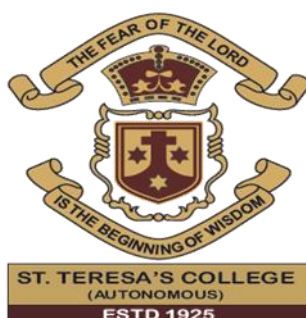


ST. TERESA'S COLLEGE (AUTONOMOUS) ERNAKULAM

Affiliated to Mahatma Gandhi University, Kottayam



CURRICULUM AND SYLLABI FOR THE PROGRAMME B.Voc. FOOD PROCESSING TECHNOLOGY

Programme Code: BVFPT

**Under Credit and Semester System
(2023 Admission onwards)**

St. Teresa's College (Autonomous), Ernakulam

Department of Food Processing Technology

Board of Studies in Home Science (2021-2024)

Sl. No	Category	Name	Designation	Official Address
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2.	Faculty Member	Dr. Betty Rani Isaac	Associate Professor	Department of Home Science, St Teresa's College, Ernakulam
3.	Faculty Member	Smt. Teresa Kuncheria	Associate Professor	Dept. of Home Science, St. Teresa's College, Ernakulam.
4.	Faculty Member	Dr. Anu Joseph	Associate Professor	Department of Home Science, St.Terasas's College Ernakulam
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6.	Faculty Member	Dr. Dhanya. N	Assistant Professor	Dept. of Home Science, St. Teresa's College, Ernakulam.
7.	Faculty Member	Dr.Leena Leon	Assistant Professor	Department of Home Science, St.Terasas's College Ernakulam
8.	Faculty Member	Dr. Rashmi H. Poojara	Assistant Professor	Department of Home Science, St.Terasas's College Ernakulam
9.	Faculty Member	Dr.Nisha Vikraman	Assistant Professor	Department of Home Science, St.Terasas's College Ernakulam
10.	Faculty Member	Smt. Nimmi Jacob	Assistant Professor	Department of Home Science, St.Terasas's College Ernakulam
11.	Faculty Member	Smt. Bhavya. E. P	Assistant Professor	Dept. of Food Processing Technology St. Teresa's College, Ernakulam.
12.	Faculty Member	Smt. Priyanka P.S	Assistant Professor	Dept. of Food Processing Technology St. Teresa's College, Ernakulam.
13.	Faculty Member	Smt. Surya M Kottaram	Assistant Professor	Dept. of Clinical Nutrition and Dietetics St. Teresa's College, Ernakulam.

Sl. No	Category	Name	Designation	Official Address
14.	Faculty Member	Mrs. Deepa Chandrashekhar	Assistant Professor	Dept. of Food Processing Technology, St. Teresa's College, Ernakulam.
15.	Faculty Member	Ms. Sherin Mary Simon	Assistant Professor	Dept. of Food Processing Technology, St. Teresa's College, Ernakulam.
16.	Faculty Member	Ms. Elizabeth Zarina Jacob	Assistant Professor	Dept. of Food Processing Technology, St. Teresa's College, Ernakulam.
17.	Faculty Member	Ms. Sandhra Santhosh	Assistant Professor	Dept. of Food Processing Technology, St. Teresa's College, Ernakulam.
18.	Faculty Member	Ms. Nikitha Susan Varghese	Assistant Professor	Dept. of Food Processing Technology, St. Teresa's College, Ernakulam.
19.	Faculty Member	Ms. Anna Aleena Paul	Assistant Professor	Dept. of Food Processing Technology, St. Teresa's College, Ernakulam.
20.	Subject Expert - 1 Outside MG University	Dr. Beela G.K	Professor	Dept. of Community Science, College of Agriculture, Vellayani.
21.	Subject Expert - 2 Outside MG University	Dr. Kavitha Menon	Professor	Dept. of Food Science and Nutrition Symbiosis International University, Pune
22.	University Nominee	Dr. Sapna Dinesh	Assistant Professor	Dept. of Home Science Mount Carmel College, Bangalore
23.	Representative from Industry/ Corporate Sector/ Allied field related to placement	Smt. Roopa George	Managing Director,	Baby Marine, Thoppumpady, Ernakulam
24.	Alumni Representative	Dr. Aswathy Sugunan	Associate Professor and Head,	Dept. of Home Science, S.N College for Women, Kollam

Preface

The curriculum, which encompasses the totality of student experience, should ensure a collective and dedicated effort to birth an inspiring academic culture in a campus. It is this vision of quality knowledge, its production and transmission, that has fueled the Teresian quest for essential and elemental student development. St. Teresa's College has taken meticulous care in the conception of the new well-balanced curriculum by retaining the fundamental prerequisites mentioned by the University/Higher Education Council. With the constraints of a prescribed syllabus in mind, we have created an academic sanctuary, where a deeper access to knowledge is achievable to students and teachers as well.

The Syllabus restructuring of 2023 instigates opportunities of real-world learning to equip a modern scholar with the practicality of experience. As an autonomous institution under Mahatma Gandhi University, St. Teresa's College offers a significant number of Programmes with definite placement windows to the learners. Student knowledge and training across a range of subject areas is efficiently enriched by engaging them in work-based learning, as provided by the revised and restructured curriculum.

The indefatigable effort taken by the teachers in developing Programmes and Course outcomes is commendable. The blossoming of the cognitive and intellectual skills of the scholars, the initiation of a research mentality, and pragmatic skill sets to venture out confidently into a professional space, are the core off-shoots that are anticipated. The curriculum should equip the students to be educators themselves, with a voice that echoes global effectiveness.

I congratulate the efforts taken by the Principal Dr. Alphonsa Vijaya Joseph and her team for restructuring the syllabus in keeping with the latest demands in academia. We trust that the syllabus will transform minds to embark upon higher academic summits and thereby mould learners who will make significant contributions to the world. We look forward to sharing the outcomes of our restructured curriculum and the positive changes that would reshape the academic lives of all our scholars.

Rev. Dr. Sr. Vinitha CSST
Provincial Superior and Manager

Foreword

The most significant characteristic of an autonomous college is its commitment to curriculum renewal or revision. Academic autonomy has granted the college the freedom to fine tune the syllabus keeping in mind the changing needs of the new generation of students, the new educational scenario in the global context and incorporation of skill based curricula. Revision of the syllabus implies responsibility and accountability and this in turn leads to excellence in academics and proactive governance. Education in the current scenario throws up a multitude of challenges and the curricula and syllabi ought to reflect the paradigm shift that has occurred in the various disciplines.

A revision of the syllabus is implemented by modifying the curriculum after review to evaluate the effectiveness of the curriculum after it has been implemented and to reflect on what students did and did not get out of it. In line with the new Educational policy, a big educational reform can be effected by restructuring of syllabi to maintain a high level of quality in the standard of education that we impart.

The three themes under Higher Education relevant to policy initiative for restructuring of the curriculum i.e., integrating skill development in higher education, linking higher education to society and integration of new knowledge are considered with utmost importance during revision of the syllabus.

Outcome-Based Education emphasizes that the learning process is innovative, interactive and effective, where the main goal is student achievement at the end of the learning period. St. Teresa's College in its pursuit of imparting quality education has adopted Outcome Based Education (OBE) system that involves restructuring of curriculum, academic processes, teaching methodologies, assessment and evaluation systems in education to reflect the achievement of high order learning. It is a student-centric instruction model that focuses on measuring student performance through outcomes that include knowledge, skills and attitudes.

The revised syllabus and curriculum is the result of the combined efforts of the members of the Board of studies, curriculum expert committee and the syllabus committee who worked as a team to revise the syllabus and curriculum in the stipulated period. Active consultations were held with various stakeholders to elicit multiple perspectives in higher education which were incorporated in the new curriculum.

With sincere gratitude I acknowledge the instinct support and constant guidance extended by Rev. Dr. Sr. Vinitha, Provincial Superior and Manager, Rev. Sr. Emeline, Director, Dr. Sajimol Augustine M., Senior Administrator, Smt. Betty Joseph, Vice-Principal and Dr. Beena Job, Dean of self-financed programmes. I specially thank the team headed by Dr. Betty Rani Isaac, the Heads of the Departments and all the faculty members for their diligence, commitment and exceptional contribution towards this endeavour.

Prof. Alphonsa Vijaya Joseph
Principal

Acknowledgement

The Bachelor of Vocation (B.Voc.) in Food Processing Technology is a programme formulated under the National Skill Qualification Framework (NSQF) notified by the UGC. This programme will equip the graduates to make a meaningful participation in food industry and enable them to become active entrepreneurs in the field of various Food processing enterprises. This skills development based higher education, leading to Bachelor of Vocation (B.Voc.) Degree has the unique opportunity with multiple exits such as Diploma/Advanced Diploma under the NSQF.

I extend my sincere gratitude to Dr. Sr. Celine. E, St. Teresa's College, for being the source of inspiration and support in the commencement of this programme. A word of sincere appreciation to Dr. Alphonsa Vijaya Joseph., Principal, St. Teresa's College, Professor Jogy Alex, Dept of Chemistry, St Thomas College Pala whose untiring efforts and committed devotion has helped to mould this innovative programme. My heartfelt thanks to Dr. Beena Job, Dean of Self Financing for her advice, continuous encouragement, valuable suggestions, and timely help.

I wish to place on record the whole hearted support and expert contributions of members of the Board of Studies in B.Voc. Food Processing Technology, Contributions and expertise of faculty members of the Department of Food Processing and all the faculty members of Department of Home Science are gratefully acknowledged. I wish to individually thank all the members who have provided valuable suggestions on course structure and content and gratefully acknowledge the unstinted support and guidance extended by all the expert committee members and teachers in formulating the syllabus.

Dr. Susan Cherian
Chairperson, Board of Studies
Department of Home Science
St. Teresa's College, Ernakulam

CONTENTS

Preambl	1
Programme Outcome	2
Programme Specific Outcome	3
Structure of UGC NSQF Programmes	3
Eligibility	6
Programme Structure	7
Scheme of courses	9
Scheme of Distribution of Instructional Hours for Skill Courses	9
Course with Credits	10
Course Code Format	10
Duration of programme	11
Scheme- Skill courses	12
Scheme - General Courses	12
Examinations	18
Pass criteria	22
Credit point and Credit Point Average	23
Syllabus	25

**B.Voc. Food Processing Technology under credit and semester system
(2023 admission onwards)**

PREAMBLE

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.

Food processing involves a combination of procedures to achieve the intend 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.

Outcome based education involves assessment and evaluation practices in education reflecting the attainment of expected learning and mastery in the programme. It is a systematic way to determine if a programme has achieved its goal. This approach of learning makes the student an active learner, the teacher a good facilitator and together they lay the foundation for life-long learning. The process includes framing of specific course outcomes at various appropriate levels of taxonomy, mapping the course outcomes of each course with the Programme Specific Outcomes and finally calculating the course attainment based on the marks scored by the student in both the Internal and External assessments.

PROGRAMME OUTCOME (POs)

On completion of an undergraduate programme from St. Teresa's College (Autonomous), Ernakulam students should be able to demonstrate the programme outcomes listed below:

PO 1. *Disciplinary knowledge*

- Demonstrate a mastery of the fundamental knowledge and skills required in the discipline to function effectively as an entry-level professional in the field.

PO 2. *Scientific Temper*

- Experiment with new approaches, challenge existing knowledge boundaries and take informed action to solve problems related to society.
- Identify, define, and deal with problems through logical, analytical and critical thinking acquired from different domains of knowledge

PO 3. *Research and Digital Competence*

- Develop a research culture for lifelong learning and demonstrate competency in creating new knowledge.
- Analyze and choose from available data and information sources to communicate, collaborate and network through a range of digital media.

PO 4. *Communication Skills*

- Develop language proficiency through interactions embedded in meaningful contexts.
- Demonstrate communicative competence particularly using technology in social and global environments.

PO 5. *Leadership, Teamwork and Interpersonal Skills*

- Function effectively both as leader and/or member of a team.
- Collaborate and interact effectively with others.

PO 6. *Moral and Ethical Awareness and Social Responsibility*

- Demonstrate social and national responsibility.
- Engage in activities that contribute to the betterment of society, with a preferential option for the economically challenged and the marginalized.

B.Voc. FOOD PROCESSING TECHNOLOGY PROGRAMME SPECIFIC OUTCOMES

On completion of an undergraduate programme in B.Voc. Food Processing Technology students should be able to demonstrate the programme specific outcomes listed below:

PSO1: Generalize the processing technology of various foods and its by-products.

PSO2: Explain the designing of the food plant and operation of food processing equipment.

PSO3: Determine the physical, chemical, microbial and nutritional characteristics of foods and its effect on health

PSO4: Apply the basic knowledge on managerial and communication skills to initiate a project/enterprise.

PSO5: Evaluate the safety, quality and emerging technologies in the food processing industry.

STRUCTURE OF UGC NSQF PROGRAMMES

PROGRAMME DESIGN

The U.G. programme of 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 (f) Study tours. The number of courses for the restructured programme shall contain 17 compulsory skill (core) courses, 5 practical's, 5 internships, 1 project in the area of core, 16 general (complementary) courses and 2 common courses.

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 and Q.A., National Skill Development Corporation, Block A, Clarion Collection, Shaheed Jeet Singh Marg, New Delhi - 110016.

Table: 1 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

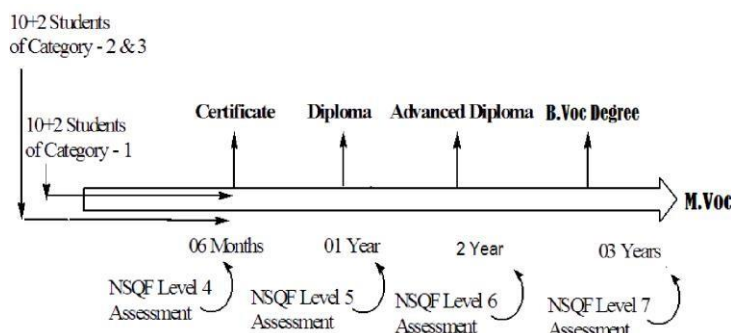


Figure 1: Assessment of Skill Component under NSQF in Vocational Courses

Table: 2 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.

SKILL ASSESSMENT BY SECTOR SKILL COUNCIL

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:
1. 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.
 2. For internship / field work, the credit weightage for equivalent hours shall be 50% of that for lectures / tutorials.
 3. 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.
 4. 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 SCPA and CCPA

Following procedure to compute the Semester Credit Point Average (SCPA) and Cumulative Credit Point Average (CCPA) may be adopted:

Credit Point (CP) of a course is calculated:

$$CP = C \times GP$$

C = Credit; GP = Grade Point

Semester Credit Point Average (SCPA) of a semester:

$$SCPA = TCP/TC$$

TCP = Total Credit Point of that semester

TC = Total Credit of that Semester

Cumulative Credit Point Average (CCPA) is calculated:

$$CCPA = TCP/TC$$

ELIGIBILITY FOR ADMISSION

A pass in Plus Two Science stream or equivalent examination or an examination recognized as equivalent thereto by this University.

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.

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.

MODEL III - B.Voc. FOOD PROCESSING TECHNOLOGY

1. Title

Regulations for conducting B. Voc. Programme under Mahatma Gandhi University

2. 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.

3. Definitions

1. **B.Voc.:** Bachelor of Vocation- is a scheme introduced by UGC for skill development based higher education as part of college/university education.
2. **NSQF:** National Skills Qualifications Framework
3. **Programme:** A Programme refers to the entire course of study and examinations for the award of the B. Voc. degree.

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.
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.
6. **Credit:** B. Voc. programme follows a credit semester system and each Course has an associated credit.
7. **Grade:** Uses seven point grading system suggested by Hrdayakumari Commission to assess the students.
8. Words and expressions used and not defined in this regulation shall have the same meaning assigned to them in the Act and Statutes.

Programme Structure

A.	Programme Duration (total) with provision for multiple entry and exit	6 semesters
B.	Total credits required for successful completion of the programme	180
C.	Credits required from common courses	08
D.	Credits required from skill courses including project and practical	103
E.	Credits required from internship	05
F.	Credits required from general courses	64

GRADUATE ATTRIBUTES

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

Semester /Year	NSQF Level
First semester	<u>Level 4</u> 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.

Semester /Year	NSQF Level
Second Semester	<u>Level 5</u> Dairy Products Processor: Reference ID: FIC/ Q2001 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.

Semester /Year	NSQF Level
Fourth Semester	<u>Level 6</u> Food Microbiologist: Reference ID: FIC/Q7603 Food Microbiologist is responsible for investigating the growth, structure development and other characteristics of microscopic organisms such as bacteria, fungi and algae. They undertake laboratory analysis and monitoring of microbial growth, cultures, raw materials, packaging materials, finished products, shelf-life samples and market complaint samples using range of identification methods and clinical trials.

Semester /Year	NSQF Level
Sixth Semester	<u>Level 7</u> Production Manager: Reference ID : FIC/Q9003 The main purpose of the qualification to enable the candidate to carry out production of food products and meet quantity, quality and cost standards.

SCHEME OF COURSES

Courses With Numbers

The different types of courses and its number is as follows:

Sl. No.	Courses	No. of Papers
1.	Common Course (English)	02
2.	General Education Components	16
3.	Skill Components (Theory)	17
4.	Skill Components (Practical)	05
5.	Project	01
6.	Internship	05
	Industrial Visits	-
Total		46

SCHEME OF DISTRIBUTION OF INSTRUCTIONAL HOURS FOR CORE COURSES

Semester	Model III		
	Theory	Practical	Internship
First	06	01	01
Second	06	01	01
Third	06	01	01
Fourth	06	01	01
Fifth	06	01	01
Sixth	05	-	-

COURSES WITH CREDITS

Scheme of distribution of credits for courses for model III is as given below

Sl. No.	Courses	Credits
1	Common Course (English)	08
2.	General Education Components	64
3.	Skill Components (Theory)	83
4.	Skill Components (Practical)	10
5.	Project	10
6.	Internship	05
7.	Industrial Visits	-
Total		180

COURSE CODE FORMAT

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: VFPT1S01B23

V ➡ Vocational Studies

FPT ➡ Food Processing Technology

1 ➡ To indicate the semester

A / G / S ➡ Common (A) / General Component (G) / Skill Component (S)

01 ➡ Serial number of the course

T / P/ PR/I ➡ Theory / Practical/ Project/ Internship

B ➡ Bachelor's Programme

23 ➡ To indicate the Year

DURATION OF PROGRAMME

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.

1. The total duration of B.Voc. programmes shall be **6 Semesters**.
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.
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.
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

DETAILED PROGRAMME STRUCTURE
B.Voc. PROGRAMME IN FOOD PROCESSING TECHNOLOGY

SEM	Course Type	Course code	Course Title	No. of Hours/ Week	Credits	Max. Marks	
						ISA	ESA
I	SKILL COURSE	VFPT1S01B23	Bakery and Confectionery Technology	5	5	20	80
	SKILL COURSE	VFPT1S02B23	Principles of Food Preservation	5	5	20	80
	SKILL COURSE	VFPT1S03B23	Food Chemistry	5	5	20	80
	SKILL COURSE (Practical)	VFPT1SP01B23	Bakery and Confectionery Technology (Practical)	3	2	80	20
	COMMON COURSE	EN1A01B23	Fine-tune Your English	4	4	20	80
	GENERAL COURSE	VFPT1G01B23	Food Science and Nutrition I	4	4	20	80
	GENERAL COURSE	VFPT1G02B23	Entrepreneurship Development and Project Management	4	4	20	80
	SKILL COURSE	VFPT1SI01B23	Internship	-	1	20	80
	Total Credits				30		

SEM	Course Type	Course code	Course Title	No. of Hour s/ Week	Credits	Max. Marks	
						ISA	ESA
II	SKILL COURSE	VFPT2S04B23	Dairy Technology	5	5	20	80
	SKILL COURSE	VFPT2S05B23	Packaging Technology	5	5	20	80
	SKILL COURSE	VFPT2S06B23	Sanitation and hygiene	5	5	20	80
	SKILL COURSE (Practical)	VFPT2SP02B23	Dairy Technology (Practical)	3	2	20	80
	COMMON COURSE	EN2A03B23	Issues that Matter	4	4	20	80
	GENERAL COURSE	VFPT2G03B23	Food Science and Nutrition II	4	4	20	80
	GENERAL COURSE	VFPT2G04B23	Business Communication	4	4	20	80
	SKILL COURSE	VFPT2SI02B23	Internship	-	1	20	80
					30		

SEM	Course Type	Course code	Course Title	No. of Hours/ Week	Credits	Max. Marks	
						ISA	ESA
III	SKILL COURSE	VFPT3S07B23	Technology of Fish, Meat and Egg Processing	5	5	20	80
	SKILL COURSE	VFPT3S08B23	Technology of Spices and Plantation Crops	5	5	20	80
	SKILL COURSE	VFPT3S09B23	Technology of Fermented Foods	5	5	20	80
	SKILL COURSE (Practical)	VFPT3SP03B23	Chemical and Microbial Analysis of Food (Practical)	3	2	20	80
	GENERAL COURSE	VFPT3G05B23	Food Microbiology	4	4	80	20
	GENERAL COURSE	VFPT3G06B23	Food Additives and Flavouring Technology	4	4	20	80
	GENERAL COURSE	VFPT3G07B23	Business Management	4	4	20	80
	SKILL COURSE	VFPT3SI03B23	Internship	-	1	20	80
	Total Credits				30		

SEM	Course Type	Course code	Course Title	No. of Hours/ Week	Credits	Max. Marks	
						ISA	ESA
IV	SKILL COURSE	VFPT4S10B23	Technology of Cereals, Pulses and Oilseeds	5	5	20	80
	SKILL COURSE	VFPT4S11B23	Technology of Beverages	5	5	20	80
	SKILL COURSE	VFPT4S12B23	Food Product Design and Development	5	5	20	80
	SKILL COURSE (Practical)	VFPT4SP04B23	Cereals, Pulses and Oilseeds Technology (Practical)	3	2	20	80
	GENERAL COURSE	VFPT4G08B23	Food Plant Designing	4	4	80	20
	GENERAL COURSE	VFPT4G09B23	By Product Utilization and Waste Management	4	.4	20	80
	GENERAL COURSE	VFPT4G10B23	Marketing Management	4	4	20	80
	SKILL COURSE	VFPT4SI04B23	Internship	-	1	20	80
	Total Credits				30		

SEM	Course Type	Course code	Course Title	No. of Hours/ Week	Credits	Max. Marks	
						ISA	ESA
V	SKILL COURSE	VFPT5S13B23	Fruit and Vegetable Processing	5	5	20	80
	SKILL COURSE	VFPT5S14B23	Engineering Properties of Foods	5	5	20	80
	SKILL COURSE	VFPT5S15B23	Sensory Evaluation of Foods	5	5	20	80
	SKILL COURSE (Practical)	VFPT5SP05B23	Processing of Fruits and Vegetables (Practical)	3	2	20	80
	GENERAL COURSE	VFPT5G11B23	Environmental Studies and Human Rights	4	4	80	20
	GENERAL COURSE	VFPT5G12B23	Food Processing Equipments	4	4	20	80
	GENERAL COURSE	VFPT5G13B23	Product and Brand Management	4	4	20	80
	SKILL COURSE	VFPT5SI05B23	Internship	-	1	20	80
	Total Credits				30		

SEM	Course Type	Course code	Course Title	No. of Hours/ Week	Credits	Max. Marks	
						ISA	ESA
VI	SKILL COURSE	VFPT6S16B23	Unit Operations in Food Industry	5	5	20	80
	SKILL COURSE	VFPT6S17B23	Food Quality Assurance	3	3	20	80
	PROJECT	VFPT6PRB23	Project and Viva voce	8	10	40	60
	GENERAL COURSE	VFPT6G14B23	Emerging Technologies in Food Industry	4	4	20	80
	GENERAL COURSE	VFPT6G15B23	Food Service Management	4	4	20	80
	GENERAL COURSE	VFPT6G16B23	Personality Development	4	4	20	80
	Total Credits				30		

EXAMINATIONS

The external theory examination of all semesters shall be conducted by the College at the end of each semester. Internal evaluation is to be done by continuous assessment. The evaluation of each course shall contain two parts: - Internal or In - Semester Assessment (ISA) and External or End -Semester Assessment (ESA). The ratio between ISA and ESA shall be 1:4. Both internal and external marks are to be rounded to the next integer.

MARKS DISTRIBUTION FOR END-SEMESTER ASSESSMENT (ESA) AND IN-SEMESTER ASSESSMENT (ISA)

Marks distribution for ESA and ISA and the components for internal evaluation with their marks are shown below:

In- Semester Assessment (ISA)

Components of the internal evaluation and their marks are as below. The in - semester is to be done by continuous assessment of the following components. The components of the evaluation for theory, practical, attendance and their mark distribution are as below.

Distribution of marks for Theory Courses

COMPONENTS	MARKS
Attendance	5
Assignment*	5
Test paper (2 x 5)	10
Total	20

Assignment*

Assignments are to be done from Ist to 6th Semesters. At least one assignment should be done in each semester for all courses.

- (i) **Assignment:** for core papers (III and IV Semester), the student must undertake a Project/ Field work/ Industrial Visit/ Internship and the report of the same should be submitted for evaluation. The marks awarded to this can be considered for assignment of any one core paper.
- (ii) **Assignment** (project/field work/ Industrial Visit) for Semester I and II- to be given by language teachers, report of which has to be submitted and for those programs which do not have additional language the students must undertake the assignment (project/field work/ Industrial Visit) for any one core paper.

Attendance (Theory courses):

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 End semester Examinations.

COMPONENTS	MARKS
90% or above	5
Between 85 and below 90	4
Between 80 and below 85	3
Between 75 and below 80	2
75 %	1
< 75%	0

Distribution of marks for Practical Courses

COMPONENTS	MARKS
Attendance	5
Lab involvement	5
Record	10
Total	20

Attendance (Practical courses):

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 end semester Examinations.

Distribution of Marks for evaluation

COMPONENTS	MARKS
90% or above	5
Between 85 and below 90	4
Between 80 and below 85	3
Between 75 and below 80	2
75 %	1
< 75%	0

Internship

Distribution of Marks for evaluation

COMPONENTS	MARKS
Presentation	5
Internship Report	10
Viva	5

Project

Projects which are preferably socially relevant/ industry oriented/ research oriented are to be undertaken by the students and the reports have to be submitted. All students have to begin working on the project in the **fifth** semester and must submit it in the **sixth** semester. The ratio of ISA to ESA component of the project is 2:3. The mark distribution for assessment of the various components is shown below.

In- Semester Evaluation of Project

COMPONENT	MARKS
Attendance	3
Review I	5
Review II	5
Viva	10
Record	10
Presentation	7
Total	40

In Semester Assessment - Test Papers

Two internal test papers are to be attended in each semester for each paper. The evaluations of all the components are to be published and are to be acknowledged by the students. All the documents of internal assessments are to be kept in the college for two years. The responsibility for evaluating internal assessment is vested on the teachers who teach the same.

End Semester Assessment

The end semester 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. For each course the End-semester Assessment is of 3 hours duration. The pattern of questions for all the theory courses are listed below.

Each question paper has four parts A, B and C.

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

Question paper pattern for all theory courses

Parts	No. of Questions	No. of questions to be answered	Marks (for all theory courses)
A (Short Answer type)	12	10	10 x 2 = 20
B (Short Essay)	9	6	6 x 5 = 30
C (Long Essay)	4	2	2 x 15 = 30

CONDUCT OF PRACTICAL EXAMINATION

Practical Examinations

The practical examinations for the core/ complementary courses are to be conducted at the end of every semester by the institution.

Evaluation

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

INTERNSHIP

External Evaluation of Internship

Component	Marks
Punctuality	10
Initiative	10
Behaviour and Co- operation	10
Performance in internship	25
Internship report	25

PROJECT
External Evaluation of Project

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

Grades

A 10-point scale based on the total percentage of marks (ISA + ESA) for all courses (theory, practical, project)

CPA	Grade
Equal to 9.5 and above	S - Outstanding
Equal to 8.5 and < 9.5	A ⁺ - Excellent
Equal to 7.5 and < 8.5	A - Very good
Equal to 6.5 and < 7.5	B ⁺ - Good
Equal to 5.5 and < 6.5	B - Above average
Equal to 4.5 and < 5.5	C - Satisfactory
Equal to 4 and < 4.5	D - Pass
Below 4	F - Failure

PASS CRITERIA: Choice

- A separate minimum of 30% marks each for ISA and ESA (for both theory and practical) and aggregate minimum of 35% is required for a pass in a course.
- For a pass in a programme, a separate minimum of Grade D is required for all the individual courses.
- If a candidate secures F Grade for any one of the courses in a semester/programme, only F grade will be awarded for that semester/programme until she improves this to D Grade or above within the permitted period.
- Students who complete the programme with D grade will have one betterment chance within 12 months, immediately after the publication of the result of the whole programme.

CREDIT POINT AND CREDIT POINT AVERAGE

Credit Point (CP) of a course is calculated:

$$CP = C \times GP$$

C = Credit; GP = Grade point

Semester Credit Point Average (SCPA) of a semester:

$$SCPA = TCP/TC$$

TCP = Total Credit Point of that semester

TC = Total Credit of that semester

Cumulative Credit Point Average (CCPA) is calculated:

$$CCPA = TCP/TC$$

TCP = Total Credit Point of that programme

TC = Total Credit of that programme

CREDIT POINT AVERAGE (CPA)

CPA of different category of courses viz. Common courses, Complementary courses, Core courses etc. are calculated:

$$GPA = TCP/TC$$

TCP = Total Credit Point of a category of course

TC = Total Credit of that category of course

Grades for the different courses, semesters and overall programme are given based on the corresponding GPA.

CREDIT POINT AVERAGE (CPA)

CPA	Grade
Equal to 9.5 and above	S – Outstanding
Equal to 8.5 and < 9.5	A ⁺ - Excellent
Equal to 7.5 and <8.5	A - Very good
Equal to 6.5 and <7.5	B ⁺ - Good
Equal to 5.5 and <6.5	B - Above average
Equal to 4.5 and <5.5	C – Satisfactory
Equal to 4 and <4.5	D – Pass
Below 4	F – Failure

- For reappearance/improvement of I, II, III and IV semesters, candidate have to appear along with the next batch.
- There will be supplementary exams for V semester in the respective academic year.
- Notionally registered candidates can also apply for the said supplementary examinations.
- A student who registers her name for the end semester assessment for a semester will be eligible for promotion to the next semester.

- A student who has completed the entire curriculum requirement, but could not register for the Semester examination can register notionally, for getting eligibility for promotion to the next semester.
- A candidate who has not secured minimum marks/credits in ISA can re-do the same registering along with the ESA for the same semester, subsequently
- There shall be no improvement for internal evaluation.
- All rules and regulations are subject to change as and when modified by M.G. University to which St. Teresa's College (Autonomous) is affiliated.

**SYLLABI FOR
B.Voc. FOOD PROCESSING TECHNOLOGY
(SKILL COURSES)**

SEMESTER I
SKILL COURSE 01
VFPT1S01B23 – BAKERY AND CONFECTIONERY TECHNOLOGY

Credits: 5

Hours Per Week: 5

Total Lecture Hours: 90

Course Overview and Context

To impart basic and applied technology of baking and confectionery and acquaint with the manufacturing technology of bakery and confectionery product. Also, to give an idea about the importance of each ingredient in the bakery and how it affects the overall product and its sensory quality parameters.

This course focuses on product development skills thereby enabling them to work as a production manager and emerge as an entrepreneur in the bakery and confectionery sector.

Course Outcomes:

- CO1:** Review the manufacturing of raw and refined sugar. (Understand)
- CO2:** Identify the classification of confectionery. (Understand)
- CO3:** Illustrate the properties of wheat. (Understand)
- CO4:** Describe the principles of baking and bread manufacturing. (Understand)
- CO5:** Explain the process of cake and biscuit manufacturing (Understand)

Syllabus Content:

Module I: Manufacture of Sugar **14 Hours**

Sugarcane, jaggery, Khand sari 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 - straightdough, 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.

References:

- Zhou. W, Hui Y,H; (2014), “Bakery Products Science and Technology”, 2nd Edition, Wiley Blackwell Publishers,
- Pyler, E. J. and Gorton, L.A. (2009), “Baking Science and Technology” Vol.1 Fourth Edition, Sosland Publications.
- Stanley P. Cauvain, Linda S. Young, (2008), “Baked Products: Science Technology and Practice”. John Wiley and Sons Publishers.

MODEL QUESTION PAPER
(without practical)
B.Voc. DEGREE (C.B.C.S.S) EXAMINATION
SEMESTER I - SKILL COURSE FOR B.Voc. FOOD PROCESSING
TECHNOLOGY
VFPT1S01B23 - BAKERY AND CONFECTIONERY TECHNOLOGY

Time: 3 hours

Maximum marks: 80

Part A

(Answer any ten questions. Each question carries 2 marks.)

Qn. No.	Questions	CO	Level of questions
1.	Identify Molasses.	1	R
2.	Define Carbonation.	1	R
3.	Memorise Gur.	1	R
4.	Define lollipops.	2	R
5.	Classify confectionery.	2	U
6.	Define oven spring.	3	R
7.	Restate the role of Amylograph.	3	U
8.	Identify stone milling.	3	R
9.	Recall biological leavening agents.	4	R
10.	List the various dough development stage.	4	R
11.	Write the role of baking powder.	5	Ap
12.	Cite examples of antimicrobial agents used to prevent spoilage of bread.	5	U

(10 x 2 = 20 marks)

Part B

(Answer any six questions. Each question carries 5 marks)

Qn. No.	Questions	CO	Level of questions
13.	Write short note on liquid sweeteners.	1	Ap
14.	Differentiate between fudge and toffee	2	An
15.	Differentiate amorphous and crystalline confectioneries.	2	An
16.	Illustrate the structure of wheat.	3	An
17.	Enumerate flour improvers citing examples of each.	3	R
18.	Write the functions of egg in bakery products.	4	Ap
19.	Write a short note on yeast and its role during fermentation.	4	Ap
20.	Write the functions of cream in icings.	5	Ap
21.	Examine the major spoilage in cakes.	5	Ap

(6 x 5 = 30 marks)

Part C

(Answer any two questions. Each question carries 15 marks.)

Qn. No.	Questions	CO	Level of questions
22.	Summarize the stages of sugar cookery in details with examples of products from each stage.	2	E
23.	Summarize the wheat milling process.	3	E
24.	Explain the various packaging materials used in cake and biscuits.	5	Ap
25.	Explain the methods of dough development in bread making.	4	Ap

(2 x 15 = 30 marks)

CO: Course Outcomes

Level: R – Remember, U – Understand, Ap- Apply, An- Analyze, E- Evaluate, C- Create

**SEMESTER I
SKILL COURSE 02
VFPT1S02B23 – PRINCIPLES OF FOOD PRESERVATION**

Credits: 5

Hours Per Week: 5

Total Lecture Hours: 90

Course Overview and Context

To make students understand about the mechanism of spoilage and deterioration in foods, the basic food preservation principle, and methods to preserve foods. Also, to know about the different spoilage agents and the ways in which they act on food.

This course focuses on improving the knowledge about various preservation techniques prevailing in the market and become a successful entrepreneur and work in the food industry.

Course Outcomes:

CO1: Explain different types and mechanisms of food spoilage (Understand)

CO2: Discuss the role of preservatives in food preservation. (Understand)

CO3: Identify the methods of high temperature preservation of foods. (Understand)

CO4: Describe the preservation of foods by low temperature. (Understand)

CO5: Illustrate the methods of moisture removal to increase the shelf life of foods. (Understand)

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.

References:

- Gould, G. W. (2012), "New Methods of food preservation", Springer Science and Business Media.
- Manay, N.S. Shadaksharaswamy, M. (2004), "Foods- Facts and Principles", New age international publishers, New Delhi.
- Srilakshmi, B.(2003), "Food Science", New Age International Publishers, New Delhi.
- Subalakshmi, G and Udipi, S.A.(2001), "Food processing and preservation". New Age International Publishers, New Delhi.

MODEL QUESTION PAPER
(without practical)
B. Voc. DEGREE (C.B.C.S.S) EXAMINATION
SEMESTER I - SKILL COURSE FOR B.Voc. FOOD PROCESSING
TECHNOLOGY
VFPT1S02B23 - PRINCIPLES OF FOOD PRESERVATION

Time:3 hours

Maximum marks: 80

Part A

(Answer any ten questions. Each question carries 2 marks)

Qn. No.	Questions	CO	Level of questions
1.	Cite food sterilisation.	3	U
2.	Illustrate food irradiation.	3	U
3.	List out the principles of food preservation.	1	R
4.	Discuss on irradiation.	3	U
5.	Interpret the difference between refrigeration and freezing.	4	U
6.	Identify the types of spoilage. Give examples.	1	U
7.	Define the term humectants.	2	R
8.	Review on food canning.	3	U
9.	Distinguish between class I and class II preservatives.	2	U
10.	Distinguish between drying and dehydration.	3	U
11.	Interpret types of food additives.	2	U
12.	Trace food concentration.	5	U

(10 x 2 = 20 marks)

Part B

(Answer any six questions. Each question carries 5 marks)

Qn. No.	Questions	CO	Level of questions
13.	Examine the importance food preservation and types of preservation.	1	Ap
14.	Explain the principles of concentration and types of concentrated foods.	5	Ap
15.	Explain merits and demerits of drying.	3	Ap
16.	Discuss on microbial spoilage of food.	1	U
17.	Explain the steps involved in freezing, types of freezing.	4	Ap
18.	Discuss in detail on class II preservatives.	2	U
19.	Explain the process of canning.	3	Ap
20.	Explain on mechanism of refrigeration.	4	Ap
21.	Explain types of freezing.	4	Ap

(6 x 5 = 30 marks)

Part C

(Answer any two questions. Each question carries 15 marks.)

Qn.No.	Questions	CO	Level
22.	Illustrate on preservation by low temperature.	4	Ap
23.	Explain about food spoilage and types of spoilage.	1	U
24.	Discover how drying helps in preservation. Explain the merits and demerits of drying.	3	Ap
25.	Discuss on types of dryers with neat diagram.	3	U

(2 x 15 = 30 marks)

CO: Course Outcomes

Level: R – Remember, U – Understand, Ap- Apply, An- Analyze, E- Evaluate, C- Create

**SEMESTER I
SKILL COURSE 03
VFPT1S03B23 – FOOD CHEMISTRY**

Credits: 5

Hours Per Week: 5

Total Lecture Hours: 90

Course Overview and Context

To make students understand the principle behind various chemical and biochemical changes that occur in food components when it is processed. The course also focuses to enhance the knowledge on food quality analysis emphasizing its application to the food industry.

Course outcomes:

CO1: Determine the moisture content and water activity in different types of food. (Apply)

CO2: Explain the structure, physical and chemical characteristics of carbohydrates. (Apply)

CO3: Explain the basic functions of proteins like enzymes. (Understand)

CO4: Identify the changes that occur to macronutrients during processing. (Understand)

CO5: Describe the relevance of micronutrients in the food industry. (Understand)

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, dextrinization, 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.

References:

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

MODEL QUESTION PAPER
(without practical)
B.Voc. DEGREE (C.B.C.S.S) EXAMINATION
SEMESTER I - SKILL COURSE FOR
B.Voc. FOOD PROCESSING TECHNOLOGY
VFPT1S03B23– FOOD CHEMISTRY

Time: 3 hours

Maximum marks: 80

Part A

(Answer any ten questions. Each question carries 2 marks.)

Qn. No.	Questions	CO	Level of questions
1.	List the precautions to be taken in estimation of moisture by oven drying method.	1	R
2.	Illustrate the structure of glucose.	2	R
3.	Acid value represents the quality of oil. How? Justify.	4	E
4.	Differentiate between amylose and amylopectin.	2	R
5.	Illustrate the primary and secondary structure of a protein.	3	U
6.	Do fats and oils exist in same state at room temperature. Comment.	4	U
7.	Coenzymes play a major role in metabolic reactions. Substantiate your answer.	3	U
8.	Fortification is a method adopted to prevent micronutrient deficiency. Justify.	5	Ap
9.	Define the term enzymes.	3	R
10.	List out the relevance of processing food.	5	U
11.	Differentiate between free water and bound water.	1	U
12.	Illustrate the formation of glycosidic linkage.	2	R

(10 x 2= 20 marks)

Part B

(Answer any six questions. Each question carries 5 marks.)

Qn. No.	Questions	CO	Level of questions
13.	Explain the classification of enzymes with suitable examples.	3	U
14.	Write about the changes that happens when a loaf of bread is made.	2	An
15.	Describe the characteristics of following flavours. a) Spice flavours b) vegetable flavours c) meat flavours	5	U
16.	Write a short note on role of emulsifiers in food industry.	4	U
17.	The terminals of an amino acid react in different ways. Explain the statement with examples.	3	U
18.	Explain the uniqueness of the structure of water with the help of neatly labelled diagram.	1	Ap
19.	Elucidate the principle and procedure for quantitative estimation of carbohydrate using glucose oxidase method.	2	Ap
20.	Discuss about chemical properties of fat.	4	U
21.	Briefly explain the structure of proteins.	3	U

(6 x 5 = 30 marks)

Part C

(Answer any two questions. Each question carries 15 marks.)

Qn. No.	Questions	CO	Level of questions
22.	Are enzymes specific for its substrate? Substantiate and explain.	3	U
23.	Various changes can occur in starch when it is subjected to heat in presence of water. Explain.	2	An
24.	Discuss in detail about properties of water.	1	U
25.	Explain the physical and chemical properties of lipids.	4	Ap

(2 x 15 = 30 marks)

CO : Course Outcomes

Level : R – Remember, U – Understand, Ap- Apply, An- Analyze, E- Evaluate, C- Create

SEMESTER I
SKILL COURSE (Practical) 01
VFPT1SP01B23 – BAKERY AND CONFECTIONERY TECHNOLOGY
(PRACTICAL)

Credits: 2

Hours Per Week: 3

Total Laboratory Hours: 36

Course Overview and Context

To develop professional and practical knowledge in bakery and confectionery. Also, to give an idea about the importance of each ingredient in the bakery and how it affects the overall product and its sensory quality parameters.

This course focuses on product development skills thereby enabling them to work as a production manager and emerge as an entrepreneur in the bakery and confectionery sector.

Course Outcomes:

CO1: Identify and explain baking terms, ingredients and equipment used in baking (Understand)

CO2: Illustrate scaling and measuring of ingredients. (Apply)

CO3: Practice baking various products. (Apply)

CO4: Design and set up a small-scale processing unit. (Create)

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 jam nut cookies
8. Preparation of vanilla cake
9. Preparation of cake.
10. Preparation of confectionery products – Peanut Chikki, Marshmallow, Carmel Pudding, Milk Toffee
11. Visit to production unit of a bakery.

SEMESTER I
SKILL COURSE (Internship) 01
VFPT1SI01B23- INTERNSHIP

Credits: 1

Hours Per Week: 1

Total Hours: 18

Course Overview and Context

To develop practical and professional knowledge in bakery and confectionery, and make them competent in different areas such as production, packaging, quality control and safety. Through this course, the students are expected to gain practical knowledge about the procurement of raw materials and their quality testing; manufacturing of various bakery and confectionery products; and packaging methods. It also enhances their awareness about final product quality testing and hygiene and safety measures.

Course outcomes:

CO1: Integrate academic and practical skills (Create)

CO2: Develop problem solving skills in the industry (Create)

**SEMESTER II
SKILL COURSE 04
VFPT2S04B23 – DAIRY TECHNOLOGY**

Total Credits: 5

Hours Per Week:5

Total Lecture Hours: 90

Course Overview and Context:

To inculcate the knowledge regarding dairy products and its processing techniques and to make them aware about various equipments and sanitation practices in the dairy industry. This course enhances their quality control and processing skills in the dairy sector and also enable them to emerge them as an entrepreneur.

Course Outcomes:

CO 1: Describe the composition and physicochemical properties of milk (Understand).

CO 2: Explain the equipment and steps in milk processing. (Understand).

CO 3: Discuss the processing of special milks (Understand).

CO4: Prepare different varieties of dairy products (Apply).

CO 5: Summarise the cleaning system of dairy plants. (Understand).

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.

References:

- Joshi.V.K., (2015), "Indigenous Fermented Foods of South Asia", CRC Press.
- Alan H. Varnam, (2012), "Milk and Milk Products: Technology, chemistry and microbiology", Springer Science and Business Media Publishers.
- Robinson, R. K., (2012), "Modern Dairy Technology: Volume 2 Advances in Milk Products", Springer Science and Business Media Publishers.

**SEMESTER II
SKILL COURSE 05
VFPT2S05B23 – PACKAGING TECHNOLOGY**

Total Credits: 5

Hours Per Week:5

Total Lecture Hours: 90

Course Overview and Context:

To provide knowledge about trends and development in food packaging technologies and materials. This course familiarizes various technology behind packaging and their testing and also develop skill in identifying various packaging materials used in the food industry.

Course outcomes:

CO1: Enumerate the various functions of packaging (Remember)

CO2: Illustrate deteriorative reactions and shelf life of foods (Apply)

CO3: Classify packaging materials and their properties. (Analyse)

CO4: Discuss the various special packaging used in the food industry. (Apply)

CO5: Explain the labelling and safety concerns in the food pack. (Apply)

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 FoodPackaging, Package testing-Thickness – Paper density - Basis weight – Grammage - Tensile Strength - Gas Transmission Rate (GTR) - Water Vapour Transmission Rate (WVTR).

References:

- Gordon L. Robertson (2012), “Food Packaging: Principles and Practice”, Third Edition, CRC Press.
- Takashi Kadoya (2012), “Food Packaging”, Academic press.
- Richard Coles, Derek McDowell, Mark J. Kirwan (2003), “Food Packaging Technology”, CRC Press.

**SEMESTER II
SKILL COURSE 06
VFPT2S06B23 – SANITATION AND HYGIENE**

Total Credits: 5

Hours Per Week:5

Total Lecture Hours: 90

Course Overview and Context:

To understand and impart knowledge of importance of food hygiene, sanitation, and safety practices and to know more about various types of cleaning agents used in the food industry. This course enables them to work efficiently and create a safe environment in the food industry and help them to advance in the field of food hygiene and food safety.

Course Outcomes:

CO1: Explain in detail about Sanitation and health followed in the food industry. (Understand)

CO2: Discuss on various types of hygiene practices that should be followed in food industries (Understand)

CO3: Summarize on various types of Environmental sanitation followed in food industries (Understand)

CO4: Apply various hygiene practices in the food industry (Apply)

CO5: Explain Sanitary standards and regulations followed in food industries (Understand)

Syllabus Content:

Module I: Sanitation and Health

15 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

13 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 equipment, guidelines for cleaning equipment, cleaning procedures, pest control, water supply, storage and waste disposal, environmental pollution.

Module IV: Hygiene Practices in food industry

18 Hours

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

Module V: Sanitation regulations and Standards

15 Hours

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

References:

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

SEMESTER II
SKILL COURSE (Practical) 02
VFPT2SP02B23 – DAIRY TECHNOLOGY (PRACTICAL)

Credits: 2

Hours per week: 3

Total Laboratory Hours: 36

Course Overview and Context

To develop knowledge about preparation of dairy products and make them aware about different processing equipment used in the dairy industry. This course enhances the skills in the chemical analysis of milk product thereby making them competent to work in the dairy industry.

Course Outcomes:

CO1: Identify the different equipment used in dairy processing (Understand)

CO2: Analysing the chemical analysis of milk. (Analyse)

CO3: Experimenting the processing of dairy products. (Apply)

CO4: Preparing a small- scale processing unit (Create).

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 and other adulterants 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. Determination of MBRT
16. Visit to milk product development centre.

SEMESTER II
SKILL COURSE (Internship) 02
VFPT2SI02B23- INTERNSHIP

Credits: 1

Hours Per Week: 1

Total Hours: 18

Course Overview and Context:

The course imparts practical and professional knowledge about dairy and dairy products as well as the relevant machineries and quality testing.

The course aims for analytical and microbiological tests like platform tests, adulteration tests, MBRT, SPC, coliform tests. It helps the students to familiarize with equipment and the process of homogenization, pasteurization, and cream separation techniques, along with CIP, plant hygiene and other safety measures.

Course Outcomes:

CO1: Correlate academic and practical skills (Analyse)

CO2: Employing problem solving skills in the industry (Apply)

SEMESTER III
SKILL COURSE 07
VFPT3S07B23 – TECHNOLOGY OF FISH, MEAT AND EGG PROCESSING

Total Credits: 5

Hours Per Week:5

Total Lecture Hours: 90

Course Overview and Context:

To understand the technology for handling, processing, preservation of meat and fish products. The course contains preparation of various animal food products and their byproduct utilization. This course imparts skill-based knowledge about fish, meat, egg processing and its preservation and thereby making the students competent to work in the industry as well as to start their own enterprise.

Course Outcomes:

CO1: Describe the structure, composition and nutritional quality of animal products (Understand)

CO2: Explain processing and preservation of fish food products (Understand)

CO3: Preparing meat food products and explaining the different preservation methods. (Apply)

CO4: Describe the structure, composition and nutritional quality of egg and preservation of eggfood products (Understand)

CO5: Discussing the various animal food products (Understand)

Syllabus Content:

Module I: Compositional and Nutritional aspect of Animal foods **20 Hours**

Fish - Classification of fish (fresh water and marine), composition, spoilage of fish - microbiological, physiological, biochemical. **Meat** - Definition of carcass, concept of red meat and white meat, composition of meat, marbling in meat, post mortem changes in meat - rigor mortis, tenderization of meat, ageing of meat. **Egg**- composition and nutritive value, egg proteins, characteristics of fresh egg, deterioration of egg quality.

Module II: Fish Processing **10 Hours**

Preservation of fish-Chilling, Freezing, curing, drying, salting - salting methods: brining, pickling, curing and canning of fish. Smoking - smoke production, smoke components, quality, safety and nutritive value of smoked fish, pre - smoking processes, smoking process control.

Module III: Meat processing **20 Hours**

Meat Quality - colour, flavour, texture, Water Holding Capacity (WHC), Emulsification capacity of meat. Tests for assessment of raw meat - TVN, FFA, PV, Nitrate and nitrite in cured meat. **Preservation of meat** -Refrigeration and freezing, thermal processing - canning of meat, dehydration, meat curing.

Module IV: Egg processing

10 Hours

Factors affecting egg quality. Preservation of eggs - Refrigeration and freezing, dehydration, coating. Egg Quality and its evaluation.

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.

References:

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

**SEMESTER III
SKILL COURSE 08
VFPT3S08B23 – TECHNOLOGY OF SPICES AND PLANTATION CROPS**

Total Credits: 5

Hours Per Week:5

Total Lecture Hours: 90

Course Overview and Context:

To know about production and consumption trends, structure, composition, quality evaluation, and processing technologies for product development and value addition of various spices and plantation crops.

The course helps to develop skills in the utilization and processing of major spices and plantation crops. The knowledge on post-harvest technologies and the application of suitable storage conditions and handling skills of various spices and plantation crops enhances the competencies of students in the food market.

Course outcomes:

CO1: Distinguish between spices and explain the general processing steps. (Understand)

CO2: Apply the systematic steps of spice processing in the processing unit. (Apply)

CO3: Categorize various spice extractives and experiment on value added products processing (Analyse)

CO4: Evaluate the processing of cashew nuts and its by-products. (Evaluate)

CO5: Experimenting on the processing of various products and by-products from sugarcane and cocoa (Analyse)

Syllabus Content:

Module I: Spice processing 18 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 12 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

15 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.

References:

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

SEMESTER III
SKILL COURSE 09
VFPT3S09B23- TECHNOLOGY OF FERMENTED FOODS

Total Credits: 5

Hours Per Week:5

Total Lecture Hours: 90

Course Overview and Context:

To impart thorough knowledge about various aspects of food fermentation process and technologies and to attain knowledge of production equipment in fermentation industry, substrate preparation and isolation of products. This course develop skill in the preparation of fermented products such as brewing industry, production of microbial biomass, creating variety in foods.

Course Outcomes:

CO1: Describe the range of fermentation process and classify them (Understand)

CO2: Illustrate microbial growth kinetics (Understand).

CO3: Analyse the various sources of media and inocula for fermentation (Analyse)

CO4: Explain the function of the fermenter and sterilization process. (Apply).

CO5: Categorise various fermented food products (Analyse)

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 product

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:

- Deirdre Rawlings, (2013), “Fermented Foods for Health”, Fair Winds Press.
- Robert W. Hutkins, (2008), “Microbiology and Technology of Fermented Foods”, John Wiley and Sons.
- Stanburry P.P. and Whitaker, A. (1984), “Principles of Fermentation Technology”. Pergamon Press, Oxford UK.
- Steinkraus, K.H. (1983). “Handbook of Indigenous Fermented Foods”, Marcel Dekker, New York

SEMESTER III
SKILL COURSE (Practical) 03
VFPT3SP03B23– CHEMICAL AND MICROBIAL ANALYSIS OF FOOD
(PRACTICAL)

Credits: 2

Hours Per Week: 3

Total Laboratory Hours: 36

Course overview and context:

To analyze the chemical constituents in food and to understand the basic concepts of food microbiology. This course develops skill of basic microbiological laboratory practice and handling of equipments.

Course outcomes:

CO1: Analyse the chemical constituents in spices. (Analyse)

CO2: Prepare fermented foods (Apply)

CO3: Experimenting the concepts of food microbiology. (Apply)

Syllabus Content:

1. Demonstration 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. Qualitative analysis of Carbohydrates
6. Introduction to the Basic Microbiology Laboratory Practices and Equipments
7. Functioning and use of compound microscope
8. Cleaning and sterilization of glassware
9. Preparation and sterilization of nutrient broth.
10. Preparation of slant, stab and plates using nutrient agar
11. Staining methods (Simple and gram)
12. Standard Plate Count Method.
13. Visit to Meat Products of India.

**SEMESTER III
SKILL COURSE (Internship) 03
VFPT3SI03B23- INTERNSHIP**

Credits: 1

Hours Per Week: 1

Total Hours: 18

Course overview and context:

The course enlightens the practical and professional knowledge about fish, meat, and poultry products as well as the post harvest handling techniques.

It also imparts awareness on manufacturing methodologies like slaughtering process, new product development, etc., packaging, and microbial and chemical quality testings in meat, fish and allied products.

The course helps the students to study about the importance of hygiene, waste-management and by-product utilization in the industry.

Course outcomes:

CO1: Construct academic and practical skills (Apply level)

CO2: Develop problem solving skills in the industry (Apply level)

CO3: Practicing communication skills (Apply level)

**SEMESTER IV
SKILL COURSE 10
VFPT4S10B23– TECHNOLOGY OF CEREALS, PULSES AND OILSEEDS**

Total Credits: 5

Hours Per Week:5

Total Lecture Hours: 90

Course Overview and Context:

To know about production and consumption trends, structure, composition, quality evaluation, and processing technologies for product development and value addition of various cereals, pulses and oilseeds.

The course helps to learn about the utilization and processing of major cereals, pulses and oil seed. The knowledge on post-harvest technologies and the application of suitable storage conditions and handling skills of various cereals and pulses enhances the competencies of students in the food market.

Course outcomes:

CO 1: Describe the composition of paddy (Understand)

CO 2: Explain the operations and equipments involved in paddy processing (Understand)

CO 3: Explain the steps involved in wheat milling (Understand)

CO 4: Describe the process of pulse milling and explaining the different products from pulses (Understand)

CO 5: Analyse the different methods of oil extraction, refining and practicing (Analyse)

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 Separator – 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

References:

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

**SEMESTER IV
SKILL COURSE 11
VFPT4S11B23– TECHNOLOGY OF BEVERAGES**

Credits: 5

Hours Per Week:5

Total Lecture Hours: 90

Course Overview and Context

The course provides the students with general scientific knowledge about processing of alcoholic and non- alcoholic beverages. The concept helps to understand about the different beverages, manufacturing processes of beverages such as tea, coffee, cocoa, spices, plant extracts, herbs, nuts and dairy-based beverages, chemical composition and processing of tea and coffee, quality evaluation, and packaging methodologies.

The course enhances the recognition of various beverages and application of innovative ideas in novel beverage development by maintaining the quality standards, thus providing a platform for the entrepreneurs and business sector.

Course Outcomes:

CO1: Describe the relevance and functioning of the beverage industries. (Understand)

CO2: Explain the process involved in manufacturing of different beverages. (Understand)

CO3: Preparing tea and coffee-based beverages. (Create)

CO4: Explain the different methods and technology for manufacturing alcoholic beverages and evaluating the best quality methods (Evaluate)

CO5: Explain the major steps involved in manufacturing and testing the quality of packaged drinking water. (Evaluate)

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, technology of still, carbonated, low-calorie and dry beverages, 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, manufacturing processes, quality evaluation of raw and processed water, methods of water treatment, quality standards of bottled water. Types of water - Mineral water, natural springwater, flavoured water, carbonated water.

References:

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

**SEMESTER IV
SKILL COURSE 12**

VFPT4S12B23– FOOD PRODUCT DESIGN AND DEVELOPMENT

Total Credits: 5

Hours Per Week:5

Total Lecture Hours: 90

Course Overview and Context

The course provides an insight on the knowledge on the management, formulation of new products, process control parameters, along with the technological knowledge on the product qualities, raw material properties, processing, packaging requirement, distribution and marketing. Process control parameters.

The understanding of consumer behaviour, preferences, and quality acceptances are relevant for an entrepreneur to introduce a novel product into the market, in addition to regulations and health benefits.

Course Outcomes:

CO 1: Explain the concept of a new product development. (Understand)

CO 2: Describe the processing of a new product. (Understand)

CO 3: Develop the knowledge base required for accomplishing a product development (Apply)

CO 4: Recall the methods to introduce a new product in the market. (Remember)

CO 5: Develop new products (Create)

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.

References:

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

SEMESTER IV
SKILL COURSE (Practical) 04
VFPT4SP04B23 – CEREALS, PULSES AND OILSEEDS TECHNOLOGY
(PRACTICAL)

Total Credits: 2

Hours Per Week: 3

Total Laboratory Hours: 36

Course Overview and Context:

The course helps to learn about the utilization and processing of major cereals, pulses and oil seed. The knowledge on post-harvest technologies and the application of suitable storage conditions and handling skills of various cereals and pulses enhances the competencies of students in the food market.

Course Outcomes:

CO1: Test the physical properties of cereal flours (Analyse)

CO2: Correlating working of a rice milling station by providing field visits (Analyse)

CO3: Examine the working of a oil expelling unit station (Apply)

Syllabus Content:

1. Physical characteristics of Wheat.
2. Physical characteristics of Rice.
3. Estimation of Gluten Content of flour.
4. Estimation of moisture content.
5. Estimation of ash content.
6. Estimation of acid insoluble ash.
7. Determination of alcoholic acidity.
8. Determination of gelatinization temperature of flours.
9. Determination of sedimentation power of flour.
10. Visit to rice mill station.
11. Visit to oil expelling unit.

**SEMESTER IV
SKILL COURSE (Internship) 04
VFPT4SI04B23- INTERNSHIP**

Credits: 1

Hours Per Week: 1

Total Hours: 18

Course Overview and Context:

The course is designed to impart practical and professional knowledge about cereals, pulses and oilseed products as well as the relevant machinery and quality testing. The course acquaints one with processes such as grading, milling, oil extraction, etc. To provide awareness on product development, packaging and quality testing of various cereals, pulses and oilseeds.

Course Outcomes:

CO1: Correlate academic and practical skills (Analyse)

CO2: Employing problem solving skills in the industry (Apply)

CO3: Develop communication skills (Create level)

SEMESTER V
SKILL COURSE 13
VFPT5S13B23- FRUIT AND VEGETABLE PROCESSING

Credits: 5

Hours Per Week:5

Total Lecture Hours: 90

Course Overview and Context:

This course enables the students to understand the post-harvest handling technologies of fruits and vegetables and to know the process of development of fruit and vegetable processing products. The course helps the students to know about the status of fruits and vegetables production in India and different methods of processing of fruits and vegetables which enable students to excel in this sector in both industrial and entrepreneurial levels. Students become skilled at identifying and using various tools, equipment and ingredients used for fruits and vegetable preservations.

Course Outcomes:

CO1: Discuss the status of fruit and vegetable production in India with importance to losses (Understand)

CO2: Identifying different types of spoilage in fruits and vegetables. (Understand)

CO3: Prepare various fruit and vegetable products. (Apply)

CO4: Experimenting the various methods of preservation of fruits and vegetables (Apply)

CO5: Analyse the processing of fruits and vegetables (Analyse)

Syllabus Content:

Module I: Introduction

15 Hours

Composition and nutritive value of fruits and vegetables. 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

References:

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

SEMESTER V

SKILL COURSE 14

VFPT5S14B23– ENGINEERING PROPERTIES OF FOODS

Total Credits: 5

Hours Per Week:5

Total Lecture Hours: 90

Course Overview and Context:

The aim of this course is to understand the concept of rheological and thermal properties of foods on measuring the various engineering properties of food products. It provides an insight into various engineering properties of food materials under different condition and to about the different methods of determining the quality and properties of different foods.

Course Outcomes:

CO1: Explain various physical properties of food materials. (Understand)

CO2: Identify different methods of determining thermal properties of foods. (Understand)

CO3: Illustrate the aerodynamic and frictional properties of foods. (Understand)

CO4: Predict the rheological behaviour and textural properties of foods. (Understand)

CO5: Identify the types of electrical and optical properties of foods. (Understand)

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

15 Hours

Aerodynamic property-definition-drag coefficient, terminal velocity - application in handling and separation of food materials. Frictional property-coefficient of friction, angle of repose, angle of internal friction, application in food handling and storage.

Module IV: Rheology and texture of foods

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.

References:

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

SEMESTER V
SKILL COURSE 15
VFPT5S15B23– SENSORY EVALUATION OF FOODS

Total Credits: 5

Hours Per Week:5

Total Lecture Hours: 90

Course Overview and Context

The course provides knowledge about Sensory test methods and procedures used to evaluate the flavour, colour and texture of foods which helps to enhance acceptance of a product. This course contains information on various subjective and objective methods of evaluation of foods and application of these analysis in food industry.

Studying this course would facilitate students to understand the concepts of sensory analysis in testing the food quality and also understand relationship between sensory and instrumental methods for the evaluation of foods.

Course Outcomes:

CO1: Describe the human senses and sensory perception (Remember)

CO2: Review the arrangements for sensory evaluation (Understand)

CO3: Classify the statistical methods for Sensory Evaluation (Analyse)

CO4: Analyse the Subjective and Objective methods in evaluation. (Analyse)

CO5: Illustrate the application of sensory evaluation (Apply)

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

References:

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

SEMESTER V
SKILL COURSE (Practical) 05
VFPT5SP05B23– PROCESSING OF FRUITS AND VEGETABLES
(PRACTICAL)

Total Credits: 2

Hours Per Week:3

Total Laboratory Hours: 36

Course Overview and Context:

This course provides knowledge about the principles and methods of preservation of fruits and vegetables into various products and to practically gain skill in development of these products. Students will excel in handling and operating of food processing equipment and Instruments and acquire knowledge about Quality analysis and quality testing of fruit and vegetable products.

Course Outcomes:

CO1: Examine the Handling and operating of food processing equipments and Instruments (Apply)

CO2: Analyse the quality of fruit and vegetable products. (Analyse)

CO3: Preparing different fruit and vegetables products. (Create)

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 pre-treatment on quality of cut fruits and vegetables.
- Refrigeration storage of fruits and vegetables
- Determination of Maturity indices of fruits and 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.

SEMESTER V
SKILL COURSE (Internship) 05
VFPT5SI05B23- INTERNSHIP

Credits: 1

Hours Per Week: 1

Total Hours: 18

Course Overview and Context:

The course provides practical and professional awareness about fruits and vegetable products and various post harvest handling techniques. It imparts knowledge on processing, manufacturing, and packaging of fruits and vegetables, along with the waste management, by-product utilization, quality testing such as acidity, TSS, reducing and non-reducing sugar, adulteration, and other various chemical and microbiological analysis.

Course Outcomes:

CO1: Integrate academic and practical skills (Create)

CO2: Develop problem solving skills in the industry (Create)

CO3: Develop communication skills (Create level)

**SEMESTER VI
SKILL COURSE 16
VFPT6S16B23- UNIT OPERATIONS IN FOOD INDUSTRY**

Total Credits: 5

Hours Per Week:5

Total Lecture Hours: 90

Course Overview and Context:

The course provides in-depth knowledge in basic concepts of various unit operations in a food industry. The course includes various unit operations performed in food industry and working of different equipment. Equipment such as Heat transfer equipment, evaporation equipment, distillation and crystallization equipment, separation equipment are dealt in detail in this course that enables students to comprehend the relationship between the unit operations and equipments.

Course Outcomes:

CO1: Employ the various modes and applications of heat transfer (Apply)

CO2: Illustrate the working of size reduction equipments (Apply)

CO3: Explain the different types of crystallizers and distillation equipments (Understand)

CO4: Analyse the working of extraction and extrusion equipments (Analyse)

CO5: Discuss the mechanism of material handling and mechanical separation equipments (Understand)

Syllabus Content:

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: Mechanical Operations **15 hours**

Size reduction: Crushers and Grinders- Hammer Mill and Ball Mill, homogenization and mixing equipments

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

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.

**SEMESTER VI
SKILL COURSE 17
VFPT6S17B23- FOOD QUALITY ASSURANCE**

Total Credits: 3

Hours Per Week:3

Total Lecture Hours: 54

Course Overview and Context:

The course acquaints one with food quality parameters and control systems, food standards, regulations, specifications. Understanding the principles, framework of food safety, food laws and regulations governing the quality of foods, preventive measures and control methods to minimize microbiological hazards and maintain quality of foods. It helps to identify the wide variety of parameters affecting food quality and Intellectual Property Rights, which helps a person to gather information on different licensing and patenting.

Course Outcomes:

CO1: Explain the principles and framework of food safety. (Understand)

CO2: Summarize food laws and regulations governing the quality of foods. (Understand)

CO3: Employ preventive measures and control methods to minimize microbiological hazards and maintain quality of foods. (Apply)

CO4: Explain the wide variety of parameters affecting food quality. (Understand)

CO5: Discuss Intellectual property rights. (Understand)

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 and 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

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

SEMESTER VI
SKILL COURSE (Project) 01
VFPT6SPRB23- PROJECT AND VIVA VOCE

Credits: 10

Hours Per Week: 8

Total Hours: 180

Course Overview and Context:

The course provides a platform for the students to showcase their academic knowledge and practical skills. The scholar acquires knowledge on article writing, cost analysis, marketing, record keeping and documentation. It improves their innovative skills, time management, leadership skills and creativity. It helps them to face the challenges in the industries and mould them into a disciplined scientific person.

Course Outcomes:

CO1: Articulate the ability to develop and analyse an innovative food product (Apply)

CO2: Execute the strategies to improve the skill on product development and handling of equipments (Apply)

CO3: Examine the ways to manage and control the food cost (Analyse)

CO4: Practice of time management and methods of market analysis of a product (Apply)

CO5: Invention of novel process and design applicable to the food industry (Create)

**SYLLABI FOR
B.Voc. FOOD PROCESSING TECHNOLOGY
(GENERAL COURSES)**

SEMESTER I
GENERAL COURSE 01
VFPT1G01B23 – FOOD SCIENCE AND NUTRITION I

Credits: 4

Hours per Week: 4

Total Lecture Hours: 72

Course Overview and Context

To understand the nutrient composition of food, their functions, sources and impart knowledge of concept of good health and its importance. To improve the knowledge about basal metabolic rate.

Course Outcomes:

CO1: Explain the relevance of nutrition in maintaining health. (Apply)

CO2: Differentiate between the types of malnourishments. (Understand)

CO3: Describe the basic characteristics and novel concepts of food. (Understand)

CO4: Examine the symptoms due to vitamin – mineral deficiency and toxicity. (Apply)

CO5: Summarize the changes in BMR during various physiological conditions. (Understand)

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 woman.

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 affecting BMR, total energy Requirement.

References:

- James L Groff and Sareen S Gropper, (2009) “Advanced Nutrition and Human Metabolism”, Fourth Edition, Wadsworth Publishing Company.
- Maurice B Shils, Moshe Shike A, Catherine Ross, Benjamin Cabellero, Robert J Cousins, (2006), “Modern Nutrition in Health and Disease”, Lippincott Williams al Wilkins.
- Michael J Gibney, Ian A Macdonald and Helen M Roche (2003) “Nutrition and Metabolism”, The Nutrition Society Textbook Series, Blackwell Publishing, First Edition.

MODEL QUESTION PAPER
(without practical)
B.Voc. DEGREE (C.B.C.S) EXAMINATION
SEMESTER I - GENERAL COURSE FOR
B.Voc. FOOD PROCESSING TECHNOLOGY
VFPT1G01B23– FOOD SCIENCE AND NUTRITION I

Time: 3 hours

Maximum marks: 80

Part A

(Answer any ten questions. Each question carries 2 marks.)

Qn. No.	Questions	CO	Level
1.	Bioavailability of vitamins is an important factor to consider to prevent deficiency. Comment.	3	Ap
2.	List out different concepts of food with examples.	2	R
3.	Write a note on major functions and sources of Iodine.	4	U
4.	List out the sources of water-soluble vitamins.	3	U
5.	Enlist the etiological factors of protein energy malnutrition.	2	R
6.	It is important to maintain water balance in human body. Justify.	1	U
7.	Respiratory quotient varies with diet. Substantiate.	5	U
8.	Vitamin D play a vital role in calcium absorption. How?	3	Ap
9.	Health of a human body depends on four different dimensions. Which are they?	1	U
10.	Illustrate the classification of minerals.	4	U
11.	List down the merits and demerits of GM foods.	1	An
12.	Illustrate a neatly labelled diagram of food guide pyramid.	2	U

(2 x 10 = 20 marks)

Part B

(Answer any six questions. Each question carries 5 marks.)

Qn. No.	Questions	CO	Level
13.	Discuss about the sources and functions of Vitamin A.	3	U
14.	Interaction between nutrients impart changes in their action and balance in human body. Justify the statement with suitable example.	1	U
15.	Briefly explain about the factors that effect BMR.	5	U
16.	Write a short note on the following about fluorine. 1. a) Characteristics b) sources c) signs of toxicity	4	U
17.	Elucidate the role of B vitamins as coenzymes.	3	Ap
18.	India faces dual burden of malnourishment? Discuss.	1	Ap
19.	Can food intake prevent the onset of a disease by providing nourishment? Validate the statement in comparison with new concepts of food.	2	Ap
20.	How is iodine absorbed in the body? Write on effects of IDD.	4	Ap
21.	Intake of Vitamin A helps in vision. How? Substantiate with the help of visual cycle.	3	U

(6 x 5 = 30 marks)

Part C

(Answer any two questions. Each question carries 15 marks.)

Qn. No.	Questions	CO	Level
22.	Is it important to include vitamin C for enhancing iron absorption. Explain the role of iron in preventing anemia.	3	U
23.	Electrolytes play a relevant role in maintaining fluid balance in human body. Substantiate and explain.	4	An
24.	Elaborate about the components of total energy expenditure.	5	U
25.	Discuss on functions, sources, toxicity and deficiency of water.	1	Ap

(2 x 15 = 30 marks)

CO : Course Outcomes

Level : R – Remember, U – Understand, Ap- Apply, An- Analyze, E- Evaluate, C- Create

**SEMESTER I
GENERAL COURSE 02
VFPT1G02B23– ENTREPRENEURSHIP DEVELOPMENT AND PROJECT
MANAGEMENT**

Credits: 4

Hours Per Week:4

Total Lecture Hours: 72

Course Overview and context

This course is introduced into the curriculum to develop Entrepreneurial culture and encourage the students to become entrepreneurs. The course will help learners 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 report to start a small-scale industry, to know about various agencies that can provide assistance for starting a new project, to understand the qualities required to be a good entrepreneur, to realize the role of entrepreneurs in the economic development of the nation etc. The course also gives a first-hand idea regarding the project management especially, the project identification, formulation and appraisal phases.

Course Outcomes:

CO1: Illustrate the importance of entrepreneurs in the economic development of the nation(Apply)

CO2: Examine the concept of entrepreneur and the qualities essential for an entrepreneur (Apply)

CO3: Discuss the basic steps for starting an enterprise of their own. (Understand)

CO4: Explain step by step procedure of managing a project (Understand)

CO5: Examine the different schemes introduced by government to accelerate entrepreneurial growth (Apply)

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.

References:

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

**ST. TERESA'S COLLEGE (AUTONOMOUS), ERNAKULAM
B.VOC. FOOD PROCESSING TECHNOLOGY**

Semester I

**VFPT1G02B23 – ENTREPRENEURSHIP DEVELOPMENT AND PROJECT
MANAGEMENT**

Time: 3 hours

Maximum marks: 80

Part A

(Answer any 10 questions. Each question carries 2 marks.)

Qn. No.	QUESTIONS	CO	LEVEL
1	State the meaning of network analysis. Mention its techniques.	4	U
2	Explain the Maslow's Needs Theory of Motivation.	2	U
3	Distinguish between Fabian Entrepreneur and Drone Entrepreneur.	1	U
4	List down the different phases of EDP.	3	U
5	Outline the symptoms of industrial sickness.	3	U
6	Review the target groups of EDP.	3	U
7	Define project planning and mention its objectives.	4	R
8	Briefly state the new classification of MSME.	5	U
9	List down the qualities of an entrepreneur.	2	U
10	Write on feasibility analysis.	4	U
11	Identify the social costs and benefits.	4	U
12	Explain the risk-bearing capacity of an entrepreneur.	1	U

(10 x 2 = 20 marks)

Part B

(Answer any six questions. Each question carries 5 marks.)

Q NO.	QUESTIONS	CO	LEVEL
13	Explain the phase of EDP.	3	U
14	Write on the classification of projects.	4	U
15	Distinguish between PERT and CPM.	4	U
16	Mention and merits and demerits of the payback period.	4	An
17	Infer the causes of Industrial Sickness.	3	U
18	Point out the objectives of EDP.	3	Ap
19	Enumerate the problems faced by women entrepreneurs.	1	U
20	Compare the special Agencies for Entrepreneurial Development and Training.	5	An
21	Explain the concept of project identification.	4	U

(6 x 5 = 30 marks)

Part C

(Answer any two questions. Each question carries 15 marks.)

Q NO.	QUESTIONS	CO	LEVEL
22	Define Entrepreneur. Explain the role of the entrepreneur in economic development.	1	An
23	Define Project Report. Elaborate on its contents.	5	Ap
24	Evaluate the different steps in the project identification phase	4	E
25	Describe MSME. Detail the steps involved in setting up MSMEs in India.	3	U

(2 x15 = 30 marks)

CO : Course Outcomes

Level : R – Remember, U – Understand, Ap- Apply, An- Analyze, E- Evaluate, C- Create

**SEMESTER II
GENERAL COURSE 03
VFPT2G03B23– FOOD SCIENCE AND NUTRITION II**

Total Credits: 4

Hours Per Week:4

Total Lecture Hours: 72

Course Overview and Context:

To gain knowledge on various methods of body composition analysis and also to understand the absorption, assimilation and **utilization** of macronutrients in the human body. The course also focuses to improve knowledge on inborn errors of metabolism and the diet therapy to prevent the consequences of the same.

Course Outcomes:

CO1: Explain the relevance and various methods of body composition analysis. (Apply)

CO2: Describe the utilization of carbohydrates in the human body. (Understand)

CO3: Summarize the basic mechanisms of protein digestion and synthesis. (Understand)

CO4: Discuss the utilization of lipids and pathways of cholesterol metabolism. (Understand)

CO5: Distinguish between the disease conditions related to deficiency of metabolic enzymes.(Understand)

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, Skinfold 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- glycemic 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.

References:

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

**SEMESTER II
GENERAL COURSE 04
VFPT2G04B23 – BUSINESS COMMUNICATION**

Total Credits: 4

Hours Per Week:4

Total Lecture Hours: 72

Course Overview and Context

This course is introduced into the curriculum to develop basic communication skills to communicate interpersonally, mainly during business contexts. This course also throws light into the barriers of communication in organizations and how to deal with them successfully. Along with stressing on the importance of listening, it also shows the importance of non-verbal aspects of communication. There also an attempt to make the learners understand the importance of group and group communication.

Course outcomes:

CO1: Recall that communication is the life blood of all businesses and the base for all humanrelations (Remember)

CO2: Explaining how to improve oral communication with the effective use of non-verbalcommunication (Understand)

CO3: Practice the steps of giving a good oral presentation (Apply)

CO4: Summarize the concept of groups and teams and tells the importance of group decisionmaking in business (Understand)

CO5: Identifying the new methods of business communication (Understand)

Syllabus 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- Brainstorming 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.

References:

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

**SEMESTER III
GENERAL COURSE 05
VFPT3G05B23- FOOD MICROBIOLOGY**

Total Credits: 4

Hours Per Week:4

Total Lecture Hours: 72

Course Overview and Context:

This course includes the study of microorganisms causing food spoilage and disease and the beneficial role of microorganisms in food. This course aims in developing the skills for an effective food microbiologist and also provides essential knowledge about the microbial safety of a food.

Course Outcomes:

- CO1:** Explain the changes caused by microorganisms in food. (Understand)
- CO2:** Identify the different microorganisms and their characteristics. (Understand)
- CO3:** Describe the methods to control microbial growth. (Understand)
- CO4:** Analyse the spoilage of various food products. (Analyse)
- CO5:** Describe the beneficial uses of microorganisms. (Understand)

Syllabus Content:

Module I: Introduction to food microbiology

9 Hours

Discovery, current status, role of food microbiology, Introduction to microscope, Culture media, and their types, culturing techniques and staining techniques, sources of microorganisms in food, 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.

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:

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

**SEMESTER III
GENERAL COURSE 06
VFPT3G06B23– FOOD ADDITIVES AND FLAVOURING TECHNOLOGY**

Total Credits: 4

Hours Per Week:4

Total Lecture Hours: 72

Course Overview and Context:

To understand the importance of food additives in food processing technology and also to study the merits and demerits of addition of food additives. This course contains isolation of various biopolymers from food resources and their relevant applications. This course develops skill in shelf-life extension and analysis and extraction of flavours.

Course Outcomes:

CO1: Explain the relevance and role of food additives in food processing. (Understand)

CO2: Examine the function of food additives added during processing of food. (Apply)

CO3: Distinguish between the flavours formed during processing and explain the extraction methods. (Analyse)

CO4: Select appropriate sources and methods to derive food additives from macronutrients. (Analyse)

CO5: Illustrating toxic food additives and predicting the formation of such compounds during processing. (Apply)

Syllabus Content:

Module I: Introduction to Food Additives

10 Hours

Role of Food Additives in Food Processing, functions -Classification -Intentional and Unintentional Food Additives. Safety evaluation of Food Additives, Beneficial and Toxic Effects. Food Additives - Generally recognized as safe (GRAS), Tolerance levels and 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 ingredients; 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.

References:

- Titus A. M. Msagati, (2012), “The Chemistry of Food Additives and Preservatives”, John Wiley and Sons Publishers.
- Jim Smith, Lily Hong-Shum (2011), “Food Additives Data Book”, John Wiley and Sons Publishers.
- Deshpande, S.S. (2002). “Handbook of Food Toxicology”, Marcel Dekker Publishers.

**SEMESTER III
GENERAL COURSE 07
VFPT3G07B23- BUSINESS MANAGEMENT**

Total Credits: 4

Hours Per Week:4

Total Lecture Hours: 72

Course Overview and Context:

This course is an attempt to familiarise the students with concepts and principles of Management. Being the basic paper in Management studies, this course prepares the learner to absorb the whole curriculum. The paper is an attempt to teach about the formation of an organization, gives idea about different management and organizational functions, familiarizes the learner with grouping of different activities in an organization and their co-ordination, importance and linkage between planning and controlling in business etc.

Course Outcomes:

CO1: Describe the primary functions of management and the roles of managers in organization.(Understand)

CO2: Distinguish the work of major contributors to the field of management and the general principles of management. (Understand)

CO3: Explain how managers align the planning process with company mission, vision, and values.(Understand)

CO4: Identify common organizational structures and the advantages and disadvantages of each.(Understand)

CO5: Discuss the importance of leadership and motivation in organizations (Understand)

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 and 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-Delegation of Authority- Responsibility and accountability-Centralisation Vs decentralisation of authority - Nature and importance of staffing - Process of selection and recruitment.

Module IV: Directing

16 Hours

Meaning and nature of directing - Motivation- meaning - importance-Theories of Motivation (Maslow, Herzberg, McGregor, X and Y theory) Leadership-Meaning-Styles, Managerial Grid by Blake and Moun-ton - 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.

References:

- Koontz and O Donnell, Management.
- Appaniah and Reddy, Essentials of Management.
- L M Prasad, Principles of management.
- Rustum and Davan, Principles and practice of Management.

**SEMESTER IV
GENERAL COURSE 08
VFPT4G08B23- FOOD PLANT DESIGNING**

Total Credits: 4

Hours Per Week:4

Total Lecture Hours: 72

Course Overview and Context:

The course strengthens the concepts of plant layout, location and its selection criteria in different food sectors, prevailing regulations and standards followed by the facilities, hygiene and safety practices that has to be practiced in the food industries in the perspective of the food market.

These concepts enlighten the entrepreneurs to exercise the selection of apt location, design and layout, providing the standard facilities ensuring food safety and standards.

Course Outcomes:

CO1: Explain the concepts of plant layout and its design in food industries. (Understand)

CO2: Examine location theories and models utilized for choosing plant location. (Analyse)

CO3: Discuss the various classical types of plant layouts. (Understand)

CO4: Generalize the different building materials and designing utilities suitable for a plant. (Create)

CO5: Describe safety aspects of plant layout in different food processing industries. (Understand)

Syllabus Content:

Module 1: Introduction

10 Hours

Definition, Basic concepts of plant layout and design with special reference to food process industries. Application of HACCP concept, ISO, FPO and 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 and 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.

References:

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

**SEMESTER IV
GENERAL COURSE 09
VFPT4G09B23– BYPRODUCT UTILIZATION AND WASTE
MANAGEMENT**

Credits: 4

Hours Per Week:4

Total Lecture Hours: 72

Course Overview and Context

The course enables one to understand different methodologies for an effective utilisation of the by-products obtained after food processing and also to gain knowledge about characterisation of waste products and effluent treatment methods.

It gives an outlook about the sources of waste generating area in food industries and thus provides an insight to the by-products that can be procured from the waste generated which gives a good market value. Additionally, the course implies the importance of minimization of waste generated to protect the environment.

Course Outcomes:

CO1: Identify the types of waste and its magnitude. (Understand)

CO2: Describe the characteristics of waste (Understand)

CO3: Analyze the various effluent treatment methods. (Analyze)

CO4: Examine the waste utilization of agro-industries. (Apply)

CO5: Examine the waste utilization of animal and marine industry. (Apply)

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 phosphorus and sulfur 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 and 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

References:

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

**SEMESTER – IV
GENERAL COURSE 10**

VFPT4G10B23 – MARKETING MANAGEMENT

Total Credits: 4

Hours Per Week:4

Total Lecture Hours: 72

Course Overview and Context

This course is an attempt to give the learners and understanding about the importance of marketing mix for marketers. This also gives an idea about various types marketing strategy involved in generating sales for a new food product, 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 etc. Since marketing is an essential activity undertaken by every producer, the paper give insight to its basics of logistics and supply chain management and also gives a clear picture about the importance of understanding consumer behaviour before going for manufacturing a product.

Course Outcomes:

CO1: Identify the importance of marketing in food industry (Understand)

CO2: Describe the new trends in marketing (Understand)

CO3: Examine the components of marketing mix (Apply)

CO4: Examine the different pricing strategies and distribution strategies (Apply)

CO5: Analyse the various steps in new product development (Analyse)

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

References:

- Kotler Philip, Keller Kevin, Koshy Abraham and Jha Mithileshwar, Marketing MANAGEMENT – A South Asian Perspective – Pearson Education 15th edition
- Ramaswamy V.S. and Namakumari S, Marketing Management – Global Perspective, Indian context – MacMillan 4th edition
- Rajan Saxena - Marketing Management – Tata McGraw Hill – 4th edition
- Kotler Philip and Armstrong Gary, Principles of Marketing (15th Edition) – Pearson Prentice Hall

SEMESTER V
GENERAL COURSE 11
VFPT5G11B23 - ENVIRONMENTAL STUDIES AND HUMAN RIGHTS

Total Credits: 4

Hours Per Week:4

Total Lecture Hours: 72

Course overview and Context:

This course aims to make aware the students about the importance of environment and Human Rights. Students learn about the scope and significance of environmental studies, the knowledge about different types of pollution, biodiversity and awareness on the Human rights

Course Outcomes:

CO1: Discuss the scope and significance of environmental studies. (Understand)

CO2: Summarize various types of ecosystems. (Understand)

CO3: Explain biodiversity and its conservation. (Understand)

CO4: Explain various types of pollution. (Understand)

CO5: Summarize the Human rights provided in the constitution of India. (Understand)

Syllabus Content:

Module I: Multidisciplinary nature of environmental studies

10hours

Definition, scope and importance - Need for public awareness. Natural Resources:- Renewable and non-renewable resources: Natural resources and associated problems - Forest resources, Water resources, Mineral resources, Food resources, Energy resources, Case studies, Land resources

Module II: Ecosystems

10 hours

Concept of an ecosystem - Structure and function of an ecosystem- Producers, consumers and decomposers - Energy flow in the ecosystem - Ecological succession - Food chains, food web and ecological pyramids. Introduction, types, characteristic features, structure and function of the given ecosystem:- Forest ecosystem

Module III: Biodiversity and its conservation

10 hours

Introduction, Biogeographical classification of India, Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. India as a mega-diversity nation Hot-spots of biodiversity, Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts, Endangered and endemic species of India.

Module IV: Environmental Pollution

15 hours

Definition, Causes, effects and control measures of: Air pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, Nuclear hazards, Solid waste Management, Disaster management, Social Issues and the Environment, Water conservation, rain water harvesting, watershed management, Resettlement and rehabilitation of people: its problems and concerns, Case studies, Environmental ethics. Environment Protection Act - Air (Prevention and Control of Pollution) Act, Water (Prevention and control of Pollution) Act, Wildlife Protection Act, Forest Conservation Act, Issues involved in enforcement of environmental legislation, Public awareness.

Module V: Human Rights

15 hours

An Introduction to Human Rights, Meaning, concept and development, Three Generations of Human Rights (Civil and Political Rights; Economic, Social and Cultural Rights). Human Rights and United Nations: contributions, main human rights related organs - UNESCO, UNICEF, WHO, ILO, Declarations for women and children, Universal Declaration of Human Rights. Human Rights in India, Environment and Human Rights - Right to Clean Environment and Public Safety. Protection of Environment Conservation of natural resources and human rights: Reports, Case studies and policy formulation. Conservation issues of western ghats - mention Gadgil committee report, Kasthurirangan report. Over exploitation of ground water resources, marine fisheries, sand mining

References:

1. Bharucha Erach, Text Book of Environmental Studies for undergraduate Courses. University Press, IInd Edition 2013 (TB)
2. Clark.R.S., Marine Pollution, Clanderson Press Oxford (Ref)
3. Cunningham, W.P.Cooper, T.H.Gorhani, E and Hepworth, M.T.2001Environmental Encyclopedia, Jaico Publ. House. Mumbai. 1196p.(Ref)
4. Dc A.K.Environmental Chemistry, Wiley Eastern Ltd.(Ref)
5. Down to Earth, Centre for Science and Environment (Ref)
6. Heywood, V.H and Watson, R.T. 1995. Global Biodiversity Assessment, Cambridge University Press 1140pb (Ref)
7. Jadhav.H and Bhosale.V.M. 1995. Environmental Protection and Laws. Himalaya Pub. House, Delhi 284p
8. Mekinney, M.L and Schock.R.M. 1996 Environmental Science Systems and Solutions. Web enhanced edition 639p (Ref)
9. Miller T.G. Jr., Environmental Science, Wadsworth Publishing Co. (TB) Odum.E.P 1971. Fundamentals of Ecology. W.B. Saunders Co. USA 574p (Ref)
10. Rao.M.N and Datta.A.K. 1987 Waste Water treatment Oxford and IBII Publication Co.Pvt.Ltd.345p (Ref)
11. Rajagopalan.
12. R, Environmental Studies from crisis and cure, Oxford University Press, Published: 2016 (TB)
13. Sharma B.K., 2001. Environmental Chemistry. Geol Publ. House, Meerut (Ref)
14. Townsend C., Harper J, and Michael Begon, Essentials of Ecology, Blackwell Science (Ref)
15. Trivedi R.K., Handbook of Environmental Laws, Rules Guidelines, Compliances and Standards, Vol I and II, Enviro Media (Ref)

16. Trivedi R. K. and P.K. Goel, Introduction to air pollution, Techno Science Publication (Ref)
17. Wanger K.D., 1998 Environmental Management. W.B. Saunders Co. Philadelphia, USA 499p (Ref)

Human Rights

1. Amartya Sen, The Idea Justice, New Delhi: Penguin Books, 2009.
2. Chatrath, K. J.S., (ed.), Education for Human Rights and Democracy (Shimla:Indian Institute of Advanced Studies, 1998
3. Law Relating to Human Rights, Asia Law House, 2001, Shireesh Pal Singh, Human Rights Education in 21st Century, Discovery Publishing House Pvt.Ltd, New Delhi,
4. S.K.Khanna, Children And The Human Rights, Common Wealth Publishers,1998.2011.
5. Sudhir Kapoor, Human Rights in 21st Century, Mangal Deep Publications, Jaipur, 2001
6. United Nations Development Programme, Human Development Report 2004: Cultural Liberty in Today's Diverse World, New Delhi: Oxford University Press, 2004

**SEMESTER V
GENERAL COURSE 12
VFPT5G12B23 – FOOD PROCESSING EQUIPMENTS**

Total Credits: 4

Hours Per week:4

Total Lecture Hours: 72

Course Overview and Context:

The course aims at providing basic equipment design and various control mechanisms. It enables the student to design and develop equipment used in Food Processing operations, identify and discuss critical design of typical processing equipment. Also understand the relationship between process design and Safety.

Course Outcomes:

CO1: Illustrate the steps in production planning and criteria for designing different food processing equipments. (Analyse)

CO2: Describe the working of mechanical separation and transport equipments. (Understand)

CO3: Interpret the hygiene and safety considerations in the food industry. (Apply)

CO4: Illustrate the working of thermal processing and refrigeration equipments. (Understand)

CO5: Discuss the features and operation of food packaging machineries. (Understand)

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. 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.

References:

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

SEMESTER V
GENERAL COURSE 13
VFPT5G13B23– PRODUCT AND BRAND MANAGEMENT

Total Credits: 4
Hours Per Week:4

Total Lecture Hours: 72

Course Overview and Context:

The basic purpose of this course included in the programme is to know the various factors to be kept in mind while managing a new product as well as an existing product. The syllabus revolves around concepts like demand forecasting, new product development, product positioning, product launch, product equity etc. There is also an attempt to give an understanding about the concepts related to brand management and various strategies used during this process. The paper also gives an overview of e-Commerce, different concept related to digital marketing and also a first-hand idea about setting up of an e-commerce business.

Course Outcomes:

CO1: Explain the importance of concentrating on the product component of the marketing mix (Understand)

CO2: Restate the fact that brand is not just a name or sign, it is the identity of a product (Understand)

CO3: Examine the basic concepts of product development and the possible errors that could come up (Analyze)

CO4: Explain the significance of Ecommerce in today's fast changing world and its applications to business (Understand)

CO5: Preparing an effective website for Ecommerce (Apply)

Syllabus Content:

Module I: Product management **13 Hours**

Introduction and importance of product management-role of a product manager- product plan and its components- product policy-kind of product teams- product Management audit-product line; additions, alterations and deletions.

Module II: New product development **13 Hours**

New product demand forecasting models-product portfolio-perceptual mapping- stages in new product development-new product launch; strategies, mistakes, successes, and failures

Module III: Brand management **13 Hours**

Strategic issues in brand management- concepts and principles of brand management-Brand positioning- brand stretching- brand equity; its components and measurement- multibranding-rebranding.

Module IV: Overview of Ecommerce

10 Hours

Introduction to ecommerce- its concepts, features and functions- operation of ecommerce- infrastructure of ecommerce-application of ecommerce in direct marketing and selling- types of ecommerce; B2B, B2C,C2C,C2B- Electronic data interchange

Module V: Setting Up of Ecommerce Business

12 Hours

Setting up of ecommerce business-web development-promotion of web sites-trust building, marketing and branding- introduction to electronic online transactions: management and control- product delivery settlement- ERP and its components.

References:

- Kevin Lane Keller – Strategic Brand Management, Pearson Education, India.
- U.C. Mathur – Product management, Excel Books, New Delhi, India.
- K S Chandrasekar – Product Management: Text and Cases, Himalaya Publishers
- Kapferer – Strategic Brand Management, Kogan Page, New Delhi, 2012
- SubratoSen Gupta – Brand Positioning, Tata McGraw Hill, Delhi

SEMESTER VI
GENERAL COURSE 14
VFPT6G14B23- EMERGING TECHNOLOGIES IN FOOD INDUSTRY

Total Credits: 4

Hours Per Week:4

Total Lecture Hours: 72

Course Overview and Context:

The course imparts understanding about new developments in the food industry and enables knowledge about the importance and applications of the various technologies in the food industry.

To enable one with the comprehension of emerging / alternative technologies applied to food processing, relative advantages / disadvantages over existing technologies and economics and commercialization of newer technologies. Insight about the rapid changes in innovative aspects of technologies helps to improve the skills of stakeholders in the food sector.

Course Outcomes:

CO1: Discuss about emerging or alternative technologies applied to food processing. (Understand)

CO2: Relate quality in existing Food technologies. (Apply)

CO3: Discuss economics and commercialization of newer technologies. (Understand)

CO4: Illustrate working principle of minimal processing. (Analyse)

CO5: Evaluate nanotechnology and antimicrobial technologies. (Evaluate)

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.

References:

- Leistner L. and Gould G. Hurdle Technologies – Combination treatments for food stability safety and quality, Kluwer Academics / Plenum Publishers, New York (2002)
- 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,
- P Richardson (2001), “Thermal Technologies in Food Processing”, Campden and Chorleywood Food Research Association, UK, Woodhead Publishing Limited.

SEMESTER VI
GENERAL COURSE 15
VFPT6G15B23– FOOD SERVICE MANAGEMENT

Total Credits: 4
Hours Per Week:4

Total Lecture Hours: 72

Course Overview and Context:

The course helps to gather knowledge on the functioning of food service establishments and thus acquire an insight about the services that should be given by a food service establishment.

The awareness on the organisation of food service establishments, management of human, material and financial resources, familiarity with various concepts involved in quantity and quality food production and service and the need for efficient personnel management in the food industry helps to improve the employability and entrepreneurship.

Course Outcomes:

CO1: Summarize the characteristics of various food service establishments. (Understand)

CO2: Examine the functioning of food service establishments. (Apply)

CO3: Focus the different types of food service and delivery systems. (Analyse)

CO4: Evaluate the process involved and management of an organization. (Evaluate)

CO5: Prepare the financial transactions of an organization. (Apply)

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.

References:

- Arora, (2007), “Food Service and Catering Management” APH Publishing.
- Wentz Bill, (2007), “Food Service Management”, Atlantic Publishing Company.
- Malhotra, R. K.(2002), “Food Service and catering Management” ,Anmol Publication Pvt Ltd

**SEMESTER VI
GENERAL COURSE 16
VFPT6G16B23– PERSONALITY DEVELOPMENT**

Total Credits: 4

Hours Per Week:4

Total Lecture Hours: 72

Course Overview and Context

This course is entirely different from other courses in the programme and is being introduced with the primary objective of giving the learners an understanding of how to improve organizational effectiveness through the development of personality. The course is a small attempt to bring about personality development with regard to the different behavioural dimensions. The paper briefly talks about the importance of developing the personality of self to attain success in personal as well as professional life. Other core areas of the paper include insight into the basics of time management, important leadership qualities an entrepreneur acquire, the importance of conflict management and stress management in organizations etc. The course also talks about how employees as well as themselves can be motivated for the achievement of excellence in both professional and personal lives.

Course Outcomes:

CO1: Recognize the various leadership styles and its application (Understand)

CO2: Execute the strategies to improve interpersonal relations (Apply)

CO3: Examine the stressors and ways to manage stress as well as conflicts in organizational context. (Analyse)

CO4: Recognize the importance of time management (Understand)

CO5: Discuss the process of motivation through different theories (Understand)

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.

References:

- Stephen P. Robbins, Timothy A. Judge, Neharika Vohra, Organisational Behaviour – Pearson Education 15th edition,
- Fred Luthans - Organisational Behavior - McGraw Hill
- Kavitha Singh, Organisational Behaviour: Text and Cases – Vikas Publishing
- Aswathappa K., Organisational Behaviour – Himalaya Publishing House