

**ST. TERESA'S COLLEGE, ERNAKULAM
(AUTONOMOUS)**

Affiliated to Mahatma Gandhi University



**CURRICULUM FOR BACHELOR'S PROGRAMME
IN
B.VOC. FOOD PROCESSING TECHNOLOGY**

**Under Choice Based Credit and Semester Based System
(2016 Admission Onwards)**

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UGC Sponsored B. Voc. Programmes

The University Grants Commission (UGC) had launched a scheme on 27 February, 2014 for skills development based higher education as 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. programme 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

- a. To provide judicious mix of skills relating to a profession and appropriate content of general education.
- b. To ensure that the students have adequate knowledge and skills, so that they are work ready at each exit point of the programme.
- c. To provide flexibility to students by means of pre-defined entry and multiple exit points.
- d. 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.
- e. 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	6 Months
Diploma	2 Semesters (after 1 st year)
Advanced Diploma	4 Semesters (after 2 nd year)
Degree	6 Semesters

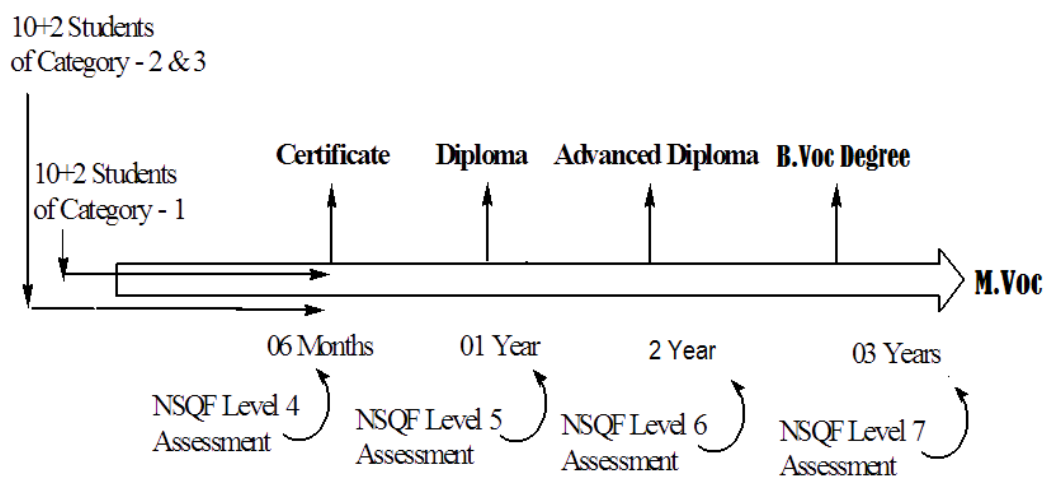


Figure 1 : Assessment of Skill Component under NSQF in Vocational Courses

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 programme 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 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:
- 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.
 - For internship / field work, the credit weightage for equivalent hours shall be 50% of that for lectures / tutorials.
 - 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,

$$i.e; \text{SGPA (Si)} = \Sigma(C_i \times G_i) / \Sigma C_i$$

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,

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

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. FOOD PROCESSING 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 flavouring 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 organisations.</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> <ol style="list-style-type: none"> <li>1. Fish and Sea food Processing Technician : Reference ID: FIC/Q4001 <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>;[P'</p> <ol style="list-style-type: none"> <li>2. Grain Mill Operator : Reference ID: FIC/Q1003 <p>A grain mill operator carries out processes such as cleaning, destoning, hulling, polishing and grinding to produce milled grains and flour(s).</p> <ol style="list-style-type: none"> <li>3. Chief Miller : Reference ID: FIC/Q1001 <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> <ol style="list-style-type: none"> <li>4. Pulse Processing Technician : Reference ID: FIC/Q1004 <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 storing.</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 PROCESSING TECHNOLOGY

a) Title

Regulations for conducting B. Voc Programme under Mahatma Gandhi University

b) Scope

The regulations stated in this document shall apply to all B.Voc Programmes conducted by colleges affiliated to Mahatma Gandhi 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 Programme: A Programme 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 programme follows a credit semester system and each Course has an associated credit.

3.7 Grade: Uses seven point grading system suggested by Hrdayakumari 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 Processing Technology shall be according to the rules that no student shall be eligible for admission to B. Voc. Food Processing 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 Processing Technology is a programme 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 Processing Technology programme 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 programmes 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 Programme, on valid reasons, within a period of 12 continuous semesters from the date of commencement of the first semester of the programme.

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
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.Co – ordinator and A.O/Superintendent as members.
3. University Level Monitoring Committee (ULMC), headed by the Vice – Chancellor and Pro –Vice – Chancellor , Convenors of Syndicate subcommittees on Examination, Academic Affairs and Staff and Registrar as members and the Controller of Examinations as member-secretary.

8. Programme Structure

The B. Voc. Food Processing 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 Programmes
- h) Study tours

9. Scheme of Courses

Scheme of distribution of credits for courses

Sl. No.	Courses	No. of Papers	Credits
1.	General Education Components (+ English)	18	72
2.	Skill Components	22	93
3.	Project	1	10
4.	Internship	5	5
Total		46	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 programme, 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: VFP1S01TB

V → Vocational Studies

FP → Food Processing

1 → Semester

A / G / S → Common (A) / 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

Semester	Title of the course	Course code	No. of Hours/Week		Total credits	Total hours/semester	University exam duration (in hrs)	Total	
			Lec	Lab				Sessionals	Finals
I	Bakery and Confectionery Technology	VFP1S01TB	5	-	5	75	3	20	80
	Principles of Food Preservation	VFP1S02TB	5	-	5	75	3	20	80
	Food Chemistry	VFP1S03TB	5	-	5	75	3	20	80
	Bakery and Confectionery Technology (Practical)	VFP1S04PB	-	3	2	60	3	80	20
	Communication Skills in English	VFP1A01TB	4	-	4	60	3	20	80
	Food Science and Nutrition I	VFP1G01TB	4	-	4	60	3	20	80
	Entrepreneurship Development and Project Management	VFP1G02TB	4	-	4	60	3	20	80
	Internship	VFP1S01IB	-	-	1	30	-	-	-

Semester II

Semester	Title of the course	Course code	No. of Hours/ Week		Total credits	Total hours/ semester	University exam duration (in hrs)	Total Marks	
			Lec	Lab				Sessionals	Finals
II	Dairy Technology	VFP2S05TB	5	-	5	75	3	20	80
	Packaging Technology	VFP2S06TB	5	-	5	75	3	20	80
	Sanitation and hygiene	VFP2S07TB	5	-	5	75	3	20	80
	Dairy Technology (Practical)	VFP2S08PB	-	3	2	60	3	20	80
	Critical Thinking, Academic Writing and Presentation Skills	VFP2A02TB	4	-	4	60	3	20	80
	Food Science and Nutrition II	VFP2G03TB	4	-	4	60	3	20	80
	Business Communication	VFP2G04TB	4	-	4	60	3	20	80
	Internship	VFP2S02IB	-	-	1	30	-	-	-

Semester III

Semester	Title of the course	Course code	No. of Hours/ Week		Total credits	Total hours/ semester	University exam duration (in hrs)	Total	
			Lec	Lab				Sessionals	Finals
III	Technology of Fish, Meat and Egg Processing.	VFP3S09TB	5	-	5	75	3	20	80
	Technology of Spices and plantation crop	VFP3S10TB	5	-	5	75	3	20	80
	Technology of Fermented Foods	VFP3S11TB	5	-	5	75	3	20	80
	Chemical and microbial analysis of food (Practical)	VFP3S12PB	-	3	2	60	3	20	80
	Food Microbiology	VFP3G05TB	4	3	2	60	3	80	20
	Food additives and flavouring technology	VFP3G06TB	4	-	4	60	3	20	80
	Business Management	VFP3G07TB	4	-	4	60	3	20	80
	Internship	VFP3S03IB	-	-	1	30	-	-	-

Semester IV

Semester	Title of the course	Course code	No. of Hours/ Week		Total credits	Total hours/ semester	University exam duration (in hrs)	Total	
			Lec	Lab				Sessionals	Finals
IV	Technology of Cereal, Pulses and Oilseeds.	VFP4S13TB	5	-	5	75	3	20	80
	Technology of Beverages	VFP4S14TB	5	-	5	75	3	20	80
	Food Product design and Development	VFP4S15TB	5	-	5	75	3	20	80
	Cereal, Pulses and Oilseeds Technology (Practical)	VFP4S16PB	-	3	2	60	3	20	80
	Food Plant designing	VFP4G08TB	4	3	2	60	3	80	20
	By product utilization and Waste Management	VFP4G09TB	4	-	4	60	3	20	80
	Marketing Management	VFP4G10TB	4	-	4	60	3	20	80
	Internship	VFP4S04IB	-	-	1	30	-	-	-

Semester V

Semester	Title of the course	Course code	No. of Hours/Week		Total credits	Total hours/semester	University exam duration (in hrs)	Total	
			Lec	Lab				Sessionals	Finals
V	Fruit and Vegetable Processing	VFP5S17TB	5	-	5	75	3	20	80
	Engineering properties of foods	VFP5S18TB	5	-	5	75	3	20	80
	Sensory Evaluation of foods.	VFP5S19TB	5	-	5	75	3	20	80
	Processing of fruits and vegetable (Practical)	VFP5S20PB	-	3	2	60	3	20	80
	Food Processing equipments	VFP5G11TB	4	3	2	60	3	80	20
	Computer Applications	VFP5G12TB	4	-	4	60	3	20	80
	Product and brand Management	VFP5G13TB	4	-	4	60	3	20	80
	Internship	VFP5S05IB	-	-	1	30	-	-	-

Semester VI

Semester	Title of the course	Course code	No. of Hours/ Week		Total credits	Total hours/ semester	University exam duration (in hrs)	Total	
			Lec	Lab				Sessionals	Finals
VI	Unit Operations in Food Industry	VFP6S21TB	5	-	5	75	3	20	80
	Food Quality Assurance	VFP6S22TB	3	-	3	45	3	20	80
	Project and Viva voce	VFP6S23TB	8	-	10	120	-	40	60
	Emerging Technologies in food industry	VFP6G14TB	4	-	4	60	3	20	80
	Food service management	VFP6G15TB	4	-	4	60	3	20	80
	Personality Development	VFP6G16TB	4	-	4	60	3	20	80

12. Evaluation

The evaluation of each course shall contain two parts- Sessional Assessment and Final Assessment. The Sessional and Final Assessment shall be made using a Mark-Based Grading System on a 7-point scale. Overall Sessional: Final ratio will be maintained as 20:80.

Theory Examinations**a. Sessional**

The sessional evaluation is to be done by continuous assessment of the following components. The components of the evaluation for theory and practical and their weights are as below.

I. Distribution of Sessional marks:**a. Theory courses**

Components	Marks
Attendance	5
Assignment/ Seminar/viva	5
Test paper	10
Total	20

b. Practical courses

Components	Marks
Attendance	4
Lab involvement	6
Record	10
Total	20

II. Attendance Evaluation

A student should have a minimum of 75% attendance. Those who do not have the minimum requirement for attendance will not be allowed to appear for the Final Examinations.

Distribution of Marks for evaluation

Components	Marks
90% - 100%	5
85% - 89%	4
80% - 84%	3
75% - 79%	2

III. Assignment/Seminar/Viva

Each student has to take one assignment or one seminar presentation per course from first to fifth semester. The students should compulsory take one seminar presentation on sixth semester.

Different components for the evaluation of Assignment

Components	Marks
Punctuality	1
Content	2
Conclusion	1
Reference	1
Total	5

Different components for the evaluation of Seminar

Components	Marks
Visual Aids used	1
Content	2
Presentation	1
Reference	1
Total	5

IV. Test Paper

Average mark of two sessional examinations shall be taken.

b. Final

The final examination of all semesters shall be conducted by the institution on the close of each semester. For reappearance/ improvement, students may appear along with the next batch.

Pattern of Questions

Questions shall be set to assess knowledge acquired, application of knowledge in life situations, critical evaluation of knowledge and the ability to synthesize knowledge. The question setter shall ensure that questions covering all skills are set. He/She shall also submit a detailed scheme of evaluation along with the question paper.

Theory Examinations

A question paper shall be a judicious mix of very short answer type, short answer type, short essay type / problem solving type and long essay type questions.

Courses such as common courses, open course and elective course do not contain practical courses. The pattern of questions for these courses without practical are listed below.

1. Each question paper has four parts A, B, C & D.
2. **Part A** contains 10 questions of 1 mark each all of which the candidate has to answer.
3. **Part B** contains 12 short answer type questions spanning the entire syllabus and the candidate has to answer 8 questions. Each question carries 2 marks.
4. **Part C** contains 9 problem type questions / short essays spanning the entire syllabus and the candidate has to answer 6 questions. Each question carries 4 marks. But, for open courses, Part C contains short essay type questions only.
5. **Part D** contains 4 essay type questions spanning the entire syllabus and the candidate has to answer 2 questions. Each question carries 15 marks.
6. The total marks for courses are 80.

Practical Examinations

The practical examinations for the core and complementary courses are to be conducted at the end of every semester by the institution. The external examiner shall be selected by the institution. The score sheet should be sent to the Controller of Examinations soon after the evaluation.

A minimum of 16 experiments should be done in a practical course and a candidate submitting a certified record with a minimum of 8 experiments alone is eligible for appearing for the Practical Examination.

Practical Evaluation

The scheme of evaluation of the practical examination will be decided by the Board of Examiners.

Student strength for practical examination

There shall be at least one teacher to supervise a batch of not more than 15 students in each laboratory session.

Internship Evaluation

The total marks of evaluation of the internship at various Food Processing Industries will be on 100 Marks including presentation of the report and viva – voce.

Project Evaluation

All students have to begin working on the project in the **fifth** semester and must submit it in the **sixth** semester.

The ratio of Sessional to Final component of the project is 2:3. The mark distribution for assessment of the various components is as follows.

a. Sessional Evaluation**Sessional Evaluation of Project**

Component	Marks
Attendance	3
Review I	5
Review II	5
Viva	10
Record	10
Presentation	7
Total	40

External Evaluation of Project

Component	Marks
Introduction and objectives	5
Review of Literature	5
Materials & Methods	15
Results & Discussion / Applications	20
Viva –Voce	15
Total	60

Letter Grades and Grade points

The UGC recommends a 10 point grading system with the following letter grades as given below:

Grades and Grade points

Letter Grades	Grade points
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) / Ab (Absent)	0

Computation of SGPA and CGPA

Credit point and credit point average:

Credit Point (CP) of a course is calculated using the formula

$$CP = C \times GP, \text{ where } C = \text{Credit for the course; } GP = \text{Grade point}$$

Semester Credit Point Average (SGPA) is calculated as

$$SCPA = \frac{\text{Total Credit Points (TCP)}}{\text{Total Credits (TC)}}$$

where $TCP = \text{Total Credit Point}$; $TC = \text{Total Credit}$

Cumulative Credit Point Average for the programme is calculated as follows:

$$CCPA = \frac{(TCP)_1 + (TCP)_2 + \dots + (TCP)_6}{TC_1 + TC_2 + \dots + TC_6}$$

Where TCP_1, \dots, TCP_6 are the **Total Credit Points** in each semester and TC_1, \dots, TC_6 are the **Total Credits** in each semester

Note: A separate minimum of **30% marks** each for Sessionals and Finals (for both theory and practical) and an aggregate minimum of **40% is** required for the pass of a course. For pass in a programme, a separate minimum of Grade E is required for all the individual courses. If a candidate secures **F** Grade for any one of the courses offered in a Semester/Programme only **F** grade will be awarded for that Semester/Programme until he/she improves this to **E** grade or above within the permitted period. Candidate who secures **D** grade and above will be eligible for higher studies.

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

**Detailed Distribution of Courses
Semester I**

Semester	Title of the course	Course code	No. of Hours/ Week		Total credits	Total hours/ semester	University exam duration (in hrs)	Total	
			Lec.	Lab.				Sessionals	Finals
I	Bakery and Confectionery Technology	VFP1S01TB	5	-	5	75	3	20	80
	Principles of Food Preservation	VFP1S02TB	5	-	5	75	3	20	80
	Food Chemistry	VFP1S03TB	5	-	5	75	3	20	80
	Bakery and Confectionery Technology (Practical)	VFP1S04PB	-	3	2	60	3	20	80
	Communication Skills in English	VFP1A01TB	4	-	4	60	3	20	80
	Food Science and Nutrition I	VFP1G01TB	4	-	4	60	3	20	80
	Entrepreneurship Development and Project Management	VFP1G02TB	4	-	4	60	3	20	80
	Internship	VFP1S011B	-	-	1	30	-	-	-

**VFP1S01TB – Bakery and Confectionery Technology
(SKILL COURSE - 01)
Semester I**

Total Credits: 5

Total Lecture Hours: 75 (5 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 Overview and Context

- To highlight 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: Manufacture of Sugar 14 Hours

Sugarcane, jaggery, khandasari sugar, raw sugar, refined sugar, white sugar, beet sugar, manufacture of sugar from sugar cane, refining of sugar.

Module II: Classification of confectionery 12 Hours

Sugar boiled confectionery- crystalline and amorphous confectionery, rock candy, hard candy, lemon drop, china balls, soft candy, lollypop, marshmallows, fudge, cream, caramel, toffee, lozenges, gumdrops, honeycomb candy.

Module III: Properties of wheat 15 Hours

Wheat – Properties, Quality – Hardness, Gluten strength, protein content, soundness. Methodology and approaches to evaluate bread and bread – wheat quality – processing factors, product factors.

Module IV: Principles of baking and Bread manufacturing 20 Hours

Major baking ingredients and their functions, role of baking ingredients in improving the quality of bread. Characteristics of good flour used for making bread, biscuits and cakes. Ingredients used for bread manufacture, methods of mixing the ingredients, dough development methods - straight dough, sponge dough, moulding, proofing, baking, packing, spoilage, bread staling, methods to reduce bread staling and spoilage.

Module V: Cake and Biscuit manufacturing 14 Hours

Processing of cakes and biscuits- ingredients, development of batter, baking and packing, Spoilage in cakes and biscuits.

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.

**VFP1S02TB – Principles of Food Preservation
(SKILL COURSE - 02)
Semester I**

Total Credits: 5

Total Lecture Hours: 75 (5 Hours/ Week)

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

Course Overview and Context

- 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 Spoilage 12 Hours

Definition, types of spoilage - physical, enzymatic, chemical and biological spoilage. Mechanism of spoilage and its end products, shelf life determination.

Module II: Preservation by using Preservatives 13 Hours

Food preservation: Definition, principles, importance of food preservation, traditional and modern methods of food preservation. Food additives – definition, types, Class I and Class II preservatives.

Module III: Preservation by use of high temperature 20 Hours

Pasteurization: Definition, types, Sterilization, Canning - history and steps involved, spoilage encountered in canned foods, types of containers used for canning foods. Food irradiation – Principles, merits and demerits, effects of irradiation and photochemical methods.

Module IV: Preservation by use of Low Temperature 16 Hours

Refrigeration - advantages and disadvantages, freezing: Types of freezing, common spoilages occurring during freezing, difference between refrigeration and freezing.

Module V: Preservation by Removal of Moisture 14 Hours

Drying and dehydration - merits and demerits, factors affecting, different types of drying, Concentration: principles and types of concentrated foods.

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. Srilakshmi, B.(2003), "Food Science", New Age International Publishers, New Delhi.
4. Subalakshmi, G and Udipi, S.A.(2001),"Food processing and preservation". New Age International Publishers, New Delhi.

**VFP1S03TB – Food Chemistry
(SKILL COURSE - 03)
Semester I**

Total Credits: 5

Total Lecture Hours: 75 (5 Hours/ Week)

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

Course Overview and Context

- 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

13 Hours

Introduction to food chemistry, structure of water molecule, hydrogen bonding, effect of hydrogen bonding on the properties of water, moisture in foods, free water, bound water, water activity, estimation of moisture in foods, determination of moisture and water activity.

Module II: Carbohydrates

16 Hours

Nomenclature, composition, sources, structure, reactions, functions, classification - monosaccharide, disaccharides, oligosaccharides and polysaccharides. Properties of Starch – gelatinisation, gel formation, syneresis, starch degradation, dextrinisation, retrogradation, Qualitative and quantitative tests of carbohydrates.

Module III: Proteins

18 Hours

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

Module IV: Fats and oils

15 Hours

Nomenclature, composition, sources, structure, functions, classification, essential fatty acids. Physical and chemical properties - hydrolysis, hydrogenation, rancidity

and flavour reversion, emulsion and emulsifiers, saponification value, acid value and iodine value, smoke point.

Module V: Pigments, colours and flavours in food**13 Hours**

Micro nutrients: Vitamins and minerals, Pigments indigenous to food, structure, chemical and physical properties, effect of processing and storage, colours added to foods, flavours- vegetable, fruit and spice flavours, flavours of milk and meat products, effect of processing on flavour components.

Reference Books:

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

VFP1S04PB – Bakery and Confectionery Technology (Practical)
(SKILL COURSE - 04)
Semester I

Total Credits: 2

Total Laboratory Hours: 60 (3 Hours/ Week)

Aim of the course: To develop professional and practical knowledge in bakery and confectionery and make them competent as an entrepreneur.

Course Overview and Context

- To improve the culinary skills of the students
- To gain knowledge about the preparation of some basic food products
- To use the processes studied in food chemistry and food preservation papers to prepare different food products
- To understand how these can be utilized to start a small scale processing unit.
- It involves not only gaining knowledge on how to make a food product but also studies the principles behind them.
- It helps the students to gain not only theoretical but also practical knowledge

Syllabus Content

1. Preparation of ghee biscuits
2. Preparation of melting marvels
3. Preparation of sweet and salt biscuits
4. Preparation of bread
5. Preparation of pizza
6. Preparation of hot cross buns(sweet buns)
7. Preparation of jamnut cookies
8. Preparation of vanilla cake
9. Preparation of cake.
10. Visit to production unit of a bakery.

VFP1A01TB– **Communication Skills in English**
(COMMON COURSE – 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 Overview and Context

- The course aims at training students in the usage of English Language in various contexts and enabling them to communicate effectively in English.

Competencies of the course

- 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 o literary writing.

Syllabus Content

Module I: Grammar

12 Hours

Articles, The Verb, Active and Passive Voice, Tenses, Concord, Modal Auxiliaries, The Adverb, The Preposition, Conjunction, 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

10 Hours

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

Module IV: Reading**15 Hours**

Reading: theory and Practice, Scanning, Surveying a textbook using an index, Reading for information, Understanding text structure, Locating main points, Making inferences, Reading graphics, Reading for research.

Module V: Writing**13 Hours**

Describing people, place, events and things, Short Stories, Vocabulary and Comprehension, Guide to letter 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 (StudySkills), SAGE Publishers.

**VFP1G01TB – Food Science and Nutrition I
(GENERAL COURSE - 01)
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 I: Introduction to Nutrition 8 Hours

Definition of nutrition and health, inter-relationship between nutrition and health. Malnutrition: Definition and types. Reference man and reference women.

Module II: Food and water 12 Hours

Definition of food, classification of foods based on origin, pH, nutritive value. Basic five food groups, 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 III: Vitamins 15 Hours

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

Module IV: Minerals 10 Hours

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

Module V: Energy 15 Hours

Units of energy, food as a source of energy, basal metabolic rate, factors effecting BMR, total energy Requirement.

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 al Wilkins.
3. Michael J Gibney, Ian A Macdonald and Helen M Roche (2003) “Nutrition and Metabolism”, The Nutrition Society Textbook Series, Blackwell Publishing, First Edition.

**VFP1G02TB – Entrepreneurship Development and Project Management
(GENERAL COURSE - 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.

Semester II

Semester	Title of the course	Course code	No. of Hours/ Week		Total credits	Total hours/ semester	University exam duration (in hrs)	Total Marks	
			Lec.	Lab.				Sessionals	Finals
II	Dairy Technology	VFP2S05TB	5	-	5	75	3	20	80
	Packaging Technology	VFP2S06TB	5	-	5	75	3	20	80
	Sanitation and hygiene	VFP2S07TB	5	-	5	75	3	20	80
	Dairy Technology (Practical)	VFP2S08PB	-	3	2	60	3	20	80
	Critical Thinking, Academic Writing and Presentation Skills	VFP2A02TB	4	-	4	60	3	20	80
	Food Science and Nutrition II	VFP2G03TB	4	-	4	60	3	20	80
	Business Communication	VFP2G04TB	4	-	4	60	3	20	80
	Internship	VFP2S02IB	-	-	1	30	-	-	-

VFP2S05TB - Dairy Technology
(SKILL COURSE - 05)
Semester II

Total Credits: 5

Total Lecture Hours: 75 (5 Hours/ Week)

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

Course Overview and Context

- 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	15 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	20 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 pasteuriser, Sterilisation and Homogenisation, Cream separation- centrifugal cream separator, bactofugation.	
Module III: Special milks	10 Hours
Skim milk, evaporated milk, condensed milk, standardized milk, toned milk, double toned milk, flavoured milk, reconstituted milk.	
Module IV: Indigenous and Fermented milk products	20 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. Instantization of milk.	
Module V: In-Plant cleaning system	10 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.

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.

VFP2S06TB - Packaging Technology
(SKILL COURSE - 06)
Semester II

Total Credits: 5

Total Lecture Hours: 75 (5 Hours/ Week)

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

Course Overview and Context

- 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 **10 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: Deteriorative Reactions and shelf life of foods **10 Hours**

Introduction, deteriorative Reactions in food- factors affecting deterioration of foods- physical changes, biological changes, chemical changes. Shelf life of foods – Definition, intrinsic and extrinsic factors controlling the rate of reactions. Shelf life determination tests.

Module III: Packaging Materials and their properties **15 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 IV: Special Packaging **20 Hours**

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

Module V: Labelling and safety concerns in food pack **20 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).

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.

**VFP2S07TB – Sanitation and Hygiene
(SKILL COURSE - 07)
Semester II**

Total Credits: 5

Total Lecture Hours: 75 (5 Hours/ Week)

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

Course Overview and Context

- 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

12 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

12 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

14 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

12 Hours

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

Module V: Sanitation regulations and Standards

10 Hours

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 Media Publishing.
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.

VFP2S08PB – Dairy Technology (P)
(SKILL COURSE - 08)
Semester II

Total Credits: 2

Total Laboratory Hours: 60 (3 Hours/ Week)

Aim of the course: To develop the skills in dairy product preparation and to familiarise with the dairy plant equipments.

Course Overview and Context

- To gain knowledge about preparation of some dairy products
- To perform chemical analysis of milk sample
- To understand different processing equipment in dairy plant

Syllabus Content

1. Milk Testing - Platform Tests.
2. Determination of Activity (Titrable Acidity) of Milk.
3. Determination of fat and SNF content in milk.
4. Clot on boiling test for milk.
5. Determination of specific gravity of milk.
6. Detection of Addition of Starch in Milk.
7. Preparation of Lassi.
8. Preparation of khoa.
9. Preparation of Basundi.
10. Preparation of chakka and shrikand.
11. Preparation of kalakand.
12. Preparation of cooking butter.
13. Preparation of ghee.
14. Preparation of flavoured milk.
15. Visit to milk product development centre.

VFP2A02TB– Critical Thinking, Academic Writing and Presentation Skills

(COMMON COURSE – 02)

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 Overview

- The course seeks to introduce the students to the concept of critical thinking, enlighten students on academic writing and develop presentation skills.

Competencies of the course:

- 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. Iona 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 (StudySkills), SAGE Publishers.

**VFP2G03TB – Food Science and Nutrition II
(GENERAL COURSE - 03)
Semester II**

Total Credits: 4

Total Lecture Hours: 60 (4 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 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 gain knowledge about the latest laws relevant to the food industry

Syllabus Content

Module I: Body Composition

12 Hours

Introduction, five levels of body composition, body compartments, Estimation of body composition (direct and indirect methods), Body Composition changes. Status/Length, Weight, Body Mass Index, Circumference measurements, Skin fold measurements.

Module II: Carbohydrates

13 Hours

Definition, classification, digestion, absorption, transport, distribution, storage and excretion. Glycemic Index and Glycemic load. Metabolic utilization and regulation of blood glucose concentration, Non- glyceimic carbohydrates- Fibre - properties, Physiological and metabolic effects, Nutritional and health significance, requirements. Resistant starch – factors influencing resistant starch content in foods and potential health benefits. Fructooligosaccharides and High Fructose Corn Syrup.

Module III: Proteins

13 Hours

Definition, classification of amino acids – Essential and non essential, structure of proteins, digestion, absorption, transport, distribution, storage and excretion. Protein Metabolism – Transamination, Deamination and Urea Cycle, Amino acid pool, Protein biosynthesis.

Module IV: Lipids

13 Hours

Definition, classification, structure, physical and chemical properties. Digestion, absorption, transport, distribution, storage and excretion Metabolism of Lipids, Cholesterol biosynthesis and regulation. Ketone bodies, Prostaglandins. Plasma lipoproteins and Hyperlipidemias. Regulation of Lipid metabolism.

Module V: Inborn errors of metabolism

9 Hours

Definition, Inborn errors of carbohydrate metabolism - Glycogen storage diseases, fructosuria, galactosemia. Inborn errors of protein metabolism - phenyl ketonuria, cystinuria, albinism, alkaptonuria, maple syrup disease.

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 and Wilkins.
4. Michael J Gibney, Ian A Macdonald and Helen M Roche (2003) “Nutrition and Metabolism”, The Nutrition Society Textbook Series, Blackwell Publishing, First Edition.

**VFP2G04TB – Business Communication
(GENERAL COURSE - 04)
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 the tools to overcome the barriers of communication.

Course Overview and Context

- 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** **13 Hours**
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** **10 Hours**
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** **15 Hours**
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** **12 Hours**
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** **10 Hours**
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.

Semester III

Semester	Title of the course	Course code	No. of Hours/ Week		Total credits	Total hours/ semester	University exam duration (in hrs)	Total	
			Lec	Lab				Sessionals	Finals
III	Technology of Fish, Meat and Egg Processing.	VFP3S09TB	5	-	5	75	3	20	80
	Technology of Spices and plantation crop	VFP3S10TB	5	-	5	75	3	20	80
	Technology of Fermented Foods	VFP3S11TB	5	-	5	75	3	20	80
	Chemical and microbial analysis of food (Practical)	VFP3S12PB	-	3	2	60	3	20	80
	Food Microbiology	VFP3G05TB	4	-	4	60	3	20	80
	Food additives and flavour technology	VFP3G06TB	4	-	4	60	3	20	80
	Business Management	VFP3G07TB	4	-	4	60	3	20	80
	Internship	VFP3S03IB	-	-	1	30	-	-	-

Module V: Products from fish, meat and egg**15 Hours**

Fishery products: Surimi - Process, traditional and modern production lines, quality of surimi products. Fish protein concentrates (FPC), fish protein extracts (FPE). **Meat products:** Sausages - processing, RTE meat products. **Egg products**– Egg powder, frozen egg pulp, designer eggs.

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.

**VFP3S10TB – Technology of Spices and Plantation Crops
(SKILL COURSE - 10)
Semester III**

Total Credits: 5

Total Lecture Hours: 75 (5 Hours/ Week)

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

Course Overview and Context

- 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 processing 15 Hours

Introduction, classification, composition and functions. Major international quality specifications of spices. Spice processing, spice reconditioning, spice grinding, post-processing treatments. Introduction to Gas chromatography, HPLC, AAS, Spectrophotometer.

Module II: Processing of Major Spices 15 Hours

Major spices: Pepper, cardamom, ginger, clove, nutmeg, vanilla, cinnamon, chilli and turmeric – method of manufacture; chemistry of the volatiles; enzymatic synthesis of flavour identical.

Module III: Spice extractives 10 Hours

Value added spice products: Spice volatile oils, spice oleoresins, Use of spice extractives, replacement of spices with oils and oleoresins, alternative products, Ground spices, processed spices, organic spices, curry powders.

Module IV: 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 V: Sugarcane and Cocoa processing

15 Hours

Production and processing of sugarcane, Cocoa: varieties, Processing of cocoa – Fermentation and Drying, storage. Manufacture of chocolate- conching, enrobing, milk chocolate, white chocolate, dark chocolate, cocoa butter, wafer coated chocolate, cocoa powder.

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.

**VFP3S11TB – Technology of Fermented Foods
(SKILL COURSE - 11)
Semester III**

Total Credits: 5

Total Lecture Hours: 75 (5 Hours/ Week)

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

Course Overview and Context

- 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 12 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 16 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 Inocula for fermentation 15 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**15 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**17 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** –Sourdough bread, croissants, rye bread, hamburger bun, Danish pastry, beer.

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, Oxford UK.
4. Steinkraus, K.H. (1983). “Handbook of Indigenous Fermented Foods”, Marcel Dekker, New York.

**VFP3S12PB – Chemical and Microbial Analysis of Foods (Practical)
(SKILL COURSE - 12)**

Semester III

Total Credits: 2

Total Laboratory Hours: 60 (3 Hours/ Week)

Aim of the course: To analyse the chemical constituents in food and to understand the basic concepts of food microbiology.

Course Overview and Context

- To analyze the spices its oleoresin and oil extraction
- To gain knowledge in the preparation of fermented foods
- To introduce basics of food microbiology.

Syllabus Content

1. Demonstrations of process of essential oil extraction and oleoresin of different spice
2. Detection of papaya seeds in black pepper.
3. Detection of powdered bran and sawdust in spices
4. Preparation of fermented foods
5. Introduction to the Basic Microbiology Laboratory Practices and Equipments
6. Functioning and use of compound microscope
7. Cleaning and sterilization of glassware
8. Preparation and sterilization of nutrient broth .
9. Preparation of slant, stab and plates using nutrient agar.
10. Standard Plate Count Method.
11. Visit to Meat Products of India

**VFP3G05TB – Food Microbiology
(GENERAL COURSE - 05)
Semester III**

Total Credits: 4

Total Lecture Hours: 60 (4 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 Overview and Context

- 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 9 Hours

Discovery, current status, role of food microbiology, sources of micro organisms in food, changes caused by microorganisms - food fermentation, putrefaction, lipolysis. Growth and survival of microorganisms in foods, biological, chemical and physical changes caused by microorganisms, physical and chemical methods to control microorganisms.

Module II: Characteristics of microorganisms 11 Hours

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. Food hygiene and sanitation: Contamination during handling and processing and its control; indicator organisms.

Module III: Food preservation 10 Hours

Factors influencing microbial growth in food: Intrinsic and extrinsic factor - 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: Spoilage in different food groups 16 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 V: Beneficial uses of microorganisms**14 Hours**

Microorganisms used in food fermentation, mechanisms of nutrient transport, application in genetics, intestinal bacteria and probiotics, food bio preservatives of bacterial origin, food ingredients and enzymes of microbial origin. Economic importance of microorganisms.

References

1. Ray , Bibek; Arun Bhunia,(2013), “Fundamental Food Microbiology”, CRC Press.
2. Adams ,Martin R, Maurice O Moss, Peter McClure (2015), “Food Microbiology”, Royal Society of Chemistry, Cambridge.
3. Jay, James M.(2012), “Modern Food Microbiology”, Springer Science & Business Media., Maryland.

**VFP3G06TB – Food Additives and Flavour Technology
(GENERAL COURSE - 06)
Semester III**

Total Credits: 4

Total Lecture Hours: 60 (4 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 Overview and Context

- 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 **10 Hours**

Role of Food Additives in Food Processing, 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 **15 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.

Module III: Flavour technology **12 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.

Module IV: Derived food additives **10 Hours**

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 V: Food additives as toxicants **13 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.

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.

**VFP3G07TB - Business Management
(GENERAL COURSE - 07)
Semester III**

Total Credits: 4

Total Lecture Hours: 60 (4 Hours/ Week)

Course Overview and Context

- To familiarise the students with concepts and principles of Management

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 8 Hours

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

Module III: Organising and Staffing 12 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 16 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 - Likert s Four level model-Coordination-Meaning and importance.

Module V: Controlling 14 Hours

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.

Semester IV

Semester	Title of the course	Course code	No. of Hours/ Week		Total credits	Total hours/ semester	University exam duration (in hrs)	Total	
			Lec	Lab				Sessionals	Finals
IV	Technology of Cereal, Pulses and Oilseeds.	VFP4S13TB	5	-	5	75	3	20	80
	Technology of Beverages	VFP4S14TB	5	-	5	75	3	20	80
	Food Product design and Development	VFP4S15TB	5	-	5	75	3	20	80
	Product development (Practical)	VFP4S16PB	-	3	2	60	3	20	80
	Food Plant design	VFP4G08TB	4	-	4	60	3	20	80
	By product utilization and Waste Management	VFP4G09TB	4	-	4	60	3	20	80
	Marketing Management	VFP4G10TB	4	-	4	60	3	20	80
	Internship	VFP4S04IB	-	-	1	30	-	-	-

**VFP4S13TB – Technology of Cereals, Pulses and Oilseeds
(SKILL COURSE - 13)
Semester IV**

Total Credits: 5

Total Lecture Hours: 75 (5 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 Overview and Context

- 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 15 Hours

Composition and Quality characteristics. Curing of Paddy. Parboiling Processes- soaking, steaming, drying, CFTRI and pressure parboiling process, Paddy Dryer - LSU Dryer. Production of Flattened Rice and Puffed Rice from Paddy.

Module II: Rice Milling 20 Hours

Paddy Dehusking Processes. Rice Mill Flow Chart. Engelberg Huller Mills. Modern Rice Mills – Their Components - Pre Cleaners, rubber roll Shellers, Paddy Separators – Satake type, Polishers - Cone polishers, glazing, Extraction of rice bran oil and uses of rice bran in food industry.

Module III: Wheat milling 10 Hours

Wheat - composition and nutritional value, wheat milling process - cleaning-conditioning/hydrothermal treatment, milling-break roll and reduction rolls.

Module IV: Milling of Pulses 10 Hours

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

Module V: Oil seed processing 20 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.

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

**VFP4S14TB – Technology of Beverages
(SKILL COURSE - 14)
Semester IV**

Total Credits: 5

Total Lecture Hours: 75 (5 Hours/ Week)

Aim of the course: The aim of the course is to provide the students with general scientific knowledge about processing of alcoholic and non- alcoholic beverages.

Course Overview and Context

- 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 to beverages 15 Hours

Types of beverages and their importance, status of beverage industry in India, 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.

Module II: Manufacturing process of beverages 10 Hours

Beverages based on tea, coffee, cocoa, spices, plant extracts, herbs, nuts, Dairy-based beverages.

Module III: Types of coffee and tea 20 Hours

Chemical composition and processing of tea and coffee and their quality assessment. Types of tea: black tea, green tea, oolong tea. Types of coffee: Vacuum coffee, drip coffee, iced coffee. Espresso coffee, instant coffee. Decaffeination of Coffee types of decaffeination: Roselius method, swiss water process, direct and indirect method, triglyceride method, carbon dioxide method.

Module IV: Alcoholic beverages 15 Hours

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 V: Packaged drinking water**15 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.

Learning Resources**Reference Books**

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

**VFP4S15TB – Food Product Design and Development
(SKILL COURSE - 15)
Semester IV**

Total Credits: 5

Total Lecture Hours: 75 (5 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 Overview and Context

- 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 16 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 14 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 18 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 12 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.

**VFP4S16PB – Technology of Cereals, Pulses and Oilseeds (Practical)
(SKILL COURSE - 16)
Semester IV**

Total Credits: 2

Total Laboratory Hours: 60 (3 Hours/ Week)

Course Overview and Context:

- To understand the physical properties of cereal flours.
- To impart knowledge on working of a rice milling station.
- To impart knowledge on working of a oil expelling unit station.

Syllabus Content

1. Physical characteristics of Wheat.
2. Estimation of Gluten Content of flour.
3. Estimation of Polanski Value of flour.
4. Estimation of Potassium Bromate in flour.
5. Fermenting power of yeast.
6. Physical Characteristics of Rice and paddy.
7. Cooking characteristics of rice.
8. Determination of sedimentation power of flour.
9. Visit to rice mill station.
10. Visit to oil expelling unit.

**VFP4G08TB – Food Plant Designing
(GENERAL COURSE - 08)
Semester IV**

Total Credits: 4

Total Lecture Hours: 60 (4 Hours/ Week)

Aim of the course: To study design of plant and processing unit and to get a thorough knowledge about the importance of a good food plant design.

Course Overview and Context

- To understand concepts of plant layout.
- To have knowledge on building, utilities in the plant.
- To know the importance of proper food plant design and safety.

Syllabus Content

Module I: Introduction **10 Hours**
Definition, Basic concepts of plant layout and design with special reference to food process industries. Application of HACCP concept, ISO, FPO & MPO requirements in food plant layout and design.

Module II: Plant Location **10 Hours**
Influence of location on plant layout, location factors, location theory and models, Economic plant size, types of manufacturing processes like continuous, repetitive and intermittent processes.

Module III: Plant Layout **10 Hours**
Preparation of a Plant Layout, Plant Layout problem, importance, objectives, classical types of layouts. Evaluation of layout. Advantages of good layout

Module IV: Plant Building **15 Hours**
Considerations in building design, type of factory buildings, choice of building construction, material for floors, foundation, walls, doors, windows, drains etc, ventilation, fly control, mold prevention and illumination in food processing industries.

Module V: Plant layout & Equipment Layout **15 Hours**
Plant layout and design of bakery and biscuit industries; fruits and vegetables processing industries including beverages; milk and milk products; meat, poultry and fish processing industries.

Learning Resources

Reference Books

1. John Holah, H. L. M. Lelieveld, (2011), “Hygienic Design of Food Factories”, Elsevier Publication.
2. J. Peter Clark, (2008), “Practical Design, Construction and Operation of Food Facilities”, Academic Press Publishers.
3. Zacharias B. Maroulis, George D. Saravacos, (2007), “Food Plant Economics”, CRC Press Publishers.
4. Antonio Lopez-Gomez, Gustavo V. Barbosa-Canovas, (2005), “Food Plant Design”, CRC Press Publishers.

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**VFP4G09TB – Byproduct utilization and Waste management
(GENERAL COURSE - 09)
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 byproducts obtained after food processing and also to gain knowledge about characterisation of waste products and effluent treatment methods.

Course Overview and Context

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

10 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 fungicides 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 of agro industries

10 Hours

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

Module V: Waste utilization of animal and marine product industries

10 Hours

Characterization and utilization of byproducts 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 of Waste Materials to Industrial Products”, Springer Science & Business Media Publishing.
3. Marcos von Sperling,(2007), “Basic Principles of Wastewater Treatment”, IWA Publishing.

**VFP4G10TB – Marketing Management
(GENERAL COURSE - 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.

Semester V

Semester	Title of the course	Course code	No. of Hours/ Week		Total credits	Total hours/ semester	University exam duration (in hrs)	Total	
			Lec	Lab				Sessionals	Finals
V	Fruit and Vegetable Processing	VFP5S17TB	5	-	5	75	3	20	80
	Engineering properties of foods	VFP5S18TB	5	-	5	75	3	20	80
	Sensory Evaluation	VFP5S19TB	5	-	5	75	3	20	80
	Processing of fruits and vegetables (Practical)	VFP5S20PB	-	3	2	60	3	20	80
	Food Processing equipments	VFP5G11TB	4		4	60	3	20	80
	Computer Applications	VFP5G12TB	4	-	4	60	3	20	80
	Product and brand Management	VFP5G13TB	4	-	4	60	3	20	80
	Internship	VFP5S05IB	-	-	1	30	-	-	-

**VFP5S17TB - Processing of Fruits and Vegetables
(SKILL COURSE - 17)
Semester V**

Total Credits: 5

Total Lecture Hours: 75 (5 Hours/ Week)

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

Course Overview and Context

- 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

15 Hours

Composition and nutritive value of fruits and vegetable. Factors effecting composition and quality of fruits and vegetables. Quality requirements of raw materials for processing; sourcing and receiving at processing plants, primary processing: grading, sorting, cleaning, washing, peeling, slicing and blanching

Module II: Spoilage of fruits and vegetables

15 Hours

Different types of spoilages in fruits and vegetables. Spoilage during storage of fruits and vegetables and their prevention. General methods of preservation of whole fruits/vegetables and processed fruits and vegetables. Spoilage of pickles. Methods of preparation, curing techniques, defects and remedies. Types of preservatives commonly used in Fruits and vegetables processing industry, limits of usage of preservatives.

Module III: Processing of fruits and vegetables

20 Hours

Dehydration of fruits and vegetables using various drying technologies like sun drying, solar drying (natural and forced convection), osmotic, tunnel drying, fluidized bed drying, freeze drying, convectional and adiabatic drying; applications to raisins, dried figs, vegetables, intermediate moisture fruits and vegetables. Fruit powders using spray drying. Technology of extraction of juices from different types of fruits.

Module IV: Manufacture of Fruit products**15 Hours**

Manufacturing process of juice, soup, puree, and paste. Jams, Jellies and marmalades: selection, preparation, production. Difference between jam and jelly. Theory of jell formation, failure and remedies in jam and jelly making. General principles and manufacturing processes of preserves, candied fruits, glazed fruits, crystallized fruits

Module V: Manufacture of vegetable products**15 Hours**

Manufacturing process of sauce, ketchup, vegetable juices and concentrated products

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.

**VFP5S18TB – Engineering Properties of Foods
(SKILL COURSE - 18)
Semester V**

Total Credits: 5

Total Lecture Hours: 75 (5 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 Overview and Context

- 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 Properties of Foods 15 Hours

Methods of estimation of – Shape- roundness, sphericity, roundness ratio, size, volume- platform scale method, density, specific gravity-apparatus, porosity and surface area.

Module II: Thermal Properties of Foods 15 Hours

Definitions - specific heat, enthalpy, conductivity and diffusivity, surface heat transfer coefficient. Measurement of thermal properties like specific heat, thermal conductivity and thermal diffusivity

Module III: Aerodynamic properties and frictional properties of Foods 15Hours

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 20 Hours

Rheology- rheological classification-viscoelasticity-viscometers. Hookean body, St Venant body and Newtonian body. Texture of foods- methods of textural evaluation-subjective and objective method- texture profile method

Module V: Electrical, optical properties and mechanical damage 15 Hours

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

Learning Resources

References

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

**VFP5S19TB – Sensory Evaluation of foods
(SKILL COURSE - 19)
Semester V**

Total Credits: 5

Total Lecture Hours: 75 (5 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 Overview and Context

- 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

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

Module IV: Subjective and objective methods

15 Hours

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

Module V: Applications of Sensory Analysis in the Food Industry 15 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.

VFP5S20PB – Processing of Fruits and Vegetables (Practical)
(SKILL COURSE - 20)
Semester V

Total Credits: 2

Total Laboratory Hours: 60 (3 Hours/ Week)

Aim of the course: To study the principles and methods of preservation of fruits and vegetables into various products and to practically gain skill in development of these products.

Course Overview and Context

- To understand the Handling and operating of food processing equipments and Instruments.
- To acquire knowledge about Quality analysis and quality testing of fruit and vegetable products.
- To prepare different fruit and vegetables products.

Syllabus Content

1. Handling and operating of food processing equipments and Instruments

- Pulper
- Sealers
- Juice extracting machines
- Autoclaves
- Corking machines
- Refractometer
- Salinometer
- Hydrometers
- Jelmeter
- Thermometer
- Vacuum gauge, pressure gauge, seam checking gauge
- Electronic weighing balance

2. Quality analysis

- Quality evaluation of fruits and vegetables.
- Quantitative analysis of cut fruits and vegetable yield.
- Effects of pretreatment on quality of cut fruits and vegetables.
- Refrigeration storage of fruits and vegetables
- Determination of Maturity indices of fruits & vegetables.

3. Quality Testing

- Determination of Degree Brix (TSS), pH and % acidity in fruits and vegetable products.
- Estimation of benzoic acid, sulphur dioxide and KMS in terms of ppm present in fruits and vegetable products.
- Estimation of reducing and non reducing sugars in fruit and vegetable products
- Estimation of chloride content in food products.

4. Preservation techniques

- Extraction of juice by different methods.
- Preservation of fruits juices with addition of preservative.
- Preparation of fruit and synthetic beverages.
- Preparation of carbonated beverages.

5. Product Preparation

- Preparation of tomato juices, puree, sauces, ketchups, soup, paste.
- Comparison of juice/pulp extraction methods on quality and yield of tomato pulp.
- Preparation of jam, jelly and marmalades.
- End point determination in preparation of high sugar product.
- Preparation of preserves, candies, crystallized and glazed fruits and fruit bars.
- Effects of pre- treatment and process variables on quality of preserve and candied fruits.
- Preparation of chutney
- Preparation of sauerkraut, gherkins, cauliflower, lime, mango and mixed pickles.

**VFP5G11TB – Food Processing Equipments
(GENERAL COURSE - 11)
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 Overview and Context

- 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 to equipments used in food industry **10 Hours**

Equipments: Types, planning, factors affecting selection and purchase

Module II: Mechanical Equipments **16 Hours**

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 III: Heat exchangers, dryers and evaporators **12 Hours**

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

Module IV: Refrigeration and thermal processing equipments **12 Hours**

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

Module V: Food packaging Equipments **10 Hours**

Introduction, preparation of food containers, filling equipments, 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.

**VFP5G12TB – Computer Applications
(GENERAL COURSE - 12)
Semester V**

Total Credits: 4

Total Lecture Hours: 60 (4 Hours/ Week)

Course Overview and Context

- To understand the operations of windows operating system, desktop, text editing and printouts in word pad
- 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: MS Word 7 15 Hours

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: MS Excel 7 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 Power Point 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, slide shows

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; Information IT.com.

**VFP5G13TB – Product and Brand Management
(GENERAL COURSE - 13)
Semester V**

Total Credits: 4

Total Lecture Hours: 60 (4 Hours/ Week)

Course Overview and Context

- 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 manger 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.

Semester VI

Semester	Title of the course	Course code	No. of Hours/ Week		Total credits	Total hours/ semester	University exam duration (in hrs)	Total	
			Lec.	Lab.				Sessionals	Finals
VI	Unit Operations in Food Industry	VFP6S21TB	5	-	5	75	3	20	80
	Food Quality Assurance	VFP6S22TB	3	-	3	45	3	20	80
	Project and Viva voce	VFP6S23TB	8	-	10	120	-	40	60
	Emerging Technologies in food industry	VFP6G14TB	4	-	4	60	3	20	80
	Food service management	VFP6G15TB	4	-	4	60	3	20	80
	Personality Development	VFP6G16TB	4	-	4	60	3	20	80

**VFP6S21TB - Unit Operations in Food Industry
(SKILL COURSE - 21)
Semester VI**

Total Credits: 5

Total Lecture Hours: 75 (5 Hours/ Week)

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

Course Overview and Context

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

Course Outline

Module I: Heat Transfer in Food Processing **10 Hours**

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

Module II: Evaporation **15 Hours**

Basic principle, need for evaporation, single effect, multiple effect, heat economy, type of evaporator-long tube, short tube, agitated film evaporator.

Module III: Distillation and crystallization **15 Hours**

Simple distillation, flash distillation, steam distillation, fractional distillation
Crystallisation -theory, tank crystallizer and scraped surface crystallizer.

Module IV: Extraction and extrusion **15 Hours**

Solid Liquid extraction-leaching, Liquid-Liquid extraction, Super critical fluid extraction, single screw extruder, twin screw extruder

Module V: Mechanical separation and material handling **15 Hours**

Sedimentation, Centrifugal separation, filtration, Mixing, Material handling-Belt conveyor, Screw Conveyor, bucket elevator and pneumatic conveyor.

Learning Resources

References

1. Y.H.Hui, (2005), "Handbook of Food Science, Technology and Engineering" (vol.1-4), Marcel Dekker Publishers.
2. M.A.Rao, S.S.H.Rizvi and A.K.Dutta, (2005), "Engineering properties of Foods", 3rd ed., Marcel Dekker Publishers.
3. 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.
4. R.P.Singh and D.R.Heldman, (2001), "Introduction to Food Engineering", 3rd ed., Academic Press.
5. S.K.Sharma, S.J.Mulvaney and S.S.H.Rizvi, (2000), "Food Process Engineering: Theory and Laboratory Experiments", Wiley and Sons Publishers.

**VFP6S22TB - Food Quality Assurance
(SKILL COURSE - 22)
Semester VI**

Total Credits: 3

Total Lecture Hours: 45 (3 Hours/ Week)

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

Course Overview and Context

- 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 6 hours

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

Module II: Concepts of quality management 12 Hours

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 III: HACCP system 7 Hours

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

Module IV: Food Quality Laws and Regulations 12 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 V: Intellectual Property Rights**8 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.

**VFP6G14TB - Emerging Technologies in Food Industry
(GENERAL COURSE - 14)
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 Overview and Context

- 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 10 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

Module V: Nanotechnology and antimicrobial technology 10 hours

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.

**VFP6G15TB – Food Service Management
(GENERAL COURSE - 15)
Semester VI**

Total Credits: 4

Total Lecture Hours: 60 (4 Hours/ Week)

Aim of the course: To understand the functioning of food service establishments. And to acquire knowledge about the services that should be given by a food service establishment.

Course Overview and Context

- To understand the organisation of food service establishments
- To understand the management of human, material and financial resources.
- To be familiar with various concepts involved in quantity and quality food production and service.
- To understand the need for efficient personnel management in the food industry.

Syllabus Content

Module I: Introduction to Food Service Establishments 8 Hours

Types of food service establishments. Planning for a food service unit- Planning, investment, Project report, Registration (License and Inspection).

Module II: Menu Planning and table setting 14 Hours

Menu Planning- importance, types, steps in planning. Requisites in designing a menu card, Methods of purchase, delivery, receiving, storage types. Table Setting and Arrangement - Indian and Western Styles of Table Setting, Table Appointments, Napkin folding styles, Flower arrangement, Table Etiquettes.

Module III: Food Service and Delivery system 15 Hours

Centralized and decentralized delivery systems, types of food service systems conventional, commissary, ready prepared, assembly, service styles - table, counter, tray, silver, plate, cafeteria, buffet. Specialized forms of food service - hospitals, airline, rail, homedelivery, catering and banquet, room and lounge service.

Module IV: Food Service Management 15 Hours

Managing an organization, Process involved, Principles of management, Functions of management- planning, organizing, directing, co-ordinating, evaluating, and

controlling. Total quality management, Management by objectives. Work design, job design, work study and simplification.

Module V: Accounting

8 Hours

Book keeping, books of accounts, Journal, Ledger, trial balance, balance sheet. profit analysis, food cost control.

Learning Resources

Reference Books

1. Arora, (2007), "Food Service And Catering Management" APH Publishing.
2. Wentz Bill, (2007), "Food Service Management", Atlantic Publishing Company.
3. Malhotra, R. K.(2002), "Food Service and catering Management" ,Anmol Publication Pvt Ltd.

**VFP6G16TB – Personality Development
(GENERAL COURSE - 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 Overview and Context

- 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