Savitribai Phule Pune University

Anekant Education Society's

TULJARAM CHATURCHAND COLLEGE, BARAMATI, DIST-PUNE – 413102

Syllabus

For

B. Voc.

(Dairy Technology)

Sponsored by

University Grant Commission

Under

National Skill Qualification Framework (NSQF)

To be implemented from

2022-23

Title of the Course: B. Voc. (Dairy Technology)
(To be implemented from Academic Year - 2022-2023)

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 practical based on the theory course, special emphasis will be on communications and soft skills development of the students.
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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 fulfil 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)

Sub. Code	**Semester-I**	**Credits**	**Marks**
	Theory (General Education Component)		
UBDT-111	Dairy Development	04	100
UBDT-112	Dairy Farm Management	04	100
UBDT-113	Dairy Chemistry	04	100
	Practical (Skill component)		
UBDT-111-1	Dairy Farm Management	06	150
UBDT-111-2	Dairy Chemistry	06	150
UBDT-111-3	Soft Skill Development	06	150
	Total	**30**	**750**
	Semester-II		
	Theory (General Education Component)		
UBDT-121	Food Technology	04	100
UBDT-122	Market Milk	04	100
UBDT-123	Microbiology of Milk and Milk Products	04	100
	Practical (Skill component)		
UBDT-121-1	Food Technology	06	150
UBDT-121-2	Microbiology of Milk and Milk Products	06	150
UBDT-121-3	Computer Skills	06	150
	Total	**30**	**750**
	Total First Year	**60**	**1500**
Sub. Code	**Semester-III**	**Credits**	**Marks**
	Theory (General Education Component)		
UBDT-231	Dairy Processing Equipment	04	100
UBDT-232	Fermented Milk Products	04	100
UBDT-233	Nutrition Science	04	100
	Practical		
UBDT-231-1	Dairy Processing Equipment	06	150
UBDT-231-2	Fermented Milk Products	06	150
UBDT-231-3	Nutrition Science	06	150
	Total	**30**	**750**
	Semester-IV		
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**
Sub. Code.	**Semester-V**	**Credits**	**Marks**
	Theory (General Education Component)		
BDT-501	Quality Assurance and Waste management	04	100
BDT-502	Fat Rich Milk Products	04	100
BDT-503	Dairy Plant Management	04	100
	Practical (Skill Based Component)		
BDT-5.1	Quality Assurance and Waste management	06	150
BDT-5.2	Fat Rich Milk Products	06	150
BDT-5.3	Project	06	150
	Total	**30**	**750**
	Semester-6		
BDT-601	Dairy Product Development	04	100
BDT-602	Packaging Technology	04	100
BDT-603	Entrepreneurship Development	04	100
	Practical (Skill Based Component)		
BDT-6.1	Dairy Product Development	06	150
BDT-6.2	Packaging Technology	06	150
BDT-6.3	In-Plant Training	06	150
	Total	**30**	**750**
	Total Final Year	**60**	**1500**
	Total for three years	**180**	**4500**

Note:

- One compulsory visit to field/industry/institute for each 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. UBDT - 231** **Semester III**

Dairy Processing Equipment (Theory-General Education)

Maximum Marks: 100 **Credits: 4**

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

Learning Objectives -

- To understand type of materials used for making of an equipment in dairy industry.
- To know about operations of equipment in a dairy industry.
- To identify and define working of a dairy equipment.
- To know about maintenance of Equipment.
- To understand the design and working of pumps, and other processing Equipment.

Learning Outcomes -

- Students will get exposure to various equipments used for milk processing.
- They will achieve the knowledge about different pipes and pumps used in the industry.
- They will be able to assemble different parts of equipments.
- They will be able to understand the working principle of machinery which is used in dairy industry.
- They will be able to operate and maintain the equipment with technical knowledge.

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) **12 Periods**

Unit-2 Description, working and maintenance of milk reception equipment: Tipping tank, Storage tank, Can washer **12 Periods**

Unit-3 Study of Dairy equipment: Clarification & Filtration, Separation, Bactofugation, Standardization, Centrifugal Cream Separator, and Clarifier, tri-process machine **12 Periods**

Unit-4 Homogenizer: Theory of homogenization, Single & Two stage, homogenizing valve, Efficiency of homogenizer, Pouch & Bottle filling machine, Carbonation unit. **12 Periods**

Unit-5 Pasteurization & Sterilization-Batch, Contineous, UHT, Formulation standards for pasteurization, efficiency of pasteurization, Aseptic packaging, Fortified days shelf life (Sterilized pillow pouch) , FSSAI categories for dairy equipments **12 Periods**

References:

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

B. Voc. Second Year **Paper No. UBDT - 232** **Semester III**

Fermented Milk Products (Theory-General Education)

Maximum Marks: 100 **Credits: 4**

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

Learning Objectives-

- To learn basics of Fermentations, Starter cultures, and Fermentor
- To understand the function of a starter culture
- To know the advantages and importance of fermentation
- To learn making process of various western and Indian fermented products
- To learn Principles of cheese making

Learning Outcomes –

- They will be able to define fermentation, starter culture, Fermentor and various fermented products.
- They will know about different western and Indian fermented products manufactured commercially.
- They will be able to evaluate different characteristics of fermented milk products.
- They will acquire knowledge about quality parameters of fermented milk products.
- They will be able to develop more fermented and probiotics milk products.

Unit-1- Introduction to fermentation

Definition, Concept, Types of fermentation, Design and working of Fermentor, Importance of fermentation, Characteristics of fermented milk products, Nutritional importance, need, and benefits of fermented milk products. **12 Periods**

Unit-2- Starter Culture

Definition and classification of Starter culture, Types and importance, Role and function of a starter culture, Probiotic effect and its advantages, Anti-microbial compounds produced by starters **12 Periods**

Unit 3- Indian Fermented Milk Products

Varieties of fermented milk products available in market of Indian origin, Dahi, Mishti Dahi, Buttermilk, Lassi, Chakka, Shrikhand and its varieties **12 Periods**

Unit -4- Western Fermented Milk Products

Varieties of fermented milk products available in market of western origin, Kefir, Kumis, Bulgaricus milk, Acidophilus milk, Yakult, Yoghurt and its varieties. **12 Periods**

Unit 5-Cheese

Definition and concept, Types of cheese milk, History, composition, classification, Microbiology & Chemistry of cheese, Principle and method of manufacture of cheddar cheese, Principle and

manufacture of Mozzarella cheese, Principle and method of manufacture of Gauda cheese, Classification & manufacture of processed cheese products**.** **12 Periods**

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. UBDT - 233 Semester III

Nutrition Science (Theory-General Education)

Maximum Marks: 100 **Credits: 4**

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

Learning Objectives -

- To understand concept of Food, Nutrition and Nutrients.
- To know about classification, sources, Functions, deficiency diseases and toxic effects of various nutrients.
- To understand bodily requirements of nutrients throughout the lisfespan through RDA
- To acquire knowledge on food groups, food guide and food exchange list.
- To understand concept of malnutrition and its prevalence in India.

Learning Outcomes -

- They will be able to define Food, Nutrition and Nutrients
- They will be able to identify sources, functions, deficiencies and toxicity of a specific nutrient.
- They will be able to modify diets according to physiological conditions.
- They will be able to calculate and interpret individual's BMI.
- They will be able to demonstrate different methods of nutritional assessment.

Unit-1 Introduction to Nutrition Science, Food and Our Body and commonly used terms in nutrition science, Food, Nutrients, Nutrition, Optimum, and poor nutrition, Balance diet' Nutritional status, BMI, Energy balance etc. **12 Periods**

Unit-2 Five food groups, Food Guide, Food Exchange list, RDA, Principle of Meal Planning, Meal planning for different physiological conditions and age groups. **12 Periods**

Unit-3 Food Constituents- Definition, Occurrence, Properties and metabolisms of Protein, Carbohydrate, Lipids, Vitamins and Minerals, Role of nutrients **12 Periods**

Unit-4 Therapeutic diets and their types, 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. UBDT – 231 - 1 Semester III

Dairy Processing Equipment (Theory-General Education)

Maximum Marks: 150 **Credits: 6**

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

Learning Objectives -

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

Learning Outcomes -

- Students will understand the working principle of various equipments.
- They will get to know about different parts of the equipment.
- They will be exposed to operations of different equipments.
- They will get exposure to different types of pumps and pipes.
- They will be able to monitor and modify working of equipment.

1. Study of sanitary pipes and fittings 3P
2. Study of sanitary milk pump 2P
3. Study of can washer 3P
4. Study of milk tanker, Storage tank & silos 2P
5. Study of cream separator 2P

6. Study of Milk homogenizer 3P
7. Study of different controls in HTST pasteurizer 2P
8. Study of batch sterilizer 2P
9. Study of ice cream freezer 2P
10. Industrial Visit 3P

References:

1. Dairy Technology & Engineering by H.G. Kessler
2. Dairy Plant Engineering & Management by Tufail Ahmed
3. Laboratory manual in Dairy Engineering - I by Khojare A.S.,Wasnik P.G., Kadu A.B. and Waseem M

B. Voc. Second Year Paper No. UBDT - 231 - 2 Semester III

Fermented Milk Products (Practical-Skill Component)

Maximum Marks: 150 Credits: 6

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

Learning Objectives -

- To learn basics of manufacture of fermented milk products.
- To understand process flow of the manufacture of fermented milk products.
- To know the advantages and importance of fermentation
- To learn the storage requirements of fermented milk products
- To learn the manufacture and varieties of Cheese.

Learning Outcomes -

- They will be able to define western and Indian Fermented products of milk.
- They will know about the techniques of manufacturing of fermented milk products.
- They will be able to understand various concepts such as Inoculation, Incubation.
- They will acquire knowledge about the defects in fermented milk products.
- They will be able to develop different fermented milk products.

1. Preparation of Dahi 1P
2. Preparation of Mishti Dahi 1P
3. Preparation of Lassi 2P
4. Preparation of Shrikhand 2P
5. Preparation of Yogurt 2P
6. Preparation of Cheddar cheese 4P
7. Preparation of Mozerella Cheese 4P
8. Preparation of Processed cheese 4P
9. Preparation of Processed cheese spread 2P
10. Visit to cheese factory 2P

References:

1. Outlines of Dairy Technology, (1980) Sukumar De
2. Cultured milk products in CRC handbook (1982) Chandan R.C, Shahani K.K

B. Voc. Second Year **Paper No. UBDT - 231 - 3** **Semester III**

Nutrition Science (Practical-Skill Component)

Maximum Marks: 150 **Credits: 6**

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

Learning Objectives -

- To understand the sources of different nutrients.
- To understand foods belonging to different food groups.
- To know the serving size of each food group.
- To calculate calorie and protein intake.
- To evaluate owns dietary intake

Learning Outcomes –

- Students will understand the identification of nutrient sources.
- They will be able to assess dairy nutrient requirement.
- They will be able to prepare nutrient rich products.
- They will be able to create different methods of dietary recall
- They will be to create public guidelines for better nutritional status of the society.

1. Identification of food sources for various nutrients	03P
2. Introduction to diet planning using food exchange list	02P
3. Diet Planning of adult male / female	03P
4. Assessment of weight and height of self and calculation of BMI	02P
5. Planning of Protein and Energy rich Product.	02P
6. Planning of Vitamin A rich Product.	02P
7. Planning of Vitamin B1 rich Product.	02P
8. Planning of Vitamin B2 rich Product.	02P
9. Planning of Vitamin B3 rich Product.	02P
10. Planning of Vitamin C rich Product.	02P
11. Planning of Calcium rich Product.	02P
12. Planning of Iron rich Product.	02P
13. Record diet of self-using 24 hour dietary recall.	02P
14. Evaluation of own diet and weight status.	02P

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
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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