Anekant Education Society's

TULJARAM CHATURCHAND COLLEGE, BARAMATI, DIST-PUNE – 413102

Revised Proposed Syllabus

For

B. Voc.

(Dairy Technology)

S.Y. (Semester III & IV)

Sponsored by

University Grant Commission

Under

National Skill Qualification Framework (NSQF)

To be implemented from

2020-21

Title of the Course: B. Voc. (Dairy Technology)
(To be implemented from Academic Year - 2019-2020)

Course structure:

- B.Voc. is three year course with three theory and three practical courses in each semester**.**
- Each theory course will be of four credits and each credit is of 15 periods
- Each practical course will be of six credits and each credit is of 15 periods
- Each period is of one clock hour.
- In each practical course there will be one visit to the relevant industry/ institute.
- In addition to the regular practicals based on the theory course, special emphasis will be on communications and soft skills development of the students.

Eligibility:

1) **First Year B. Voc. (Diploma):** A student who has passed the Higher Secondary School Certificate (10+2) in any stream or its equivalent examination
2) **Second Year B. Voc. (Advanced diploma):** Keeping terms of First Year of B. Voc. and if they fulfill the eligibility conditions.
3) **Third Year B. Voc. (Degree):** Student shall pass all First Year B. Voc. courses and satisfactorily keeping terms of Second Year of B. Voc.

Note: Admissions will be given as per the selection procedure / policies adopted by the college, in accordance with conditions laid down by the Savitribai Phule Pune University, Pune.

Examination Pattern:

Examination:

- **Pattern of Examination**.
  i) Internal exam, Term end exam, Oral, Project, Presentation, GD, Viva voce
  ii.) Pattern of the question paper:
    i) 25% Objective Question
    II) 50% Short and Long Answer type question
    iii) 25% Problem based Case Study/long answer type
- **Theory Examination: -**
  i) Continuous Internal Assessment: 50 Marks (Unit Test I & II, Assignment-2 No., Attendance) for each course of programme.
  ii) Semester End Examination: 50 Marks on the basis of Answer Sheet Evaluation for each course
- **Practical Examination: -**
  i) Continuous Internal Assessment: 75 Marks (Visit Report, Journal, Viva Voce, Seminar/Presentation, Group Discussion and Attendance) for each course.
  ii) Semester End Examination: 75 Marks on the basis of Answer Sheet Evaluation with performance in practical examination which will be evaluated by external examiner for each course.

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Dairy Technology (B. Voc. Programme) Second Year Syllabus

Sub. Code.	Semester-III	Credits	Marks
	Theory (General Education Component)		
BDT-301	Dairy Processing Equipments	04	100
BDT-302	Fermented Milk Products	04	100
BDT-303	Nutrition Science	04	100
	Practical		
BDT-3.1	Dairy Processing Equipments	06	150
BDT-3.2	Fermented Milk Products	06	150
BDT-3.3	Nutrition Science	06	150
	Total	**30**	**750**
	Semester-4		
BDT-401	Dairy Engineering	04	150
BDT-402	Traditional Indian Dairy Products	04	150
BDT-403	Food Safety, Hygiene & Sanitation	04	150
	Practical (Skill Based Component)		
BDT-4.1	Dairy Engineering	06	150
BDT-4.2	Traditional Indian Dairy Products	06	150
BDT-4.3	Food Safety, Hygiene & Sanitation	06	150
	Total	**30**	**750**
	Total Second Year	**60**	**1500**

Note:

- One compulsory visit to field/industry/institute for practical papers in all semesters
- Report Submission and PPT presentation of visit report is mandatory
- Seminar Report preparation and PPT presentation mandatory for each theory papers.
- Group discussion/case study based on local/regional/national social economic aspects.

B. Voc. Second Year **Paper No. BDT-301** **Semester III**

Dairy Processing Equipments (Theory-General Education)

Maximum Marks: 100 **Credits: 4**

Teaching Period: 4 Theory **Teaching Load: 60 Theory Period**

Objectives-

- **To understand type of materials used for making equipment in dairy industry.**
- **To know about maintenance of Equipments.**
- **To understand the design and working of pumps, and other processing Equipments.**

Unit-1 Materials and sanitary features of the dairy & food equipment, Sanitary pipes and fittings, Pumps: Types, working principle, care & maintenance, Cleaning & Sanitation in Dairy & Food equipment: Cleaning & Sanitizing Agents, Cleaning in Place (CIP)

Unit-2 Homogenizer: Single & Two stage, homogenizing valve. Sterilizer, Pouch & Bottle filling machine, Carbonation unit.

Unit-3 Description, working and maintenance of milk reception equipment: Tipping tank, Storage tank, Can washer, bottle washers, crate washer

Unit-4 Study of Dairy & Food processing equipment: Pasteurizer: batch, HTST, FDV, Centrifugal Cream Separator, and Clarifier.

Unit-5 Boilers & steam generation: Modes of heat transfer, thermal conductivity, specific heat, temperature measuring instruments,. Properties of steam: Wet, dry saturated, superheated steam, Steam generators: Fire tube boilers, Water tube boilers. Boiler mountings and accessories

References:

- Dairy engineering Technology and engineering of Dairy Plant Operation- Anantkrishnan C.P. Simha N.N. (1987)
- Dairy Plant Engineering and Management (1990) Tufail Ahmad
- Food engineering and Dairy Technology- Kessler H.G. (1981)

B. Voc. Second Year **Paper No. BDT-302** **Semester III**

Fermented Milk Products (Theory-General Education)

Maximum Marks: 100 **Credits: 4**

Teaching Period: 4 Theory **Teaching Load: 60 Theory Period**

Objectives-

- **To learn basics of fermentations, starter cultures, and fermenters**
- **To learn making process of various fermented products**
- **To learn Principles of cheese making**

Unit-1- Introduction to fermentation

Definition, Concept, Types of fermentation, Fermenter, Importance of fermentation, Starter culture and its classification , types and importance, Nutritional importance and need and benefit of fermented products.

Unit 2- Fermented Milks

Characteristics of fermented milk products, varieties of fermented milk products available in market Dahi, MishtiDahi, Lassi, Shrikhand, Yogurt,

Unit 3- Cheese

Starter cultures, Types of milk, Coagulants, Molds History, Definition, composition, classification, Principle and method of manufacture of cheddar cheese, Principle and method of manufacture of Mozzarella cheese, Principle and method of manufacture of Pasteurized processed cheese products.

Unit 4 – Butter

Definition, composition, nutritive value, Manufacturing, Theories of churning, Defects in butter and their causes and prevention

Unit-5 Processed cheese

Definition, composition, nutritive value, Manufacturing and types.

References:

1. Outlines of Dairy Technology, (1980) Sukumar De
2. Cultured milk products in CRC handbook (1982) Chandan R.C, Shahani K.K.
3. Yogurt Science and Technology (2004) Tamime A.Y. and Robinson R.K.

B. Voc. Second Year **Paper No. BDT-303** **Semester III**

Nutrition Science (Theory-General Education)

Maximum Marks: 100 **Credits: 4**

Teaching Period: 4 Theory **Teaching Load: 60 Theory Period**

Objectives-

1. **To understand nutrients and food component that supply nourishment to the body.**
2. **To know about the functions, deficiency and toxicity of nutrients**
3. **To understand malnutrition and its prevention**

Unit-1 Introduction to Nutrition Science, Food and Our Body and Recommended Dietary Allowances **12 Periods**

Unit-2 Food Constituents- Definition, Occurrence, Properties and metabolisms of Protein, Carbohydrates and lipids. **12 Periods**

Unit-3 Role of nutrients, Balance diet, Food exchange list and Principle of Meal Planning, Energy Balance- BMR, Recommended dietary allowances, Balanced diet for different age groups (infant to old age) **12 Periods**

Unit-4 Nutrition for Fitness and Sports, Therapeutic diets and effective nutritional counseling, Diet during Energy Imbalance and Diet for different diseases **12 Periods**

Unit-5 Malnutrition Causes, types, symptoms and presentation of Assessment of Nutrition status of the community National Nutritional Policy **12 Periods**

References:

1. Bamji MS, Krishnaswamy K, Brahmam GNV (2009). *Textbook of Human Nutrition,* 3rd edition. Oxford and IBH Publishing Co. Pvt. Ltd.
2. Srilakshmi (2007). *Food Science*, 4th Edition. New Age International Ltd. 29
3. Wardlaw MG, Paul M Insel Mosby (1996). Perspectives in Nutrition, Third Edition.
4. B. Srilakshmi (2007) Dietetics, Revised Fifth Edition, New Age International Publishers

5. B. Srilakshmi (2011) Nutrition Science, Third Edition, New Age International Publishers
6. Dr. M. Swaminathan (2006) Advanced Text book on Food and Nutrition, Volume 1 and 2, Second Edition, BAPPCO Publication.
7. Jim Mann and A. Stewart Truswell (2010) Essentials of Human Nutrition, Third Edition, Oxford Publication.
8. Michael J. Gibney, Hester H. Vorster and Frans J. Kok (2002) Introduction to Human Nutrition, First Indian Reprint, Blackwell Publishing.
9. Biochemistry of Foods-N.A.M Eskin, H.M. Henderson, R.J. Townsend.
10. Introduction to Biochemistry of Foods, Z. Berk

B. Voc. Second Year **Paper No. BDT-3.1** **Semester III**

Dairy Processing Equipments (Practical-Skill Component)

Maximum Marks: 150 **Credits: 6**
Teaching Period: 2/Week **Teaching Load: 90 Practical Period**
Objectives-

- **To understand type of materials used for making equipment in dairy industry.**
- **To know about maintenance of equipments.**
- **To understand the design and working of pumps, and other processing equipments.**

1. Study of sanitary pipes and fittings
2. Study of sanitary milk pump
3. Study of can washer
4. Study of milk tanker, Storage tank & silos
5. Study of cream separator
6. Study of Milk homogenizer
7. Study of different controls in HTST pasteurizer
8. Study of fire tube and water tube boilers
9. Study of construction of motors
10. Study the construction and working of Bourden pressure gauge. Test and calibration of pressure gauges using dead weight tester.

B. Voc. Second Year **Paper No. BDT-3.2** **Semester III**

Fermented Milk Products (Practical-Skill Component)

Maximum Marks: 150 **Credits: 6**
Teaching Period: 2/Week **Teaching Load: 90 Practical Period**
Objectives-

- **To understand need and importance of fermented products**
- **To understand technology behind preparation of fermented milk products**

1. Preparation of Dahi
2. Preparation of Mishtidoi
3. Preparation of Lassi

4. Preparation of Yogurt
5. Preparation of Shrikhand
6. Preparation of Processed Cheese
7. Preparation of Processed Cheese Spread
8. Preparation of cheddar cheese
9. Preparation of mozzarella cheese
10. Visit to cheese factory

B. Voc. Second Year **Paper No. BDT-3.3** **Semester IV**

Nutrition Science (Practical-Skill Component)

Maximum Marks: 150 **Credits: 6**

Teaching Period: 2/Week **Teaching Load: 90 Practical Period**

Objectives-

- **To prepare different nutrient rich products**

1) Identification of food sources for various nutrients
2) Introduction to diet planning using food exchange list
3) Diet Planning of adult male / female
4) Assessment of weight and height of self and calculation of BMI
5) Planning of Protein and Energy rich Product.
6) Planning of Vitamin A rich Product.
7) Planning of Vitamin B1 rich Product.
8) Planning of Vitamin B2 rich Product.
9) Planning of Vitamin B3 rich Product.
10) Planning of Vitamin C rich Product.
11) Planning of Calcium rich Product.
12) Planning of Iron rich Product.
13) Record diet of self-using 24 hour dietary recall
14) Evaluation of own diet and weight status

B. Voc. Second Year **Paper No. BDT-401** **Semester IV**

Dairy Engineering (Theory-General Education)

Maximum Marks: 100 **Credits: 4**

Teaching Period: 4 Theory **Teaching Load: 60 Theory Period**

Objectives-

- **To study the different utilities used in dairy plant**
- **To study refrigeration unit, its working, and principle**

Unit-1 Refrigeration: **12 Periods**

Principles of Vapor compression refrigeration cycle, refrigeration components, common refrigerants, properties of good refrigerants, Ice bank Tank (IBT), Bilk milk cooler

Unit-2 Basic electrical engineering: **12 Periods**

Alternating current fundamentals, Polyphase alternating current circuits, star & delta connections. AC Motors, starters & DG set, Fundamentals of Transformer

Unit 3 Water Supply and Dairy Effluent System **12 Periods**

Tube well, water storage and supply

Water quality water treatments and purification
Waste water treatment, reuse and disposal
Water conservation and rain water harvesting

Unit 4 Heat and Mass transfer **12 Periods**

Heat transfer Principle and Laws
Types of heat exchangers, their installation & working
Microwave heating of milk and milk products.
Evaporators and dryers
Humidifiers

Unit 5 Equipments and Milk storage **12 Periods**

Butter churners – Types, Installation, working & Maintenance
Ice-Cream freezers-Types & working, Ghee Vat, Cheese Vat., Paneer Equipments.
Milk storage tanks and milk silo's, Packaging equipments of milk/dairy products and processing units of UHT plant.

References:

1. Refrigeration and Air conditioning (1993) Arora S.C. Domkundwar S.
2. Engineering Thermodynamics (1977) Gupta C.P. , Prakash Rajendra
3. Food engineering systems (1979) Farrall Arthur W.

B. Voc. Second Year **Paper No. BDT-402** **Semester IV**

Traditional Indian Dairy Products (Theory-General Education)

Maximum Marks: 100 **Credits: 4**
Teaching Period: 4 Theory **Teaching Load: 60 Theory Period**

Objectives-

- **To know importance of indigenous milk product and its market demand**
- **To learn the making process of different indigenous milk products**
- **To study the defects to the products and prevention**

Unit 1- Heat desiccated products **12 Periods**

- Definition, Composition, And standards of Khoa and Basundi
- Methods of manufacture and factors affecting quality of products
- Khoa based sweets

Unit 2- Paneer and Chhana **12 Periods**

Definition, Composition, Standards and Factors affecting quality of Paneer and Chhana, Methods of manufacturing Paneer and Chhana, Chhana based sweets

Unit 3- Concentrated Milks **12 Periods**

Definition, standards and nutritive value and principle of evaporation, methods of manufacture and use of sweetened condensed and evaporated milks

Unit 4 Fat Rich Products

Ghee, Butter Definition, Composition and standards, Methods of manufacturing

Unit 5 Judging and Grading of indigenous milk products **12 Period**

Procedure for examination, Requirements for high grade products, any indigenous products, defects and their causes and prevention

References:

1. Milk Products of India – ICAR Anantkrishanan C.P. and Srinivasan M.R.
2. Technology of Indian Milk Products- Aneja R.P., Mathur B.N.
3. Indian Dairy Products (1974) Rangappa K.S., Acharya K.T.

B. Voc. First Year **Paper No. BDT-403** **Semester IV**

Food Safety, Hygiene and Sanitation (Theory-General Education)

Maximum Marks: 100 **Credits: 4**

Teaching Period: 4/Week Teaching Load: 60 Theory Period/Semester

Objectives: To understand the following:

- Food safety, hygiene and sanitation
- Industrial waste utilization
- Design and implementation of food safety management systems such as ISO series, HACCP and its prerequisites such as GMP, GHP etc.

Unit-1: Introduction to Food Safety: Definition, Types of hazards, biological, chemical, physical hazards, Factors affecting Food Safety, Importance of Safe Foods **12 Periods**

Unit-2: Food Safety Management Tools: 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 **12 Periods**

Unit-3: Industrial byproducts and waste utilization: Potential & prospects of byproduct & waste utilization from the food Industries in India Byproduct & waste with special reference to milk & milk products **12 Periods**

Unit-4:Hygiene and Sanitation in Food Service Establishments: Introduction, Sources of contamination, Control methods using physical and chemical agents, Waste Disposal, Pest and Rodent Control, Personnel Hygiene, Food Safety Measures **12 Periods**

Unit-5: Recent concerns: New and Emerging Pathogens, Packaging, Product labelling and Nutritional labeling, genetically modified foods\Transgenics, Organic foods, Newer approaches to food safety, Recent Outbreaks. **12 Periods**

References:

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

B. Voc. Second Year **Paper No. BDT-4.1** **Semester IV**

Dairy Engineering (Practical-Skill Component)

Maximum Marks: 150 **Credits: 6**

Teaching Period: 2/Week **Teaching Load: 90 Practical Period**

Objectives-

- **To study the different utilities used in dairy industry**

1. Study of home refrigerator
2. Study and identification of milk storage units
3. Study of Parts and operations of a cold storage plant and ice bank unit
4. Study the different parts and learn the operations of the plate chillers and bulk milk coolers
5. Study of water supply system and water softening plant
6. Study of different safety measures to be adopted in a dairy plant
7. Study of various workshop tools
8. To learn elementary layout, drawings of utilities

B. Voc. Second Year **Paper No. BDT-4.2** **Semester IV**

Traditional Indian Dairy Products (Practical-Skill Component)

Maximum Marks: 150 **Credits: 6**

Teaching Period: 2/Week **Teaching Load: 90 Practical Period**

Objectives-

- **To learn the making process of different indigenous milk products**

1. Preparation of Khoa
2. Preparation of Gulabjamun
3. Preparation of Rassgulla
4. Preparation of Pedha
5. Preparation of Barfi
6. Preparation of Kalakand
7. Preparation of Chhana
8. Preparation of Chakka
9. Preparation of Rasmalai
10. Preparation of Paneer

B. Voc. First Year **Paper No. BDT-4.3** **Semester II**

Hygiene and Sanitation (Practical-Skill Component)

Maximum Marks: 100 **Credits: 6**

Teaching Period: 2/Week Teaching Load: 24 Practical/Semester (4 Period Each)

Objectives-

- To study different schedules and charts
- To study the properties and use of different detergents, sanitizers and their required strength.

1. Preparation of inspection schedule and inspection charts. 4P
2. Study of CIP system 4P
3. Preparation of detergent & sanitizer solutions of desired strength. 4P
4. Test for sanitization of dairy equipment (Swab method) 4P
5. Contamination Control methods using physical and chemical agents 4P
6. To study Personnel Hygiene habits 4P