

 Estd. 1962 "A++" Accredited by NAAC(2021) With CGPA 3.52	SHIVAJI UNIVERSITY, KOLHAPUR - 416 004, MAHARASHTRA PHONE : EPABX – 2609000, www.unishivaji.ac.in , bos@unishivaji.ac.in शिवाजी विद्यापीठ, कोल्हापूर - ४१६ ००४, महाराष्ट्र दूरध्वनी - ईपीएबीएक्स - २६०९०००, अभ्यासमंडळे विभाग दूरध्वनी ०२३१-२६०९०९३/९४	
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Ref.No. SUK/BOS/ 655

Date: 02/09/2023

To,

The Principals,

All Concerned Affiliated Colleges / Institutions.

Shivaji University, Kolhapur.

Subject : Regarding syllabi of Vocational Education Part-II under the Faculty of Inter-Disciplinary Studies.

Sir/Madam,

With reference to the subject, mentioned above, I am directed to inform you that the university authorities have accepted and granted approval to the syllabi of Vocational Education Part-II under the Faculty of Inter-Disciplinary Studies. as per National Education Policy 2020.(NEP)

1)	Advanced Diploma in Catering and Hospitality Management.
2)	Advanced Diploma in Medical Laboratory technology
3)	Advanced Diploma in Nutrition and Dietetics.
4)	Advanced Diploma in Nursing and Hospital Management.
5)	Advanced Diploma in Sustainable Agriculture Management.
6)	Advanced Diploma in Tourism and Service Industry
7)	Advanced Diploma in Agriculture
8)	Advanced Diploma in Food Processing Technology
9)	Bachelor of Design Part-II

This syllabi shall be implemented from the academic year 2023-2024 onwards. A soft copy containing the syllabi is attached herewith and it is also available on university website www.unishivaji.ac.in. (Online Syllabus)

The question papers on the pre-revised syllabi of above mentioned course will be set for the examinations to be held in October /November 2023 & March/April 2024. These chances are available for repeater students, if any.

You are, therefore, requested to bring this to the notice of all students and teachers concerned.

Thanking you,

Yours faithfully,



Dr. S.M.Kubal

(Dy Registrar)

Copy to:

1	Director, Board of Evaluation and Examination	7	Centre for Distance Education
2	The Dean, Faculty of IDS	8	Computer Centre / I.T.cell
3	The Chairman, Respective Board of Studies	9	Affiliation Section (U.G.) / (P.G.)
4	B.A.,B.Com.,B.Sc. Exam	10	P.G.Admission / P.G.Seminar Section
5	Eligibility Section	11	Appointment Section -A/B
6	O.E. I, II, III, IV Section	12	Dy.registrar (On/ Pre.Exam)

SHIVAJI UNIVERSITY, KOLHAPUR



Accredited By NAAC with 'A++' Grade

**Faculty of Interdisciplinary Studies
Structure, Scheme and Syllabus for
Bachelor of Vocation (B. Voc.)**

**Food Processing Technology
Part II-Sem. III & IV**

**NEP 2020 PATTERN
Syllabus to be implemented from**

(Subject to the modifications that will be made from time to time)
Syllabus to be implemented from June, 2022 onwards.

National Education Policy (NEP-2020)

Second Year Bachelor of Vocation (B. Voc. - Advanced Diploma) Course Structure for (Level-6)

With Multiple Entry and Multiple Exit option
(To be implemented from the Academic Year 2023-24)

Semester III – Duration: 6 Months											
Sr. No.	Teaching Scheme					Evaluation Scheme					
	Course	No. of Lectures		Hours (T + P)	Credits	Theory	Internal/ Practical	Total Marks	Min Marks (Separate passing)	Exam Duration (Hrs.)	
		T	P							T	P
1.	AECC-CD	4	2	6	-	-	-	-	-	-	-
2.	GEC –C	4	2	6	4	40	10	50	18	2	-
3.	DSC –C-I	4	-	4	4	50	-	50	18	2	-
4.	DSC –C-II	4	-	4	4	50	-	50	18	2	-
5.	DSC –C-III	4	-	4	4	50	-	50	18	2	-
6.	SEC-C-I	-	4	4	2	-	50	50	18	-	3
7.	SEC-C-II	-	4	4	2	-	50	50	18	-	3
8.	SEC-C-III	-	4	4	2	-	50	50	18	-	3
9.	SEC-C-IV	-	-	2	2	-	50	50	18	-	-
	Total	20	16	38	24	190	210	400	-	-	

Semester IV – Duration: 6 Months (Advance Diploma)											
Sr. No.	Teaching Scheme					Evaluation Scheme					
	Course	No. of Lectures		Hours (T + P)	Credits	Theory	Internal/ Practical	Total Mark s	Min Marks (Separate passing)	Exam Duration (Hrs.)	
		T	P							T	P
1.	AECC-CD	4	2	6	4+4	70	30	100	28+14	3	-
2.	GEC – D	4	2	6	4	40	10	50	18	2	-
3.	DSC – D -I	4	-	4	4	50	-	50	18	2	-
4.	DSC – D-II	4	-	4	4	50	-	50	18	2	-
5.	DSC – D -III	4	-	4	4	50	-	50	18	2	-
6.	SEC- D -I	-	4	4	2	-	50	50	18	-	3
7.	SEC- D -II	-	4	4	2	-	50	50	18	-	3
8.	SEC- D -III	-	4	4	2	-	50	50	18	-	3
9.	SEC- D -IV	-	-	2	2	-	50	50	18	-	-
	Total	20	16	38	32	260	240	500	-	-	
	Grand Total	40	32	76	56	450	450	900	-	-	

Semester III – Duration: 6 Months		
Sr. No.	Course	Subject Name
1	AECC-CD	Environmental Science-I
2	GEC –C	Food Chemistry
3	DSC –C-I	Food Microbiology - II
4	DSC –C-II	Fruits and Vegetables Processing
5	DSC –C-III	Food Quality & Sensory Evaluation
6	SEC-C-I	Food Microbiology - II
7	SEC-C-II	Fruits and Vegetables Processing
8	SEC-C-III	Food Quality & Sensory Evaluation
9	SEC-C-IV	Project/On-Job Training/Industrial Visit

Semester IV – Duration: 6 Months (Advance Diploma)		
Sr. No.	Course	Subject Name
1	AECC-CD	Environmental Science-I
2	GEC – D	Post Harvest Technology
3	DSC – D -I	Food Analytical Techniques
4	DSC – D-II	Dairy Technology
5	DSC – D -III	Food Safety, Hygiene and Sanitation
6	SEC- D -I	Food Analytical Techniques
7	SEC- D -II	Dairy Technology
8	SEC- D -III	Food Safety, Hygiene and Sanitation
9	SEC- D -IV	Project/On-Job Training/Industrial Visit

• Student Contact Hrs Per week: 36 hrs	• Total marks for B. Voc.- Advanced Diploma: 900
• Theory and Practical Lectures: 48 Minutes Each	• Total credits for B. Voc.- Advanced Diploma: 56
• AECC: Ability Enhancement Compulsory Course (Compulsory Environmental Science)	
• Practical workload will for batch of 20 students	
• Practical Examination will be conducted Semester wise for 50 Marks per course (subject).	
• DSC: Discipline Specific Core Course - Candidate can opt three courses (Subjects) from DSC.	
• GEC: Generic Elective Compulsory Course - Candidate can opt any one course (Subject).	
• There shall be separate passing for theory and practical courses.	
• AECC & GEC Internal Evaluation should be done at college or respective departmental level	
• Exit option after Level 6: Students can exit with Advance Diploma Course in Bachelor of Vocation with the completion of courses equal to minimum of 56 credits and also shall have to acquire additional CCC credits by successfully completing CCC-I and CCC-II courses which are assisted by Compulsory Civic Courses	
• SEC-C & SEC-D are two parts of Vocational Advance Diploma Course-II.	

Eligibility:

Eligibility for Admission: For Advance Diploma: Diploma or equivalent in any related stream.

Eligibility for Faculty: 1) Post Graduate with NET / SET/Ph. D. Or
Five Year Industry Experienced Personal
2) M. Sc. (Environmental Science) with NET/SET for Environmental Science

Eligibility for Lab Assistant: Graduation with related field

Staffing Pattern: Teaching: In the 1st year of B. Voc. – One Full Time Environmental Science
One C. H. B. for Environmental Science

Lab. Assistant: For 1st Year of B. Voc. – 1 Part Time
For 2nd and 3rd Year (Inclusive of 1st Year) of B. Voc. – 1 Full Time

**Bachelor of Vocation (B. Voc.) Part II - Sem. III
(AECC-CD)**

Paper – I: Environmental Science-I

Paper No.....

Credits: 08

Theory: 4 lectures/week

Total Marks: 100 (Theory 70 + Project 30)

Practical: 02 lectures per week per batch of 20 students

Units Prescribed for Theory: 70 Marks.

*****COMMON TO ALL*****

Bachelor of Vocation (B. Voc.) Part II - Sem. III
Generic Elective Compulsory Course (GEC-C)
Paper Title: Food Chemistry

Paper No: XX

Credits: 04

Theory: 4 lectures/week

Total Marks: 50 (Theory 40 + Internal 10)

Practical: 2 lectures/week/batch

Course Outcomes: The students will be able

1. To the importance of water in foods and its effect on the quality of foods
2. To the structures, chemical properties, and reactions of major food components
3. To knowledge of the use of additives in foods
4. To the basic knowledge and understanding of the application of enzymes in foods
5. To understand the basic concept, functions, and classification of food flavour.

Content of syllabus:

Unit I: Water:

(15 Hrs)

The basic molecule of life, physical properties of water, properties of hydration, solvation. Sorption isotherm, Bound water, free water, water activity. Distribution of water in various foods and moisture determination, Filtration Technology for Water: RO, UF, NF etc

Unit II: Food Additives:

(15 Hrs)

Definition, Functions, legal approval, major additives used in food processing, nutrient supplements, functional foods, Phyto-chemicals and nutraceuticals

Unit III: Properties of Foods:

(15 Hrs)

Physical Properties, Acids, Bases, and Buffers, the Chemical Bond and Colloids

Unit IV: Food Flavour and Food Colours:

(15 Hrs)

Food Flavour: Introduction, definition and basic tastes, Description of food flavours and Flavour enhancers. Effect of different factors on flavor perceptions.

Food Colour (Pigments):

Introduction and classification, Food pigments (chlorophyll, carotenoids, anthocyanins and flavonoids, beet pigments, caramel)

Books Recommended: (List of Minimum 5 Books)

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

Bachelor of Vocation (B. Voc.) Part II - Sem. III

Skill Enhancement Course (GEC-C-I)

Paper Title: Food Chemistry

Paper No:

Practical: 4 lectures/week

Credits: 02

Total Marks: 10 (Practical)

Course Outcomes: The students will acquire knowledge of

1. Understand the basic concepts of food chemistry, including the structure and properties of food components.
2. Be able to perform common proximate analysis tests, such as the estimation of moisture, protein, fat, carbohydrates, and ash.
3. Be able to use a variety of analytical instruments, such as a pH meter, a colorimeter, and a refractometer.
4. Understand the principles of food processing and preservation, and be able to apply these principles to the development of new food products.
5. Be able to apply food chemistry principles to solve problems in the food industry.

List of Practical: (Minimum 10)

1. Preparation and Standardization of NaOH Solution
2. Determination of percent free fatty acids and Acid value of fat /oil
3. Browning in fruits And Vegetables
4. Effects of heat on fruits & vegetables
5. Natural acidity of milk
6. Isolation of starch
7. Isolation of casein
8. Effect of sugar on boiling point of water
9. Determination of Saponification value of an oil.
10. Visit to food analysis laboratory

Student Instructions:

1. Arrive on time and be prepared.
2. Follow safety procedures.
3. Ask questions if you do not understand something.

Laboratory Requirements:

1. Solution should be made properly.
2. Use the instruments properly at right temperature and time.

Pattern of a Question Paper
B. Voc. Part-II Semester –III
Food Chemistry

Paper No: XX

Time: 2 hours

Total Marks: 40

Solve any five questions from the following.

Q. 1 Multiple choice Question	08 Marks
Q. 2 Long answer Question	08 Marks
Q. 3 Long answer Question	08 Marks
Q. 4 Long answer Question	08 Marks
Q. 5 Long answer Question	08 Marks
Q. 6 Long answer Question	08 Marks
Q. 7 Short Type Questions (any 2 out of 3)	08 Marks

Nature of Practical Question Paper:

Internal practical examination

10 marks

- 1. Carry out any practical of processing or analysis**
- 2. Submission of Certified Journal**

5 Marks

5 Marks

Bachelor of Vocation (B. Voc.) Part II - Sem. III

Discipline Specific Core Course (DSC– C-I)

Paper Title: Food Microbiology -II

Paper No: XXI

Theory: 4 lectures/week

Credits: 04

Total Marks: 50 (Theory)

Course Outcomes: The students will acquire knowledge of

1. Students will understand the basic concepts in food microbiology.
2. Students will get the knowledge about the how-to bacteria grows, different factors which affects their growth.
3. Students will understand the principles and importance of different staining methods used for bacteria.
4. Students will understand different culture methods and culture media for bacteria.
5. Students will understand biochemical properties of bacteria.

Content of syllabus:

Unit I: Food in relation to disease:

(15 Hrs)

Food borne illness: Bacteria causing food borne diseases, food borne poisoning, infections and intoxications: nonbacterial- mycotoxins, viruses, rickettsia, food borne parasites, sea food toxicants, poisoning by chemicals. Investigations of food borne illnesses, out breaks of food borne illness, materials and equipment required, the field investigation, laboratory testing, preventive measures.

Unit II: Methods of microbiological examination of food:

(15 Hrs)

Culture Media- Composition, Importance, types- simple media, complex media, synthetic media, enriched media, enrichment media, selective media, indicator media, differential media, sugar media, transport media and anaerobic media.

Cultural methods- Methods for isolation of pure culture- Streak plate, Pour plate and Spread plate and Laboratory Accreditation

Unit III: Stains and Staining Procedures:

(15 Hrs)

Definition of dye & stains, classification of stains- Acidic, Basic and Neutral, principles, procedure, mechanism & application of staining procedures: simple staining, negative staining, differential staining, gram staining & acid-fast staining.

Unit IV: Biochemical Properties of Bacteria:

(15 Hrs)

Sugar fermentation, Indole production, Methyl red test, Voges-Proskauer test, Methylene blue reduction and urease test, composite media

Books Recommended: (List of Minimum 5 Books)

1. MC. Williams, M and Paine, H. (1984). Modern Food preservation Surjeet Publications, Delhi.
2. Potter, N.N. and Hotchkiss J. H. (1996). Food Science. CBS publishers and distributors
3. Srilakshmi, B. (2003). Food Science New Age International Publishers, New Delhi
4. Srivastava, R.P.O and Kumar, S. (1994). Fruit and vegetable preservation International Book distribution Company, Lucknow
5. Subalakshmi, G and Udipi, S.A. (2001). Food processing and preservation New Age International Publishers, New Delhi.

Pattern of a Question Paper
B. Voc. Part-II Semester –III
Food Microbiology -II

Paper No: XXI

Time: 2 hours

Total Marks: 50

Solve any five questions from the following.

Q. 1 Multiple choice Question	10 Marks
Q. 2 Long answer Question	10 Marks
Q. 3 Long answer Question	10 Marks
Q. 4 Long answer Question	10 Marks
Q. 5 Long answer Question	10 Marks
Q. 6 Long answer Question	10 Marks
Q. 7 Short Type Questions (any 2 out of 3)	10 Marks

Bachelor of Vocation (B. Voc.) Part II - Sem. III

Discipline Specific Core Course (DSC– C-II)

Paper Title: Fruits and Vegetables Processing

Paper No: XXII

Theory: 4 lectures/week

Credits: 04

Total Marks: 50 (Theory)

Course Outcomes: The students will acquire knowledge of

1. Learn different preservation methods such as pasteurization, sterilization, canning, freezing, refrigeration.
2. The knowledge about processing of canning, spoilage of canned food, different packaging materials used for canned food.
3. Learn about processing of different fruits and vegetables product like fruit beverages, squash, cordial, nectar, jam, jelly, marmalade and defects in preparation of products.
4. Learn the processing and types of different pickles, chutney, sauces and tomato products.
5. Learn processing of tea, coffee and cocoa beans like selection, cleaning, sorting, fermentation, pulverization, drying.

Content of syllabus:

Unit I: Introduction and Method of Preservation:

(15 Hrs)

Importance of fruits and vegetable, history of food preservation. Importance of vegetable crops, improving keeping quality of fruits and vegetable, cultivation of fruits and vegetable.

Unit II: Canning and bottling of fruits and vegetables:

(15 Hrs)

Principle and process of canning, Selection of fruits and vegetables, grading, washing, peeling, cutting, blanching, cooling, filling, exhausting, sealing, processing, cooling, storage containers used, bottling of fruits and vegetables, spoilage of canned foods, General consideration in establishing a commercial fruit and vegetable canning industry, Types and causes of Spoilage of canned foods.

Unit III: Fruit and vegetable products:

(15 Hrs)

Unfermented and Fermented fruit beverages, Jam, Jelly and Marmalade, Preserve, Candied and Crystallized Fruits and Vegetables, Pickles, Chutneys and Sauces/Ketchups, Nectar, cordials, Fruit Cheese and Pectin.

Unit IV: Quality Control and Waste Utilization:

(15 Hrs)

Quality Characteristics of Fruits and Vegetable for Processing, Quality Control in Food Processing Industry, utilization of Fruit and Vegetable waste, water for Fruit and Vegetable Processing Industries.

Books Recommended: (List of Minimum 5 Books)

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

Bachelor of Vocation (B. Voc.) Part II - Sem. III
Discipline Specific Core Course (DSC– C-III)
Paper Title: Food Quality & Sensory Evaluation

Paper No: XXIII

Theory: 4 lectures/week

Credits: 04

Total Marks: 50 (Theory)

Course Outcomes: The students will acquire knowledge of

1. To study the quality of food and evaluation of food.
2. To study the quality attributes in food industry.
3. To understand the concept for sensory analysis.
4. Understand how to design and undertake sensory testing using different types of methodologies.
5. Understand the basic anatomy and physiology of the sensory organs used to evaluate food.

Unit I: Introduction to Food Quality:

(15 Hrs)

Food quality and its role in food industry need of quality control, factors affecting quality control, Quality attributes: dominant and hidden attributes. Color-role of colors in quality spectra, different types of colour measuring instruments

Unit II: Viscosity:

(15 Hrs)

Types of fluids, different viscometers to measure viscosity.

Consistency: - methods used to measure consistency or product difference between viscosity and consistency

Size and shape: - Method to find shape and size of food and food products

Defects: Classification

Unit III: Texture:

(15 Hrs)

Classification, role of firmness, yielding quality, juiciness, chewiness, fibrousness, grittiness, mealiness, stickiness, measurement of texture/ kinesthetic

Characteristics. - by compression, mechanical thumb, puncture tester.

Unit IV: Flavour:

(15 Hrs)

Definition and its role in food quality, Taste, classification, taste qualities, relative intensity, reaction time, effect of disease, temperature, and taste medium on taste, basic tastes and interaction of tastes.

Odour: definition, Classification, neutral - mechanisms, Olfactory abnormalities, odor testing techniques.

Books Recommended: (List of Minimum 5 Books)

1. Fundamentals of Quality Control for Food Industry Krammer and Twigg Avi Publishing Company, 1966
2. Quality Control in Food Industry Krammer and Twigg Avi Publishing Company, 1966
3. Quality Control in Food Industry Herschdoerfer Elsevier, 2012
4. Handbook of Analysis and Quality Control for Fruit and Vegetable Products. Ranganna S. 2nd Ed. Tata-McGraw-Hill. 2001.
5. Sensory Evaluation Practices Stone, Bleibaum and Thomas Academic Press, 2012

Bachelor of Vocation (B. Voc.) Part II - Sem. III

Skill Enhancement Courses (SEC– C-I)

Paper Title: Food Microbiology-II

Paper No: XXIV

Credits: 02

Practical: 4 lectures/week

Total Marks: 50 (Practical)

Course Outcomes: The students will acquire knowledge of

1. Understand the principles and working of different instruments used in microbiology lab along with the applications.
2. They will learn about handling of compound microscope.
3. They will study different staining methods for bacteria and its importance.
4. They will understand difference between bacteria and fungi.
5. They will understand different isolation of bacteria from food samples.

List of Practical: (Minimum 10)

1. Introduction to the Basic Microbiology Laboratory Practices and Equipment
2. Cleaning and sterilization of glassware
3. Cultivation and sub-culturing of microbes
4. Preparation of slant, stab and plates using nutrient agar
5. Simple staining
6. Negative staining
7. Standard Plate Count Method
8. Isolation of E. coli from given sample.
9. Isolation of staphylococcus from given sample.
10. IMVIC Test
11. Visit to microbiology laboratory

Student Instructions:

1. Arrive on time and be prepared.
2. Follow safety procedures.
3. Ask questions if you do not understand something.

Laboratory Requirements:

1. Specialized microbiology laboratory
2. Microbiology Instruments

Nature of Practical Question Paper:

Internal practical examination	50 marks
1. Carry out any practical of microbiology or analysis	15 Marks
2. Carry out any practical of microbiology or analysis	15 Marks
3. Identification	10 Marks
4. Submission of Certified Journal	05 Marks
5. Viva – Voce	05 Marks

Bachelor of Vocation (B. Voc.) Part II - Sem. III
Skill Enhancement Courses (SEC– C-II)
Paper Title: Fruits and Vegetables Processing

Paper No: XXV

Credits: 02

Practical: 4 lectures/week

Total Marks: 50 (Practical)

Course Outcomes: The students will acquire knowledge of

1. They will learn about different preservation methods.
2. They will get knowledge about processing of canning, spoilage of canned foods, etc.
3. They will learn about processing of different fruits and vegetables products like beverages, jam, jelly, marmalade, etc.
4. They will get knowledge about drying and dehydration of fruits and vegetables.
5. They will learn about the processing and types of different pickles, chutney, sauces and tomato products.

List of Practical: (Minimum 10)

1. Maturity analysis of fruits (sensory, chemical, etc.)
2. Preparation of Jam
3. Preparation of Jelly
4. Preparation of Cordial
5. Preparation of RTS
6. Preparation of Squash
7. Preparation of fruit candy
8. Preparation of Sauerkraut
9. Drying of fruit slices, green leafy vegetables using different drying techniques
10. Visit to Fruit & Vegetable Processing Industries

Student Instructions:

1. Arrive on time and be prepared.
2. Follow safety procedures.
3. Ask questions if you do not understand something.

Laboratory Requirements:

1. Laboratory space
2. Equipments for fruits and vegetables processing

Nature of Practical Question Paper:

Internal practical examination

50 marks

- | | |
|---|----------|
| 1. Carry out any practical of processing and analysis | 15 Marks |
| 2. Carry out any practical of processing and analysis | 15 Marks |
| 3. Identification | 10 Marks |
| 4. Submission of Certified Journal | 05 Marks |
| 5. Viva – Voce | 05 Marks |

Bachelor of Vocation (B. Voc.) Part II - Sem. III
Skill Enhancement Courses (SEC– C-III)
Paper Title: Food Quality & Sensory Evaluation

Paper No: XXVI

Credits: 02

Practical: 4 lectures/week

Total Marks: 50 (Practical)

Course Outcomes: The students will acquire knowledge of

1. Understand the different quality analysis in food.
2. Understand the quality attributes of different food products.
3. Understand the sensory analysis of different food products.
4. Understand the different sensory test for sensory evaluation of food products.
5. Understand the consumer study for food quality.

List of Practical: (Minimum 10)

1. Determination of Quality attributes of various food products
2. Determination of characters of fresh fruits and vegetables
3. Determine of Sensory analysis of different food products
4. Determination of Quality evaluation of product for colours
5. Determination of Quality evaluation of product for size, shape
6. Descriptive testing for sensory evaluation of food
7. Sensory Evaluation by Hedonic rating
8. Measurement of insect damage
9. Consumer study for food quality
10. Visit to fruit & vegetable market for quality assessment

Student Instructions:

1. Arrive on time and be prepared.
2. Follow safety procedures.
3. Ask questions if you do not understand something.

Laboratory Requirements:

1. Adequate sensory laboratory facilities.
2. Sensory Lab Should be used for sensory purpose.

Nature of Practical Question Paper:

Internal practical examination	50 marks
1. Carry out any practical of evaluation and analysis	15 Marks
2. Carry out any practical of evaluation and analysis	15 Marks
3. Identification	10 Marks
4. Submission of Certified Journal	05 Marks
5. Viva – Voce	05 Marks

Bachelor of Vocation (B. Voc.) Part II - Sem. III
Skill Enhancement Courses (SEC– C-IV)
Paper Title: Project/On-Job Training/Industrial Visit

Paper No: XXVII

Credits: 02

Term Work: 2 lectures/week

Total Marks: 50 (Internal)

Course Outcomes: The students will acquire knowledge of

1. Students get exposed to actual working environment and enhance their knowledge and skill from what they have learned in the college.
2. Provide students an insight into the real working environment.
3. To provide students with an insight into the corporate world.
4. To provide students with a practical real-world perspective on different functions in organizations such as Marketing, HR, Finance, Operations, Customer Service, Logistics,
5. Specific statements of what students will be able to do when they successfully complete a learning experience
6. To prepare for new interview Techniques.

Important Note: Field Work/Industrial Visit/Study Tour should be of **minimum five days** in or out of Maharashtra.

Suggested Places:

1. In Maharashtra: Satara, Kolhapur, Ratnagiri, Pune, Baramati
2. Out of Maharashtra: Gujrat, Kerala, Maisur

Student Instructions:

1. Choose a topic that you are interested in and that is relevant to your field of study.
2. Ask questions about industry or related processing
3. Prepare notes and take information from industry staff or respected officer.

Nature of Evaluation: INTERNAL

Bachelor of Vocation (B. Voc.) Part II - Sem. IV (Advanced Diploma)

Generic Elective Compulsory Course (GEC-D)

Paper Title: Post Harvest Technology

Paper No: XXIX

Credits: 04

Theory: 4 lectures/week

Total Marks: 50 (Theory 40 + Internal 10)

Practical: 2 lectures/week/batch

Course Outcomes: The students will be able

1. To reduce loss in quantity or volume and the product's qualitative or nutritional value.
2. To maintain the excellent quality of the produce (color, taste, flavor, aroma).
3. To increase the shelf life of the crops.
4. A significant decrease in post-harvest loss can alleviate food insecurity all over the world.
5. To minimize losses and spoilage and value addition of commodities.

Content of syllabus:

Unit I: History and role of post-harvest technology: (15 Hrs)

Harvesting factors and Quality- Pre-harvesting factor, Maturity of harvest, Harvesting Methods, Post-Harvest Physiology

Unit II: Structure and Composition of Food Grains: (15 Hrs)

Engineering Properties of agricultural Materials, Physical Properties, Mechanical Properties, thermal properties, Rheological Properties and Cleaning and Grading, Post-harvest technology of Cereal, Pulses, Oilseeds, Fruits and Vegetables, Material Handling

Unit III: Post-Harvest Handling of Foods: (15 Hrs)

Post-Harvest Handling of Foods of Animal Origin, Post Slaughter Handling of Meat, Post-Harvest Handling of Fish and Seafood and Post-Harvest Handling of Milk

Unit IV: Food Storage Systems: (15 Hrs)

Direct Damage, Indirect damage, Sources of infestation, Traditional storage structures, improved storage structures, modern storage structures, storage of agricultural perishables, controlled and Modified atmosphere storage, post-harvest treatments for quality retention of horticultural crops, methods to reduce decay.

Books Recommended: (List of Minimum 5 Books)

1. Preservation of Fruits & Vegetables by Srivastava & Kumar. 1996. Intl. Book Publishing Co. Lucknow.
2. Preservation of Fruits & Vegetables by Siddappa et al. 1999. ICAR, New Delhi
3. An introduction to Post Harvest Technology by RBH Wills. 2003.
4. Post Harvest Technology of Fruits & Vegetables by Verma & Joshi. 2000. Indus Publication, New Delhi
5. Hand Book of Post Harvest Technology by Chakravarty et al. 2003. Mercer-Dekker Ltd
6. Kadar, A.A. 1992. Post-harvest Technology of Horticultural Crops. 2nd Ed. University of California.

Bachelor of Vocation (B. Voc.) Part II - Sem. IV (Advanced Diploma)

General Education Components (GEC– D)

Paper Title: Post Harvest Technology

Paper No: XXIX

Credits: 02

Practical: 4 lectures/week

Total Marks: 10 (Practical)

Course Outcomes: The students will acquire knowledge of

1. The studying theme will include understanding post-harvest physiology and biochemical changes in fruits and vegetables, handling, transportation and preservation/storage of the fresh harvest with emphasis laid on safety and quality evaluation.
2. The students will learn more on the physiology, biochemistry and on various technologies involved relevant to shelf-life extension.
3. Indicate the importance and the significance of proper post-harvest handling to maintain the quality of fruits and vegetables.
4. Analyze various aspects of quality control and evaluation.
5. students will learn more about the importance of quality, safety and marketability of the fresh horticultural produce, all of which are directly dependent on the consumers' attitude.

List of Practical: (Minimum 10)

1. Determination of physiological loss in weight in fruits and vegetables under cold conditions.
2. Determination of Acidity in lemon juice, grapes in different stages.
3. Estimations of sugars.
4. Determination of Vitamin C.
5. Determination of juice content of fruits
6. Determination of total solids.
7. Wax coating of fruits
8. Preparation of fruit squash
9. Preparation of fruit syrup.
10. Visit to grains milling industry.

Student Instructions:

1. Arrive on time and be prepared.
2. Follow safety procedures.
3. Ask questions if you do not understand something.

Laboratory Requirements:

1. Student Should Carry the Book with Botanicals names of crops
2. Practicallss should carry neat and carefully.

Pattern of a Question Paper
B. Voc. Part-II Semester –IV
Post Harvest Technology

Paper No: XXIX

Time: 2 hours

Total Marks: 40

Solve any five questions from the following.

Q. 1 Multiple choice Question	08 Marks
Q. 2 Long answer Question	08 Marks
Q. 3 Long answer Question	08 Marks
Q. 4 Long answer Question	08 Marks
Q. 5 Long answer Question	08 Marks
Q. 6 Long answer Question	08 Marks
Q. 7 Short Type Questions (any 2 out of 3)	08 Marks

Nature of Practical Question Paper:

Internal practical examination

10 marks

- 1. Carry out any practical of processing or analytical**
- 2. Submission of Certified Journal**

5 Marks

5 Marks

Bachelor of Vocation (B. Voc.) Part II - Sem. IV (Advanced Diploma)

Discipline Specific Core Course (DSC– D-I)

Paper Title: Food Analytical Techniques

Paper No: XXX

Theory: 4 lectures/week

Credits: 04

Total Marks: 50 (Theory)

Course Outcomes: The students will acquire knowledge of

1. To recognize clearly the principles behind the analytical methods associated with food analysis
2. To be aware of the improvement in food analysis techniques with technology development;
3. Select an appropriate analytical technique when presented with a practical problem
4. Demonstrate abilities in analytical, problem-solving and critical thinking
5. To understand the atomic absorption spectroscopy and electrophoresis.

Content of syllabus:

Unit I: Proximate analysis of food and types of solutions:

(15 Hrs)

Preparation of sample, Methods for estimation of moisture, protein, fat, fibre, ash and carbohydrate.

Types of Solutions: Molar Solution, Normal solution, Colloidal solutions, Buffer solutions, Measurement of Ph.

Unit II: Colorimetry and spectrophotometry:

(15 Hrs)

Principle, Beer's - Lambert's law, Construction, Working, Care of colorimeter, Standard solutions, Blank solutions

Unit III: Atomic absorption spectroscopy and Electrophoresis:

(15 Hrs)

Principle, Instrumentation, Applications, Principle, Types of electrophoresis, Moving boundary electrophoresis, Zone electrophoresis, applications.

Unit IV: Flame photometer and Fluorimetry:

(15 Hrs)

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

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

Books Recommended: (List of Minimum 5 Books)

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

Pattern of a Question Paper
B. Voc. Part-II Semester –IV
Food Analytical Techniques

Paper No: XXX

Time: 2 hours

Total Marks: 50

Solve any five questions from the following.

Q. 1 Multiple choice Question	10 Marks
Q. 2 Long answer Question	10 Marks
Q. 3 Long answer Question	10 Marks
Q. 4 Long answer Question	10 Marks
Q. 5 Long answer Question	10 Marks
Q. 6 Long answer Question	10 Marks
Q. 7 Short Type Questions (any 2 out of 3)	10 Marks

Bachelor of Vocation (B. Voc.) Part II - Sem. IV (Advanced Diploma)

Discipline Specific Core Course (DSC– D-II)

Paper Title: Dairy Technology

Paper No: XXXI

Theory: 4 lectures/week

Credits: 04

Total Marks: 50 (Theory)

Course Outcomes: The students will acquire knowledge of

1. Students will learn about the basics of dairy processing.
2. Students will evaluate composition of milk, principles & methods of milk processing.
3. Learners will gain awareness about microbiology of milk & milk products.
4. Students will learn about processed milk products such as toned milk, flavored milk, etc.
5. Students will get the knowledge about the preparation & principles of paneer, cheese, curd, ice-cream etc.

Content of syllabus:

Unit I: Livestock and dairy Building:

(15 Hrs)

Importance of livestock, their importance species and breeds, functional requirement, site selection, buying and collection of milk, transportation of milk, milk reception in dairies. Quality and quantity test at reception. Dairy plant sanitization Cleaning in place bottle and can washing, cleaning of tankers and silos Detergents and sanitizers used.

Unit II: Dairy Chemistry and Microbiology:

(15 Hrs)

Introduction, Milk - composition, food and nutritive value, physico-chemical properties. Microbiological Properties of milk, Judging and Grading of milk.

Unit III: Milk Processing:

(15 Hrs)

Milk Processing flow sheet Filtration / clarification, Storage of milk, Standardization simple problems in standardization, Homogenization, Pasteurization Types of pasteurization process, Sterilization of milk. **Equipment's used in each process** - Cream separating centrifuges, Pasteurizers (Heat Exchangers), Homogenizers, Bottle and pouch fillers, Milk Chillers.

Unit IV: Manufacture of Dairy Products:

(15 Hrs)

Manufacture of Ice Cream, Cream, Paneer, Butter, Ghee, Milk powder, Khoa, Cheese and milk-based sweets (Only method of preparation), Manufacture of Homogenized, Standardized, rehydrated, Toned Milk and Sweetened Condensed milk, Extraction of casein from milk properties - composition and industrial uses. Production of lactose and whey Fermented products Yoghurt, Curd, acidophilus milk, butter milk

Books Recommended: (List of Minimum 5 Books)

1. De Sukumar, Outlines of Dairy Technology, Oxford University Press, Oxford. 2007
2. Robinson, R.K. (2 vol. set). 1986. Modern Dairy Technology. Elsevier Applied Science, UK.
3. Warner, J.M. 1976. Principles of Dairy Processing. Wiley Eastern Ltd., New Delhi.
4. Yarpar, W.J. and Hall, C.W. 1975. Dairy Technology and Engineering. AVI, Westport.
5. Rosenmal, I. 1991. Milk and Milk Products. VCH. New York.
6. Webb and Johnson, Fundamentals of Dairy Chemistry

Bachelor of Vocation (B. Voc.) Part II - Sem. IV (Advanced Diploma)

Discipline Specific Core Course (DSC– D-III)

Paper Title: Food Safety, Hygiene and Sanitation

Paper No: XXXII

Credits: 04

Theory: 4 lectures/week

Total Marks: 50 (Theory)

Course Outcomes: The students will acquire knowledge of

1. Explain various types of food contamination and factors that contribute to foodborne illness.
2. Identify the characteristics of potentially hazardous foods.
3. Describe the dangers of foodborne illness.
4. Identify the high-risk population.
5. To minimize the risk of foodborne illnesses by making the working environment of food handlers free from food safety hazards.

Content of syllabus:

Unit I: Introduction to Food Safety:

(15 Hrs)

Definition, Types of hazards, biological, chemical, physical hazards, Factors affecting Food Safety, Importance of Safe Foods.

Unit II: Food Safety Management Tools:

(15 Hrs)

Basic concept, Prerequisites- GHPs, GMPs, SOPs etc., HACCP, ISO series.

TQM – concept and need for quality, components of TQM, Kaizen.

Risk Analysis, Accreditation and Auditing

Unit III: Industrial byproducts and waste utilization:

(15 Hrs)

Potential & prospects of byproduct & waste utilization from the food Industries in India.

Byproduct & waste with special reference to Agricultural & agro based industries, cereal & cereal product, fruits and vegetable, meat, Poultry and fish, milk & milk products.

Unit IV: Hygiene and Sanitation in Food Service Establishments:

(15 Hrs)

Introduction, Sources of contamination, Control methods using physical and chemical agents, Waste Disposal, Pest and Rodent Control, Personnel Hygiene, Food Safety Measures, New and Emerging Pathogens, Packaging, Product labelling and Nutritional labeling. Genetically modified foods\Transgenics, Organic foods, Recent Outbreaks.

Books Recommended: (List of Minimum 5 Books)

1. Lawley, R., Curtis L. and Davis, J. The Food Safety Hazard Guidebook, RSC publishing, 2004
2. De Vries. Food Safety and Toxicity, CRC, New York, 1997
3. Marriott, Norman G. Principles of Food Sanitation, AVI, New York, 1985
4. Forsythe, S J. Microbiology of Safe Food, Blackwell Science, Oxford, 2000 & Sons; USA, 1987
5. Quality Control for Food Industry - Krammer & Twig

Bachelor of Vocation (B. Voc.) Part II - Sem. IV (Advanced Diploma)

Skill Enhancement Courses (SEC– D-I)

Paper Title: Food Analytical Techniques

Paper No: XXXIII

Credits: 02

Practical: 4 lectures/week

Total Marks: 50 (Practical)

Course Outcomes: The students will acquire knowledge of

1. Learning about basic concept of design in dairy plant for milk and other products
2. Students will undertake and compare various food analysis techniques, followed by analysis, interpretation and presentation of the results
3. Select appropriate analytical techniques for specific food components
4. Apply valid sampling techniques to food materials having widely diverse properties and volumes
5. Apply valid sampling techniques to food materials having widely diverse properties and volumes

List of Practical: (Minimum 10)

1. Principle and working of analytical instrument such as colorimeter, balances, oven, muffle furnace, incubator, centrifuge.
2. Estimation of Moisture from food sample
3. Estimation of Ash from food sample
4. Estimation of Protein from food sample
5. Estimation of Fat from food sample
6. Qualitative test for carbohydrates
7. Estimation of starch by Anthrone reagent
8. Estimation of Fiber from food sample
9. Determination of acidity of honey sample
10. Visit to Food Analysis Laboratory

Student Instructions:

1. Arrive on time and be prepared.
2. Follow safety procedures.
3. Ask questions if you do not understand something.

Laboratory Requirements:

1. Food Sample Should not be tasted or smelled
2. Reagents should be properly used and stored in right place.

Nature of Practical Question Paper:

Internal practical examination	50 marks
1. Carry out any practical of estimation of chemical analysis	15 Marks
2. Carry out any practical of estimation of chemical analysis	15 Marks
3. Identification	10 Marks
4. Submission of Certified Journal	05 Marks
5. Viva – Voce	05 Marks

Bachelor of Vocation (B. Voc.) Part II - Sem. IV (Advanced Diploma)

Skill Enhancement Courses (SEC– D-II)

Paper Title: Dairy Technology

Paper No: XXXIV

Credits: 02

Practical: 4 lectures/week

Total Marks: 50 (Practical)

Course Outcomes: The students will acquire knowledge of

1. Comprehensive understanding of dairy production, processing, and preservation techniques.
2. Proficiency in quality control and food safety practices specific to the dairy industry.
3. Proficiency in quality control and food safety practices specific to the dairy industry.
4. Basics of Biochemistry from milk and milk products.
5. Learning about basic concept of design in dairy plant for milk and other products

List of Practical: (Minimum 10)

1. Analysis techniques for milk
 - a) Physical examination of milk
 - b) Platform tests of milk
 - c) Detection of adulteration of milk
2. Testing of milk for acidity
3. Preparation of Dahi
4. Preparation of Lassi
5. Preparation of Basundi.
6. Preparation of Khoa.
7. Preparation of Gulabjamun.
8. Preparation of Paneer.
9. Preparation of Rasgulla.
10. Preparation of Shrikhand.
11. Visit to Dairy Industry

Student Instructions:

1. Arrive on time and be prepared.
2. Follow safety procedures.
3. Ask questions if you do not understand something.

Laboratory Requirements:

1. Milk should draw properly.
2. Adulteration test carried out of all milk-based products.

Nature of Practical Question Paper:

Internal practical examination	50 marks
1. Carry out any practical of preparation of any product	15 Marks
2. Carry out any practical of preparation of any product	15 Marks
3. Identification	10 Marks
4. Submission of Certified Journal	05 Marks
5. Viva – Voce	05 Marks

Bachelor of Vocation (B. Voc.) Part II - Sem. IV (Advanced Diploma)

Skill Enhancement Courses (SEC– D-III)

Paper Title: Food Safety, Hygiene and Sanitation

Paper No: XXXV

Credits: 02

Practical: 4 lectures/week

Total Marks: 50 (Practical)

Course Outcomes: The students will acquire knowledge of

1. Identify the factors that influence the growth of micro-organisms
2. Introduce the causes and prevention of food poisoning and to introduce the requirements of safety in the workplace
3. Introduce local legislation relating to the food service industry
4. Present the rules of personal hygiene and the importance of adhering to safety rules and regulations.
5. Explain what is meant by the “temperature danger zone” in food safety

List of Practical: (Minimum 10)

1. Preparation of inspection schedule and inspection chart.
2. Study of CIP system.
3. Preparation of detergent and sanitizer solution of desire strength.
4. Test for sanitization of dairy equipment (swab method).
5. Contamination control method using physical and chemical method.
6. To study personal hygiene habit.
7. Determination of turbidity of the given sample of water.
8. Preparation of HACCP Plan.
9. Case study of food hygiene and sanitation (GMP/GHP) of a food industry.
10. Visit to industry.

Student Instructions:

1. Arrive on time and be prepared.
2. Follow safety procedures.
3. Ask questions if you do not understand something.

Laboratory Requirements:

1. Clean and sanitized work surfaces.
2. Proper storage of food and samples and safe disposal of waste.

Nature of Practical Question Paper:

Internal practical examination	50 marks
1. Carry out any practical of estimation of chemical analysis	15 Marks
2. Carry out any practical of estimation of chemical analysis	15 Marks
3. Identification	10 Marks
4. Submission of Certified Journal	05 Marks
5. Viva – Voce	05 Marks

Bachelor of Vocation (B. Voc.) Part II - Sem. IV (Advanced Diploma)

Skill Enhancement Courses (SEC– D-IV)

Paper Title: Project/On-Job Training/Industrial Visit

Paper No: XXXVI

Credits: 02

Term Work: 2 lectures/week

Total Marks: 50 (Internal)

Course Outcomes: The students will acquire knowledge of

1. Provide students an insight into the real working environment.
2. To provide students with an insight into the corporate world.
3. To provide students with a practical real-world perspective on different functions in organizations such as Marketing, HR, Finance, Operations, Customer Service, Logistics,
4. Specific statements of what students will be able to do when they successfully complete a learning experience
5. To prepare for new interview Techniques.

Important Note: Field Work/Industrial Visit/Study Tour should be of **minimum five days** in or out of Maharashtra.

Suggested Places:

1. In Maharashtra: Satara, Kolhapur, Ratnagiri, Pune, Baramati
2. Out of Maharashtra: Gujrat, Kerala, Maisur

Student Instructions:

1. Choose a topic that you are interested in and that is relevant to your field of study.
2. Ask questions about industry or related processing
3. Prepare notes and take information from industry staff or respected officer.

Nature of Evaluation: INTERNAL