



**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**

**Advanced Diploma in Food Processing Technology (Year II)**

**Under Scheme of**

**B. Voc. of UGC**

**[Effective from 2019-20]**

## **UGC Sponsored B. Voc Programme**

Bachelor of Vocation (B. Voc.) is launched under the scheme of University Grants Commission on skill development based higher education leading to Bachelor of Vocation (B. Voc.) Degree with multiple exits as Diploma, Advanced Diploma and B. Voc. The B. Voc. Programme incorporate specific job roles and their National Occupational Standards along broad based general education. This course has been started in order to make education relevant and to create '**Industry Fit**' skilled workforce. B. Voc. programme has been designed as per National Skill Qualification Framework emphasizing on skill based education.

### **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 eligible to work at each exit point of the programme.
- To provide flexibility to students by means of pre-defined entry and multiple exit points.
- To integrate NSQF within the undergraduate level of higher education in order to enhance employability of the graduates and meet industry requirements. Such graduates apart from meeting the needs of local and national industry are also expected to be equipped to become part of the global workforce.
- To provide vertical mobility to students coming out with 10+2.

### **Preamble**

Arts, Science and Commerce College CIDCO, Nashik are offering a three year Bachelor Program in Vocational Education (B. Voc.) in Food Processing Technology from Academic year 2018-19. The curriculum design of this program is undertaken in the following framework (Preamble) as per the UGC guidelines for providing skill based education under National Skill Qualification framework.

In the age of globalization and increased unemployment there is huge demand for processed food and increased export of food and food products. This has opened a great avenue and career options for the students. Recent few years have proven to be a plethora of innovations in the field of food preservation and engineering therefore food industries are now

voraciously absorbing food technologists at a very fast rate. A changing urban life style has been making processed food more dependable by the day. Besides this, quality assurance of food is a major concern which is opening up a quite a few opportunities in the Government and private sectors. Industries, Government agencies, educational and research institutions need the expertise of people holding advanced degree in food science and processing technology. In addition to food manufacturing companies, lot of other industries offer unlimited opportunities for food scientists in the areas of basic research, quality assurance, product development, regulatory affairs and the application of technology. It is estimated around 200000 jobs will be available in the food and allied sector in our country. Self-employment through establishing start up projects is an important area for the graduates of food technology. There are several government and development department schemes for establishing small and medium enterprises by food technologists. As a qualified food technologist one can find umpteen opportunities in Food Processing Technology multinational and national companies, research and development organizations, Government bodies and academic institutions in the world over.

### **Program Outcomes**

Vocational Education is education that prepares the students for specific job role in various sectors in Food Processing Technology industries and Professional organization. It trains the students from a trade, technician or professional position in Research and Development organizations for specific job roles.

The program outcomes are the skills and knowledge which the students acquire at each exit level and at the end of graduation. These outcomes are generic and are common to all exit levels mentioned in the program structure.

- Students with vocational training can find work in several state and central government organizations, non-profit groups, and academic institutions and in private sectors as well.
- This program prepares students for specific types of occupations and for direct entry into the market.
- After completion of this program students will have enough competences, to get benefit from market opportunities.
- This program would enable students to update their knowledge and professional skills for entering the work force, executing income generating activities or occupying better positions.

- At each exit level of this program, students will be able to
  - a) Apply knowledge of general education subjects and skill development subjects to the conceptualization of food processing technologies.
  - b) Designing and formulation of new food products, on the basis of consumer's demands, development of methodology/technologies of food processing, design that meet solutions needs with appropriate consideration for public health and safety, cultural, social and environmental considerations.
  - c) Conduct and undertake investigations of problems of including design of processing technology for various type food, food analysis, food quality and safety aspects and interpretation of data in order to provide valid conclusions.
  - d) Create, select and apply appropriate processing technology/techniques, resources, modern processing tools in order to improve the quality, safety and the shelf life of fresh and processed food.
  - e) Communicate effectively on minimal processing activity and value addition to the farmers/producers/grower at large, such as being able to comprehend and write effective reports, design documentation and make effective presentations.
  - f) Demonstrate understanding of the social, health, safety, legal, cultural issues and the consequent responsibilities relevant to Food processing.
  - g) Understand and commit to professional ethics and responsibilities and norms/regulation for manufacturing of process food and its effects on health.
  - h) Understand the impact of food processing technologies solutions in a social context and demonstrate technical know-how and understanding of food safety, quality for sustainable development.

#### **Levels of award**

The certification levels shall lead to Diploma/Advanced Diploma/B.Voc Degree (Agriculture) in Food processing.

<b>Award</b>	<b>Duration</b>	<b>Corresponding NSQF level</b>
Diploma in Food Processing Technology	1 Year	5
Advanced Diploma in Food Processing Technology	2 Year	6
B. Voc. Degree in Food Processing Technology	3 Year	7

Cumulative credits awarded to the students at the end of each year.

Year	Skill Component Credits	General Education Credits	Total Credits for Award	Normal Duration	Exit Points/ Awards
1	36	24	60	Two sem.	Diploma
2	72	48	120	Four sem.	Advanced Diploma
3	108	72	180	Six sem.	B. Voc. Degree

### Eligibility for admission in B. Voc.

1. A candidate will be eligible to join 1<sup>st</sup> semester of B. Voc. Food Processing Technology course, if he/she has passed 10+2 examination, Diploma, 10+2 vocational stream (MCVC) from recognized Board/ university or any other examination recognized as equivalent to above mentioned.
2. Semester examination will be open to regular candidates who have been on the rolls of a college and meet the attendance and other requirements.
3. **Standard of Passing:** Student has to obtain 40% marks in the combined examination of In-Semester and End- Semester assessment with minimum passing of 30% passing in both assessments separately.

No. of Credits	Internal Marks Total	External Marks Total	Total Marks	Internal Passing Marks (30%)	External Passing Marks (30%)	Total Passing Marks (40%)
4	50	50	100	15	15	40
6	75	75	150	23	23	60

- **ATKT Rules:** A student cannot register for third semester if s/he fails to complete the 50% credits of the total credits expected to be ordinarily completed within two semesters.
- To qualify for admission to 5<sup>th</sup> semester (3<sup>rd</sup> year) of the course, the candidate must have passed 1<sup>st</sup> year and completed 50% credits of the 3<sup>rd</sup> and 4<sup>th</sup> semester (2<sup>nd</sup> year).
- **Attendance:** Students must have 75 % of attendance in each course for appearing examination otherwise he / she will not be allowed for appearing the examination of the course. However, students having 65 % attendance may request Principal for appearing the examination on medical ground.

### Evaluation Methods

The assessment will be based on Continuous Internal Assessment (CIA) and semester end examination (SEE). For each general course Continuous Internal Assessment (CIA) and semester end examination (SEE) will be of 50 marks each. For each skill based course Continuous Internal Assessment (CIA) and semester end examination (SEE) will be of 75 marks each. Marks obtained by the student in all heads viz. CIA and SEE will be added while declaring the final result.

**Continuous Internal Assessment (CIA):-** The internal marks shall be assigned on the basis of tutorials/home assignment/seminar presentation and weekly tests/class test/ preliminary examination, etc. to be conducted by the college. For practical courses continuous evaluation process will be on the basis of the following- Performance assessment of each experiment on the basis of attendance, punctuality, journal completion, practical skills, results, oral and analysis. Test on practical may be conducted before the end-semester examination. Assessment of each experiment shall be done for each practical weekly. If student misses internal assessment examination, she/he will have second chance with the permission of the concerned teacher. But it will not be right of the student. There shall be revaluation of answer script of end semester examination, but not of internal assessment papers. Internal assessment answer scripts may be shown to the concerned student but not end semester answer script.

**Semester End Examination (SEE):-** Semester end examination of the course would be held about two weeks after completion of teaching for the semester.

#### **Award of Class**

Grades will be awarded from grade point average (GPA) of the credits.

Marks/Grade/Grade Point (10 Point Scale)

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

#### **Final Grade (10 Point Scale)**

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

Remark- B+ is equivalent to 55% marks and B is equivalent to 50% marks.

### Computation of SGPA and CGPA

Credit Point (CP) = Credit (C) × Grade Point (G)

$$\text{SGPA } (S_i) = \sum (C_i \times G_i) / \sum C_i$$

SGPA = Semester Grade Point Average

$C_i$  = Number of Credit of the  $i^{\text{th}}$  course component

$G_i$  = Grade Points scored by the student in the  $i^{\text{th}}$  course component

### CGPA= Cumulative Grade Point Average

$$\text{CGPA} = \sum (C_i \times S_i) / \sum C_i$$

$S_i$  = SGPA of the  $i^{\text{th}}$  Semester

$C_i$  = Number of credits in that semester

$$\text{Grade Point Average} = \frac{\text{Total of Grade Point Earned} \times \text{Credit hrs for each Course}}{\text{Total Credit Hours}}$$

## **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)



**Course structure of B. Voc. Food Processing Technology**  
**Diploma in Food Processing Technology**  
**First year (Semester I & II)**

<b>Semester I</b>			
<b>Paper code</b>	<b>Title</b>	<b>No. of Credits</b>	<b>Marks</b>
<b>General education component</b>			
BVFP111G	Personality Development and Computer Fundamentals	4	100
BVFP112G	Fundamentals of Food and Nutrition	4	100
BVFP113G	Introduction to Food Processing	4	100
<b>Skill Based Component</b>			
BVFP111S	Personality Development and Computer Fundamentals	6	150
BVFP112S	Fundamentals of Food and Nutrition	6	150
BVFP113S	Introduction to food Processing	6	150
	<b>Total</b>	<b>30</b>	<b>750</b>
<b>Semester II</b>			
<b>General education component</b>			
BVFP121G	Grape Processing and Preservation	4	100
BVFP122G	Principles of Food Preservation	4	100
BVFP123G	Fish, Meat and Egg Processing Technology	4	100
<b>Skill Based Component</b>			
BVFP121S	Grape Processing and Preservation	6	150
BVFP122S	Principles of Food Preservation	6	150
BVFP123S	Fish, Meat and Egg Processing Technology	6	150
	<b>Total</b>	<b>30</b>	<b>750</b>

**Course structure of B. Voc. Food Processing Technology**  
**Advanced Diploma in Food Processing Technology**  
**Second year (Semester III & IV)**

<b>Semester III</b>			
<b>Paper code</b>	<b>Title</b>	<b>No. of Credits</b>	<b>Hours/week</b>
<b>General education component</b>			
BVFP231G	Fundamental of Food Biochemistry	4	100
BVFP232G	Basics of Food Packaging	4	100
BVFP233G	Agro-Processing	4	100
<b>Skill Based Component</b>			
BVFP231S	Fundamental of Food Biochemistry	6	150
BVFP232S	Basics of Food Packaging	6	150
BVFP233S	Agro-Processing	6	150
	<b>Total</b>	<b>30</b>	<b>750</b>
<b>Semester IV</b>			
<b>General education component</b>			
BVFP241G	Bakery and Confectionary	4	100
BVFP242G	Food quality Assurance and Control	4	100
BVFP243G	Milk and Milk Product Processing	4	100
<b>Skill Based Component</b>			
BVFP241S	Bakery and confectionary	6	150
BVFP242S	Food quality Assurance and Control	6	150
BVFP243S	Milk and Milk Product Processing	6	150
	<b>Total</b>	<b>30</b>	<b>750</b>

**Course structure of B. Voc. Food Processing Technology**

**B. Voc. Food Processing Technology**

**Third year (Semester V & VI)**

<b>Semester V</b>			
<b>Paper code</b>	<b>Title</b>	<b>No. of Credits</b>	<b>Hours/week</b>
<b>General education component</b>			
BVFP 351G	Marketing, Retail Management and Entrepreneurship Development	4	100
BVFP 352G	Food Spoilage and Control	4	100
BVFP 353G	Food Industry Waste Management	4	100
<b>Skill Based Component</b>			
BVFP 351S	Marketing, Retail Management and Entrepreneurship Development	6	150
BVFP 352S	Food Spoilage and Control	6	150
BVFP 353S	Food Industry Waste Management	6	150
	<b>Total</b>	<b>30</b>	<b>750</b>
<b>Semester VI</b>			
<b>General education component</b>			
BVFP 361G	Technology of Beverages	4	100
BVFP 362G	Food processing Plant Designing and Documentation	4	100
BVFP 363G	Emerging Technologies in Food Industry	4	100
<b>Skill Based Component</b>			
BVFP364S	Industrial/ Institutional project	14	350
BVFP365S	Preparation of Food Processing Plant Proposal	04	100
	<b>Total</b>	<b>30</b>	<b>750</b>

## **Food Processing Technology**

### **Year 2: Advanced Diploma in Food Processing Technology**

#### **Semester – III**

#### **BVFP231G: Fundamental of Food Biochemistry and Microbiology (General)**

**Total credits: 4**

**Teaching Hours- 40 (4 hours/week)**

**Aim of the course:** To explain the chemical composition and functional properties of food. Study about the major and minor components of food, their properties and Microbiology essential for food processing.

**Outcome of the course:** Knowledge of the classification, structure and chemistry of the various food components and micro-organisms.

#### **Syllabus**

##### **Unit I: Water**

**5 Hours**

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

##### **Unit II: Carbohydrates**

**5 Hours**

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

##### **Unit III: Proteins**

**5 Hours**

Nomenclature, sources, structure, functions, classification - essential and nonessential amino acids, Physical and chemical properties of proteins and amino acids, Functional properties- denaturation, hydrolysis, changes in proteins during processing. Enzymes - Specificity, enzymes added to food during processing, enzymatic browning.

**Unit IV: Fats and oil****5Hours**

Nomenclature, composition, sources, structure, functions, classification, essential fatty acids. Physical and chemical properties - hydrolysis, hydrogenation, rancidity and flavour reversion, emulsion and emulsifiers, saponification value, acid value and iodine value, smoke point.

**Unit V: Pigments, colours and flavours in food****5 Hours**

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

**Unit-VI: Introduction and Scope of Microbiology****5 Hours**

Definition and history of microbiology, contributions of Antony van Leeuwenhoek, Louis Pasteur, Robert Koch, importance and scope of microbiology. Microscope: Construction and working principles of different types of microscopes compound, dark field, Phase contrast, Fluorescence and Electron (Scanning and transmission).

**Unit-VII: Microbial Taxonomy****10 Hours**

Concept of microbial species and strains, prokaryotes and eukaryotes, classification of bacteria based on- (a) morphology (shape and flagella), (b) staining reaction, (c) nutrition and (d) extreme environment.

General Account of Viruses and Bacteria- Bacteria – Ultrastructure of bacterial cell (both Gram positive and Gram negative) including, endospore and capsule. Viruses- Structure and classification

Principles of Microbial Nutrition: the requirements for carbon, nitrogen, sulphur growth factors etc, role of oxygen in nutrition, nutritional categories among microorganisms.

Microbial growth: Kinetics of microbial growth, growth curve synchronous growth, factors affecting bacterial growth.

**References**

- 1) David L. Nelson and M.M. Cox Lehninger: Principles of Biochemistry, 4th edition, by Maxmillan/Worth publishers/W.H. Freeman and Company.
- 2) Garrett R.H and C. M. Grisham Biochemistry, 2nd edition (1999). Saunders College Publishing, N. Y. Sons, NY.
- 3) David J. Rawn, Biochemistry , Panima Publishing Corporation, New Delhi.
- 4) Stryer Biochemistry, 4th edition, W.H. Freeman and Co. NY.

- 5) Donald Voet, Judith G. Voet and Charlotte W. Pratt Fundamental of Biochemistry, 2nd ed. (2006), John Wiley and Sons, INC.
- 6) Atlas, R.M. (1998) Microbiology: Fundamental and applications, 2nd edition, Macmillan Publishing Company, New York.
- 7) Pelezar, M.J., Chan, E. G. S. and Krieg, N.R. (1999) Microbiology.
- 8)** Prescott, L.M., Harley, J.P. and Klein, D.A. (1999) Microbiology, W.C.B. Oxford.

## **BVFP231S: Fundamental of Food Biochemistry and Microbiology (Skill Based)**

**Total credits: 6**

### **List of Practicals :**

1. Determination of TSS value of given food product.
2. Determination of acidity and pH of food product.
3. Determination of acid value in given oil.
4. Estimation of salt content in given food stuff.
5. Determination of vitamin C by titration method.
6. Determination of Protein by kjeldahl method.
7. Determination of fat by soxhlet apparatus.
8. Quantitative estimation of Total sugars, reducing sugars.
9. Determination of Moisture and ash content in food.
10. Determination of pigment in food.
11. Determination of Calcium, Iron and Zinc in food.
12. Demonstration of presence of bacteria from – soil/ water/ air/ milk
13. Demonstration of yeast, fungi, actinomycetes, algae, protozoa etc.
14. Microscopic examination of bacteria:
  - i. Monochrome staining
  - ii. Negative Staining
  - iii. Gram's staining
15. Hanging drop technique to demonstrate bacterial motility

## **BVFP232G: Basics of Food Packaging (General)**

**Total credits: 4**

**Teaching Hours- 40 (4 hours/week)**

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

**Outcome of the Course:** Familiarization with the different materials and methods used for packaging. Understanding the technology behind packaging and packaging materials. Basic idea about the materials used for food packaging, their testing and different forms in which a food can be packed.

### **Unit I: Introduction to Packaging**

**6 Hours**

Definition, Functions of packaging – Containment, Protection, Preservation, Promotion, Convenience, Communication. Requirements of effective package, Types of food packaging- primary, secondary and tertiary packaging.

### **Unit II: Deteriorative Reactions and Shelf life of Foods**

**8 Hours**

Introduction, deteriorative Reactions in food- factors affecting deterioration of foods physical changes, biological changes, chemical changes.

Shelf life of foods – Definition, intrinsic and extrinsic factors controlling the rate of reactions. Shelf life determination tests.

### **Unit III: Packaging Materials and their Properties**

**9 Hours**

Rigid containers- Glass, wooden boxes, metal cans (Aluminium and tin plate containers). Semi rigid containers- paperboard cartons.

Flexible packaging- paper, plastic pouches (Low density polyethylene, High density polyethylene and Polypropylene).

Packaging materials for dairy products, bakery and confectionary, granular products, fruits and vegetables.

### **Unit IV: Special Packaging**

**7 Hours**

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



**Unit V: Labelling and Safety Concerns in Food Pack****10 Hours**

Printing process, inks, adhesives, labelling, coding- bar codes, Food packaging closures of glass and plastic containers.

Legislative and safety aspects of food packaging.

Machineries used in Food Packaging, Package testing-Thickness, Paper density, Basis weight, Grammage, Tensile Strength, Gas Transmission Rate (GTR), Water Vapour Transmission Rate (WVTR).

**References:**

- 1) Gordon L. Robertson (2012), "Food Packaging: Principles and Practice", Third Edition, CRC Press.
- 2) Takashi Kadoya, "Food Packaging", Academic press.
- 3) Richard Coles, Derek McDowell, Mark J. Kirwan (2003), "Food Packaging Technology", CRC Press
- 4) Miguel Angelo, "Edible food packaging" CRC Press.
- 5) Jari Vartiainen, "Food packaging materials" Excelic press.
- 6) Preeti Singh, "Food packaging materials- testing and quality assurance" CRC Press.
- 7) Rinus Rijk and Rob Veraart "Global legislation for food packaging material", WILEY- VCH.

## **BVFP232S: Basics of Food Packaging (Skill Based)**

**Total credits: 6**

### **List of Practicals:**

1. Study of different types of packaging and packaging materials.
2. To perform different destructive and non- destructive test for glass containers.
3. Determination of tensile strength of given material.
4. Determination of tearing strength of paper.
5. Determination of water vapour transmission rate.
6. Determination of drop test of food package.
7. To demonstrate shrink packaging.
8. Measurement of thickness of packaging materials.
9. Determination of wax weight.
10. To perform grease-resistance test in plastic pouches.
11. Determination of bursting strength of packaging material.
12. Demonstration of can-seaming operation.
13. Testing of chemical resistance of packaging materials.
14. Video display of latest trends in packaging.
15. Visit to food packaging industries.

## **BVFP233G: Agro-Processing (General)**

**Total credits: 4**

**Teaching Hours- 40 (4 hours/week)**

**Aim of the course:** To acquaint with production and consumption trends, structure, composition, quality evaluation, and processing technologies for product development and value addition of various cereals, pulses and oilseeds.

**Outcome of the Course:** Awareness about the processing of major cereals like paddy, maize. Storage and handling techniques of cereals, oilseed and pulses. Gain knowledge on processing and milling of pulses and extraction of oil.

### **Syllabus**

#### **Unit I: Paddy Processing**

**9 Hours**

Composition, quality characteristics of paddy, Parboiling Processes (soaking, steaming, drying) and its advantages and disadvantages, Methods of parboiling- CFTRI and pressure parboiling process, Paddy Dryer - LSU Dryer. Production of Flattened Rice and Puffed Rice from Paddy.

#### **Unit II: Rice Milling**

**11 Hours**

Rice Mill Flow Chart, Screening, Type of Screens, Effectiveness of screens, Modern rice mill and their components- Air screen cleaners, Separators- Spiral separator, Inclined drapper, pneumatic separator, Fineness modulus, size reduction machineries- crushers, grinders, Engelberg Huller Mills. rubber roll Shellers, Paddy Separators- rubber roll Sheller with husk separator, Polishers - Vertical Whitening Cone polishers, Extraction of rice bran oil and uses of rice bran in food industry.

#### **Unit III: Wheat Milling**

**7 Hours**

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

#### **Unit IV: Milling of Pulses**

**5 Hours**

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

### **Unit V: Processing of oil seeds**

**8 Hours**

Composition and characteristics of oil seeds and oils, Oil extraction methods, Process of oil refining, Methods, principle and working- hydraulic press, screw press, solvent extraction methods, blending of oils.

### **References**

- 1) Dendy DAV & Dobraszczyk BJ. “Cereal and Cereal Products”, Aspen Publications.
- 2) Chakraverty, A. (1995), “Post Harvest Technology of Cereals, Pulses and Oilseeds”. Oxford and IBH Publishing Co, Calcutta
- 3) N.L.Kent and A.D.Evans: (1994) “Technology of Cereals” (4th Edition), Elsevier Science (Pergaman), Oxford, UK,
- 4) Samuel Matz: (1992), “The Chemistry and Technology of Cereals as Food and Feed, Chapman & Hall.
- 5) Smail Chemat “Edible oils-Extraction, processing and applications” CRC press.
- 6) Edward Bradfield, “Wheat and the flour mill- A handbook for practical flour millers” General Books.
- 7) Walter E. Farr, “Green vegetable oil processing” Academic press.
- 8) Sergio O. Serna- Saldivar, “ Cereal grains- properties, processing and nutritional attributes” CRC press.

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### **BVFP233S: Agro-Processing (Skill Based)**

**Total credits: 6**

#### **List of Practicals:**

1. Determination of Physical properties of grains.
2. Determination of Moisture content of Flours.
3. Flour Analysis.
4. Estimation of Starch in wheat flour.
5. Study of drying of grains.
6. Determination of average size of flour by using sieve analysis.
7. Preparation of Puffed cereals.
8. Preparation of Dal.
9. Preparation of Pulse flour of different granule size.
10. Preparation of soya milk.
11. Preparation of soy nuts.
12. Preparation of Health food mix.
13. Preparation Flavoured Soya milk.
14. Preparation of oil.
15. Visit to mill/cereal/ or pulse or oil processing unit.

## **Food Processing Technology**

### **Year 2: Advanced Diploma in Food Processing Technology**

#### **Semester IV**

#### **BVFP241G: Bakery and Confectionary (General)**

**Total credits: 4**

**Teaching Hours-40 (4 hours/week)**

**Aim of the course:** To impart basic and applied technology of baking, confectionary and acquaint with the manufacturing technology of bakery and confectionary products.

#### **Outcome of the Course:**

Knowledge of the processing methods used in baking and confectionery industries. Information about the various types of food products made using baking technology. Basic idea about baking and confectionery manufacture and quality control. Efficiency to start a small scale bakery and confectionery unit.

#### **Syllabus**

##### **Unit I: Properties of wheat**

**7 Hours**

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

##### **Unit II: Principles of baking and Bread manufacturing**

**10 Hours**

Major baking ingredients and their functions, role of baking ingredients in improving the quality of bread. Characteristics of good flour used for making bread, biscuits and cakes. Ingredients used for bread manufacture, methods of mixing the ingredients.

Dough development methods - straight dough, sponge dough, moulding, proofing, baking, packing, spoilage, bread staling.

Methods to reduce bread staling and spoilage.

**Unit III: Cake and pastries manufacturing****8 Hours**

Cakes and pastries- ingredients, development of batter, baking and packing. Spoilage in cakes and pastries.

Pastries- Short crust, choux, flaky (pies, tarts, éclairs, puff).

Icing- classification, preparing and applying various types of icing. Basic procedures, tools and equipments.

**Unit IV: Manufacture of different Biscuits.****7 Hours**

Classification, backing various types of biscuits. Basic procedure in production. Types of biscuits- salted, icebox, piping, rolling, macaroons, tarts.

**Unit V: Confectionery****8 Hours**

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

Pudding – chocolate mousse, bavarois, ginger pudding, cold lemon soufflé, fruit trifle.

**References:**

1. Zhou. W, Hui Y,H; “Bakery Products Science and Technology”, 2nd Edition, Wiley Blackwell Publishers,
2. Pyler, E. J. and Gorton, L.A. “Baking Science & Technology” Vol.1 Fourth Edition,Sosland Publications.
3. Stanley P. Cauvain, Linda S. Young,“Baked Products: Science Technology and Practice”. John Wiley & Sons Publishers.
4. John Kingslee, “A professional text to bakery and confectionary”.
5. Yogambal Ashokkumar, “Text book of bakery and confectionary”. Prentice Hall India.
6. Parvinder Bali, “Theory of bakery and patisserie”. Oxford University press.
7. Thangam Philip, “Modern Cookery”, Orient Black Swan.

## **BVFP241S: Bakery and Confectionary (Skill Based)**

**Total credits: 6**

### **List of practicals**

1. Introduction to Bakery and Confectionery Equipments.
2. Determination of Gluten content.
3. Preparation of Bread.
4. Preparation of brown bread.
5. Preparation of pizza base.
6. Preparation of Cake.
7. Preparation of pastries.
8. Preparation of Biscuits.
9. Preparation of Cookies.
10. Preparation of Toast.
11. Preparation of candy.
12. Preparation of Toffee.
13. Preparation of Fudge.
14. Preparation of Khari.
15. Visit to bakery.



## **BVFP242G: Food Quality Assurance and Control (General)**

**Total credits: 4**

**Teaching Hours- 40 (4 hours/week)**

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

**Outcome of the Course:** Understanding the principles and framework of food safety and food laws and regulations governing the quality of foods. Applications of preventive measures and control methods to minimize microbiological hazards and maintain quality of foods. Identification of wide variety of parameters affecting food quality. Knowledge of Intellectual Property Rights.

### **Syllabus**

#### **UNIT I: Introduction to Quality Attributes of Food**

**3 Hours**

Appearance, flavour, textural factors and additional quality factors.

#### **UNIT II: Gustation**

**8 Hours**

Introduction and importance of gustation. Structure and physiology of taste organs- tongue, papillae, taste buds, salivary glands. Mechanism of taste perception. Chemical dimensions of basic tastes- sweet, salt, sour, bitter and umami, Factors affecting taste quality, reaction time, taste modification, absolute and recognition threshold, Taste measurement- Electronic Tongue, Taste abnormalities

#### **UNIT III: Olfaction**

**8 Hours**

Introduction, definition and importance of odour and flavour. Anatomy of nose, physiology of odour perception. Mechanism of odour perception, Theories of odour classification, chemical specificity of odour, Odour measurement techniques – historical perspective and emphasis on recent techniques- e- nose etc, olfactory abnormalities.

**UNIT IV: Colour****6 Hours**

Introduction and importance of colour, Dimensions of colour and attributes of colour; gloss etc., Perception of colour, Colour Measurement: Munsell colour system, CIE colour system, Hunter colour system, etc., Colour abnormalities.

**UNIT V: Texture****7 Hours**

Introduction, definition and importance of texture, Phases of oral processing, Texture perception, receptors involved in texture perception, Rheology of foods, Texture classification, Texture measurement – basic rheological models, forces involved in texture measurement and recent advances in texture evaluation, Application of texture measurement in cereals, fruits and vegetables, dairy, meat and meat products.

**Unit VI: Food Quality Laws and Regulations****8 Hours**

Quality assurance, Total Quality Management, GMP/GHP, FSSAI, GAP, Sanitary and hygienic practices, HACCP, Quality manuals, documentation and audits; Indian & International quality systems and standards like ISO and Food Codex, Export import policy, export documentation, Laboratory quality procedures and assessment of laboratory performance. Applications in different food industries. Food adulteration and food safety.

**References:**

1. Rao E. S. Food Quality Evaluation. Variety Books.
2. Pomeranz Y and Meloan CE Food Analysis – Theory and Practice, CBS Publishers and Distributors, New Delhi.
3. DeMan J. Principles of Food Chemistry, 3rd ed., Springer.
4. Meilgard Sensory Evaluation Techniques, 3rd ed. CRC Press LLC.
5. Amerine, Pangborn & Roessler Principles of Sensory Evaluation of food, Academic Press, London.
6. Yong-Jin Cho, Sukwon Kang. “Emerging Technologies for Food Quality and Food Safety Evaluation”, CRC Press.
7. Alli Inteaz, “Food Quality Assurance: Principles and Practices”, CRC Press.
8. Vasconcellos J. Andres, “Quality Assurance for the Food Industry: A Practical Approach”, CRC Press.

## **BVFP242S: Food Quality Assurance and Control (Skill Based)**

**Total credits: 6**

### **List of Practicals**

1. Determination of crude fiber content of food.
2. Determination of Total Plate Count.
3. Determination of Yeast and Mould Count.
4. Detection of presence of coliform group of organism in food.
5. Sensory analysis of food products.
6. To perform sensitivity tests for four basic tastes.
7. To perform analytical and affective tests of sensory evaluation.
8. Recognition tests for various food flavors.
9. Sensory evaluation of milk and milk products.
10. Flavour defects in milk.
11. Extraction of pigments from various fruits and vegetables.
12. Study the effect of temperature on food product.
13. Study the effect of pH on food product.
14. Texture evaluation of various food samples- cookies/ biscuits/ snack foods.
15. Measurement of colour.

## **BVFP243G: Milk and Milk Product Processing (General)**

**Total credits: 4**

**Teaching Hours- 40 (4 hours/week)**

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

**Outcome of the Course:** Understanding of the products that can be made from milk. Understand the processing and storage of dairy products. Gain about the quality control measures applied in dairy industries. Basic idea about their processing and products which can be made at a small scale.

### **Syllabus**

#### **Unit I: Introduction**

**7 Hours**

Milk - Definition, sources, and milk composition and milk constituents, factors effecting composition of milk, physiochemical properties of milk, collection and transportation of milk. Sources of contamination of milk, methods applied to reduce the contamination of milk.

#### **Unit II: Processing of Market Milk**

**8 Hours**

Flowchart of milk processing, Reception, Different types of cooling systems. Clarification and filtration process, standardization- Pearson's square method, pasteurization-LTLT, HTST and UHT process- continuous pasteuriser, Sterilisation and Homogenisation, Cream separation- centrifugal cream separator.

#### **Unit III: Special Milks**

**7 Hours**

Skim milk, evaporated milk, condensed milk, standardized milk, toned milk, double toned milk, flavoured milk, reconstituted milk.

#### **Unit IV: Indigenous and Fermented Milk Products**

**8 Hours**

Product description, methods for manufacture of butter, cheese, ice cream, khoa, channa, paneer, shrikhand, ghee. Spray drying system: dried milk- whole milk and skim milk powder. Instantization of milk.

#### **Unit V: In-Plant Cleaning System**

**10 Hours**

Introduction to Cleaning in- place (CIP) system - cleaning procedure, Cleaning efficiency,

Methods of cleaning in food industry, cleaning solutions – Detergents, Sanitizers. SIP system of dairy plant, Personal hygiene in dairy plant.

**References:**

- 1) Joshi.V.K. “Indigenous Fermented Foods of South Asia”, CRC Press.
- 2) Alan H. Varnam, “Milk and Milk Products: Technology, chemistry and microbiology”, Springer Science & Business Media Publishers.
- 3) Robinson, R. K., “Modern Dairy Technology: Volume 2 Advances in Milk Products”, Springer Science & Business Media Publishers.
- 4) Jane Salia dos Reis Coimbra, “engineering aspects of milk and dairy products.” CRC press.
- 5) Young W.Park, “Milk and dairy products in human nutrition” Willey- Black well.
- 6) Ramesh C.Chadan, “Dairy processing and quality assurance” Willey- Black well.
- 7) Megh R Goal. “Novel dairy processing technologies” CRC press.

## **BVFP243S: Milk and Milk Product Processing (Skill Based)**

**Total credits: 6**

### **List of practicals**

1. Detection and Quantification of Starch in Milk
2. Determination of specific gravity of milk by using lactometer
3. Determination of Titrable Acidity of Milk and pH of milk.
4. Determination of Fat and SNF content in milk.
5. Study on Separation of cream from milk.
6. Study the pasteurization and sterilization process in detailed.
7. Determination of Clot on boiling test of milk.
8. Preparation of Dahi.
9. Preparation of Lassi.
10. Preparation of khoa.
11. Preparation of Basundi.
12. Preparation of shrikand.
13. Preparation of Pedha.
14. Preparation of ice cream .
15. Preparation of ghee.
16. Preparation of flavoured milk.
17. Visit to milk product development centre.