and a viva voce will be conducted. Evaluation of the students will be done on the basis of training/Project report, Presentation, Viva-Voce as follows.

Particular	Internal	External
Training / Project report	25	25
Presentation	25	25
Viva-Voce	25	25
Total	75	75

**VFT6S18PB- Project and Viva-Voce
(SKILL COMPONENT - 18)
Semester VI**

Total Credits: 6**Total Marks: 150**

Group of maximum four students who have undertaken the project work in fifth semester related to design and development of innovative food product, its quality evaluation, packaging, labeling and shelf life testing or development of any process, its feasibility and application should be completed in sixth semester under the guidance of expert. In this semester students are supposed to work on analysis of product or process, packaging, shelf life analysis in order to reach to the conclusion by analyzing the results. At the end of the semester the student will submit an interim report on his/her work in typed form (minimum 80 pages). Evaluation shall include following parameters.

Sr. No.	Particular	Internal	External
1.	Attendance	15	-
2.	Review I	10	-
3.	Review II	10	-
4.	Record	15	-
5.	Viva	15	15
6.	Result and analysis	-	15
7.	Summary, conclusion & Bibliography	-	15
8.	Project Report	10	15
9.	Presentation	-	15
	Total	75	75