Arts, Science and Commerce College CIDCO, Nashik-422 008

Affiliated to Savitribai Phule Pune University, Pune

FOR

BACHELOR OF VOCATION (AGRICULTURE)

IN

FOOD PROCESSING TECHNOLOGY

Diploma in Food Processing Technology (Year I)

Under Scheme of

B. Voc. of UGC [NSQF]

[Effective from 2018-19]

[Revised - 2020-21]

UGC Sponsored B. Voc Programme

1. Preamble

The Government of India to meet the goal of empowering the youth and also to make education relevant and creating 'industry fit' skilled work force, initiated the B. Voc. programs. Based upon the guidelines for B. Voc. courses issued by AICTE, UGC and also the guidelines of B. Voc. programs in colleges in NSQF (Academic council sub-committee report of SPPU, June 2019) the Board of studies has prepared the admission rules, regulations and syllabus structure common for the programs.

2. Objectives

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

The focus is to formulate courses as per the regional skill gap as per the need of

i. Industry in specialized areas
ii. Design curriculum and contents in the areas of skill development.
iii. Pedagogy, assessment for skills development education and training.
iv. Trained faculty to deliver in the areas of skill development and
v. Entrepreneurship development.

3. **Duration of the B. Voc. Programs**: 3 years [Six semesters].

4. **Eligibility for Admission to the B. Voc. Programs**

i. Type A - Students who have already acquired NSQF certification level 4 in a particular trade and opted
ii. Type B - Students who have passed 10+2 or equivalent in any stream from any recognized board or university without any background of vocational training.
iii. Type C – Students passed 10+2 examination with conventional schooling without any background of vocational training.

While admitting type B and type C students' additional courses for skill intensive training and teaching during the first six months shall be mandatory for such students, who will be assessed and certified for NSQF level 4 of skill competency by concerned CSA at the end of first semester. However, students belonging to type A will not require such certification as they were already having NSQF level 4 certificates in same industry sector / job role required for specified skill credits. All students continuing to Diploma courses or further will be treated at par from second semester onwards. Student may exit after diploma or advanced diploma level courses or above. The academic progression for students in vocational stream after senior secondary level should be as per table 1 and thus the curriculum shall be framed as per these guidelines.

Table 1: Stages and Exit points and Credits

NSQF Level	Skill component credits	General Education Credits	Total credits for Award	Normal duration	Exit points / Awards
7	108	72	180	Six semesters	B. Voc. degree
6	72	48	120	Four semesters	Advanced diploma
5	36	24	60	Two semesters	Diploma

5. COMMON COURSE STRUCTURE AND CREDIT DISTRIBUTION

Table 2: Typical courses and distribution of theory, practical, contact hours and credits.

Course structure of B. Voc. Food Processing Technology

Diploma in Food Processing Technology

First year (Semester I & II)

Semester I				
Course code	**Name of Subject**	**Theory/Practical**	**Contact hours**	**Credits**
General education component				
BVFP111G	Personality development and Computer Fundamentals	Theory	60	04
BVFP112G	Fundamentals of food and nutrition	Theory	60	04
BVFP113G	Introduction to food processing	Theory	60	04
Skill Based Component				
BVFP111S	Personality development	Practical	90	06
BVFP112S	Fundamentals of food and nutrition	Practical	90	06
BVFP113S	Introduction to food processing	Practical	90	06
	Total		**450**	**30**
Semester II				
General education component				
BVFP121G	Grape processing and preservation	Theory	60	04
BVFP122G	Principles of food preservation	Theory	60	04
BVFP123G	Fish, Meat and Egg Processing technology	Theory	60	04
Skill Based Component				
BVFP121S	Grape processing and preservation	Practical	90	06
BVFP122S	Principles of food preservation	Practical	90	06
BVFP123S	Fish, Meat and Egg Processing technology	Practical	90	06
	Total		**450**	**30**

Course structure of B. Voc. Food Processing Technology

Advanced Diploma in Food Processing Technology

Second year (Semester III & IV)

Semester III				
Course code	**Name of Subject**	**Theory/Practical**	**Contact hours**	**Credits**
General education component				
BVFP231G	Fundamental of Food Biochemistry	Theory	60	04
BVFP232G	Basics of Food Packaging	Theory	60	04
BVFP233G	Agro-Processing	Theory	60	04
Skill Based Component				
BVFP231S	Fundamental of Food Biochemistry	Practical	90	06
BVFP232S	Basics of Food Packaging	Practical	90	06
BVFP233S	Agro-Processing	Practical	90	06
	Total		**450**	**30**
Semester IV				
General education component				
BVFP241G	Bakery and confectionary	Theory	60	04
BVFP242G	Food quality assurance and control	Theory	60	04
BVFP243G	Milk and milk product processing	Theory	60	04
Skill Based Component				
BVFP241S	Bakery and confectionary	Practical	90	06
BVFP242S	Food quality assurance and control	Practical	90	06
BVFP243S	Milk and milk product processing	Practical	90	06
	Total		**450**	**30**

Course structure of B. Voc. Food Processing Technology

B. Voc. Food Processing Technology

Third year (Semester V & VI)

Semester V				
Course code	**Name of Subject**	**Theory/Practical**	**Contact hours**	**Credits**
General education component				
BVFP 351G	Marketing, retail management and Entrepreneurship Development	Theory	60	04
BVFP 352G	Food spoilage and control	Theory	60	04
BVFP 353G	Food industry waste management	Theory	60	04
Skill Based Component				
BVFP 351S	Marketing, retail management and Entrepreneurship Development	Practical	90	06
BVFP 352S	Food spoilage and control	Practical	90	06
BVFP 353S	Food industry waste management	Practical	90	06
	Total		**450**	**30**
Semester VI				
General education component				
BVFP 361G	Technology of Beverages	Theory	60	04
BVFP 362G	Food processing plant designing and Documentation	Theory	60	04
BVFP 363G	Emerging Technologies in Food Industry	Theory	60	04
Skill Based Component				
BVFP364S	Industrial/ Institutional project	Practical	210	14
BVFP365S	Preparation of Food Processing plant Proposal	Practical	60	04
	Total		**450**	**30**

a. One credit would mean equivalent of 15 periods of 60 minutes each for theory lectures.
b. For lab course / workshops/ internship/ field work / project, the credit weightage for equivalent hours shall be 50% that for lectures.
c. The courses offered shall be in accordance to the rules / norms of the respective apex body (UGC/AICTE).
d. The number theory papers and practicals shall be decided by each program depending upon the knowledge domains required.

6. Examination

a. **Theory Courses** –

i. The assessment of theory subjects shall include continuous internal assessment [CIA] of 50% of total marks which can include midterm test, short quiz, assignment, extension work, project work, seminar, presentations etc. There shall be semester end examination [SEE] of 50% of the total marks.

ii. The student should get minimum 30% marks in CIA and SEE each and minimum 40% in CIA and SEE jointly.

iii. In case of failure in CIA the student shall appear only in the next academic year when the said course is offered in the regular academic session at his/her responsibility. However in case of failure in SEE in particular course(s) exam will be conducted in immediate subsequent semester.

iv. In case a student fails in certain course(S) in a particular semester and the same course(s) are modified / revised/removed from the curriculum in due course, the student will have to appear as per the newly framed curriculum and/or pattern in subsequent semester at his/her own responsibility.

b. **Practical Courses-**

i. The skill component of the course will be assessed and certified by the respective Certified Skill Assessor. The Certified skill assessor for a specific trade is made available by the respective sector skill council or a committee headed by the respective board or prescribed by the concerned regulatory body. Assessment of practical courses / on job training course shall be in equal proportion by the internal and external examiners.

ii. The semester end exam for practical courses shall be conducted at the end of each semester along with the theory exams.

iii. A student must get minimum 40% marks (jointly in internal and external) to pass in the practical courses.

7. Grading System

Table 3: Letter Grades, Points and Marks

Letter Grade	Points	Marks obtained
O: Outstanding	10	80-100
A+: Excellent	9	70-79
A: Very Good	8	60-69
B+: Good	7	55-59
B: Above Average	6	50-54
C: Average	5	45-49
P: Pass	4	40-44
F: Fail	0	0-39
Ab: Absent	0	-

Table 4: Grade point Average

Grade Point Average	Grade
9.00 – 10.00	O
8.50 – 8.99	A+
7.50 – 8.49	A
6.50 – 7.49	B+
5.50 – 6.49	B
4.25 – 5.49	C
4.00 – 4.24	P
0.00 – 3.99	F

8. Computation of SGPA and CGPA

- The semester end grade sheet will contain grades for the course along with titles and SGPA. Final grade sheet and transcript shall contain CGPA.
- SGPA: The performance of a student in a semester is indicated by a number called the semester grade point average (SGPA). The SGPA is the weighted average of grade points obtained in all the courses registered by the student during the semester.

Semester Grade Point Average (SGPA) =

$$\text{SGPA} = \frac{\sum_{i=1}^{p} CiGi}{\sum_{i=1}^{p} Ci}$$

$$= \frac{\sum Grade\ Points\ earned \times Credits\ for\ each\ course}{Total\ credits}$$

SGPA is calculated up to two decimal places by rounding off.

- **CGPA**: The CGPA is the weighted average of the grade points obtained in all the courses (theory Practical courses) of all the semesters till the respective exit point. It is calculated in the same manner as the SGPA. It is calculated based upon the SGPA of the concerned semesters.

9. **OTHER RULES-** University may frame additional rules and regulations or modify these regulations if needed and once approved by the University they would be binding on the students.

Course Code

An eight-character Course code is assigned to each course. The first two characters indicates the discipline, third and fourth character indicates the programme, fifth for year, sixth for semester, seventh characters for serial no of the course, eighth for general or skilled component.

Example: BVFP111G

BV: Bachelor of vocation

FP: Food Processing Technology

1: First year

1: First semester

1: serial number of the course

G/S: General Component (G) / Skill Component (S)

Food Processing Technology

Year 1: Diploma in Food Processing Technology

Semester – I

BVFP111G: Personality Development and Computer Fundamentals (General)

Total credits: 4 **Teaching Hours-60**

Aim of the course: The aim of the subject is to bring out personality development with regard to the different behavioural dimensions that have far reaching significance in the direction of organizational effectiveness. To facilitate students to study basic IT skills using application software tools in industry and teaching –learning process.

Outcome of the course: Awareness in the participants with regard to the different aspects of interpersonal relations based on the ideas envisaged in Transactional Analysis and their relative significance in the context of the functional effectiveness of organizations. Students will have command on basic IT skills to use computer and internet facilities for their academic and holistic development purpose.

Syllabus

Unit-I: Self-Analysis and Motivation **18 Hours**

SWOT Analysis, Who am I, Attributes, Importance of Self Confidence, Self Esteem. Creativity- Out of box thinking, lateral thinking. Attitude- Factors influencing attitude, Challenges and lessons from attitude, etiquette. Motivation- Factors of motivation, Self-talk, Intrinsic & Extrinsic Motivators. Goal Setting- Wish List, Smart Goals, Blue print for success, Short Term, Long Term, Life Time Goals. Time Management- Value of time, Diagnosing, Weekly Planner to do list, Prioritizing work.

Unit-II: Leadership and Interpersonal Relations **14 Hours**

Introduction to leadership, Leadership Power, Leadership Styles and Leadership in administration.

Introduction to Interpersonal Relations- Analysis of different ego states, Analysis of Transactions, Analysis of Strokes. Introduction to Stress- Causes of Stress, Impact Stress and Managing Stress. Conflict- Introduction to Conflict and Causes of Conflict.

Unit III: Operating system- MS Office **23 Hours**

Definition & functions, Basic components of windows, types of icons, taskbar, using desktop, title bar, running applications, exploring computer, managing files and folders, copying and moving files and folders. Control panel -adding and removing software and hardware, setting date and time, screen saver and appearance.

MS-Word - Documentation - Introduction to Office Automation, Creating & Editing Document, Formatting Document, Auto-text, Autocorrect, Spelling and Grammar Tool, Document Dictionary, Page Formatting, Bookmark, Advanced features of MS-Word-Mail Merge, Macros, Tables, File Management, Printing, Styles, linking and embedding object, Template.

MS-Excel- Introduction to MS-Excel, Creating & Editing Worksheet, Formatting and Essential Operations, Formulas and Functions, Charts, Advance features of MS-Excel-Pivot table & Pivot Chart, Linking and Consolidation. Database Management using Excel-Sorting, Filtering, Table, Validation, Goal Seek and Scenario.

MS-PowerPoint - Presentations, Creating, Manipulating & Enhancing Slides, Organizational Charts, Excel Charts, Word Art, Layering art Objects, Animations and Sounds and insertion, Inserting Animated Pictures.

Unit IV: Introduction to concept of Internet **5 Hours**

Internet applications, www, Email, ftp, web browsers (Internet explorer, Google Chrome, Mozilla).

References

1) Lall & Sharma – Personal Growth Training & Development (Excel Books)
2) Janakiraman- Training & Development (Biztantra)
3) Hurlock, Elizabeth B - Personality Development (Tata McGraw Hill, 1st Ed.)
4) Sahu R.K. - Training for Development (Excel Books, 1st Ed.)
5) Prof. Achhru Singh & Dr. Dharminder Singh Ubha, Personality Development and Soft Skills.
6) Petri, H.L. and Govern, J.M., 2013, Motivation: Theory, Research, and Applications, (sixth edition) Wadsworth Cengage Learning: Belmont CA.
7) Soft skills, Career Development Centre, Green Pearl Publications.
8) Carnegie Dale, How to win Friends and Influence People, New York: Simon & Schuster.

9) Thomas A Harris, I am ok, You are ok , New York-Harper and Row.
10) Daniel Coleman, Emotional Intelligence, Bantam Book.
11) Covey Sean, Seven Habits of Highly Effective Teens, New York, Fireside Publishers.
12) Russell A. Stultz, Learn Microsoft Office – BPB Publication
13) Microsoft Office – Complete Reference – BPB Publication
14) P.K. Sinha and P. Sinha, Foundations of Computing, First Edition, BPB.
15) Torben Lage Frandsen, Microsoft office word.
16) Chetan Srivastva, Fundamentals of Information Technology, Kalyani Publishers.
17) Turban Mclean and Wetbrete, Information Technology and Management, Second Edition, John Wiley & Sons.
18) Satish Jain, Information Technology, BPB.
19) V. Rajaraman, Fundamental of Computers – (Prentice Hall)
20) P. K. Sinha, Fundamental of Computers – (B.P.B publication)
21) Alexis Leon, Introduction to Information Systems.
22) Dr. S. Chand, Courter, G Marquis, Microsoft Office 2000, Computer Fundamentals & Its Business Applications, Professional Edition. BPB.

Reference website:

1) https://persmin.gov.in/otraining/UNDPProject/undp_modules/Personality%20Dev%20N%20DLM.pdf
2) https://www.scribd.com/doc/39657092/Personality-Development-Study-Material
3) https://mscit.mkcl.org/

BVFP111S: Personality Development and Computer Fundamentals (Skill based)

Total credits: 6

1. Stress, Anger and Time Management.
2. Communication Skills.
3. CV Writing and Interview Techniques.
4. Teamwork and Leadership.
5. Problem Solving and Conflict Resolution.
6. Presentation Skills.
7. Internet surfing.
8. MS-Windows: features.
9. Documentation Using MS-Word.
10. Electronic Spread Sheet using MS-Excel.
11. Database Management using Excel.
12. Presentation using MS-PowerPoint
13. Creating tables in MS ACCESS using different ways.
14. Import and export data from MS ACCESS.
15. Creating queries in MS ACCESS
16. Creating forms in MS ACCESS
17. Working of Internet with Different Browsers (Internet Explorer, Google Chrome, Mozzila).
18. Applications of Internet. (Handling Email accounts.
19. Student Have to Do Following Activities:
    i. How to create Email
    ii. How to send email?
    iii. How to Download the Data?
    iv. How to attach files with email?

BVFP112G: Fundamentals of Food and Nutrition (General)

Total credits: 4 **Teaching Hours-60**

Aim of the course: The aim of the subject is to understand the importance of nutrient in our daily diet, formulate nutritionally enriched food products as per the requirement.

Outcome of the course: Development of proficiency skill in producing different nutritious food products. Operating and management of balanced diets for different age groups. Making different processed food products with quality assurance and assessment of nutritional status of the individual.

Syllabus

Unit-I: Basic concept of Food **18 Hours**

Nutrient and Nutrition- Classification of Nutrients, Food constituents- Definition, Classification of Food. Occurrence, properties and metabolism of- Protein, Carbohydrate and Lipids.

Unit- II: Enzymes **10 Hours**

Definition and classification of enzyme.

Reactions in foods-

i. Non enzymic browning: Maillard reaction, browning of ascorbic acid, caramelization of sugars.
ii. Enzymic browning: Definition, mechanism, control measures.

Unit-III: Biochemical changes in foods of plant and animal origin **9 Hours**

Fruits, vegetables, cereals, pulses, oilseeds, meat, poultry, seafood, dairy and their products

Unit-IV: Concept of food and nutrition **8 Hours**

Elements of nutrition, Food groups and role of nutrients. Energy metabolism - BMR

Unit-V: Concept of balanced diet **8 Hours**

Recommended dietary allowances, Balanced diet for different age groups (Infancy to old age).

Unit- VI: **Malnutrition** **7 Hours**

Causes, types, symptoms and prevention, Assessment of nutritional status of the community, National nutrition policy.

References

1) N.A.M. Eskin, H.M. Henderson, R. J. Townsend, Biochemistry of Foods.
2) Z. Berk, Introduction to the Biochemistry of Foods.
3) Julio Polaina and Andrew P. Mac Cabe. Industrial Enzymes: Structure, Function and applications.
4) M. Swaminathan, Food and Nutrition.
5) S. Mudambi, Human Nutrition.

Reference Websites:

1) https://www.fsis.usda.gov/wps/portal/fsis/home
2) https://www.foodrisk.org/
3) http://www.fao.org/food/food-safety-quality/scientific-advice/jecfa/jecfa-flav/en/

BVFP112S: Fundamentals of Food and Nutrition (Skill based)

Total credits: 6

List of Practicals-

1. Development of low cost recipes for baby, pre-schoolers, adolescent, pregnant and lactating mother.
2. Estimations of cholesterol in foods.
3. Separation and identification of amino acids by paper chromatography.
4. Calculation of BMR and body surface area
5. Calculation of energy value of food.
6. Planning and calculation of nutritive value of balanced diet for different age groups.
7. Assessment of nutritional status of an individual by anthropometric method and diet survey.
8. Enrichment and fortification of daily diet.
9. Computation of energy requirement on the basis of physical activity.
10. Collection of household food consumption data.
11. Collection of 24 hours dietary recall.
12. Preparation of dietary chart for different diseased conditions
    i. Intestinal disorders
    ii. Diabetes mellitus
    iii. Hypertension and cardiovascular disease.
13. Visit to institution conducting research in human nutrition.

BVFP113G: Introduction to Food Processing (General)

Total credits: 4 **Teaching Hours -60**

Aim of the course: To enable the students to know the post-harvest management systems and processing technologies for preservation of fruits & vegetables and various value added products.

Outcome of the course:

Development of proficiency skill in producing different types of processed fruits & vegetables products. Operating & maintenance the modern processing equipments & machineries. Knowledge of processed fruits & vegetables based products with quality assurance and safety.

Syllabus

Unit-I: Overview of food processing **6 Hours**

Production and processing scenario of fruits and vegetables in India and World. Post harvest management of fruits and vegetables- control of losses in harvesting, and handling operations. Scope of fruit and vegetable preservation industry in India, present status, constraints and prospects.

Unit-II: Maturity standards of fruits and vegetables **8 Hours**

Morphology, structure, composition of fruits and vegetables. Importance, methods of maturity determinations, maturity indices for selected fruits and vegetables. Harvesting of important fruits and vegetables. Fruit ripening- chemical changes and regulation methods.

Unit-III: Storage practices **13 Hours**

Modified & Controlled atmospheric storage, hypobaric storage, cool store. Commodity treatments- chemicals, wax coating, pre-packaging. Post Harvest handling, packaging & transport system for various fruits & vegetables, packaging house operations.

Unit-IV: Overview of fruit and vegetable preservation **11 Hours**

Overview of principles and preservation methods of fruits and vegetables. Commercial processing of major fruits and vegetables (jam, jellies, marmalade, purees, concentrates, candy, toffee/bar etc.).

Unit-V: Fruit juice preparation **8 Hours**

Processing technology for manufacturing of fruit juices, pulp, RTS beverage, nectars, squash, syrups, cordials, carbonated.

Unit-VI: Processing Products **14 Hours**

Tomato- Paste, ketchup, sauce, puree, soup, chutney etc. Drying and dehydration technology of fruits and vegetables- preparation of raisins, anardana, dried figs, dried leafy vegetables, juice powders, flakes, wafers, chips etc. Fermented fruits and vegetables products- sauerkraut, pickles, wines etc. Utilization of By-products and wastes from fruits and vegetables processing industry.

Reference Books:

1) Pantastico E. B., Post Harvest Physiology, "Handling and Utilization of Tropical and Subtropical Fruits and Vegetable", AVI Publishing Company, INC.
2) Wills R.B., M.B. Mc Glasson, D. Graham, L. Lee and E.G. Hall "Post Harvest: An Introduction to the Physiology and Handling of Fruits and Vegetables".
3) Verma L. R. and Joshi V. K. "Post Harvest Technology of Fruits and Vegetables: Handling, Processing, Fermentation and Waste Management" Vol. I and II.
4) Srivastava R.P. and Sanjeev Kumar, "Fruit and Vegetable Preservation Principles and Practices".
5) Khader, 'Preservation of Fruits and Vegetables".
6) Bhutani R.C. "Fruit and Vegetable Preservation".
7) Morris, Thomas Norman. "Principles of Fruit Preservation".
8) Giridharilal, G.S. Siddappa and G.L. Tandon. "Preservation of fruits and vegetables."
9) Duckworth, "Fruit and Vegetable Technology".

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2) http://www.fao.org/home/en/
3) https://nzifst.org.nz/resources/unitoperations/index.htm
4) http://ecoursesonline.iasri.res.in/course/index.php?categoryid=91

BVFP113S: Introduction to food processing (Skill based)

Total credits: 6

List of Practicals:

1. Studies on maturity indices of fruits and vegetables.
2. Studies on extension of shelf life.
3. Studies on use of chemicals for ripening of fruits and vegetables.
4. Studies on pre-packaging.
5. Studies on physiological disorders - chilling injury of banana and custard apple.
6. Canning/bottling of mango/guava/papaya fruits.
7. Preparation of fruit jam: apple/mango/guava/ papaya/amla/ strawberry.
8. Preparation of fruit jelly/marmalade: wood apple/ sweet orange/mandarin/guava/ tamarind.
9. Preparation of fruit preserve and candy.
10. Preparation of fruit RTS beverage/ squash/ syrup.
11. Preparation of pickle/ mixed pickle.
12. Preparation of grape raisin/ anardana / dried fig etc.
13. Preparation of dried ginger/ amchur/ onion and garlic.
14. Preparation of paste- Ginger /garlic/ chilli etc.
15. Visit to food processing industry

Food Processing Technology

Year 1: Diploma in Food Processing Technology

Semester II

BVFP121G: Grape processing and preservation (General)

Total credits: 4 **Teaching Hours -60**

Aim of the course: To learn about various processing and preservation techniques of grapes.

Outcome of the course: Understanding of techniques used in grape processing and study the procedures for preparation of grape products.

Syllabus

Unit I: Introduction to Grape Processing **14 Hours**

-Types of Grapes

- Harvesting and Maturity Indices of grapes for processing
- Composition of grape
- Recent trends in grape processing

Unit II: Raisin Processing **24 Hours**

- Selection and preparation of grape for raisin processing
- Pre-treatments used in raisin processing
- Drying methods
- Grading of Raisin (By colour and size)

Packaging of Raisin

- Packaging materials used

-Packaging methods used

- Equipments used in raisin processing and packaging

Unit III: Grape processing products **8 Hours**

- Grape pulp
- Grape jam preparation and packaging.
- Grapes leather praparation

Unit IV: Grape Beverages **14 Hours**

- Non-alcoholic beverages
- Alcoholic beverages

- Packaging material and methods
- Equipments used in beverage processing

References:

1) Lal G., Siddhappa G., Tondon G. L., 1986, Preservation of fruits and vegetables, ICAR, New Delhi.
2) Shrivastava, R. P. and Kumar. S., 1998, Fruit and Vegetable Preservation: Principles and
3) Practices, 2nd Edition, International Book Distribution Co., Lakhanow.
4) Salunkhe, D. K., and Kadam S. S., Ed 1995, Handbook of Fruit Science and Technology:
5) Production, Composition and Processing, Marcel Dekker, New York.

Reference Website:

1) http://www.fao.org/fao-who-codexalimentarius/en/
2) http://www.fao.org/home/en/

BVFP121S: Grape processing and preservation (Skill based)

Total credits: 6

1. Selection of grapes for various grape products.
2. Determination of TSS.
3. Determination of pH and Acidity of grape.
4. Preparation of Raisin from different variety of grapes.
5. Preparation of grape juice.
6. Preparation of grape RTS.
7. Preparation of grape squash.
8. Preparation of grape Syrup.
9. Preparation of grape crushes.
10. Preparation of grape nectar.
11. Preparation of grape wine.
12. Microbial profiling of wine.
13. Art of testing of wine.
14. Effect of age on appearance of wine.
15. Matching wine with food.
16. Visit to winery.

BVFP122G: Principles of Food Preservation (General)

Total credits: 4 **Teaching Hours -60**

Aim of the course: To acquaint the students with fundamental principles and various techniques of food preservation.

Outcome of the course: Student will enable to understand different food preservation techniques, process and extend shelf life of different food product by using the various methods of food preservation.

Syllabus

Unit-I: Introduction to Food Preservation **7 Hours**

Introduction, sources of food, scope and benefit of industrial food preservation, perishable, non-perishable food, causes of food spoilage. Types of food preservation.

Unit-II: Preservation by drying dehydration and concentration **12 Hours**

Principle, Methods, equipment and effect on quality: Difference, importance of drying and dehydration over other methods of drying and dehydration, equipment and machineries, physical and chemical changes in food during drying and dehydration.

Unit-III: Thermal Processing Methods of Preservation **18 Hours**

Principle and equipments: Canning, blanching, pasteurization, sterilization, evaporation, etc. Need and principle of concentration, methods of concentration – Thermal concentration, freeze concentration, membrane concentration, changes in food quality by concentration.

Unit-IV: Food preservation by use of Low Temperature **5 Hours**

Principle, equipments and effect of temperature on food quality. (Chilling, cold storage, freezing etc.).

Unit-V: Preservation by radiation and chemical preservatives **10 Hours**

Radiation- Definition, methods of irradiation, direct and indirect effect, measurement of radiation dose, dose distribution, effect on microorganisms. Deterioration of irradiated foods-physical, chemical and biological, effects on quality of foods.

Chemical preservatives- antioxidants, mold inhibitors, antibiotics, acidulants etc. Preservation by salt and sugar – Principle, method, equipment and effect on food quality.

Preservation by fermentation- Definition, advantages, disadvantages, types, equipments.

Unit-VI: Recent methods in preservation **8 Hours**

Theory, equipments and effect on food quality- Pulsed electric field processing, high pressure processing, Processing using ultrasound, dielectric, Ohmic and infrared heating.

References

1) Subbulaksmi G., and Udipi S Food Processing and Preservation.
2) Borgstron G., Mc. Millan Co. Ltd. London, Principles of Food Science, Vol. II
3) Owen R. Fenemma Principles of food preservation Part I& II.
4) Potter, Food Science, CBS publishers.
5) Desroiser N.W. and N.W. Desrosier, Technology of Food Preservation
6) Stewart G.P. & M.A. Amerine, Introduction to Food Science & Technology
7) Joslyn M.A. and J.J. Heild, Food Processing Operations Vol. III.
8) Giridhari Lal, G.S. Siddappa, and G.L.Tondon, Preservation of Fruits and Vegetables.

Reference website:

1) https://ec.europa.eu/food/safety/food_improvement_agents/flavourings/eu_lists_flavourings_en
2) http://www.fao.org/food/food-safety-quality/scientific-advice/jecfa/jecfa-additives/en/

BVFP122S: Principles of Food Preservation (Skill based)

Total credits: 6

1. Demonstration of various machineries used in food processing.
2. Study of effect of blanching on quality of foods.
3. Study of canning and bottling of fruits and vegetables.
4. Preservation of food by high concentration of sugar i.e. preparation of jam.
5. Preservation of food by using salt e.g. Pickle.
6. Preservation of food by hurdle technology i.e. pickling by acid, vinegar or acetic acid.
7. Preservation of food by using chemicals.
8. Preservation of coconut shreds using humectants.
9. Drying of fruit slices in cabinet drier.
10. Drying of green leafy vegetables.
11. Osmotic dehydration of foods e.g. candy.
12. Preparation of ready to cook soups.
13. Preservation of milk by condensation/concentration.
14. Demonstration of preserving foods under cold v/s freezing process.
15. Preparation of fermented food (Sauerkraut, Idli, curd, dhokla etc.)
16. Visit to any food processing industry/unit.

BVFP123G: Fish, Meat and Egg Processing Technology (General)

Total credits: 4 **Teaching Hours - 60**

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

Outcome of the course: Knowledge of **s**election of raw materials for specific poultry meat products and appropriate technological processes to produce different poultry, meat products. Awareness of legal regulations related to meat, fish and eggs.

Syllabus

Unit I: Compositional and Nutritional aspect of Animal foods **12 Hours**

Fish - Classification of fish (fresh water and marine), composition, and spoilage of fish - microbiological, physiological, biochemical.

Meat - Definition of carcass, concept of red meat and white meat, composition of meat, marbling in meat, post mortem changes in meat - rigor mortis, tenderization of meat, ageing of meat.

Eggs- Composition and nutritive value, egg proteins, characteristics of fresh egg, deterioration of egg quality.

Unit II: Fish Processing **13 Hours**

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

Unit III: Meat Processing **13 Hours**

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

Unit IV: Egg Processing **10 Hours**

Preservation of eggs - Refrigeration and freezing, thermal processing, dehydration, coating. Factors affecting egg quality.

Unit V: Products from Fish, Meat and Egg **12 Hours**

Fishery products- Process, traditional and modern production lines and quality of fish products. Fish protein concentrates (FPC), fish protein extracts (FPE).

Meat products: Sausages - processing, RTE meat products.

Egg products– Egg powder, frozen egg pulp, designer eggs.

References

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

Reference website:

1) https://mpeda.gov.in/MPEDA/
2) https://www.wcrf.org/dietandcancer/exposures/meat-fish-dairy

BVFP123S: Fish, Meat and Egg Processing Technology (Skill based)

Total credits: 6

List of Practicals:

1. Survey of the different processed products from meat, fish and poultry.
2. Meat processing- cutting, cleaning, storage, sanitation.
3. Handling and practice on meat processing equipment.
4. Practical on canning, pickling, preservation of meat.
5. To perform curing of meat.
6. Production of dehydrated, canned, pickled fish, Fish meal protein, fish meal powder.
7. Production methods of egg albumin, powder and other useful products from egg.
8. Preparation of egg pickle.
9. Preparation of canned egg and canned egg pickle.
10. Evaluation of egg quality parameters.
11. Quality testing of chicken meat.
12. Preparation of processed product from chicken – Sausages.
13. Preparation of processed product from chicken –pickle.
14. Preparation of processed product from chicken -dried chicken.
15. Industrial visit to fish, meat and meat products industry.