

**COMMISSIONERATE OF COLLEGIATE EDUCATION
TELANGANA STATE**

Proposed Curriculum of Dairy Science as
(Vocational Subject at Under Graduation)

| Yr | Sem | Paper No. | Title of the Paper | Credits | No. of Lectures |
|-----------|------------|-------------------|---|----------------|------------------------|
| I | I | DSC P1 | Dairy Husbandry – I | 4 +1 | 60 |
| | II | DSC P2 | Dairy Husbandry – II | 4 +1 | 60 |
| II | III | DSC P3 | Dairy Cattle Nutrition | 4 +1 | 60 |
| | IV | DSC P4 | Dairy Development & Cooperative Societies | 4 +1 | 60 |
| III | V | DSE-IA / DSE-IB | Technology of Dairy Products – I OR Dairy Chemistry | 4+1 | 60 |
| | VI | DSE-IIA / DSE-IIB | Technology of Dairy Products – II OR Dairy Microbiology | 4+1 | 60 |

Proposed Skill Enhancement Courses and Generic Elective

| Yr | Sem | Paper No. | Title of the Paper | Credits | No. of Lectures |
|-----------|------------|------------------|---|----------------|------------------------|
| II | III | SEC I | Artificial Insemination | 2 | 30 |
| | | SEC II | Conservation of Green Fodder | 2 | 30 |
| | IV | SEC III | Concentrate Feeds & Agro industrial by-products in Animal Nutrition | 2 | 30 |
| | | SEC IV | Special Milks | 2 | 30 |
| III | V | GE I | Entrepreneurship Development | 2 | 30 |
| | VI | Project/ OPT | Food Hygiene and Quality Testing | 2 | 30 |

Faculty of Science
Dairy Science (Optional Subject)
I Year I Semester
Paper 1: Dairy Husbandry - I
Theory Syllabus (4 Credits)

60 Lectures

- Unit 1:** Introduction, Common terms and Definitions in Animal Husbandry. Cattle and Buffalo population and its distribution; Milk production Statistics; Breeds of Dairy cattle, Buffaloes and Goats. Indigenous, Exotic and Cross bred Cattle breeds. (15)
- Unit 2:** Anatomy of Udder; Development of Udder; Lactogenesis & Galactopoieses; Let down of milk. Milking procedure and practices for clean milk production: Cleanliness of animal, utensils, milkers, health condition of cows, proper cleaning of milking area. (15)
- Unit 3:** Methods of milking: Stripping, Full hand Knuckling and Machine milking. Economic traits of Dairy cattle. Methods of selection of Dairy animals: Individual, Pedigree, Family, Progeny. Unified Score Card system, Body Condition Score system. (15)
- Unit 4:** Systems of Dairy cattle breeding. Inbreeding, Outbreeding, Cross breeding, Grading up. Breeding systems suitable to enhance milk production in India (Cross breeding of cattle and Grading up of buffaloes). Multiovation and Embryo transfer technique. Cloning and Transgenic animals. (15)

B.Sc. Dairy Science (Vocational Subject)
I Year I Semester
Paper 1: Dairy Husbandry - I
Practical Syllabus (1 Credit)

1. Confirmation Points of dairy cow.
2. Identification of different breeds of dairy cattle and buffaloes.
3. Classification and study of distinguishing characters of Indian and Exotic cattle.
4. Study of descriptive and productive features of different Indian cattle breeds.
5. Classification and study of distinguishing characters of Buffalo breeds.
6. To study the comparative merits of cows and buffaloes; Zebu and crossbred cows.

Reference Books:

1. Text Book of Animal Husbandry – G.C. Banerjee.
2. Hand Book of Animal Husbandry – ICAR Edition.
3. Principles and practices of Dairy farm – Jagdish Prasad.
4. Livestock production Management in tropics – Verma, D.N.

B.Sc. Dairy Science (Vocational Subject)

I Year II Semester

Paper 2: Dairy Husbandry - II

Theory Syllabus (4 Credits)

60 Lectures

- Unit 1:** Systems of Housing of Dairy cattle – Loose Housing and Conventional Dairy Stanchion Barns. Drawing of layouts for dairy cattle dwellings; Criteria for selecting site for establishing Dairy farm buildings; Water requirement of dairy animals. (15)
- Unit 2:** Symptoms of sick Dairy animals. Diseases of Dairy animals – Bacterial, Viral, Parasitic and Nutritional deficiency diseases and their control. (15)
- Unit 3:** Management of different classes of Dairy animals – Milch animals, Pregnant animals, Dry animals, Heifers and Calves. Management practices for Dairy farm; Identification, Dehorning, Castration, Grooming, Deworming, Vaccination, Disinfection and Milking. (15)
- Unit 4:** Maintenance of high level of fertility in the herd: Importance, Reasons for low fertility, Methods of maintaining high level of fertility in the herd. Methods of determining reproductive efficiency: i) By non return percentage of cows, ii) By calving interval period iii) By pregnancy days of cows per year. (15)

B.Sc. Dairy Science (Vocational Subject)
I Year II Semester
Paper 2: Dairy Husbandry - II
Practical Syllabus (1 Credit)

1. Dairy Farm layout.
2. Identification of cows.
3. Dehorning of calves.
4. Castration of bulls.
5. Deworming of dairy cattle.
6. Preparation of vaccination schedule of dairy cattle.
7. Identification of sick animals.
8. Tests for hardness of water.
9. Determining the strength of disinfectant and detergent solutions.

Reference Books:

1. Text Book of Animal Husbandry – G.C. Banerjee.
2. Hand Book of Animal Husbandry – ICAR Edition.

B.Sc. Dairy Science (Vocational Subject)

II Year III Semester

Paper 3: Dairy Cattle Nutrition

Theory Syllabus (4 Credits)

60 Lectures

- Unit 1:** Digestive system and role of nutrients in dairy cattle. Classification of Feeds and Fodder. Importance of proteins, fats and carbohydrates in livestock feeding. (15)
- Unit 2:** Types of Fodder varieties – Legumes and non-legumes, Seasonal and Perennial fodder crops. Cultivation practices of fodder crops – Para grass, Hybrid Napier, Berseem, Cow pea and Jowar. (15)
- Unit 3:** Feeding Standards; Balanced rations for Dairy cattle; Feeding practices of Dairy cattle i) Soiling ii) Ensiling iii) Pasturing iv) Hay feeding v) General feeding practices with regard to management. (15)
- Unit 4:** Utilization of agricultural and industrial by-products for livestock feeding. Enrichment of poor quality roughages – Urea treatment of paddy straw. (15)

B.Sc. Dairy Science (Vocational Subject)
II Year III Semester
Paper 3: Dairy Cattle Nutrition
Practical Syllabus (1 Credit)

1. Identification of feeds and fodder.
2. Computation of rations.
3. Preparation of urea enriched paddy straw.
4. Determination of dry matter and moisture content in feed or fodder.
5. Determination of crude protein content by Kjeldahls method.

Reference Books:

1. Text Book of Animal Husbandry – G.C. Banerjee.
2. Principles and practices of Dairy farm – Jagdish Prasad.
3. Animal Nutrition and feeding practices – Dr. Surendra K. Ranjhan.
4. Dairy Chemistry and Animal Nutrition – M.M. Roy.

B.Sc. Dairy Science (Vocational Subject)
II Year IV Semester
Paper 4: Dairy Development and Cooperative Societies
Theory Syllabus (4 Credits) 60 Lectures

Unit 1: Advantages of Dairying. Principles involved in successful dairying. Systems of dairy farming – Mixed farming and specialized dairy farming. (15)

Unit 2: Methods of procurement of milk; Transportation of milk; Pricing of milk and marketing of milk. (15)

Unit 3: Cooperative Dairying – Structure of Dairy cooperatives; Primary milk producers Cooperative Society; District milk producers Cooperative Union; Objectives and functions. (15)

Unit 4: Dairy development programs implemented in India. Operation Flood program. Economics of maintaining Dairy Farm – Income and expenditure. Estimating the production cost of milk. (15)

Note: On-Farm Training for two weeks is compulsory during II year IV semester. Students need to submit report at IV semester Practical Exam for Evaluation (weightage of 20%).

B.Sc. Dairy Science (Vocational Subject)
II Year IV Semester
Paper 4: Dairy Development and Cooperative Societies
Practical Syllabus (1 Credit)

1. Record keeping.
2. Preparation of project reports for various sizes of dairy farm.
3. Calculations on cost of milk production.
4. Calculating the cost of milk production exercises for various sizes of farms.

Reference Books:

1. Dairy management in India – Madan Mohan.
2. Text Book of Animal Husbandry – G.C. Banerjee.
3. Principles and practices of Dairy Farm – Jagdish Prasad.

B.Sc. Dairy Science (Vocational Subject)
III Year V Semester

DSE-IA: Technology of Dairy Products - I

Theory Syllabus (4 Credits)

60 Lectures

- Unit 1:** Reception of milk: Unloading, Grading, Sampling, Testing, Weighing and Recording. Storage of milk. Straining, filtration and clarification of milk. Definition and objectives of Pasteurization of milk, Objections to Pasteurization and Principles of heat exchange. (15)
- Unit2:** Methods of Pasteurization: LTLT, HTST and Uperization. Sterilization of milk. Factors influencing homogenization, effect of homogenization on milk. Standardization of milk. (15)
- Unit 3:** Packaging of milk: Desirable characters and types of packaging materials; Forms of packaging. Disposal of dairy effluents: Sources of dairy waste; Necessity of treatment of dairy waste; Methods of treatment: Low cost methods and Conventional methods - Activated sludge process and trickling filters. (15)
- Unit 4:** Market milk: Toned milk, Double toned milk, Reconstituted milk, Standardized milk and Full cream milk – Standards and methods of manufacture. Cream: Types of cream, composition, methods of cream separation, gravity and centrifugal methods, types of cream separators; factors affecting fat losses in skim milk and fat percentage in cream. (15)

B.Sc. Dairy Science (Vocational Subject)
III Year V Semester
DSE-IA: Technology of Dairy Products - I
Practical Syllabus (1 Credit)

1. RMRD Testing of milk.
2. Standardization of milk.
3. Homogenization of milk.
4. Pasteurization of milk.
5. Sterilization of milk.
6. Preparation of toned milk and double toned milk.
7. Preparation of Reconstituted milk.
8. Cream separation.

Reference Books:

1. Dairy processing handbook – Gosta Bylund.
2. Outlines of Dairy Technology – Sukumar De.
3. Milk products preparation and quality control – C.P. Ananthkrishnan.
4. The technology of milk processing – C.P. Ananthkrishnan.
5. Modern Dairy products – Lincoln M. Lampert.

B.Sc. Dairy Science (Vocational Course)

III Year V Semester

DSE-IB: Dairy Chemistry

Theory Syllabus (4 Credits)

60 Lectures

Unit 1: (a) Composition of milk: Definition of milk, Composition of cow milk, buffalo milk, sheep milk, goat milk and human milk. Differences between the composition of cow and buffalo milks. Constituents of milk: Minor and major constituents.
(b) Colostrums: Significance, Composition, difference between normal milk and colostrums. (15)

Unit 2: Factors affecting composition and yield of milk – Species, Breed, Individuality, Stage of lactation, Age of the animal, Season, Interval between milking, Stage of milking, Feed, Estruses, Exercise, Milker and Drugs. (15)

Unit 3: Physico-chemical properties of milk – Colour, Flavour, Density, Specific gravity, Freezing point, Boiling point, Surface tension, Viscosity, Specific heat, Refractive index, Electrical conductivity, Germicidal property, pH and acidity. (15)

Unit 4: (a) Chemistry of major constituents of milk b) Nutritive value of milk (c) Platform tests; Tests for detection of adulteration of milk; Preservatives and Neutralizers.
(d) FSSAI specifications for milk. (15)

B.Sc. Dairy Science (Vocational Subject)
III Year V Semester
DSE-IB: Dairy Chemistry
Practical Syllabus (1 Credit)

1. Estimation of Fat in milk.
2. Estimation of SNF in milk.
3. Estimation of Specific gravity of milk.
4. Estimation of Acidity of milk.
5. Measurement of pH of milk.
6. Measurement of Surface tension of milk.
7. Measurement of Viscosity of milk.
8. Comment on the quality of given milk sample.

Reference Books:

1. Dairy Chemistry and Animal Nutrition – M.M. Roy.
2. Text book of Practical Dairy Chemistry – N.K. Roy.
3. Fundamentals of Dairy Chemistry – Webb Johnson and Alfred.
4. Dairy Chemistry and Physics – Pieter Walstra and Robert Jenner.
5. Fundamentals of Dairy Chemistry – Noble P. Wong.
6. A text book of Dairy Chemistry – Ling, E.R.

**B.Sc. III Year
Semester-V
Generic Elective**

GE-1 (2 hrs/week)

(2 Credits) Lectures: 30

Entrepreneurship Development

- Unit-I** Entrepreneurial Development:
- Case studies of Successful Entrepreneurs.
 - Exercises on ways of sensing opportunities – Sources of idea, creating efforts, SWOT Analysis.
 - Entrepreneurial skill assessment test.
 - Techniques of development of entrepreneurial skills, positive self image and locus of control.

- Unit-II** Food Business Management:
- Case studies of Food Processing Business and its aspects.
 - Business opportunity Identification and Assessment Techniques.
 - Business idea generation and evaluation exercise.
 - Market Assessment study; Analysis of competitive situation.
 - SWOT Analysis for business and competitors.
 - Preparation of business plan.
 - Preparation of Project Report.
 - Methods of arrangement of inputs – Finance and Material.

Recommended Books:

1. Acharya SS and Agarwal NL “Agricultural Marketing in India”, Oxford and ISH Publishers Co., New Delhi, 1987.
2. Chandra, Prasanna “Projects, Planning, Analysis, Selection, Implementation and Review”, TMH Pub., Co., New Delhi, 1996.
3. David D and Erickson S “Principles of Agribusiness Management” MGH Book Co., New Delhi, 1987.
4. David H. Holt “Entrepreneurship – A new Venture Creation” Prentice Hall of India, New Delhi, 2002.
5. Phillip Kotler “Marketing Management”, PHI Pvt. Ltd., New Delhi, 1994.
6. Vasant Desai “The Dynamics of Entrepreneurial Development and Management” Himalaya Publishing House Pvt. Ltd., Mumbai, 2011.
7. Vasant Desai “Fundamentals of Entrepreneurship and Small Business Management” Himalaya Publishing House Pvt. Ltd., Mumbai, 2012.

B.Sc. Dairy Science (Vocational Subject)
III Year VI Semester
DSE-IIA: Technology of Dairy Products - II
Theory Syllabus (4 Credits)

60 Lectures

Unit 1: Butter: PFA Standards, Classification, Composition, Method of manufacture of butter by Creamery butter method, Overrun in butter. Butter oil: Composition, uses and method of manufacture. (15)

Unit2: Cheese: PFA Standards, Composition, Classification, method of manufacture of Cheddar cheese and Cottage cheese. Ice cream: BIS Standards, Composition, Classification, Method of manufacture and Overrun in ice cream. (15)

Unit3: Condensed and Evaporated milks: Types of condensed milks, Standards, Composition and method of manufacture. Milk powder: BIS Standards, Types of drying systems, Manufacture of Roller dried and Spray dried milk powder. (15)

Unit 4: Indigenous Milk products: Khoa, Channa, Ghee, Dahi and Kulfi: PFA Standards and method of manufacture. (15)

Note: In-Plant Training for 2 weeks is compulsory during III year VI semester in any of the Dairy plants where there is facility for making wide range of Dairy products. Students need to submit report at the time of VI Semester Practical Examination. (Weightage of 25%)

B.Sc. Dairy Science (Vocational Subject)
III Year VI Semester
DSE-IIA: Technology of Dairy Products - II
Practical Syllabus (1 Credit)

1. Preparation of butter.
2. Preparation of different varieties of ice cream.
3. Preparation of Indigenous milk products like
 - a) Khoa
 - b) Channa
 - c) Paneer
 - d) Kulfi
 - e) Ghee
 - f) Dahi
4. Visit to a Dairy plant to observe preparation of Concentrated milk and Dried milk.

Reference Books:

1. Outlines of Dairy Technology – Sukumar De.
2. Milk products preparation and quality control – C.P. Ananthakrishnan.
3. The technology of milk processing – C.P. Ananthakrishnan.
4. Modern Dairy products – Lincoln M. Lampert.
5. Milk and milk products – Eckles, Combs, Harold Macy.

B.Sc. Dairy Science (Vocational Subject)

III Year VI Semester

DSE-IIB: Dairy Microbiology

Theory Syllabus (4 Credits)

60 Lectures

Unit 1: (a) Types of microorganisms present in milk: acid producing, gas producing, protein splitting, fat splitting, pathogenic and inert organisms.

(b) Types of microorganisms based on temperature requirement: Psychrophilic, mesophilic, thermophilic and thermoduric microorganisms. (15)

Unit 2: (a) Chemical changes observed during storage of milk and abnormal fermentations observed in milk: Souring, gassy fermentation, proteolysis, lipolysis, ropiness and flavor fermentations.

(b) Sources of contamination of milk and their control: Exterior of the animal, interior of the udder, utensils, water, milker, flies and insects, soil and manure, milking barn, cattle shed and surroundings. (b) Methods of clean milk production. (15)

Unit 3: Microbiological examination of milk: Direct microscopic count, Standard plate count, Methylene blue reduction test, Resazurin reduction test and Coliform test. Milk borne diseases: bacterial, viral and other diseases. (15)

Unit 4: Cleaning and sanitization of dairy equipment: Desirable properties of detergents and sanitizers; commonly used detergents and sanitizers; Methods of cleaning and sanitization: (i) Hand washing (ii) Mechanical washing (iii) Cleaning in place. (15)

B.Sc. Dairy Science (Vocational Course)

III Year VI Semester

DSE-II B: Dairy Microbiology

Practical Syllabus (1 Credit)

1. MBRT test of milk.
2. RRT test of milk.
3. Direct microscopic count of milk.
4. SPC of milk.
5. Coliform count of milk.
6. Thermoduric count of milk.
7. Thermophilic count of milk.
8. Psychrophilic count of milk.
9. Mesophilic count of milk.

Reference Books:

1. Dairy Microbiology – R.K. Robinson.
2. Milk products preparation and quality control – C.P. Ananthkrishnan.
3. Food microbiology – W.C. Frazier.

**B.Sc. III Year
Semester-VI
Paper 8: Optional**

GE-II (2 hrs/week)

(2 Credits) Lectures: 30

Food Hygiene and Quality Testing

Unit I: Introduction to Food Hygiene 15

- Food hygiene
- Food spoilage
- Food handling
- Special requirements for high-risk foods,
- Safe food cooking temperature and storage techniques.
- Hygiene and Sanitation in Food Service Institutions
- Cleaning and disinfection, Personal hygiene Pest control, Waste disposal

Unit II: Sensory Methods of Food Quality Testing 15

- Sensation of taste, smell, appearance and flavor,
- Sensory evaluation techniques
- Objective Methods of Food Quality Testing
- Physical test methods (moisture, acidity, water activity, texture, viscosity, colour)
- Simple methods of chemical analysis (protein, fat, water, ash)
- Microbiological sampling and testing.

Recommended Books:

1. Fellows P et al. Making Safe Food: A Guide to Safe Food Handling and Packaging for Small-scale Producers Practical. Action Publishing, 1998.
2. Frazier WC and Westhoff DC. Food Microbiology, TMH, New Delhi, 2004.
3. IFST. Food Hygiene Training: A Guide to its Responsible Management, UK: Institute of Food Science and Technology 1992.
4. Lawley R, Curtis L and Davis J. The Food Safety Hazard Guidebook , RSC Publishing, 2004.
5. Manay NS and Shadakshaswamy M. Food Facts and Principles, New Age International, 2004.
6. Marriott NG and Gravani RB. Principles of Food Sanitation, New York: Springer, 2006.
7. FAO Food and Nutrition Paper – 60. Food Fortification - Technology and Quality Control. 1996.
8. Suri S and Malhotra A. Food Science, Nutrition and Safety, Pearson India Ltd, 2014.

**B.Sc. II Year
Semester-III
Skill Enhancement Course**

SEC-1(2 hrs/week)

(2 Credits) Lectures: 30

Artificial Insemination

Unit-I

1. Study of male and female reproductive systems. (4h)
2. Gametogenesis and Oestrus cycle. (4h)
3. Semen: Definition, Collection by AV method, Collection technique, Evaluation, Freezing, Handling and Storage. (6h)
4. Heat detection. (1h)

Unit-II

5. Study of AI Equipments. (4h)
6. Time and Technique of AI. (4h)
7. Pregnancy diagnosis. (2h)
8. Visits to Veterinary Hospitals and AI Centres. (5h)

Reference Books:

1. Advances in Dairy animal production – Mudgal.
2. Dairy Bovine production – CK Thomas.
3. Handbook of Animal husbandry – ICAR publication.
4. Animal husbandry and Dairy Science – Jagdish Prasad.
5. A text book of Animal husbandry - G E Banerjee.
6. Livestock production and management – NSR Sastri and Thomas.
7. Reproduction in farm animals – Hafeez.
8. Animal Genetics and Breeding – Dr. Satish Kulkarni, Dr. Pandurang Gangasagar.

**B.Sc. II Year
Semester-III
Skill Enhancement Course**

SEC-2 (2 hrs/week)

(2 Credits) Lectures: 30

Conservation of Green Fodder

Unit-I

1. Principles of conservation and its significance. (3h)
2. Suitable crops for conservation and stage of harvesting. (3h)
3. Silage making: (9h)
 - a. Definition and Standards of Silage.
 - b. Types of silo pits and their dimensions.
 - c. Ensiling, care during and after ensiling.
 - d. Chemical changes during ensiling.

Unit-II

4. Hay making: (10h)
 - a. Definition
 - b. Characteristics of good quality hay
 - c. Curing of hay
 - d. Factors affecting quality of hay.
5. Visit to Silage and Hay Unit. (5h)

Reference Books:

1. Silage and Hay Making, ICAR – Chatterjee BN.
2. Applied Animal Nutrition-Feeds and Feeding – Peter R. Cheeke.
3. Tropical feeds, FAO – Gohl BO.
4. Fodder production and Grassland management for Veterinarians - Reddy DV.
5. Feeds and Principles of Animal Nutrition –Banerjee GC.
6. Animal nutrition and feeding practices in India – SK Ranjhan.

B.Sc. II Year
Semester-IV
Skill Enhancement Course

SEC-3 (2 hrs/week)

(2 Credits) Lectures: 30

Concentrate Feeds and Agro industrial By-products in Animal Nutrition

Unit-I

1. Study of Concentrates – Cereal grains and their nutritive value: (6h)
 - a. Oil seeds, Oil cakes and Nutritive value.
 - b. Study of Concentrates available in local market.
2. Concentrate by-products – Wheat bran, Rice bran, Maize gluten husk, Tur chuni, Gram chuni. (3h)
3. Industrial by-products – (3h)
 - a. Sugar Industrial by-products – Molasses, Press-mud, Bagasse, Sugarcane tops, UMMB, UROMOL.
 - b. Animal Industrial by-products – Fish meal, Bone meal, Blood meal, Poultry excreta and local market available by-products. (3h)

Unit-II

4. Fruits and Vegetables Industry by-products – Seed kernels, Hulls, Tomato (10h) pomace, Potato pomace, Apple pomace, Banana peels, Citrus peels, Pine apple waste, Leafy vegetable waste.
5. Visits to Fodder crops, Feed Factories, Oil industries, Fruits and Vegetable industries and Sugar industry by-products. (5h)

Recommended Books:

1. Animal Nutrition – Aron A Bondi, John Wiley and Sons, Britain, 1987.
2. Nutrient requirements of ruminant livestock - ARC, UK, 1984.
3. Handbook of Applied Animal Nutrition – Niranjana PS, Chahal US, Srivastava V & Kumar S. IBDC Publishers, Lucknow, 2010.
4. Animal Nutrition in the Tropics, 3rd Edn., - Ranjhan SK, 1993.
5. Applied Nutrition – Livestock, Poultry, Pets, Rabbits & Laboratory animals – Reddy DV, 2009.
6. Nutrient requirement of dairy cattle - NRC, 2001.

B.Sc. II Year
Semester-IV
Skill Enhancement Course

SEC-4 (2 hrs/week)

(2 Credits) Lectures: 30

Special Milks

Unit-I

1. Introduction, Definition, Methods of manufacture and uses of Processed Special Milk: (5h)
 - a. Sterilized milk
 - b. Homogenized milk
2. Introduction, Definition, Methods of manufacture and uses of Value Added Special Milk: (5h)
 - a. Flavoured milk
 - b. Vitaminized milk/Irradiated milk/Fortified milk
3. Introduction, Definition, Methods of manufacture and uses of Fermented Special Milk: (5h)
 - a. Cultured Butter milk
 - b. Acidophilus milk

Unit-II

4. Introduction, Definition, Methods of manufacture and uses of Standardized Special Milk: (5h)
 - a. Toned milk
 - b. Double Toned milk
5. Introduction, Definition, Methods of manufacture and uses of Special Milk of Plants/Vegetable origin: (5h)
 - a. Soya milk
 - b. Groundnut milk
 - c. Almond milk
6. Visits to Milk processing plants, Fermentation plants, Soya processing plants, Food Foliage College. (5h)

Reference Books:

1. Outlines of Dairy Technology – SK De.
2. Milk and Milk Products – Eckless, Combs and Macacy.
3. Modern Dairy Product – Lampert.
4. Indigenous Milk Products – ICAR publication.
5. Market Milk Industry – CI Rhodhouse and JL Handerson.
6. Technology of Indian Milk Products – RP Aneja, BN Mathur, RC Chandan and AK Banerjee.