Chaudhary Charan Singh University, Meerut

M.Sc.Ag. Dairy Science and Technology

J-1011 Dairy Cattle Production (w.e.f. 2010-11)

Contact hours-50 Maximum Marks-100

1. Live Stock Industry: Its scope and potential, taxonomical classification of dairy animals, animal behavior, direct and indirect effect of temperature, humidity, solar radiation and light on productivity of dairy animals. 7 hours

2. Breeding- System of animal breeding, breeding policies for cattle and buffaloes, strategies for genetic improvement of cow and buffalo for productive and reproductive performance, artificial insemination and its role in animal breeding. 8 hours

3. Housing: Types and planning of building/ sheds for various age groups in dairy cattle, site selection and foundation, water-its quality and supply, cleaning and disinfection of barns and sheds. 8 hours

4. Nutrition: Nutrient requirement for growth, reproduction and production; formulation and consumption of economic ration, composition of ration for different dairy animals for growth, milk production and draft. 8 hours

5. Management: Care and management of dairy livestock during pregnancy and parturition, care of newly born –weaned and suckling calves. 7 hours

6. Labour Management: Selection of labour, milking practices and problems, farm records and their upkeep. 6 hours

7. Clean Milk Production: Constraints and strategies, Good animal Husbandry Practices. 5 hours

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Practicals:

1. Layout of cattle sheds, feed storage stacks, ensuring of green fodder, hay making. 3 session
2. Identification of common feeds and fodders. 2 session
3. Formulation of ration for dairy animals. 3 session
4. Vaccination and deworming programme formulation for dairy livestock. 2 session
5. Demonstration of semen collection, processing and insemination of female. 2 session

Suggested Readings:

1. N.S.R. Shastry & C.K. Thomas; 1976, Farm Animal Management; Vikas Publishing house Pvt. Ltd. 5 Ansary Road, New Delhi 110002.
2. ICAR, 2002, Hand Book of Animal Husbandry; Directorate of Information and Publication, ICAR, New Delhi.
3. Hafez, E.S.E., 1993, Reproduction in Farm Animals 6th Ed. Lea & Febiger, Philadelphia.
4. Benerjee, G.C., 1982, A Text Book of Animal husbandry, 66 Janpath, New Delhi.
5. Cheek, P.R., 1999, Applied Animal Nutrition- Feed and feeding; .2nd Ed. Prentice Hall, Upper saddle River, New Jersy-07458.
6. Ranjhan, S.K., 1992, Animal Nutrition and Feeding Practice; 4th Ed. Vikas Publishing house Pvt.Ltd. 5 Ansary Road, New Delhi 110002.
7. Prasad, J., 1997, Principles and Practices of Dairy Farm Management; Kalyani Publishers, 24 Daryaganj, New Delhi.
8. Ranjhan, S.K. and Pathak, N.N. 1983, Management and Feeding of Buffaloes; Vikas Publishing house Pvt., Ltd. 5 Ansary Road, New Delhi 110002.

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J-1012 Chemistry of Milk (w.e.f. 2010-11)

Contact hours-50 Maximum Marks-100

1. Milk: Constituents and gross composition of milk of milch animals and factor affecting it. Colostrums-Definition, composition and significance. 5 hours

2. Preservatives, neutralizers and adulterants in milk and their detection. 5 hours

3. Physical Properties of milk: Theories and practices involved in determination of specific gravity, viscosity, surface tension, refractive index, electrical conductivity, specific heat, boiling point, freezing point, acidity, hydrogen ion-concentration, oxidation-reduction potential, color and taste. 8 hours

4. Protein: Nomenclature, classification of amino acids in milk protein; physical and chemical properties of various types of milk protein and non nitrogen fractions in milk. Hydrolysis and denaturation of milk protein under different physical and chemical environment. Protein polymorphism and its importance in heat stability of milk and quality of cheese. 8 hours

5. Milk Carbohydrates: Status, importance, physical and chemical properties of lactose, sugar-amine condensation, anadori re-arrangement, production of hydroxyl-methyl furfural, processing related degradation of lactose. 6 hours

6. Lipids: Definition, composition and classification, general structure of milk lipids, factor affecting fatty acid composition, milk phospholipids and their role in milk products, unsaponafiable matter and fat soluble vitamins. 6 hours

7. Milk Enzyme: Introduction and significance of lipase, xanthin oxidase, phosphatase, proteases and lactoperoxidase. 5 hours

8. Milk Salts: Minerals in milk-Major minerals and trace elements; Partitioning of major minerals and factor affecting it. 4 hours

9. Milk contact surfaces and metallic contamination. 3 hours

Practical:

1. Determination of fat, Solids not fat and Total Solids in milk. 2 session
2. Determination of titratable acidity and pH in milk. 1 session
3. Estimation of total milk protein by kjeldahal method. 2 session
4. Determination of casein, whey protein and NPN in milk. 2 session
5. Determination of lactose in milk. 1 session
6. Determination of chloride, phosphorus, calcium and ash in milk. 2 session
7. Determination of temporary and permanent hardness in water. 2 session

Suggested Readings:

1. Walstra, P. and Jenness, R. 1984, Dairy Chemistry and Physics; John Wiley and Sons, New York, US
2. Lewiss, M.J. 1986, Physical Properties of Dairy Products; Pub. Sc. Pub. London.
3. Mathur, M.P. Datta, Roy D. Dinakar, P. 1999, Text Book of Dairy Chemistry; ICAR, New Delhi.
4. Varnan, A.H. and Sutherland, J.P. 1984, Milk and Milk Product Technology, Chemistry and Microbiology; Chapman and Hall, London.
5. Wong, N.P. ;Jeness, R. ; Keeney, M. and Elmer, H.M. 1988 ,Fundamentals of Dairy Chemistry; Van Nostrand Reinhold Co., New York, USA.
6. Fox, P.F. and McSwamy,P.L.H.,1998.,Dairy Chemistry and Biochemistry :Blackie Academics Professional, Chapman and Hall ,London.
7. Walstra, P. and Jenness, R 1984, Dairy Chemistry and Physics, John wiley & Sons, New York.

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J-1013 Introduction to Dairy Microbiology (w.e.f. 2010-11)

Contact hours-50 Maximum Marks-100

1. Micro-organism associated with milk and milk products: Bacteria, yeast, viruses. Characteristics (morphological and biochemical) of important groups, classification based on growth, temperature (psychrotrophs, mesophils, thermodurics and thermophils.) 6 hours
2. Good manufacturing practices good hygienic practices. 4 hours
3. Microbiological change in bulk refrigerated raw milk: Role of psychrotrophics organism and incidence of diseases, microbiological tests for grading of raw milk-SPC and dye reduction test. 6 hours
4. Role of microorganism in spoilage of milk and milk products: Microbiological interaction (synergism, metabiosis, mutualism, commensalism), undesirable fermentation (souring, curdling, bittyness in cream, proteolysis, lypolysis), abnormal flavor and discoloration. 8hours
5. Mastitic Milk: Type of causative microorganism, somatic cell secreted in milk; their detection and significance from processing and public health point of view; effect on fermented milk. 5 hours
6. Milk Born Disease: Prevention of milk born disease, incidence and growth of emerging pathogens such as listeria, campylobactor, yarsinia and vibrio. 4 hours
7. Antimicrobial substances in milk: Immunoglobulin, lactoferrins, lysozyme, L.P.system etc. 4 hours
8. Microbiology of heat treated milk: Thermized, pasteurized, boiled, sterilized,UHT milk, thermal destruction values. 8 hours
9. Heat injury, damage and repair mechanism in bacteria. 5 hours

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Practical:

1. Identification of common lab instruments and bacteriological media. 1 session
2. Morphological characteristics of common dairy organism (shape, size, arrangement, motility and sporulation.) 1 session
3. Identification of common yeast and mold encountered in dairy products. 1 session
4. Enumeration of psychrotropic, thermoduric and thermophilic microorganisms in milk. 1 Session
5. Detection of sources of contamination: air, water, feed, utensils, dung, equipment and personnel through on line testing. 1 session
6. Fermentative changes caused by microorganism in milk: gassiness, lipolysis, ropiness, proteolysis and discoloration. 1 session
7. Tests for mastitis: pH, SLST, somatic cell count, chloride content, hotis test, CAMP test. 1 session
8. Detection of pathogens: E.coli, Staphylococcus, salmonella and B.cereus using selective media and bio-chemical tests. 3 session
9. Dye reduction test-MBRT, RRT, Tetrazolium tests. 1 session
10. Tests for detection of antibiotic residues. 1 session

Suggested Reading:

1. Black, J.G. 1999, Microbiology; Principles and Explorations; 4th Ed., John Wiley and sons, New York, USA.
2. Marth, E.M. and Steele, J.L. 1998, Applied Dairy Microbiology; Marcel Dekker Inc., New York, USA.
3. Atlas, R.M. 1993, Microbiology-Fundamentals and Applications; 3rd Ed., Macmillan Publishing Co., New York, USA.
4. Yadav, J.S., Batish V.K. and Grover, S. 1993, Comprehensive Dairy Microbiology; Metropolitan Publ., Delhi, India.
5. Clark, V.L. and Baroil, P.M. 1997.Bacterial Pathogens; Academic Press, New York, USA.
6. Frazier, W.C. Wessthoff, D.C. 1988, Food Microbiology; Tata McGraw Publ., New Delhi.

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J-2011 Dairy Plant Engineering (w.e.f. 2010-11)

Contact hours-50 Maximum Marks-100

1. Dairy Plant Designing- Importance of dairy plant layout; factors to be considered in site selection; concepts preparing layout for various sections in a dairy plant. 5 hours

2. Basic concepts in process engineering: Basic heat transfer processes; thermal resistance, film coefficients and overall heat transfer coefficients. Insulation materials and their properties. Heat exchangers. Calculation of heat transfer area. Properties of fluids- concepts of pressure and fluid flow. 8 hours

3. Instrumentation: Importance of measuring instruments and automatic control in dairy industry. Temperature-its measurement. Temperature controllers and recorders. Sanitary pressure gauges. Measurement of flow of liquids in pipes. Humidity controllers and their application. Air operated milk valves. 8 hours

4. Steam and Hot Water: Steam- its classification and properties; steam generation, boilers constructional features and classification, common fuels used in dairy boilers-properties, merits and demerits. Care and maintenance of boilers. Water requirements of boilers-impurities and hardness in water. 8 hours

5. Refrigeration: Role of refrigeration in dairy industry. Refrigeration principles. Systems of refrigeration, parts and functions. Rating of refrigeration machine. Refrigerants-types and limitations. Methods of utilization of refrigeration. Brine composition and maintenance. Air conditioning -methods and equipments used. Construction of cold stores. 8 hours

6. Dairy Effluent Management: Selection criteria for waste water treatment methods; common methods used in dairy industry; whey waste handling in dairy. 6 hours

Practical:

1. Layout of small, medium and large sized dairy plants. 3 session

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2. Study the construction and working of vertical and horizontal boilers. 2 session

3. Study the constructional and working of LTLT and HTST pasteurizers. 2 session

4. Calculations pertaining to refrigeration and steam requirement. 3 session

5. Study the direct expansion and brine circulation systems of refrigeration. 2 session

Suggested Readings:

1. Ahmad, T.1997, Dairy Plant Engineering and Management; Kitab Mahal, Allahabad.

2. Ananta Krishnan, C.P. and Simha N.N. 1987. Technology and Engineering of Dairy Plant Operations; Laxmi Publication, Delhi.

3. Brennan, J.G.1981, Food Engineering Operation; Applied Sc. Pub. Ltd., London.

4. K.P.S.Sangwan, 2008; Technology of Dairy Plant Operation; Agrobios (India) Jodhpur, 342002.

5. S. Domkundwar, 1980, A course in Refrigeration and Air Conditioning, Dhanpat Rai and Sons, Delhi.

6. Richard Conway & Richard, D. Ross, 1980, Hand Book of Industrial Waste Disposal; Van Nortrand, Reinhold Company, New York.

Chaudhary Charan Singh University, Meerut

M.Sc.Ag. Dairy Science and Technology

J-2012 Market milk Technology (w.e.f. 2010-11)

Contact hours-50 Maximum Marks-100

1. Introduction: Status of dairy industry in India, operation flood program; Technological mission on dairy development; National Milk Grid; Milk Production and utilization in India; Dairy development through successive five year plans; Recent policies related to dairy sector (WTO) and their impact on dairy industry in the country. Milk marketing federations- their concept, achievements, limitations and impacts on the dairy industry. Food Safety and Standard Act 2006, Codex Standards. 6 hours

2. Procurement- Methods of milk procurement and mode of payment, utility assessment, chilling and transportation of milk for processing in dairies; route planning. 4 hours

3. Receiving of Milk: Routine operations including platform tests; milk storage; Basics in planning of milk flow line. 4 hours

4. Clarification and Bactogugation-Principles and application; automatic ~~dislodging~~ desludging of separators and clarifiers. 4 hours

5. Homogenization- Principles and theories of homogenization, effect on milk constituents, factors affecting the efficiency of homogenization. 4 hours

6. Heat treatment: Principles and methods of thermization, pasteurization and sterilization, UHT processing ~~for virus and particulate products~~ and effect of UHT processing on bacterial, physical, chemical, bio-chemical and nutritional properties of milk. 5 hours

7. Special Milks: Principles of production, Processing of fat corrected whole milk, standardized milk, toned, double toned, reconstituted, recombined, sterilized, flavoured, fortified and filled milk. 6 hours

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8. Packaging: Types of containers used in packaging, advantage and disadvantage of existing packaging systems and recent development. 4 hours

9. Marketing: Systems of delivery-Recent development in organized milk distribution.

4 hours

10. Cleaning and Sanitization: Deposition of milk solids in dairy equipments; dairy detergent and sanitizers and their properties; basic principles in formulating the washing solutions, cleaning and sanitization of dairy equipments; CIP systems.

8 hours

Practicals:

1. Platform tests and Grading of milk. 2 session
2. Cleaning and sanitization of dairy equipments. 1 session
3. Study of cream separator and cream separation. 1 session
4. Preparation of special milks. 4 session
5. Milk adulteration – detection and estimation. 3 session
6. Organization and working of cooperative milk producers' society. 1 session

Suggested Readings:

1. Allen, H. Vernon & Jane, P. Southerland, 1994, Milk and Milk Product Technology, Chemistry and Microbiology; Chapman and Hall, London.
2. Burton, H. 1998, Ultra high temperature processing of Milk and milk Products; Elsevier Applied Science Ltd., England.
3. Goud, G.W. 1995, New Methods of Food Preservation; Blackie Academics and Professional Pub. London.
4. Robinson, R.K. 1994; Modern Dairy Technology; Chapman and Hall, London.
5. K.P.S.Sangwan, 2008; Technology of Dairy Plant Operation; Agrobios (India) Jodhpur, 342002.

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J-2013 Traditional and Value added Milk Products. (w.e.f. 2010-11)

Contact hours-50 Maximum Marks-100

1. Present status of traditional dairy products, globalization of traditional dairy products, plans and policies of the government and development agencies. 5 hours
2. Process schedule of frozen, heat desiccated, coagulated and fermented dairy products. 8 hours
3. Process improvement in production of milk sweets and new products based on fruits, vegetables and cereals. 8 hours
4. Application of membrane technology and microwave heating for industrial production of traditional dairy products. 5 hours
5. Different methods of ghee manufacturing with merits of demerits of each. Advances in industrial production of ghee; flavor and texture simulation. Agmark grading of ghee. 5 hours
6. Techno-economic aspects for establishing commercial units for traditional products. 5 hours
7. Convenience traditional dairy products. 5 hours
8. Use of class I and class II preservatives in traditional dairy products. 5 hours
9. New packaging systems for traditional dairy products. 5 hours

Practicals:

1. Preparation of frozen, heat-desiccated, coagulated and fermented traditional dairy products. 4 session

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2. Preparation of milk sweets and new products based on fruits, vegetables and cereals. 4 session

3. Microwave heating of traditional milk delicacies. 2 session

4. Preparation of feasibility report for establishing commercial units for traditional products. 2 session

Suggested Readings:

1. Lecture Compendium, 1998, Dairy Technology Division, NDRI; Advances in Traditional Dairy Products.

2. Achaya,K.T. and Rangappa, K.S. 1973 Indian Dairy Products.

3. Aneja,R.P.; Mathur, B.N.; Chauhan, R.C. and Benerjee, A.K. 2002 Technology of Indian Milk Products. A Dairy India Publication, Delhi.

4. De, S. 1994, Outlines of Dairy Technology; Oxford Univ. Press, New Delhi.

5. K.P.S.Sangwan, 2008, Technology of Dairy Plant Operation; Agrobios (India) Jodhpur,342002.

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M.Sc.Ag. Dairy Science and Technology

J-3011 Chemistry of Milk Products (w.e.f. 2010-11)

Contact hours-50 Maximum Marks-100

1. Chemical composition and legal standards of different milk products. 3 hours
2. Process induces change in milk-cooling,freezing, heating, homogenization and irradiation. 5 hours
3. Chemistry of creaming and factor affecting it. Ripening, ageing and neutralization of cream. 5 hours
4. Theories of churning, factors influencing churningt. Mechanism of churning. Structure and rheology of butter. Genesis of flavor. 6 hours
5. Ghee-Physico-chemical changes during manufacture, chemistry of flavor compounds. Oxidative and hydrolytic deterioration, natural and systhetic antioxidents. Adulteration of ghee and its detection. 6 hours
6. Physico-chemical changes in milk costituents during manufacture of khoa, chhana, paneer, rabri and basundi and shrikhand. 4 hours
7. Chemistry of cheese- milk clotting enzymes from various sources, enzymetic coagulation of milk, chemistry of stretching in mozzarella cheese, physico-chemical change during manufacture and ripening of cheese. Chemical defects in cheese and their causes and preventive measures. 6 hours
8. Condensed and evaporated milk-effect of process variables on heat stability of concentrated milk; lactose crystallization, browning, gelation, salt balance, etc. 6 hours

9. Milk powder-structure and physico-chemical properties (particle size and particle size distribution, bulk density, free fat, insolubility index and flowability reconstitution properties (wettability sinkability, dispersibility and rate of sultion changes during manufacture and storage particularly, lactose crystallization and its effect on casein development of abnormal flavours causes and prevention of these defects. Physiological consequences of feeding infant with infant food. 6 hours

10. Ice-cream- properties of ice cream mix, stability, mechanism of action of stabilizers and emulsifiers. Physic-chemical change during freezing and storage of ice-cream mix. 4 hours

11. Physico- chemical change during manufacture of fermented milk. 2 hours

Practical:

1. Estimation of acidity and fat in cream. 1 session
2. Determination of fat , moisture, salt, curd and acidity. 1 session
3. Determination of moisture and physico-chemical contants in ghee. 2 session
4. Sampling and determination of moisture, fat, salt, protein and acidity in cheese. 1 session
5. Estimation of fat, ash, solubility, acidity and bulk density of milk powder. 1 session
6. Sampling and analysis of condensed and evaporated milk for protein, ash, sucrose and acidity. 2 session
7. Sampling and analysis of ice-cream for total solids, fat, sucrose and protein. 1 session
8. Analysis of khoa and paneer / chhana for moisture fat and protein. 1 session

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Suggested Reading:

1. Fox, P.F. 1985 Developments in Dairy Chemistry-3 Applied Science Publishers,U.K.
2. Law,B.A. 1997. Microbiology and Biochemistry of cheese and fermented milks. 2nd edn. Blackie Academic and Professional, Chapman and Hall.
3. Walstra, P. Jenness,R. 1984. Dairy Chemistry and physics. John Wiley and Sons, New York.U.S.A.
4. Wong,N.P., Jeness,R., Keeney,M.and Elmer,H.M 1988. Fundamentals of Dairy Chemistry, Van Nostrand Reinhold Co., New York.

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J 3012 Elementary Food Science (w.e.f. 2010-11)

Contact hours-50 Maximum Marks-100

1.Introduction: Food production-significance of agriculture (crops and live stock), food constituents, specific nutrients in foods, functions of foods. Basic food groups-energy giving, body building and protective foods. Status, prospects and constraints in development of food industry in India. World food problem and role of food processing industry in solving it. 8 hours

2. Post Harvest Management of Foods: Harvesting indices, bio-chemical and physical change during ripening of fruits and vegetable, role of ethylene in accelerated ripening, climacteric and non climacteric fruits and vegetables extension of shelf life of fresh produce and minimizing post harvest losses.

5 hours

3 Food Preservation: Food spoilage, principles of food preservation, temperature in relation to bacterial life, thermal death time (F 0 value). Principles involved in heating, chilling, freezing and drying; change during cold storage and drying of food products; advance drying process- freeze drying, infrared drying and micro wave drying; use of sugar, salt, chemical preservatives and smok in food preservation.

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4 Food Fermentation: Role of acid fermentation, alcoholic fermentation and flavor producing fermentation in food industry; technology of pickled vegetable and production of wineger, wine and beer.

5 hours

5 Meat Preservation: Freezing, canning and smoking of meat, fermented sausages.

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3 hours

7. Food Additives: Stabilizer, emulsifier, anti-oxidant and preservatives for formulated foods. 3 hours

8. Bakery Products: Solvent extractive milling of rice and turbo milling of wheat, role of ingredients in bakery products; change during processing of breads, biscuits, pizza bases and cake. 5 hours

9. Packaging: Packaging of food products sensitive to oxygen, light and moisture; packaging of convenience foods, fruits, vegetable, meat products and egg products; controlled atmosphere packaging, shrink and stretch packaging; biodegradable and edible packages. 8 hours

Practical:

1. Manufacture of bread, biscuits, pizza base and cake. 2 session
2. Preparation of squash, cordial, nectar and whey based drinks. 2 session
3. Clarification of fruit juices. 1 session
4. Preparation of soya milk and tofu. 1 session
5. Drying of fruits and vegetables. 1 session
6. Manufacture of sauerkraut / fermented vegetables. 1 session

Suggested Readings:

1.Fellows PJ 2000 Food Processing Technology: Principles and Practices 2nd edition CRC Woodhead publ.

2.NDRI 2001 Advances in Preservation of Dairy and Food Products. Lecture Compendium, Dairy Technology NDRI, Karnal.

3.Raija A 2006 Novel Food Packaging Woodland Publ.Co.

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J-3013 Condensed & Dried Milks and Dairy by-products. (w.e.f. 2010-11)

Contact hours-50 Maximum Marks-100

1.Condensed and Evaporated Milks: Importance, definition, standards, classification, nutritive value, grading and quality of raw milk for condensed and evaporated milk manufacture, physico-chemical properties of condensed and evaporated milks, role of stabilizer in stability of evaporated milk, physico-chemical change taking place during manufacture of condensed and evaporated milks, manufacture technique, packaging, storage, judging and possible defects with their preventive measures. 15 hours

2.Dried Milks: Importance, definition, standards, physico-chemical properties, nutritive value, classification, manufacture technique, packaging, storage, judging and possible defects with their remedies, reconstitution of WMP and SMP. 10 hours

3.Dried Milk Products: Standards and manufacture of infant and weaning milk foods, malted milk foods, introduction to basics involved in manufacture, packaging and storage of milk tablets, milk biscuits, butter milk powder, whey powder, cream powder, ice-cream mix powder, cheese powder, chhana powder, khoa powder, butter powder and shri-khand powder. 10 hours

4.Dairy By-Products: Physico-chemical properties, composition and utilization of separated milk, butter milk, whey and ghee residues.

Manufacture, packaging and utilization of casein, sodium caseinate, calcium caseinate, casein hydrolysate, fermented products from whey, whey beverage, deproteinized and deminiralized whey, condensed whey, dried whey, lactose, whey protein concentrate, condensed butter milk, dried butter milk and ghee residue products. 15 hours

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Practical:

1. Testing the suitability of milk for concentration. 2 session

2. Manufacture of edible casein, sodium caseinate, calcium caseinate and precipitate. 4 session

3. Manufacture of whey drinks. 2 session

4. Field trips to malted or dried milk plants.

Suggested Reading:

1. De S. 1980 Outlines of Dairy Technology. Oxford University Press,Delhi.

2. Allen, H; Vernon and Southerland, Jane P. 1994 Milk and Milk Product Technology, Chemistry and Microbiology. Chapman and Hall.

3. Sangwan K.P.S. 2008 Technology of Dairy Plant Operations Agrobiose (India) Jodhpur 342002.

4. Robinson R.K. 1994 Modern Dairy Technology (2 vol.set) Chapman Hall U.K.

5. Zadaw J.G. 1994 Whey and Lactose Processing, Elsevier Applied Science, Londen.

6..Webb B.H. and Whittier,E.O 1970 By-Products from Milk. The AVI Pub.Co. Inc. West Port Conn.

7. Sienkiewizc, T. and R. Tiedel, C.L. 1990 Whey and Whey Utilization. Vslag Th. Mann Gelsen Kirchen-Buer, Germany.

8. Zadaw J.G 1994 Whey and Lactose Processing; Elsevier Applied Science, London.

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J-3014 Technology of Functional Foods (w.e.f. 2010-11)

Contact hours-50 Maximum Marks-100

1. Food nutrition and health. 3 hours
2. Nutritional status and dietary requirement of different target groups and deficiency diseases. 4 hours
3. Infant nutrition and dietary formulation for meeting normal and special needs. 4 hours
4. Special food formulation for lactose intolerant and diabetics. 5 hours
5. Therapeutic diet for patients suffering from acute gastritis, flatulence, peptic ulcers, jaundice, viral hepatitis etc. 10 hours
6. Low fat, low energy and slimming foods for the obese. 4 hours
7. Low cholesterol and low sodium foods. 3 hours
8. Geriatric and probiotic foods and nutritional management of the elderly. 5 hours
9. Food formulation for the sport persons and growing children. 3 hours
10. Special dietary foods-Infant foods, weaning foods, high energy foods and low residue diets. 9 hours

Practicals:

1. Production of various formulated foods-low and high energy foods, high fiber content foods, probiotic foods. 8 session
2. Measurement of dietary fiber contents in dairy foods. 2 session

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3. Measurement of cholesterol content in milk foods. 2 session

Suggested Readings:

1. Arnold,E.Bender 1973 Nutrition and Dietitics foods;Chemical Publishing Company, Inc.,New York.
2. Morie V. Krause and L. Kathleen Mohan 1979 Food, Nutrition and Diet therapy;WB Saunders Company.
3. J.M. Jussawalla 1979 Natural Dietetics, Vikas publishing House Pvt.Ltd.
4. Virginia Aronson 1989 The Dietetics Technician, Effective Nutrition Counselling (2nd Ed.) VAN Nastrand Reinhold, New York.
5. Khan Riaz Blackie 1993 Low Calorie Food and Food Ingredients,Academic and Professional, New York.
6. Smit J. 1993 Technology of reduced Additives Foods, Blackie Academic and Professional, New York.
7. Baker R.C., Hahn P.W. and Robins K.R. 1994 Fundamentals of New Food Products Development, Elsevier, New York.
8. Israel Gold berg 1994 Functional Foods, Chapman and Hall, New York.

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J-4011 Fat Rich and Frozen Dairy Products. (w.e.f. 2010-11)

Contact hours-50 Maximum Marks-100

1. Status of fat rich dairy products in India and abroad. 3 hours

2. Cream: Definition, composition, standards, classification, efficiency of cream separation and factor affecting it; control of fat concentration in cream, ; preparation of cream for butter making; receiving testing, grading, sampling and weighing of raw cream, neutralization, pasteurization and cooling of cream. Manufacture and properties of different type of cream- table cream, sterilized cream, whipped cream, plastic cream, frozen cream and cultured cream. 8 hours

3. Butter: Definition, composition, standards and nutritive value of butter; butter making equipments, churning theories, batch and continuous method of butter making, overrun, control of fat loss in butter, packaging storage of uses, transportation, judging and defects with possible remedies. Special butter and related products: Manufacture, packaging, storage and properties of whey butter, flavored butter, whipped butter, renovated butter, fractionated and poly-unsaturated milk fat products, vegetable oil blended products and low fat spreads. 12hours

4. Margarine: Manufacture, packaging, storage and basic characteristics. 4 hours

5. Butter Oil: Definition, composition, standards, manufacture, packaging, storage, distribution and its uses. 5 hours

6. Ice–Cream: Definition, classification and composition, role of process treatments and milk constituents and stabilizer and emulsifier in quality of ice-cream. Preparation of ice-cream mix, processing and freezing of ice-cream mix and control of overrun, packaging, hardening, storage and shipping of ice-cream. Defects- their causes and prevention. 8 hours

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Practical:

1. Standardization and neutralization of cream for butter manufacture. 2. session

2. Preparation of butter and estimation of overrun in it. 2 session

3. Preparation of ghee using cream and butter. 1 session

4. Standardization of ice-cream mix. 1 session

5. Manufacture of ice-cream and estimation of overrun in it. 2 session

6. Manufacture of kulfi. 1 session

Suggested Reading:

1. Allen, H; Vernon and Southerland, Jane P 1994 Milk and Milk Product Technology, Chemistry and Microbiology, Chapman and Hall.

2. Frandsen, J .H. And Arbuckle, W.S. 1961 Ice-Cream and Related Products. The AVI Publishing Company, Westport, Connecticut.

3. Robinson, R.K. 1994 Modern Dairy Technology (2 Vol. set.) Chapman Hall U.K.

4. Sangwan, K.P.S. 2008 Technology of Dairy Plant Operation, Agrobiose (India) Jodhpur, India.

5. De, S. 1980 Outlines of Dairy Technology, Oxford University Press Delhi.

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M.Sc.Ag. Dairy Science and Technology

J-4012 Microbiology of Milk Products. (w.e.f. 2010-11)

Contact hours-50 Maximum Marks-100

1. Process induced injury and repair mechanism in microorganism. Hurdle concept. Microbiological standards for milk product. 5 hours
2. Cream- type of micro organism and sources; microbial defects, standards and controlling measures; problems in pasteurized and sterilized cream. 5 hours
3. Butter- change during manufacture and storage, factors affecting microbioal growth. 5 hours
4. Condensed and evaporated milks- types of organism surviving during manufacture and storage; microbial defects and control measures. 5 hours
5. Dried milks- microflora of roller and spray dried whole and skim milk powder and infant foods; factors influencing microflora of dried milks and infant foods.5 hours
6. Ice-cream and frozen desserts- microbioal quality of ingradients, incidence and implications of enteropathogens in ice-cream and their control. 7 hours
7. Indigenous milk products-organism suviving during manufacture and storage of khoa,chhana / paneer and shrikhand: microbiological defects in indegenous milk products. 6 hours
8. Cheese-propagation and role of starter culture in cheese, microbiological changes during manufacture and ripening of cheddar cheese, microbiological defects-causes and prevention. 6 hours
9. Dahi, yoghurt, shrikhand, acidophilus milk, kefir, koumiss, bulgerian milk, cultured butter milk, leben and yakult - microbiology, defects and their control. 6 hours

Practical:

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1. Cream - standard plate count, lipolytic count, coliform count, direct microscopic count and dye reduction test. 2 session

2. Butter- Standard plate count, lipolytic count, coliform count, psychotrophic count; yeast and mold count. 2 session

3. Condensed and evaporated milk- standard plate count, coliform count, anaerobic count, yeast and mold counts, thermoduric and thermophilic counts. 1 session

4. Dried milks- standard plate count, thermoduric and thermophilic counts. 1 session

5. Ice-cream- standard plate count, coliform count, staphylococcal count and detection of salmonella. 1 session

6. Khoa- Standard plate count, coliform count, staphylococcal count, yeast and mold count. 1 session

7. Paneer and shrikhand-spore count, coliform count, staphylococcal count, yeast and mold count. 1 session

8. Packaging material- standard plate count, spore count, yeast and mold count. 1 session

Suggested Readings:

1. Marshall, R.T. 1992. Standard Methods for the examination of Dairy Products. APHA Washington D C, USA.

2. Mortimore S. and Wallace C. 1994 HACCP: A Practical Approach. Chapman and Hall, London, UK.

3. Robinson R.K. 1990 Dairy Microbiology. Applied Science Publ. London, UK.

4. Yadav, J.S., Batish, V.K. and Grover,S. 1993. Comprehensive Dairy Microbiology. Metropolitan publ., Delhi, India.

5. Marth. E.H. and Steele, J.L. 1998 Applied Dairy Microbiology, Marcel and Dekker Inc., New York. USA.

6. Clark, V.L. and Baroil, P.M. 1997. Bacterial Pathogens. Academics press, New York, USA.

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M.Sc.Ag. Dairy Science and Technology

J-4013 Dairy Process Biotechnology (w.e.f. 2010-11)

Contact hours-50 Maximum Marks-100

1. Development and impact of biotechnology on food and dairy industry. 3 hours

2 Cheese- microbial rennet and recombinant chymosin- characteristics and application in cheese making; exogenous free and microencapsulated enzyme, immobilized enzyme-their application in accelerated ripening of cheese, enzymatically modified cheese (EMC) their utilization in various food formulation; technological requirements of modified micro-organism for production of cheese and fermented milk foods. 10 hours

2. Technological innovation in the development of functional dairy foods with improved nutritional therapeutic and probiotic attributes. 5 hours

3. Physiologically active bio-peptides/ nutraceuticals. 3 hours

4. Protein hydrolysate- their physico-chemical and therapeutic properties. 4 hours

5. Production of bio-yighurt, probiotic cheese and fermented milk, bifidus factors in infant food formulation. 10 hours

6. Microbial polysaccharides-their properties and application in foods. 3 hours

7. Production of alcoholic beverage from whey and other byproducts. 4 hours

8. Biosweeteners-type, properties and application in dairy industry. 4 hours

9. Biopreservatives- characteristics and application in dairy foods. 4 hours

Practical:

1. To study the various factors affecting the coagulation of milk by microbiological rennet. 2 session

2. Manufacture and evaluation of probiotic cheese and fermented milks. 2 session

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J-4014 Cheese and Fermented Milk Products (w.e.f. 2010-11)

Contact hours-50 Maximum Marks-100

Cheese:

1. Status and Scope in dairy industry; Definition, standards, nutritive value and classification of cheese. Milk quality in relation to cheese manufacture.5 hours
2. Starter Culture- requirements of good culture, manufacture of various type of starter culture; role of starter culture, rennet and milk constituents in cheese manufacture. 8 hours
3. Rennet for difference sources and their properties. 6 hours
4. Manufacture, packaging, storage and distribution of cheddar, Gouda, Mozzarella, Cottage and Processed cheese. 10 hours
5. Manufacture of cheese spread and processed cheese foods. 6 hours
6. Judging, grading causes and prevention from common defects. 3 hours

Fermented Dairy Foods:

7. Definition, standards, composition, manufacture, packaging, storage and distribution of dahi, yoghurt, lassi, shrikhand, acidophilus milk, kefir, koumiss and cultured butter milk. 10 hours
8. Therapeutic value of fermented milk foods. 2 hours

Practical:

1. Familiarization with cheese making equipments. 1 session

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Determination of glycolysis, proteolysis and lipolysis in cheese and fermented milks

3 session

4. Study of enzymatic process for manufacture of low lactose milk whey products.

2 session

5. Preparation of casein hydrolysis. 1 session

Suggested Reading:

1. Alan Wiseman 1988 Principles of Biotechnology, Surrey University Press, New York.
2. Jack G; Chirikjian 1995 Biotechnology-Theory and Technique, Jones and Bartlett Publishers, London.
3. Byong H. Lee 1996 Fundamentals of Food Biotechnology, VCH Publishers, NY.
4. Rogar,A. 1989 Food Biotechnology, Elsevier Applied Sci. Pub. UK.