



Anekant Education Society's

Tuljaram Chaturchand College, Baramati

(Autonomous)

**Four Year B.Voc Degree Program in
Food Technology & Research**

(Faculty of Food Technology & Research)

CBCS Syllabus

FY B.Voc (Food Technology) Semester -III

For Department Food Technology & Research

Tuljaram Chaturchand College, Baramati

Choice Based Credit System Syllabus (2023 Pattern)

(As Per NEP 2020)

To be implemented from Academic Year 2024-2025

Title of the Programme : FY B.Voc (Food Technology & Research)

Preamble

AES's, TuljaramChaturchand College of Arts, Science and Commerce (Autonomous) has made the decision to change the syllabi of across various faculties from June, 2023 by incorporating the guidelines and provisions outlined in the National Education Policy (NEP), 2020. The NEP envisions making education more holistic and effective and to lay emphasis on the integration of general (academic) education, vocational education and experiential learning. The NEP introduces holistic and multidisciplinary education that would help to develop intellectual, scientific, social, physical, emotional, ethical and moral capacities of the students. The NEP 2020 envisages flexible curricular structures and learning based outcome approach for the development of the students. By establishing a nationally accepted and internationally comparable credit structure and courses framework, the NEP 2020 aims to promote educational excellence, facilitate seamless academic mobility, and enhance the global competitiveness of Indian students. It fosters a system, where educational achievements can be recognized and valued not only within the country but also in the international arena, expanding opportunities and opening doors for students to pursue their aspirations on a global scale.

In response to the rapid advancements in science and technology and the evolving approaches in various domains of Food Technology and related subjects, the Board of Studies in Dept. of Food Technology and Research at TuljaramChaturchand College of Arts, Science and Commerce (Autonomous), Baramati - Pune, has developed the curriculum for the first semester of F.Y. B.Voc. Food Technology, which goes beyond traditional academic boundaries. The syllabus is aligned with the NEP 2020 guidelines to ensure that students receive an education that prepares them for the challenges and opportunities of the 21st century. This syllabus has been designed under the framework of the Choice Based Credit System (CBCS), taking into consideration the guidelines set forth by the National Education Policy (NEP) 2020, LOCF (UGC), NCrf, NHEQF, Prof. R.D. Kulkarni's Report, Government of Maharashtra's General Resolution dated 20th April and 16th May 2023, and the Circular issued by SPPU, Pune on 31st May 2023.

A Food Technology Graduates degree equips students with the knowledge and skills necessary for a diverse range of fulfilling career paths. Food Technology graduate students find

opportunities in various fields, including procurement, Testing and quality control, Processing and Production, Research and Development, Storage and Supply Chain Management, Food Regulatory Agencies, Auditing, Academics, Competitive exams, Biostatistics, Database analysis, Entrepreneurship Development, and many other food and food related organizations.

Throughout their Three-year degree program, students explore the significance of Farm to Fork processing by utilization of post -harvest technology. They learn tools, techniques, and processes which is required to set up agencies including pickles, jam and jelly, fruit processing, vegetable processing, organic product, dairy products, Animal Product processing Bakery and Confectionery products producing industries.

Overall, revising the Food Technology syllabi in accordance with the NEP 2020 ensures that students receive an education that is relevant, comprehensive, and prepares them to navigate the dynamic and interconnected world of today. It equips them with the knowledge, skills, and competencies needed to contribute meaningfully to society and pursue their academic and professional goals in a rapidly changing global landscape.

Programme Specific Outcomes (PSOs)

Programme Outcomes for Vocational (B.Voc.) Degree Programme in accordance with National Education Policy-2020 with effect from Academic Year 2023-24. Bachelor of Vocation (B.Voc.) Courses are designed to provide students with specific vocational skills and knowledge that are directly applicable to the industry or field they are studying. The programme outcomes of these courses typically focus on preparing students for employment or entrepreneurship in their chosen vocational area.

PO1-Technical Competence: Students will acquire specialized technical skills and knowledge relevant to their chosen vocation, enabling them to perform tasks effectively and efficiently in their respective industries.

PO2-Problem Solving Skills: Students will develop the ability to identify, analyze, and solve problems encountered in their vocational field, using both theoretical knowledge and practical experience.

PO3-Employability Skills: Students will gain employability skills such as communication, teamwork, leadership, adaptability, and professionalism, which are essential for success in the workplace.

PO4-Industry Relevance and entrepreneurial abilities: The students will adopt knowledge and skills that are relevant to the current needs and required practices of the industry or sector, they are entering. Students focus on fostering entrepreneurial skills, equipping students with the knowledge and capabilities to start and manage their own businesses in their chosen field.

PO5-Ethical and Social Responsibility: Students will be aware of the ethical considerations and social responsibilities associated with their vocational field, and they will be able to apply ethical principles in their professional practices.

PO6-Environmental Awareness: The students should be able to ability to apply the knowledge, skills, attitudes and values required to take appropriate action for justifying the effect of environmental degradation, climate change, pollution control, effective waste management etc.

PO7-Research and Innovations: Depending on the programme, students may develop research and innovation skills, enabling them to contribute to advancements and improvements within their vocational field.

PO8 -Global Perspective: In an increasingly interconnected world, programmes may emphasize the importance of understanding global trends, markets, and perspectives relevant to the students' vocation.

PO9-Multidisciplinary studies: Students will adopt the multidisciplinary studies in an academic approach that integrate knowledge and methodology from various discipline to provide a comprehensive understanding of related job/business opportunities.

PO10-Community Engagement: The students will be able to demonstrate the capability to participate in community-engaged services/activities for promoting the wellbeing of society

Anekant Education Society's

Tuljaram Chaturchand College, Baramati*(Autonomous)***Board of Studies(BOS) B.Voc. Food Technology & Research****From 2022-23 to 2024-25**

Sr.No	Name of the BOS members	Designation
1.	Dr. Wajid A. Khan Head & Associate Professor, Department of Food Technology & Research. C. College, Baramati	Chairman
2.	Ms. Vaibhavi A. Bhosale Assistant Professor, Dept. of Food Tech. & Research T. C. College, Baramati	Internal Member
3.	Ms. Asawari D. Katekar Assistant Professor, Dept. of Food Tech. & Research T. C. College, Baramati	Internal Member
4.	Ms. Tilotama R. Pawar Assistant Professor, Dept. of Food Tech. & Research T. C. College, Baramati	Internal Member
5.	Ms. Shreeja R. Deokar Assistant Professor, Dept. of Food Tech. & Research T. C. College, Baramati	Internal Member
6.	Ms. Gayatri T. Deshmukh Assistant Professor, Dept of Food Tech. & Research T. C. College, Baramati	Internal Member
7.	Dr. A.K. Sahoo Professor, Dept. of Food Technology, Shivaji University, Kolhapur	External Member Expert from other University
8.	Dr. Rinku Agarwal Assistant Professor, Dept. of Food Technology, MIT- ADT University	External Member Expert from other University
9.	Ms. Meenaz Wadgaonkar, General Manager- Operation, Gits Food Products Pvt. Ltd., Hadapsar	External Member Industry Expert
10.	Mr. Sagar Salunkhe Plant Manager, Bauli India Bakes & Sweets, MIDC, Baramati	Meritorious Alumni

Information

1. **One semester** = 15 weeks (12 weeks actual teaching and 3 weeks for internal evaluation, tutorials, problem solutions, student's difficulty solution, etc.)
2. As per NCrF :
 - Theory course: A minimum of 15 hours of teaching per credit is required.
 - Laboratory course: A minimum of 30 hours in laboratory activities per credit is required.
3. **1-credit theory** = 15 hours i.e. for 1 credit, 1 hour per week teaching is to be performed.

15 hours of 1-credit are splinted as 12 hours actual teaching + 3 hours Tutorial (practice problem solving sessions, repeated discussion on difficult topics, and discussion on student's difficulties, questions discussion and internal evaluation)
4. **1-credit practical** = 30 hours. Thus, 1 credit practical = 2 contact hours in laboratory per week

30 hours splinted as 24 hours' actual table work and 6 hours for journal competition, oral on each practical and other internal evaluation.
5. **Each theory courses of any type** (Major, Minor, VSC, VEC, OE/GE, VEC, SEC, CC, etc.) **is of 2 credits.**
 - a. **Theory per semester:** Contact hours = 24 teaching + 6 tutorials (problem solving sessions, repeated discussion on difficult topics, difficult solution, questions discussion and internal evaluation)
 - b. Each course will be of two modules, One module = 15 hours
 - c. Each module may consist of one or more than one chapter.
6. **Each practical course of any course is of 2 credits = 60 hours per semester**
 - a. Minimum 12 laboratory sessions must be conducted in one semester.
 - b. Each laboratory sessions should be 4 hours.
 - c. If practical is short, then two short practicals should be included in one laboratory sessions.
 - d. In 12 laboratory sessions maximum 2 demonstration sessions or table work sessions may be included and must be designed carefully for 4 hours' sessions.
 - e. 4 hours' laboratory sessions include - performing table work (practical), calculation, writing results and conclusion, and submission of practical in written form to practical in charge.
 - f. Pre-laboratory reading and post laboratory work / questions should be assigned on each practical and this will be the part of internal evaluation.
7. **Design syllabus of each theory and practical course as per above guidelines.**
 - a. **Theory syllabus** should be given module wise and chapter wise.
 - b. **Theory syllabus** should include name of topic, number of teaching hours allotted, detailed point wise syllabus, page numbers, references book no.

- c. It is recommended that, **design syllabus of one theory course from maximum two references books** and they will be called as main reference books/text books. Below that, you can add names of more reference books and they will be supplementary reference books.
- d. **Syllabus of practical** must be given practical wise. Name of experiment and aim of the experiment should be clearly mentioned. Mention reference book number or bibliography for each practical. At least 16 practicals' must be included in syllabus from which 12 practicals will be actually conducted. If practical is short, then two short practicals' will be considered as one practical.
- e. At the end of syllabus of theory and practical course, a list of references book should be given number wise.
- f. **At the end of each theory and practical course 6 CO should be given.**

A. Names of UG and PG courses related to Specialization

Important Note: For specialized subjects wherever designing of practical course is not adequate then included, theory course of 2 credits in place of practical course.

Semester	Major Courses	Major Courses	Elective	Minor Courses	VSC	IKS
I	2 theory + 1 Practical				1 Theory	1 Theory
II	2 theory + 1 Practical			1 Theory + 1 Practical	1 Practical	0
III	3 theory + 1 Practical			1 Theory + 1 Practical	1 Theory	0
IV	3 theory + 1 Practical			1 Theory + 1 Practical	1 Practical	0
V	3 theory + 2 Practical	1 Theory + 1 Practical		1 Theory + 1 Practical	1 Theory	0
VI	3 theory + 2 Practical	1 Theory + 1 Practical			1 Practical	0
VII and VIII Sem honours degree with major						
VII	5 theory + 2 Practical	1 Theory + 1 Practical		0	0	0
VIII	5 theory + 2 Practical	1 Theory + 1 Practical		0	0	0
VII and VIII Sem honours degree with research						
VII	4 theory + 1 Practical	1 Theory + 1 Practical		0	0	0
VIII	4 theory + 1 Practical	1 Theory + 1 Practical		0	0	0

* In elective course 2T+2P are related to each other. In this case students have to choose more than 1 option i.e. in elective part, at least 2 courses each consisting of 1 theory 1 practical courses in combination.

**Anekant Education Society's
Tuljaram Chaturchand College of Arts, Science and Commerce, Baramati
(Autonomous)**

**Course & Credit Structure for (B.Voc. Food Technology & Research) Part-II (2023 Pattern
as per NEP-2020**

Sem	Course Type	Course Code	Course Name	Theory /Practical	Credits
III	Major Mandatory	FTR- 201-MJM	Processing of Fruits and vegetables	Theory	02
	Major Mandatory	FTR-202-MJM	Food Chemistry	Theory	02
	Major Mandatory	FTR-203-MJM	Processing of Fruits and vegetables	Practical	02
	Major Mandatory	FTR-204-MJM	Food Chemistry	Practical	02
	Minor	FTR-211-MN	Plantation crops	Theory	02
	Minor	FTR-212-MN	Plantation crops	Practical	02
	Open Elective(OE)	FTR-216-OE	Preservation Technology	Theory	02
	Vocational Skill Course(VSC)	FTR-221-VSC	Food Analytical techniques	Practical	02
	Ability Enhancement Course(AEC)	FTR-231- AEC	Marathi/Hindi/Sanskrit	Theory	02
	Co-curricular Course(CC)	FTR-239-CC	To be selected from the Basket	Theory/ Practical	02
	Field Project (FP)	FTR-235-FP	Field Project (FP)	Practical	02
Generic IKS Course (IKS)	FTR-245-IKS	Common	Theory	02	
Total Credits Semester-III					24
IV	Major Mandatory	FTR-251-MJM	Food Engineering	Theory	02
	Major Mandatory	FTR-252-MJM	Cereals & Pulses Technology	Theory	02
	Major Mandatory	FTR-253-MJM	Food Engineering	Practical	02
	Major Mandatory	FTR-254-MJM	Cereals & Pulses Technology	Practical	02
	Minor	FTR-261-MN	Beverage Technology	Theory	02
	Minor	FTR-262-MN	Beverage Technology	Practical	02
	Open Elective(OE)	FTR-266-OE	Confectionery Technology	Practical	02

Skill Enhancement Course(SEC)	FTR-271-SEC	Confectionery Technology	Practical	02
Ability Enhancement Course(AEC)	FTR-281-ACE	Marathi/Hindi/Sanskrit	Theory	02
Co-curricular Course(CC)	FTR-289-CC	To be selected from the Basket	Theory/ Practical	02
Community Engagement Programme	FTR-295-CEP	Community Engagement Programme	Practical	02
Total Credits Semester-IV				22
Cumulative Credits Semester- III and IV				44

**CBCSSyllabusasperNEP2020for F.Y B.Voc. Food Technology & Research
(2023 Pattern)**

Name of the Programme: B.Voc. Food Technology & Research

Programme Code : FTR

Class : F.Y B.Voc.

Semester : *III*

Course Type : Major Mandatory

Course Code : FTR-201-MJM

Course Title : Processing of Fruits and vegetables

No. of Credits : 02

No. of Teaching Hours : 30

LearningObjectives:

- To impart knowledge of different methods of fruits and vegetable processing.
- To learn about nutritional importance of fruits, vegetable and plantation crops
- To learn about processing of various spices, tea, coffee and cocoa.
- To develop the skills of various postharvest technologies and processing of food after postharvest
- To study preservation of fruits, vegetables and plantation crops
- To study various processed product, their preparation and storage methods.

CourseOutcomes:

CO1:Students will have a thorough understanding of various food processing techniques.

CO2:The students will know the importance of various preservation techniques.

CO3:The students will knowabout nutritional importance of fruits, vegetable and plantation crops

CO4: The students will knowQuality Control and Waste Utilization in fruits & vegetables

CO5: The students will know various postharvest technologies and processing of food after postharvest

CO6: The students will know preservation of fruits, vegetables and plantation crops

CO7: The students will know various processed product, their preparation and storage methods

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	3	-	-	1	1	1	2	1	2	-
CO2	3	1	1	-	-	-	2	-	-	-
CO3	-	-	-	-	-	-	-	2	-	-
CO4	-	-	-	-	1	3	-	-	-	-
CO5	1	-	1	1	-	-	-	-	-	-
CO6	1	2	2	3	-	-	3	-	2	-
CO7	1	2	2	-	-	-	3	-	2	-

Justification of POs

PO1- Technical Competence: Students will acquire specialized technical skills and knowledge relevant to their chosen vocation, enabling them to perform tasks effectively and efficiently in their respective industries.

CO1: Students will have a thorough understanding of various food processing techniques.

CO2: The students will know the importance of various preservation techniques.

CO5: The students will know various postharvest technologies and processing of food after postharvest

CO6: The students will know preservation of fruits, vegetables and plantation crops

CO7: The students will know various processed product, their preparation and storage methods

PO2- Problem Solving Skills: Students will develop the ability to identify, analyze, and solve problems encountered in their vocational field, using both theoretical knowledge and practical experience.

CO2: The students will know the importance of various preservation techniques.

CO6: The students will know preservation of fruits, vegetables and plantation crops

CO7: The students will know various processed product, their preparation and storage methods

PO3- Employability Skills: Students will gain employability skills such as communication, teamwork, leadership, adaptability, and professionalism, which are essential for success in the workplace.

CO2: The students will know the importance of various preservation techniques.

CO5: The students will know various postharvest technologies and processing of food after postharvest

CO6: The students will know preservation of fruits, vegetables and plantation crops

CO7: The students will know various processed product, their preparation and storage methods

PO4- Industry Relevance and entrepreneurial abilities: The students will adopt knowledge and skills that are relevant to the current needs and required practices of the industry or sector, they are entering. Students focus on fostering entrepreneurial skills, equipping students with the knowledge and capabilities to start and manage their own businesses in their chosen field.

CO1: Students will have a thorough understanding of various food processing techniques.

CO5: The students will know various postharvest technologies and processing of food after postharvest

CO6: The students will know preservation of fruits, vegetables and plantation crops

PO5- Ethical and Social Responsibility: Students will be aware of the ethical considerations and social responsibilities associated with their vocational field, and they will be able to apply ethical principles in their professional practices.

CO1:Students will have a thorough understanding of various food processing techniques.

CO4: The students will know Quality Control and Waste Utilization in fruits & vegetables

PO6- Environmental Awareness: The students should be able to ability to apply the knowledge, skills, attitudes and values required to take appropriate action for justifying the effect of environmental degradation, climate change, pollution control, effective waste management etc.

CO1:Students will have a thorough understanding of various food processing techniques.

CO4: The students will know Quality Control and Waste Utilization in fruits & vegetables

PO7 Research and Innovations: Depending on the programme, students may develop research and innovation skills, enabling them to contribute to advancements and improvements within their vocational field.

CO1:Students will have a thorough understanding of various food processing techniques.

CO2:The students will know the importance of various preservation techniques.

CO6: The students will know preservation of fruits, vegetables and plantation crops

CO7: The students will know various processed product, their preparation and storage methods

PO8 Global Perspective: In an increasingly interconnected world, programmes may emphasize the importance of understanding global trends, markets, and perspectives relevant to the students' vocation.

CO1:Students will have a thorough understanding of various food processing techniques.

CO3:The students will knowabout nutritional importance of fruits, vegetable and plantation crops

PO9 Multidisciplinary studies: Students will adopt the multidisciplinary studies in an academic approach that integrate knowledge and methodology from various discipline to provide a comprehensive understanding of related job/business opportunities.

CO1:Students will have a thorough understanding of various food processing techniques.

CO6: The students will know preservation of fruits, vegetables and plantation crops

CO7: The students will know various processed product, their preparation and storage methods

TopicsandLearningPoints

Unit 1: Introduction to Fruit and Vegetable Processing

8 P

1.1 Fruit and vegetable processing industry in India, Importance, Status of fruit and vegetable processing industry and fruit product orders.

- 1.2 Climacteric and Non-climacteric fruits, Poly-nutrients in fruits and vegetables, ripening process, handling, transportation
- 1.3 controlled atmosphere ripening process, modified atmosphere packaging.

Unit 2: Canning, Freezing, Drying & Dehydration **8 P**

- 2.1 Process of Canning, Equipments used in canning,
- 2.2 Process of Freezing, Equipments used and problems associated with specific fruits and Vegetable
- 2.3 Dehydration- Pre-processing methods
- 2.4 Osmotic dehydration
- 2.5 Indian Food Regulations and Quality assurance

Unit 3: Fruits and Vegetable Products **7 P**

- 3.1 Fruit Beverages, Jam, Jelly, Marmalade, preserve,
- 3.2 candied and crystallized fruits and vegetables, pickles, chutney, sauces/Ketchups, Nectar, Cordials, Fruit Cheese,
- 3.3 Potato products and Pectin.

Unit-4 Quality Control and Waste Utilization **7P**

- 4.1 Quality Characteristics of Fruits and Vegetable for Processing,
- 4.2 Quality Control in Food Processing Industry,
- 4.3 utilization of Fruit and Vegetable waste,
- 4.4 water for Fruit and Vegetable Processing Industries.

References:

1. Subbulakshi G ,Udapi shobha A, (2001) ,food processing and preservation , New age international (P) limited , publisher
 2. Srivastava R.P, Kumar Sanjeev (1994) ,Fruits and vegetable preservation , first edition, International book distributing co.
 3. S. Rangna (1977) ,Handbook of Analysis and quality control for fruit and vegetable products (second edition) ,Tata Mcgraw –hill publishing co. limited
 4. Loesecke H.W.V. (2005), Drying and dehydration of foods, Updesh purohit for agrobios (India) jodhpur.
 5. S. Saraswathy , T.L.preethi , S.Balsubramanyan , J.suresh ,N. Revanthy and S. naarajan (2008) : Post harvest Management of Horticulture Crops , Dr, Updesh
 6. Purohit for Agrobios (India) Jodhpur Salunkhe D.K, Kadam S.S(2005) ,Handbook of fruit science and technology ,Marcel dekker, Inc.
 7. Bose T.k ,Mitra S.K ,Sanyal D (2001) , Fruits : Tropical and subtropical (vol .1), Third edition ,Partha sankar basu naya udyog.
- Bhatiya Vijaya (2004),Preservation of fruit and vegetables, 2nd edition, Kalyani publishers

**CBCSSyllabusasperNEP2020for F.Y B.Voc. Food Technology & Research
(2023 Pattern)**

Name of the Programme: B.Voc. Food Technology & Research

Programme Code : FTR

Class :F.Y B.Voc.

Semester *III*

Course Type :Major Mandatory

Course Code :FTR-202-MJM

Course Title :Food Chemistry

No.ofCredits :02

No.ofTeachingHours 30

LearningObjectives:

1. To understand the chemistry of foods - composition of food, role of each component and their interactions.
2. To understand the functional aspects of food components and highlight their role in food processing.
3. To develop the skills for structure, functions, metabolism of various components of food and their role in body.
4. To study different functions of water and other nutrients in body
5. To study structure and working of all nutrients
6. To learn different natural and artificial colors and flavours
7. To study structure and working of allvitamin.

Course Outcomes:

CO1: Students will have a thorough understanding of water as a molecule and its importance in food.

CO2:The students will know about the major and minor minerals and its importance

CO3: The students will know molecular structure of water, its reactions and filtration techniques

CO4: Students will learn different functions of water and other nutrients in body

CO5:The students will know about structure and working of all nutrients

CO6:Students will know different natural and artificial colors and flavours

CO7: Students will know role of different components of food material during metabolism and processing

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	-	-	-	-	3	3	-	1	-	-
CO2	-	-	-	-	5	-	1	2	-	-
CO3	4	2	6	2	-	1	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	3	3	-	3	-
CO6	-	2	3	-	-	3	-	-	-	-
CO7	-	3	-	-	3	-	-	-	-	-

Justification for POs & COs

PO1-Technical Competence: Students will acquire specialized technical skills and knowledge relevant to their chosen vocation, enabling them to perform tasks effectively and efficiently in their respective industries.

CO3: The students will know molecular structure of water, its reactions and filtration techniques

PO2-Problem Solving Skills: Students will develop the ability to identify, analyze, and solve problems encountered in their vocational field, using both theoretical knowledge and practical experience.

CO3: The students will know molecular structure of water, its reactions and filtration techniques

CO6: Students will know different natural and artificial colors and flavours

CO7: Students will know role of different components of food material during metabolism and processing

PO3-Employability Skills: Students will gain employability skills such as communication, teamwork, leadership, adaptability, and professionalism, which are essential for success in the workplace.

CO3: The students will know molecular structure of water, its reactions and filtration techniques

CO6: Students will know different natural and artificial colors and flavours

PO4-Industry Relevance and entrepreneurial abilities: The students will adopt knowledge and skills that are relevant to the current needs and required practices of the industry or sector, they are entering. Students focus on fostering entrepreneurial skills, equipping students with the knowledge and capabilities to start and manage their own businesses in their chosen field.

CO3: The students will know molecular structure of water, its reactions and filtration techniques

PO5-Ethical and Social Responsibility: Students will be aware of the ethical considerations and social responsibilities associated with their vocational field, and they will be able to apply ethical principles in their professional practices.

CO1: Students will have a thorough understanding of water as a molecule and its importance in food.

CO2: The students will know about the major and minor minerals and its importance

CO7: Students will know role of different components of food material during metabolism and processing

PO6-Environmental Awareness: The students should be able to ability to apply the knowledge, skills, attitudes and values required to take appropriate action for justifying the effect of environmental degradation, climate change, pollution control, effective waste management etc.

CO1:Students will have a thorough understanding of water as a molecule and its importance in food.

CO3: The students will know molecular structure of water, its reactions and filtration techniques

CO5:The students will know about structure and working of all nutrients

CO6:Students will know different natural and artificial colors and flavours

PO7-Research and Innovations: Depending on the programme, students may develop research and innovation skills, enabling them to contribute to advancements and improvements within their vocational field.

CO2:The students will know about the major and minor minerals and its importance

CO5:The students will know about structure and working of all nutrients

PO8 -Global Perspective: In an increasingly interconnected world, programmes may emphasize the importance of understanding global trends, markets, and perspectives relevant to the students' vocation.

CO1:Students will have a thorough understanding of water as a molecule and its importance in food.

CO2:The students will know about the major and minor minerals and its importance

PO9-Multidisciplinary studies: Students will adopt the multidisciplinary studies in an academic approach that integrate knowledge and methodology from various discipline to provide a comprehensive understanding of related job/business opportunities.

CO5:The students will know about structure and working of all nutrients

Topics and Learning Points

Unit-1: Carbohydrates

7 Periods

1.1 General classification, distribution and importance,

1.2 physical and chemical properties

1.3 synthesis and breakdown of glucose, starch, cellulose and pectic acid

Unit-2: Lipids & Vitamins 8 Periods

2.1 General classification, structure, physical and chemical properties,

2.2 components of fatty acid,

2.3 Technology of edible fats and oils- Refining,

2.4 Hydrogenation and Inter-esterification

2.5 **Vitamin:** Chemistry, bioavailability and role of vitamins in food- outline.

Unit-3: Amino acid and Proteins**7 Periods**

3.1 Importance, classification, structure of amino acid, peptide and proteins, primary, secondary, tertiary and quaternary structure of proteins,
3.2 source and distribution, physical and chemical properties,
3.3 Functional properties of proteins eg. Organoleptic, solubility, viscosity, binding gelation / texturization, emulsification, foaming.

Unit-4: Food Industry Enzyme**8 Periods**

4.1 Introduction, nature, classification, nomenclature, role, specificity,
4.2 hypothesis- lock and key, induced to fit,
4.3 Enzymatic and Non-Enzymatic Browning, Maillard Reaction, Caramelization reaction,
4.4 Enzymes in food industry, Industrial Uses of Enzymes.

References:

1. Fennema, Owen R, Food Chemistry, 3rd Ed., Marcell Dekker, New York, 1996
2. Whitehurst and Law, Enzymes in Food Technology, CRC Press, Canada, 2002
3. Wong, Dominic WS, Food Enzymes, Chapman and Hall, New York, 1995
4. Potter, N.N. and Hotchkiss, J.H, Food Science, 5th Ed., Chapman & Hall, 1995
5. DeMan, John M., Principles of Food Chemistry, 3rd Ed., Springer 1999
6. Desrosier, Norman W. and Desrosier, James N., The technology of food preservation, 4th Ed., Westport, Conn. : AVI Pub. Co., 1977.
7. Fuller, Gordon W, New Product Development From Concept to Marketplace, CRC Press, 2004.
8. Manay, S. & Shadaksharaswami, M., Foods: Facts and Principles, New Age Publishers, 2004
9. Ranganna S, Handbook of Analysis and Quality Control for Fruits and Vegetable Products, 2nd ed. TMH Education Pvt. Ltd, 1986
10. Essentials of Food Science – Vickie A. Vaclavik, Elizabeth W. Christian

**CBCSSyllabus as per NEP 2020 for F.Y B.Voc. Food Technology & Research
(2023 Pattern)****Name of the Programme:** B.Voc. Food Technology & Research**Programme Code** : FTR**Class** : F.Y B.Voc.**Semester** *III***Course Type** : Major Mandatory**Course Code** : FTR-203-MJM

CourseTitle :Processing of Fruits &Vegetables

No.ofCredits :02

No.ofTeachingHours 30

LearningObjectives:

- To impart knowledge of different methods of fruits and vegetable processing.
- To learn about nutritional importance of fruits, vegetable and plantation crops
- To learn about processing of various spices, tea, coffee and cocoa.
- To develop the skills of various postharvest technologies and processing of food after postharvest
- To study preservation of fruits, vegetables and plantation crops
- To study various processed product, their preparation and storage methods.

CourseOutcomes:

CO1:Students will have a thorough understanding of various food processing techniques.

CO2:The students will know the importance of various preservation techniques.

CO3:The students will knowabout nutritional importance of fruits, vegetable and plantation crops

CO4: The students will knowQuality Control and Waste Utilization in fruits & vegetables

CO5: The students will know various postharvest technologies and processing of food after postharvest

CO6: The students will know preservation of fruits, vegetables and plantation crops

CO7: The students will know various processed product, their preparation and storage methods

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	6	-	-	2	2	2	4	1	2	-
CO2	6	2	2	-	-	-	4	-	-	-
CO3	-	-	-	-	-	-	-	2	-	-
CO4	-	-	-	-	1	3	-	-	-	-
CO5	2	-	2	2	-	-	-	-	-	-
CO6	2	3	3	3	-	-	6	-	2	-
CO7	2	3	3	-	-	-	6	-	2	-

Justification for mapping

PO1- Technical Competence: Students will acquire specialized technical skills and knowledge relevant to their chosen vocation, enabling them to perform tasks effectively and efficiently in their respective industries.

CO1:Students will have a thorough understanding of various food processing techniques.

CO2:The students will know the importance of various preservation techniques.

CO5: The students will know various postharvest technologies and processing of food after

postharvest

CO6: The students will know preservation of fruits, vegetables and plantation crops

CO7: The students will know various processed product, their preparation and storage methods

PO2- Problem Solving Skills: Students will develop the ability to identify, analyze, and solve problems encountered in their vocational field, using both theoretical knowledge and practical experience.

CO2:The students will know the importance of various preservation techniques.

CO6: The students will know preservation of fruits, vegetables and plantation crops

CO7: The students will know various processed product, their preparation and storage methods

PO3- Employability Skills: Students will gain employability skills such as communication, teamwork, leadership, adaptability, and professionalism, which are essential for success in the workplace.

CO2:The students will know the importance of various preservation techniques.

CO5: The students will know various postharvest technologies and processing of food after postharvest

CO6: The students will know preservation of fruits, vegetables and plantation crops

CO7: The students will know various processed product, their preparation and storage methods

PO4- Industry Relevance and entrepreneurial abilities: The students will adopt knowledge and skills that are relevant to the current needs and required practices of the industry or sector, they are entering. Students focus on fostering entrepreneurial skills, equipping students with the knowledge and capabilities to start and manage their own businesses in their chosen field.

CO1:Students will have a thorough understanding of various food processing techniques.

CO5: The students will know various postharvest technologies and processing of food after postharvest

CO6: The students will know preservation of fruits, vegetables and plantation crops

PO5- Ethical and Social Responsibility: Students will be aware of the ethical considerations and social responsibilities associated with their vocational field, and they will be able to apply ethical principles in their professional practices.

CO1:Students will have a thorough understanding of various food processing techniques.

CO4: The students will know Quality Control and Waste Utilization in fruits & vegetables

PO6- Environmental Awareness: The students should be able to ability to apply the knowledge, skills, attitudes and values required to take appropriate action for justifying the effect of environmental degradation, climate change, pollution control, effective waste management etc.

CO1:Students will have a thorough understanding of various food processing techniques.

CO4: The students will know Quality Control and Waste Utilization in fruits & vegetables

PO7 Research and Innovations: Depending on the programme, students may develop research and innovation skills, enabling them to contribute to advancements and improvements within their vocational field.

CO1:Students will have a thorough understanding of various food processing techniques.

CO2:The students will know the importance of various preservation techniques.

CO6: The students will know preservation of fruits, vegetables and plantation crops

CO7: The students will know various processed product, their preparation and storage methods

PO8-Global Perspective: In an increasingly interconnected world, programmes may emphasize the importance of understanding global trends, markets, and perspectives relevant to the students' vocation.

CO1:Students will have a thorough understanding of various food processing techniques.

CO3:The students will knowabout nutritional importance of fruits, vegetable and plantation crops

PO9- Multidisciplinary studies: Students will adopt the multidisciplinary studies in an academic approach that integrate knowledge and methodology from various discipline to provide a comprehensive understanding of related job/business opportunities.

CO1:Students will have a thorough understanding of various food processing techniques.

CO6: The students will know preservation of fruits, vegetables and plantation crops

CO7: The students will know various processed product, their preparation and storage methods

TopicsandLearningPoints

1. Maturity analysis of Fruits	1P
2. Preparation of Fruit Beverages	7P
a. Juice	
b. RTS	
c. Squash	
d. Syrup	
e. Cordial	
f. Nectar	
g. Wine	
3. Preparation of Mixed Fruit Jam	1P
4. Preparation of Jelly	1P
5. Preparation of Fruit Cheese	1P
6. Preparation of Fruit Butter	1P
7. Preparation of Fruit Juice Powder	1P
8. Vegetable Pickle Preparation	2P
9. Preparation of Tomato Products	2P
a. Ketchup/Sauce	
b. Tomato Soup	
10. Preparation of Fruit Juice Powder	2P
11. Preparation of Potato Products	2P

a. Potato Wafers/chips	
b. French Fries	
12. Canning of fruits and vegetables	2P
13. Adulteration of spices	2P
14. Visit to Industry	3P
15. Preparation of Report on Industrial Visit	2P

References:

1. Subbulakshi G ,Udapi shobha A, (2001) ,food processing and preservation , New age international (P) limited , publisher
 2. Srivastava R.P, Kumar Sanjeev (1994) ,Fruits and vegetable preservation , first edition, International book distributing co.
 3. S. Rangna (1977) ,Handbook of Analysis and quality control for fruit and vegetable products (second edition) ,Tata Mcgraw –hill publishing co. limited
 4. Loesecke H.W.V. (2005), Drying and dehydration of foods, Updesh purohit for agrobios (India) jodhpur.
 5. S. Saraswathy , T.L.preethi , S.Balsubramanyan , J.suresh ,N. Revanthy and S. naarajan (2008) : Post harvest Management of Horticulture Crops , Dr, Updesh
 6. Purohit for Agrobios (India) Jodhpur Salunkhe D.K, Kadam S.S(2005) ,Handbook of fruit science and technology ,Marcel dekker, Inc.
 7. Bose T.k ,Mitra S.K ,Sanyal D (2001) , Fruits : Tropical and subtropical (vol .1), Third edition ,Partha sankar basu naya udyog.
- Bhatiya Vijaya (2004),Preservation of fruit and vegetables, 2nd edition, Kalyani publishers

CBCSSyllabusasperNEP2020for F.Y B.Voc. Food Technology & Research (2023 Pattern)

NameoftheProgramme:B.Voc. Food Technology & Research

ProgrammeCode :FTR

Class :F.Y B.Voc.

Semester *III*

CourseType :Major Mandatory

Course Code :FTR-204-MJM

CourseTitle :Food Chemistry

No.ofCredits :02

No.ofTeachingHours 30

Learning Objectives:

1. To develop the skills for structure, functions, metabolism of various components of food
2. To study about the Analysis of water
3. To learn about working and principles of different instruments
4. To learn about different methods of food chemistry
5. To Understand the properties of food components
6. To learn about the procedure used for analysis of oil.
7. To learn about chemical techniques and its importance in food industry

Course Outcomes:

CO1: Student will learn about the properties of food components

CO2: Student will study about the different chemicals

CO3: the students may know about working of various equipment used in food processing industries.

CO4: Students will study about the different methods of food chemistry

CO5: The students will learn about the food properties

CO6: Students will get knowledge about different color measurement techniques.

CO7: The students will know about the Analysis of water

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	6	5	5	-	-	-	-	-	3	-
CO2	-	-	3	3	-	-	2	-	-	-
CO3	7	6	6	5	-	-	4	-	4	-
CO4	6	6	6	-	-	-	-	-	-	-
CO5	6	5	4	-	-	-	-	-	3	-
CO6	6	7	-	-	-	-	-	-	-	-
CO7	3	-	-	3	4	6	-	-	-	-

Justification for mapping

PO1-Technical Competence: Students will acquire specialized technical skills and knowledge relevant to their chosen vocation, enabling them to perform tasks effectively and efficiently in their respective industries.

CO1: Student will learn about the properties of food components

CO3: the students may know about working of various equipment used in food processing industries.

CO4: Students will study about the different methods of food chemistry

CO5: The students will learn about the properties of food components

CO6: Students will get knowledge about different color measurement techniques.

CO7: The students will know about the Analysis of water

PO2-Problem Solving Skills: Students will develop the ability to identify, analyze, and solve problems encountered in their vocational field, using both theoretical knowledge and practical experience.

CO1: Student will learn about the properties of food components

CO3: the students may know about working of various equipment used in food processing industries.

CO4: Students will study about the different methods of food chemistry

CO5: The students will learn about the food properties

CO6: Students will get knowledge about different color measurement techniques.

PO3-Employability Skills: Students will gain employability skills such as communication, teamwork, leadership, adaptability, and professionalism, which are essential for success in the workplace.

CO1: Student will learn about the properties of food components

CO2: Student will study about the different chemicals

CO3: the students may know about working of various equipment used in food processing industries.

CO4: Students will study about the different methods of food chemistry

CO5: The students will learn about the food properties

PO4-Industry Relevance and entrepreneurial abilities: The students will adopt knowledge and skills that are relevant to the current needs and required practices of the industry or sector, they are entering. Students focus on fostering entrepreneurial skills, equipping students with the knowledge and capabilities to start and manage their own businesses in their chosen field.

CO2: Student will study about the different chemicals

CO3: the students may know about working of various equipment used in food processing industries.

CO7: The students will know about the Analysis of water

PO5-Ethical and Social Responsibility: Students will be aware of the ethical considerations and social responsibilities associated with their vocational field, and they will be able to apply ethical principles in their professional practices.

CO7: The students will know about the Analysis of water

PO6-Environmental Awareness: The students should be able to ability to apply the knowledge, skills, attitudes and values required to take appropriate action for justifying the effect of environmental degradation, climate change, pollution control, effective waste management etc.

CO7: The students will know about the Analysis of water

PO7-Research and Innovations: Depending on the programme, students may develop research and innovation skills, enabling them to contribute to advancements and improvements within their vocational field.

CO2: Student will study about the different chemicals

CO3: the students may know about working of various equipment used in food processing industries.

PO9-Multidisciplinary studies: Students will adopt the multidisciplinary studies in an academic approach that integrate knowledge and methodology from various discipline to provide a comprehensive understanding of related job/business opportunities.

CO1: Student will learn about the properties of food components

CO3: the students may know about working of various equipment used in food processing industries.

CO5: The students will learn about the food properties

Topics and Learning Points

1) Preparation and Standardization of NaOH Solution	1P
2) Water analysis- pH, Hardness, TDS, N, S, total phosphorous	4P
3) Determination of percent free fatty acids and Acid value of fat /oil	1P
4) Determination of specific gravity of food sample	1P
5) Iodine value of fat / oil	1P
6) Smoking points at fats & oils	1P
7) Estimation of saponification value	1P
8) Browning in fruits And Vegetables	1P
9) Measurement of Food Color by Tintometer/ spectrophotometer	2P
10) Effects of heat on fruits & vegetables	1P
11) Testing pectin strength in fruit & vegetable extracts.	1P
12) Natural acidity of milk	1P
13) Isolation of starch	1P
14) Isolation of casein	1P
15) Changes on heating at starches / gelatinization properties of starches	1P
16) Effect of Acid & alkali on colour of fruits & vegetables	1P
17) Estimation of vitamins	1P
18) Estimation of minerals	1P
19) Effect of sugar on boiling point of water	1P
20) Visit to food analysis laboratory	1P
21) Preparation of visit report & presentation	2P

References:

1. Fennema, Owen R, Food Chemistry, 3rd Ed., Marcell Dekker, New York, 1996
2. Whitehurst and Law, Enzymes in Food Technology, CRC Press, Canada, 2002
3. Wong, Dominic WS, Food Enzymes, Chapman and Hall, New York, 1995

4. Potter, N.N. and Hotchkiss, J. H, Food Science, 5th Ed., Chapman & Hall,1995
5. DeMan, J.M., Principles of Food Chemistry, AVI, New York, 1980
6. deMan, John M., Principles of Food Chemistry ,3rd Ed., Springer 1999
7. Desrosier, Norman W. and Desrosier., James N., The technology of food preservation , 4th Ed., Westport, Conn. : AVI Pub. Co., 1977.
8. Fuller, Gordon W, New Product Developmentfrom Concept to Marketplace, CRC Press, 2004.

CBCSSyllabusasperNEP2020for F.Y B.Voc. Food Technology & Research (2023 Pattern)

NameoftheProgramme:B.Voc. Food Technology & Research

ProgrammeCode :FTR

Class :F.Y B.Voc.

Semester *III*

CourseType :Minor (MN)

Course Code :FTR-261-MN

CourseTitle : Plantation crops

No.ofCredits :02

No.ofTeachingHours 30

LearningObjectives:

- To impart knowledge of understanding of various food plantation techniques
- To learn about nutritional importance of fruits, vegetable and plantation crops
- To learn about processing of various spices, tea, coffee and cocoa.
- To study about various nutritional value and health benefits food plantation crops
- To study about various types of plantation crops.
- To study knowHistory & Originfood plantation crops

CourseOutcomes:

CO1: Students will have a thorough understanding of various food plantation techniques.

CO2: The students will know the nutritional importance of Plantation Crops

CO3: The students will knowabout nutritional value and health benefits food plantation crops

CO4: The students will knowHistory & Originfood plantation crops

CO5: The students will know about composition and nutritional value of tea, coffee & Cocoa

CO6: The students will know about composition and nutritional value of spices & condiments

CO7: The students will know various types of various plantation crops.

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	6	5	5	4	2	3	-	2	-	-
CO2	-	-	-	-	2	-	-	-	-	-
CO3	2	-	-	-	4	-	-	-	-	-
CO4	-	-	-	-	4	-	-	2	2	1
CO5	-	-	-	2	1	3	-	-	-	-
CO6	1	-	2	2	1	3	-	-	-	-
CO7	-	-	-	2	4	6	-	2	1	-

Justification for mapping

PO1-Technical Competence: Students will acquire specialized technical skills and knowledge relevant to their chosen vocation, enabling them to perform tasks effectively and efficiently in their respective industries.

CO1: Students will have a thorough understanding of various food plantation techniques.

CO3: The students will know about nutritional value and health benefits food plantation crops

CO6: The students will know about composition and nutritional value of spices & condiments

PO2-Problem Solving Skills: Students will develop the ability to identify, analyze, and solve problems encountered in their vocational field, using both theoretical knowledge and practical experience.

CO1: Students will have a thorough understanding of various food plantation techniques.

PO3-Employability Skills: Students will gain employability skills such as communication, teamwork, leadership, adaptability, and professionalism, which are essential for success in the workplace.

CO1: Students will have a thorough understanding of various food plantation techniques.

CO6: The students will know about composition and nutritional value of spices & condiments

PO4-Industry Relevance and entrepreneurial abilities: The students will adopt knowledge and skills that are relevant to the current needs and required practices of the industry or sector, they are entering. Students focus on fostering entrepreneurial skills, equipping students with the knowledge and capabilities to start and manage their own businesses in their chosen field.

CO1: Students will have a thorough understanding of various food plantation techniques.

CO5: The students will know about composition and nutritional value of tea, coffee & Cocoa

CO6: The students will know about composition and nutritional value of spices & condiments

CO7: The students will know various types of various plantation crops.

PO5-Ethical and Social Responsibility: Students will be aware of the ethical considerations and social responsibilities associated with their vocational field, and they will be able to apply ethical principles in their professional practices.

CO1: Students will have a thorough understanding of various food plantation techniques.

CO2: The students will know the nutritional importance of Plantation Crops

CO3: The students will know about nutritional value and health benefits food plantation crops

CO4: The students will know History & Origin food plantation crops

CO5: The students will know about composition and nutritional value of tea, coffee & Cocoa

CO6: The students will know about composition and nutritional value of spices & condiments

CO7: The students will know various types of various plantation crops.

PO6-Environmental Awareness: The students should be able to apply the knowledge, skills, attitudes and values required to take appropriate action for justifying the effect of environmental degradation, climate change, pollution control, effective waste management etc.

CO1: Students will have a thorough understanding of various food plantation techniques.

CO5: The students will know about composition and nutritional value of tea, coffee & Cocoa

CO6: The students will know about composition and nutritional value of spices & condiments

CO7: The students will know various types of various plantation crops.

PO8 -Global Perspective: In an increasingly interconnected world, programmes may emphasize the importance of understanding global trends, markets, and perspectives relevant to the students' vocation.

CO1: Students will have a thorough understanding of various food plantation techniques.

CO4: The students will know History & Origin food plantation crops

CO7: The students will know various types of various plantation crops.

PO9-Multidisciplinary studies: Students will adopt the multidisciplinary studies in an academic approach that integrate knowledge and methodology from various disciplines to provide a comprehensive understanding of related job/business opportunities.

CO4: The students will know History & Origin food plantation crops

CO7: The students will know various types of various plantation crops.

PO10-Community Engagement: The students will be able to demonstrate the capability to participate in community-engaged services/activities for promoting the wellbeing of society

CO4: The students will know History & Origin food plantation crops

Topics and Learning Points

Unit 1: Introduction to plantation Crops **8 P**

1.1 Introduction, History & Origin – (Tea, Coffee, Cocoa, Spices),

1.2 Definition, Scope & Importance of Plantation Crops

1.3 Important crops of India, Role of plantation Crops,

1.4 Inter crops and Mixed crops.**Unit 2: Tea & Coffee****8 P****2.1** Introduction, Classification, Composition, manufacturing process of Tea**2.2** Advantage & Disadvantages of Tea.**2.3** Introduction, Classification, Composition, manufacturing process of Coffee,**2.4** Advantage & Disadvantages of Coffee**Unit 3: Cocoa Processing****7 P****3.1** History, Introduction,**3.2** Classification, Composition, manufacturing process of Cocoa, Cocoa Liquor, Cocoa Butter Cocoa Powder**3.3** Advantage & Disadvantages of Cocoa**Unit-4 Spices and Condiments****7P****4.1** History, Introduction, Definition,**4.2** Importance, Uses of spices and Condiments**4.3** Classification, Composition.

Major Spices:

Minor Spices:

References:

1. Subbulakshi G ,Udapi shobha A, (2001) ,food processing and preservation , New age international (P) limited , publisher
2. Srivastava R.P, Kumar Sanjeev (1994) ,Fruits and vegetable preservation , first edition, International book distributing co.
3. S. Ranganna (1977) ,Handbook of Analysis and quality control for fruit and vegetable products (second edition) ,Tata Mcgraw –hill publishing co. limited
4. Loesecke H.W.V. (2005), Drying and dehydration of foods, Updesh purohit for agrobios (India) jodhpur.
5. S. Saraswathy , T.L.preethi , S.Balsubramanyan , J.suresh ,N. Revanthy and S. naarajan (2008) : Post harvest Management of Horticulture Crops , Dr, Updesh
6. Purohit for Agrobios (India) Jodhpur Salunkhe D.K, Kadam S.S(2005) ,Handbook of fruit science and technology ,Marcel dekker, Inc.
7. Bose T.k ,Mitra S.K ,Sanyal D (2001) , Fruits : Tropical and subtropical (vol .1), Third edition ,Partha sankar basu naya udyog.
8. Bhatiya Vijaya (2004),Preservation of fruit and vegetables, 2nd edition, Kalyani publishers
9. Banerjee B. 2002. Tea Production and Processing. Oxford Univ. Press.
10. Minifie BW. 1999. Chocolate, Cocoa and Confectionery Technology. 3rd Ed. Aspen Publ.
11. NIIR. 2004. Handbook on Spices. National Institute of Industrial Research Board, Asia Pacific Business Press Inc

**CBCSSyllabusasperNEP2020for F.Y B.Voc. Food Technology & Research
(2023 Pattern)****NameoftheProgramme:**B.Voc. Food Technology & Research**ProgrammeCode** :FTR**Class** :F.Y B.Voc.*Semester* *III***CourseType** :OpenElective (OE)**Course Code** :FTR-262-MN**CourseTitle** :Plantation crops

No.ofCredits :02

No.ofTeachingHours : 30**LearningObjectives:**

- To impart knowledge of understanding of various food plantation techniques
- To learn about nutritional importance of fruits, vegetable and plantation crops
- To learn about processing of various spices, tea, coffee and cocoa.
- To study about various nutritional value and health benefits food plantation crops
- To study about various types of Masala & their preparation methods
- To identify different types of spices.
- To study the Maturity indices in spices and condiments

CourseOutcomes:**CO1:** Students will have a thorough understanding of various food plantation techniques.**CO2:** The students will know the nutritional importance of Plantation Crops**CO3:** The students will know about nutritional value and health benefits food plantation crops**CO4:** The students will know different types of Masala & their preparation methods**CO5:** The students will know about composition and nutritional value of tea, coffee & Cocoa**CO6:** The students will know the Maturity indices in spices and condiments**CO7:** The students will know different types of spices.

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	5	5	6	6	-	-	5	-	-	-
CO2	-	-	-	-	2	-	-	-	-	-
CO3	2	-	-	-	4	-	-	-	-	-
CO4	6	5	6	6	-	2	6	-	2	-
CO5	-	-	-	2	1	3	-	-	-	-
CO6	2	4	2	-	3	4	2	-	-	-
CO7	-	3	-	-	-	3	2	-	2	-

Justification for mapping

PO1-Technical Competence: Students will acquire specialized technical skills and knowledge relevant to their chosen vocation, enabling them to perform tasks effectively and efficiently in their respective industries.

CO1: Students will have a thorough understanding of various food plantation techniques.

CO3: The students will know about nutritional value and health benefits food plantation crops

CO4: The students will know different types of Masala & their preparation methods

CO6: The students will know the Maturity indices in spices and condiments

PO2-Problem Solving Skills: Students will develop the ability to identify, analyze, and solve problems encountered in their vocational field, using both theoretical knowledge and practical experience.

CO1: Students will have a thorough understanding of various food plantation techniques.

CO4: The students will know different types of Masala & their preparation methods

CO6: The students will know the Maturity indices in spices and condiments

CO7: The students will know different types of spices.

PO3-Employability Skills: Students will gain employability skills such as communication, teamwork, leadership, adaptability, and professionalism, which are essential for success in the workplace.

CO1: Students will have a thorough understanding of various food plantation techniques.

CO4: The students will know different types of Masala & their preparation methods

CO6: The students will know the Maturity indices in spices and condiments

PO4-Industry Relevance and entrepreneurial abilities: The students will adopt knowledge and skills that are relevant to the current needs and required practices of the industry or sector, they are entering. Students focus on fostering entrepreneurial skills, equipping students with the knowledge and capabilities to start and manage their own businesses in their chosen field.

CO1: Students will have a thorough understanding of various food plantation techniques.

CO4: The students will know different types of Masala & their preparation methods

CO5: The students will know about composition and nutritional value of tea, coffee & Cocoa

PO5-Ethical and Social Responsibility: Students will be aware of the ethical considerations and social responsibilities associated with their vocational field, and they will be able to apply ethical principles in their professional practices.

CO2: The students will know the nutritional importance of Plantation Crops

CO3: The students will know about nutritional value and health benefits food plantation crops

CO5: The students will know about composition and nutritional value of tea, coffee & Cocoa

CO6: The students will know the Maturity indices in spices and condiments

PO6-Environmental Awareness: The students should be able to ability to apply the knowledge, skills, attitudes and values required to take appropriate action for justifying the effect of environmental degradation, climate change, pollution control, effective waste management etc.

CO5: The students will know about composition and nutritional value of tea, coffee & Cocoa

CO6: The students will know the Maturity indices in spices and condiments

CO7: The students will know different types of spices.

PO7-Research and Innovations: Depending on the programme, students may develop research and innovation skills, enabling them to contribute to advancements and improvements within their vocational field.

CO1: Students will have a thorough understanding of various food plantation techniques.

CO4: The students will know different types of Masala & their preparation methods

CO6: The students will know the Maturity indices in spices and condiments

CO7: The students will know different types of spices.

PO9-Multidisciplinary studies: Students will adopt the multidisciplinary studies in an academic approach that integrate knowledge and methodology from various discipline to provide a comprehensive understanding of related job/business opportunities.

CO4: The students will know different types of Masala & their preparation methods

CO7: The students will know different types of spices.

Topics and Learning Points

1) Introduction & Identification of spices	1P
2) To study Grading in Spices and Condiments	1P
3) To study the Maturity Standards in spices and condiments	1P
4) Extraction of Essential Oils	1P
5) Preparation of Tea	1P
6) Preparation of Coffee	1P
7) Preparation of Turmeric powder	2P
8) Determination of Curcumin	2P
9) Preparation of Goda Masala	1P
10) Preparation of Coriander powder	1P
11) Preparation of Chilli powder & Chilli flakes	1P

12) Preparation of Chaat Masala	1P
13) Preparation of Garam Masala	1P
14) Spices Album	1P
15) Visit to spice processing Industry	

References:

1. Subbulakshi G ,Udapi shobha A, (2001) ,food processing and preservation , New age international (P) limited , publisher
2. Srivastava R.P, Kumar Sanjeev (1994) ,Fruits and vegetable preservation , first edition, International book distributing co.
3. S. Rangna (1977) ,Handbook of Analysis and quality control for fruit and vegetable products (second edition) ,Tata Mcgraw –hill publishing co. limited
4. Loesecke H.W.V. (2005), Drying and dehydration of foods, Updesh purohit for agrobios (India) jodhpur.
5. S. Saraswathy , T.L.preethi , S.Balsubramanyan , J.suresh ,N. Revanthy and S. naarajan (2008) : Post harvest Management of Horticulture Crops , Dr, Updesh
6. Purohit for Agrobios (India) Jodhpur Salunkhe D.K, Kadam S.S(2005) ,Handbook of fruit science and technology ,Marcel dekker, Inc.
7. Bose T.k ,Mitra S.K ,Sanyal D (2001) , Fruits : Tropical and subtropical (vol .1), Third edition ,Partha sankar basu naya udyog.
8. Bhatiya Vijaya (2004),Preservation of fruit and vegetables, 2nd edition, Kalyani publishers
9. Banerjee B. 2002. Tea Production and Processing. Oxford Univ. Press.
10. Minifie BW. 1999. Chocolate, Cocoa and Confectionery Technology. 3rd Ed. Aspen Publ.
11. NIIR. 2004. Handbook on Spices. National Institute of Industrial Research Board, Asia Pacific Business Press Inc.

**CBCSSyllabusasperNEP2020for F.Y B.Voc. Food Technology & Research
(2023 Pattern)**

NameoftheProgramme:B.Voc. Food Technology & Research

ProgrammeCode :FTR

Class :F.Y B.Voc.

Semester *III*

CourseType :Open Elective(OE)

Course Code :FTR-216-OE

CourseTitle : Preservation Technology

No.ofCredits : 02

No.ofTeachingHours 30

LearningObjectives:

1. To study importance of shelf life and preservation of foods
2. To study traditional methods of food preservation
3. To study different modern methods of food preservation
4. To develop the skills for processing of food after postharvest
5. To learn various types of food preservatives
6. To study current scenario of food preservation
7. To study traditional methods of food preservation

CourseOutcomes:

CO1: Students will have a thorough understanding of various food processing techniques.

CO2: The students will know the importance of various preservation techniques.

CO3: The students will know about traditional methods of food preservation

CO3: Students will have thorough knowledge of emerging preservation techniques

CO4: Students will get practical skills for processing of food after postharvest

CO5: Students will have a thorough understanding of types of food preservatives

CO6: Students will get thorough knowledge of current scenario of food preservation

CO7: Students will know importance of various packaging and processing methods in food preservation

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	6	6	5	4	2	-	6	4	2	1
CO2	-	5	6	4	2	-	-	-	-	-
CO3	2	4	5	3	5	-	-	-	-	-
CO4	5	4	6	3	2	2	-	3	-	-
CO5	-	5	6	4	2	-	-	-	-	-
CO6	-	-	-	-	-	-	-	7	2	-
CO7	4	-	3	4	-	6	-	4	-	-

Justification for mapping

PO1-Technical Competence: Students will acquire specialized technical skills and knowledge relevant to their chosen vocation, enabling them to perform tasks effectively and efficiently in their respective industries.

CO1: Students will have a thorough understanding of various food processing techniques.

CO3: The students will know about traditional methods of food preservation

CO3: Students will have thorough knowledge of emerging preservation techniques

CO4: Students will get practical skills for processing of food after postharvest

CO7: Students will know importance of various packaging and processing methods in food preservation

PO2-Problem Solving Skills: Students will develop the ability to identify, analyze, and solve problems encountered in their vocational field, using both theoretical knowledge and practical experience.

CO1: Students will have a thorough understanding of various food processing techniques.

CO2: The students will know the importance of various preservation techniques.

CO3: The students will know about traditional methods of food preservation

CO3: Students will have thorough knowledge of emerging preservation techniques

CO4: Students will get practical skills for processing of food after postharvest

CO5: Students will have a thorough understanding of types of food preservatives

PO3-Employability Skills: Students will gain employability skills such as communication, teamwork, leadership, adaptability, and professionalism, which are essential for success in the workplace.

CO1: Students will have a thorough understanding of various food processing techniques.

CO2: The students will know the importance of various preservation techniques.

CO3: The students will know about traditional methods of food preservation

CO3: Students will have thorough knowledge of emerging preservation techniques

CO4: Students will get practical skills for processing of food after postharvest

CO5: Students will have a thorough understanding of types of food preservatives

CO7: Students will know importance of various packaging and processing methods in food preservation

PO4-Industry Relevance and entrepreneurial abilities: The students will adopt knowledge and skills that are relevant to the current needs and required practices of the industry or sector, they are entering. Students focus on fostering entrepreneurial skills, equipping students with the knowledge and capabilities to start and manage their own businesses in their chosen field.

CO1: Students will have a thorough understanding of various food processing techniques.

CO2: The students will know the importance of various preservation techniques.

CO3: The students will know about traditional methods of food preservation

CO3: Students will have thorough knowledge of emerging preservation techniques

CO4: Students will get practical skills for processing of food after postharvest

CO5: Students will have a thorough understanding of types of food preservatives

CO7: Students will know importance of various packaging and processing methods in food preservation

PO5-Ethical and Social Responsibility: Students will be aware of the ethical considerations and social responsibilities associated with their vocational field, and they will be able to apply ethical principles in their professional practices.

CO1: Students will have a thorough understanding of various food processing techniques.

CO2: The students will know the importance of various preservation techniques.

CO3: The students will know about traditional methods of food preservation

CO3: Students will have thorough knowledge of emerging preservation techniques

CO4: Students will get practical skills for processing of food after postharvest

CO5: Students will have a thorough understanding of types of food preservatives

PO6-Environmental Awareness: The students should be able to ability to apply the knowledge, skills, attitudes and values required to take appropriate action for justifying the effect of environmental degradation, climate change, pollution control, effective waste management etc.

CO4: Students will get practical skills for processing of food after postharvest

CO7: Students will know importance of various packaging and processing methods in food preservation

PO7-Research and Innovations: Depending on the programme, students may develop research and innovation skills, enabling them to contribute to advancements and improvements within their vocational field.

CO1: Students will have a thorough understanding of various food processing techniques.

PO8 -Global Perspective: In an increasingly interconnected world, programmes may emphasize the importance of understanding global trends, markets, and perspectives relevant to the students' vocation.

CO1: Students will have a thorough understanding of various food processing techniques.

CO4: Students will get practical skills for processing of food after postharvest

CO6: Students will get thorough knowledge of current scenario of food preservation

CO7: Students will know importance of various packaging and processing methods in food preservation

PO9-Multidisciplinary studies: Students will adopt the multidisciplinary studies in an academic approach that integrate knowledge and methodology from various discipline to provide a comprehensive understanding of related job/business opportunities.

CO1: Students will have a thorough understanding of various food processing techniques.

CO6: Students will get thorough knowledge of current scenario of food preservation

PO10-Community Engagement: The students will be able to demonstrate the capability to participate in community-engaged services/activities for promoting the wellbeing of society

CO1: Students will have a thorough understanding of various food processing techniques.

Topics and Learning Points**Unit-1: Introduction to Preservation****08 Periods**

- 1.1 Introduction & History of food preservation,
- 1.2 Definition, principles & Need,
- 1.3 Traditional methods of Food Preservation,
- 1.4 Types of preservatives- Class I & Class II,
- 1.5 Bio preservation,
- 1.6 Enzymes as a food preservatives

Unit-II: Preservation by high temperature**07 Periods**

- 2.1 Principle of high temperature preservation,
- 2.2 methods of high temperature preservation: Blanching, Drying
- 2.3 Pasteurization, Sterilization
- 2.4 Canning.

Unit-III: Preservation by Low temperature**07 Periods**

- 3.1 Principle of high temperature preservation,
- 3.2 methods of low temperature preservation: Chilling, Refrigeration
- 3.3 freezing and irradiation
- 3.4 Effect of low temperature preservation methods on food & microorganisms

Unit-IV: Modern methods of food preservation**08 Periods**

- 4.1 Non-thermal methods of food preservation: Pulse electric heating
- 4.2 high pressure processing, ohmic heating, etc.
- 4.3 hurdle technology and nanotechnology

References:

- Food Facts & Principles – N. Shakuntala Manay, M. Shadaksharswamy
- Food Science – Sumati R. Mudambi, Shalini M. Rao, M.V.Rajagopal
- Essentials of Food Science – Vickie A. Vaclavik, Elizabeth W. Chrishtian
- Food Science (Vth edition) – Norman N. Potter and Joseph H. Hotchkiss (CSB Publishers and Distributors, New Delhi, 1996)
- Food Preservation, Desorier
- Unit Operations by Brennan & Cowell Lilly

**CBCSSyllabus as per NEP 2020 for F.Y B.Voc. Food Technology & Research
(2023 Pattern)**

NameoftheProgramme:B.Voc. Food Technology & Research

ProgrammeCode :FTR

Class :F.Y B.Voc.

Semester *III*

CourseType :Vocational Skill Course(VSC)

Course Code :FTR-221-VSC

CourseTitle :Food Analytical techniques

No.ofCredits :02

No.ofTeachingHours 30

LearningObjectives:

- 1 To study importance and methods of food analysis
- 2 To gain clear understanding of the analytical procedure use to analyse specific food compounds
- 3 To study qualitative and quantitative methods of food analysis
- 4 To study different techniques used in analysis of food
- 5 To study the subjective and objective evaluation of food
- 6 To study the working principle of instruments used for analysis
- 7 To develop the skills on the quantification technique of various components, allergens present in food products.

CourseOutcomes:

CO1: Students will have a thorough understanding on the working principle and instrumentation of various instruments used in food analysis

CO2: The students will know the importance of various methods to identify any malfunction aspect of food.

CO3: The students will know qualitative and quantitative methods of food analysis

CO4: The students will know different techniques used in analysis of food

CO5: The students will know the subjective and objective evaluation of food

CO6: The students will know the working principle of instruments used for analysis

CO7: The students will know the quantification technique of various components, allergens present in food products.

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	6	6	5	5	-	-	4	-	-	-
CO2	3	3	-	-	4	-	4	-	-	-
CO3	6	6	5	6	-	-	5	-	3	-
CO4	7	6	4	5	-	-	5	2	3	-
CO5	-	-	3	5	2	-	5	4	1	3
CO6	5	6	4	4	-	-	6	1	-	-
CO7	-	5	-	3	-	-	2	-	-	-

Justification for the mapping

PO1-Technical Competence: Students will acquire specialized technical skills and knowledge relevant to their chosen vocation, enabling them to perform tasks effectively and efficiently in their respective industries.

CO1: Students will have a thorough understanding on the working principle and instrumentation of various instruments used in food analysis

CO2: The students will know the importance of various methods to identify any malfunction aspect of food.

CO3: The students will know qualitative and quantitative methods of food analysis

CO4: The students will know different techniques used in analysis of food

CO6: The students will know the working principle of instruments used for analysis

PO2-Problem Solving Skills: Students will develop the ability to identify, analyze, and solve problems encountered in their vocational field, using both theoretical knowledge and practical experience.

CO1: Students will have a thorough understanding on the working principle and instrumentation of various instruments used in food analysis

CO2: The students will know the importance of various methods to identify any malfunction aspect of food.

CO3: The students will know qualitative and quantitative methods of food analysis

CO4: The students will know different techniques used in analysis of food

CO6: The students will know the working principle of instruments used for analysis

CO7: The students will know the quantification technique of various components, allergens present in food products.

PO3-Employability Skills: Students will gain employability skills such as communication, teamwork, leadership, adaptability, and professionalism, which are essential for success in the workplace.

CO1: Students will have a thorough understanding on the working principle and instrumentation

of various instruments used in food analysis

CO3: The students will know qualitative and quantitative methods of food analysis

CO4: The students will know different techniques used in analysis of food

CO5: The students will know the subjective and objective evaluation of food

CO6: The students will know the working principle of instruments used for analysis

PO4-Industry Relevance and entrepreneurial abilities: The students will adopt knowledge and skills that are relevant to the current needs and required practices of the industry or sector, they are entering. Students focus on fostering entrepreneurial skills, equipping students with the knowledge and capabilities to start and manage their own businesses in their chosen field.

CO1: Students will have a thorough understanding on the working principle and instrumentation of various instruments used in food analysis

CO3: The students will know qualitative and quantitative methods of food analysis

CO4: The students will know different techniques used in analysis of food

CO5: The students will know the subjective and objective evaluation of food

CO6: The students will know the working principle of instruments used for analysis

CO7: The students will know the quantification technique of various components, allergens present in food products.

PO5-Ethical and Social Responsibility: Students will be aware of the ethical considerations and social responsibilities associated with their vocational field, and they will be able to apply ethical principles in their professional practices.

CO2: The students will know the importance of various methods to identify any malfunction aspect of food.

CO5: The students will know the subjective and objective evaluation of food

PO7-Research and Innovations: Depending on the programme, students may develop research and innovation skills, enabling them to contribute to advancements and improvements within their vocational field.

CO1: Students will have a thorough understanding on the working principle and instrumentation of various instruments used in food analysis

CO2: The students will know the importance of various methods to identify any malfunction aspect of food.

CO3: The students will know qualitative and quantitative methods of food analysis

CO4: The students will know different techniques used in analysis of food

CO5: The students will know the subjective and objective evaluation of food

CO6: The students will know the working principle of instruments used for analysis

CO7: The students will know the quantification technique of various components, allergens present in food products.

PO8 -Global Perspective: In an increasingly interconnected world, programmes may emphasize the importance of understanding global trends, markets, and perspectives relevant to the students' vocation.

CO4: The students will know different techniques used in analysis of food

CO5: The students will know the subjective and objective evaluation of food

CO6: The students will know the working principle of instruments used for analysis

PO9-Multidisciplinary studies: Students will adopt the multidisciplinary studies in an academic approach that integrate knowledge and methodology from various discipline to provide a comprehensive understanding of related job/business opportunities.

CO3: The students will know qualitative and quantitative methods of food analysis

CO4: The students will know different techniques used in analysis of food

CO5: The students will know the subjective and objective evaluation of food

PO10-Community Engagement: The students will be able to demonstrate the capability to participate in community-engaged services/activities for promoting the wellbeing of society

CO5: The students will know the subjective and objective evaluation of food

Topics and Learning Points

- | | |
|--|----|
| 1. Principle and working of analytical instrument such as colorimeter, balances, oven, muffle furnace, incubator, centrifuge | 3P |
| 2. Estimation of Moisture from food sample | 3P |
| 3. Estimation of total minerals from food sample | 3P |
| 4. Estimation of Protein from food sample | 3P |
| 5. Estimation of Fat from food sample | 3P |
| 6. Qualitative test for carbohydrates | 2P |
| 7. Phenol sulphuric acid test for carbohydrates | 2P |
| 8. Estimation of starch by anthrone reagent | 2P |
| 9. Verification of Beer's and Lambert's law | 2P |
| 10. Estimation of Fiber from food sample | 2P |
| 11. Determination of acidity of honey sample | 1P |
| 12. Determination of protein by Biuret method | 2P |
| 13. Visit to Food Analysis Laboratory | 1P |
| 14. Preparation of visit report & presentation | 2P |

CBCS Syllabus as per NEP 2020 for F.Y B.Voc. Food Technology & Research (2023 Pattern)

Name of the Programme: B.Voc. Food Technology & Research

Programme Code : FTR

Class : F.Y B.Voc.

Semester

III

CourseType :Ability Enhancement Course(AEC)

Course Code :FTR-231-AEC

CourseTitle :Marathi/Hindi/ Sanskrit

No.ofCredits :02

No.ofTeachingHours 30

**CBCSSyllabusasperNEP2020for F.Y B.Voc. Food Technology & Research
(2023 Pattern)**

NameoftheProgramme:B.Voc. Food Technology & Research

ProgrammeCode :FTR

Class :F.Y B.Voc.

Semester

III

CourseType :Community Engagement Programme (CEP)

Course Code :FTR-235-CEP

CourseTitle :Community Engagement Programme (CEP)

No.ofCredits :02

No.ofTeachingHours 30

**CBCSSyllabusasperNEP2020for F.Y B.Voc. Food Technology & Research
(2023 Pattern)**

NameoftheProgramme:B.Voc. Food Technology & Research

ProgrammeCode :FTR

Class :F.Y B.Voc.

<i>Semester</i>	<i>III</i>
CourseType	:Field Project
Course Code	:FTR-2335-FP
CourseTitle	:Field Project (FP)
No.ofCredits	:02
No.ofTeachingHours	30

**CBCSSyllabusasperNEP2020for F.Y B.Voc. Food Technology & Research
(2023 Pattern)**

NameoftheProgramme:B.Voc. Food Technology & Research

ProgrammeCode	:FTR
Class	:F.Y B.Voc.
<i>Semester</i>	<i>III</i>
CourseType	:Generic IKS Course (IKS)
Course Code	:FTR-245-IKS
CourseTitle	:Common
No.ofCredits	:02
No.ofTeachingHours	30