

**D R. BABASAHEB AMBEDKAR
MARATHWADA UNIVERSITY,
AURANGABAD.**



Revised Syllabus of
B.Sc. [Dairy Science & Technology]
Semester – I & II
(With Credit System)

(Effective from 2009-10 & onwards)

Dr. Babasaheb Ambedkar Marathwada University, Aurangabad
B.Sc. Dairy Science and Technology (Optional) Pattern in
Semester System
B.Sc. First Year

Semester	Course code	Paper number	Title of paper	Credits	Marks
I	DST-101	Paper-I	Dairy Farm Management	03	50
	DST-102	Paper-II	Market Milk Industry	03	50
	DST-103	Paper-III	Practical Based On Paper-I	1.5	50
	DST-104	Paper-IV	Practical Based On Paper-II	1.5	50
II	DST-201	Paper-V	Live Stock health and Hygiene	03	50
	DST-202	Paper-VI	Dairy Processing & Engineering	03	50
	DST-203	Paper-VII	Practical Based On Paper-V	1.5	50
	DST-204	Paper-VIII	Practical Based On Paper-VI	1.5	50

B.Sc. Second Year

Semester	Course code	Paper number	Title of paper	Credits	Marks
III	DST-301	Paper-IX	Animal Nutrition	03	50
	DST-302	Paper-X	Indian Dairy Products	03	50
	DST-303	Paper-XI	Practical Based On Paper-VIII	1.5	50
	DST-304	Paper-XII	Practical Based On Paper-IX	1.5	50
IV	DST-401	Paper-XIII	Feed Processing	03	50
	DST-402	Paper-XIV	Cheese and Fermented Milk Products	03	50
	DST-403	Paper-XV	Practical Based On Paper-XIII	1.5	50
	DST-404	Paper-XVI	Practical Based On Paper-XIV	1.5	50

B.Sc. Third Year

Semester	Course code	Paper number	Title of paper	Credits	Marks
V	DST-501	Paper-XVII	Animal Reproduction and A.I.	03	50
	DST-502	Paper-XVIII	Ice-Cream and fat rich dairy products	03	50
	DST-503	Paper-XIX	Practical Based On Paper-XVII	1.5	50
	DST-504	Paper-XX	Practical Based On Paper-XVIII	1.5	50
VI	DST-601	Paper-XXI	Genetics and Breeding	03	50
	DST-602	Paper-XXII	Condensed dried milks and by products	03	50
	DST-603	Paper-XXIII	Practical Based On Paper-XXI	1.5	50
	DST-604	Paper-XIV	Practical Based On Paper-XXIII	1.5	50

Note: For Theory Paper, 1 Credit = 15 Periods
For Practical Paper, 1 Credit = 30 periods

Dairy Science & Technology

Structure of the B.Sc. I, II & III year Course

Sr. No.	Class	Semester	Paper No	Title of the Paper	Credits
1.	B.Sc. I	I	Paper I	Dairy Farm Management	03
			Paper II	Market Milk Industry	03
			Paper III	Practical	1.5
			Paper IV	Practical	1.5
		II	Paper V	Live Stock health and Hygiene	03
			Paper VI	Dairy Processing & Engineering	03
			Paper VII	Practical	1.5
			Paper VIII	Practical	1.5
2.	B.Sc. II	III	Paper IX	Animal Nutrition	03
			Paper X	Indian Dairy Products	03
			Paper XI	Practical	1.5
			Paper XII	Practical	1.5
		IV	Paper XIII	Feed Processing	03
			Paper XIV	Cheese and Fermented Milk Products	03
			Paper XV	Practical	1.5
			Paper XVI	Practical	1.5
3.	B.Sc. III	V	Paper XVII	Animal Reproduction and A.I.	03
			Paper XVIII	Ice-Cream and fat rich dairy products	03
			Paper XIX	Practical	1.5
			Paper XX	Practical	1.5
		VI	Paper XXI	Genetics and Breeding	03
			Paper XXII	Condensed dried milks and by products	03
			Paper XXIII	Practical	1.5
			Paper XXIV	Practical	1.5

B.Sc. First Year
(Dairy Science Technology)
Semester I & II

Objectives

The course is planned to acquaint the students with :

- i) Farming aspects in livestock so as to prepare themselves for future prospectus.
- ii) Role of Dairying in national economy.
- iii) Sanitary and hygienic conditions in Animal farm.
- iv) Establishment of Dairy farm
- v) Various Drug Therapies.
- vi) Study of various diseases & disorders in livestock.
- vii) Processing of market milk in dairy plant.
- viii) Dairy Engineering inputs to dairy plant.
- ix) Dairy Chemistry applicable to market milk.
- x) Dairy Microbiology considerations to market milk.

B.Sc. I Year (Semester – I)
Dairy Science & Technology
Paper-I
Title: Dairy Farm Management

Max. Marks – 50

Sr. No.	Topics	No. of Periods
1.	Role of Livestock in national economy	03
2.	Management: i) Principles of Management ii) Tools of Management iii) Tools of Management	05
3.	General Management Practices in Dairy Farming i) Grooming ii) Drying Off iii) Control of bad habits iv) Castration v) Dehorning vi) Trimming vii) Shoeing viii) Identification marks ix) Removing extra teats x) Shearing	06
4.	Cattle and Buffalo Management i) Housing of Cattle & Buffalo ii) Calf Management iii) Heifer Management iv) Management of Pregnant and Lactating Cow & Buffalo v) Care and Management of Cross – breed Cows vi) Care and Management of Breeding buffalo.	20

5.	Sheep and Goat Management i) Housing of Sheep & Goat ii) General Management Practices	06
6.	Poultry Management i) Housing of Poultry ii) General Management Practices	06
Total		46

B.Sc. I Year (Semester – I)
Dairy Science & Technology
Paper-II
Title: Market Milk Industry

Sr. No.	Topics	No. of Periods
1.	Dairy Development in India. NDDDB, NDRI, Military dairy farm, IDC, Dairy Co-operatives, Milk Grid, Operation Flood.	06
2.	Milk Chemistry and Constituents i) Definition and Composition of milk. ii) Constituent of Milk iii) Factors affecting quality and quantity of milk. iv) Nutritive value of milk v) Physico – Chemical properties of milk.	15
3.	Anatomy and Physiology of mammary gland. i) Morphology and anatomy of udder. ii) Physiology of Milk secretion. iii) Milk Precursors iv) Endocrinology of milk secretion.	05
4.	Microbiology of milk. i) Definition and classification of micro organism. ii) Reproduction and growth of microorganism. iii) Common micro-organism found in milk. iv) Spoilage of milk v) Fermentation of milk – desirable and undesirable. vi) Clean milk production, sources of contamination. vii) Milk borne diseases	15

5.	Metals and Non-metals using in dairy industry	02
6.	Legal Standard	01
7.	Adulteration of Milk	02
8.	Packaging and Packaging material	02
	Total	48

B.Sc. I Year (Semester – I)
Dairy Science & Technology
Paper-III
Practicals (Dairy Form Management)

Sr. No.	Topics	No. of Periods
1.	Morphology of Cattle, buffalo and poultry	01
2.	Classification of Cattle Breeds	01
3.	Study of Cattle Breeds i) Milch : Gir, Sahiwal, Red Sindhi ii) Draught : Khillar, Dangi, Red Kandhari iii) Dual : Deoni, Hariyana iv) Exotic : Jersey, H.F. v) Cross breed : Holdeo, Jerdeo	03
4.	Study of buffalo breeds : Murratia, Jaffrabadi, Nagpuri, Surti	01
5.	Study of Goat breeds : Osmanabadi, Saqnen	01
6.	Identification marks of form animals	01
7.	Casting of form animals	01
8.	Milking of Dairy animals	01
9.	Ageing of dairy cattle	01
10.	Weighing of dairy cattle	01
11.	Trimming of dairy cattle	01
12.	Shoeing of bullocks	01
13.	Visit to modern dairy farm	01
Total		15

B.Sc. I Year (Semester – I)
Dairy Science & Technology
Paper-IV
Practical : (Market Milk Industry)

Sr. No.	Topics	No. of Periods
1.	Study of Structure of Udder on model	01
2.	Study of steps for clean and safe milk production	01
3.	Sampling techniques of milk for physico – chemical test.	01
4.	Platform test. i) Organoleptic test ii) Temperature iii) C.O.B. test iv) Alcohol test v) Sediment test	02
5.	Determination specific gravity of milk	01
6.	Determination of fat test of milk	01
7.	Determination of SNF and TS of milk	01
8.	Determination of Acidity and PH of milk	01
9.	Staining of bacteria	01
10.	Methylene blue reduction (MBR) test	01
11.	Standard plate count (SPC) of milk	02
12.	Detection of Adulterants and preservatives in milk	02
13.	Collection and identification of packaging material.	01
14.	Visit to collection centre	
	total	16

B.Sc. I Year (Semester – II)
Dairy Science & Technology
Paper-V
Title: Livestock Healthy and Hygiene

Sr.No.	Topics	No. of Periods
1.	Identification of healthy and sick animals	01
2.	Classification of animal diseases	02
3.	Study of major diseases i)Foot and mouth disease (FMD) ii)Rinder pest (RP) iii)Anthrax iv)Black quarters (BQ) v)Heamorrhagic Septicaemia (H.S.)	10
4.	Diseases of Parasitic diseases i) Brucellosis ii) Babesiasis iii) Theteriosis iv) Trichomoniasis v) Trypanosomiasis	08
5	Diseaseof Lactating cow : i) Mastitis ii) Dystokia iii) Milk fever iv) Prolaps v) Ketosis	06
6.	Diseases of Carves i) Pneumonia ii) Calf Score iii) Diarrhoea	04
7.	Poultry Disease i) Raniknet ii) Coccidiosis iii) Fowlpox iv) Gumboro v) Parasites of poultry	09

8.	First aid measures	03
9.	Disposal of carcass	02
	Total	46

B.Sc. I Year (Semester – II)
Dairy Science & Technology
Paper-VI

Title: Dairy Processing and Engineering

Sr.No.	Topics	No. of Periods
1.	Dairy Processing i) Milk collection, transportation, Grading, weighing and cooling of milk ii) Strainer and Straining of milk iii) Filter and Filtration of milk iv) Clarifier and clarification of milk v) Cream separator and separation vi) Standardization vii) Pasteurization History, formulation standards types, FDV, Regeneration efficiency viii) Homogenization Single & double stage homogenization, theory of homogenization, Homogenizer valve, homogenization efficiency ix) Sterilization Bottle, UHT, aseptic packaging	20
II	Special Milks : 1) Flavored Milk 2) Toned & double toned milk 3) Recombined & Reconstituted milk 4) Sterilized milk 5) Imitation milk	05

III	<p>Dairy Engineering</p> <p>i) Cleaning & Sanitation : Cleaning agents, CIP & COP</p> <p>ii) Working & maintenance of can washer, crate washer and bottle washer</p> <p>iii) Sanitary milk pump & fittings, types of pumps</p> <p>iv) Boiler : Properties of steam, steam generation, types of boiler.</p> <p>v) Refrigeration : Vapor compression refrigeration cycle, common refrigerants, properties of good refrigerants.</p> <p>vi) Dairy Plant layout : Selection of site, layout of liquid and composite milk plant.</p> <p>vii) Cold Storage : Types of cold storages, types of loads.</p>	20
	Total	45

B.Sc. I Year (Semester – II)
Dairy Science & Technology
Paper-VII
Practical: (Livestock Health & Hygiene)

Sr.No.	Topics	No. of Periods
1.	Identification of healthy animals	01
2.	Identification of sick animals	01
3	Recording the temperature of farm animals	01
4	Recording pulse and respiration rate of farm animals	01
5	Preparation of antiseptic ointments	01
6.	Preparation of Astringents	01
7.	Study of injections	01
8.	Preparation of Vaccination schedule	01
9.	Dressing of common wounds	01
10.	Mastitis tests	01
11.	Pathological tests, urine, blood.	01
12.	Identification & control of ecto and endoparasites in farm animals.	02
13.	Study of dairy farm records.	01
14.	Study of common appliances used in animal treatment.	01
15.	Visit to veterinary polyclinic	01
	Total	16

B.Sc. I Year (Semester – II)
Dairy Science & Technology
Paper-VIII
Practical: (Dairy Processing & Engineering)

Sr. no.	Topics	No.of periods
1.	Study of milk collection equipment	01
2.	Study of filter, strainer, clarifier	01
3.	Study of cream separator	01
4.	Preparation of standardized milk	01
5.	Study of Autoclave	01
6.	Preparation of sterilized milk.	01
7.	Study of Can washer, Crate Washer and Bottle Washer.	01
8.	Study of Boiler	01
9.	Study of Household refrigerator	01
10.	Layout of milk processing / Chilling Center	01
11.	Preparation of flavoured milk.	01
12.	Preparation of toned milk	01
13.	Preparation of Imitation milk.	01
14.	Dairy arithmetics : (a) Standardization (b) Efficiency of regeneration in pasteurizer. (c) Efficiency of Cream separation / creaming efficiency	02
15.	Visit to Dairy processing plant / Chilling Center.	01
	Total	16

Dairy Science & Technology

Reference Books

- 1] A Text book of Animal Husbandry by - G.C. Banarjee
- 2] A Text Book of Animal Science by - Dr. A.U. Bhikane and Dr. S.B. Kawitkar
- 3] Advances of animal Husbandry, The I.C.A.R. publication.
- 4] Animal Husbandry & Dairy Science by. Jagdish Prasad.
- 5] Dairy India Year Book – 2007 by - P.R. Gupta
- 6] Handbook of Veterinary Physician by V.A. Sarpe
- 7] Farm Animal Management and feeding practices in India by Thomas of Shashtri.
- 8] Outlines of Dairy Technology by Sukumar De.
- 9] Dairy Processing by Earl.
- 10] Dairy Technology and Engineering by H.G. Kessler
- 11] Dairy Plant Engineering and Management by Tuffel Ahmed.
- 12] Textbook of Dairy Plant Layout & Design by Lalat Chander, I.C.A.R. publication.
- 13] Principles of Dairy Chemistry by Jenners and Pattorn.
- 14] Dairy Chemistry by M.M. Rai.
- 15] Dairy Microbiology by K.C. Mahanta.

डॉ. बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ, औरंगाबाद

परिपत्रक क्रमांक/एस.यु./विज्ञान/अभ्यासक्रम/७४/२०१४

या परिपत्रकाद्वारे सर्व संबंधितांना सुचित करण्यात येते की, विज्ञान विद्याशाखेने शिफारस केल्यानुसार बी. एस्सी. / एम. एस्सी. प्रथम व द्वितीय वर्षाच्या सुधारित अभ्यासक्रमास आणि बी. एस्सी. प्रथम वर्षाच्या अभ्यासक्रमात किरकोळ बदल करण्यास विद्यापरिषदेच्या वतीने मा. कुलगुरु यांनी, त्यांना प्राप्त असलेल्या विशेष अधिकार महाराष्ट्र विद्यापीठ अधिनियम-१९९४ कलम १४(७) अन्वये मान्यता दिलेली आहे. त्या अनुषंगाने सुधारीत तयार केलेल्या अभ्यासक्रमाची प्रत या परिपत्रकासोबत आपल्या पुढील कार्यवाहीसाठी पाठविण्यात येत आहे.

[1]	B.Sc. Physics	Semester-III & IV,
[2]	B.Sc. Chemistry	Semester-III & IV,
[3]	B.Sc. Botany	Semester-III & IV,
[4]	B.Sc. Zoology with minor changes	Semester-I & II,
[5]	B.Sc. Zoology	Semester-III & IV,
[6]	B.Sc. Fisheries	Semester-III & IV,
[7]	B.Sc. Electronics (Opt.)	Semester-III & IV,
[8]	B.A./B.Sc. Mathematics	Semester-III & IV,
[9]	B.Sc. Computer Science	Semester-I & II,
[10]	B.Sc. Information Technology	Semester-I & II,
[11]	B.C.A.	Semester-I & II,
[12]	B.Sc. Computer Science(Opt.)	Semester-I & II,
[13]	B.Sc. Information Technology(Opt.)	Semester-I & II,
[14]	B.Sc. Computer Application(Opt.)	Semester-I & II,
[15]	B.Sc. Computer Maintenance(Opt.)	Semester-I & II,
[16]	B.Sc. Biotechnology (Progressively)	Semester-I to VI,
[17]	B.Sc. Biotechnology (Opt.) (Progressively)	Semester-I to IV,
[18]	B.Sc. Sericulture Technology	Semester-I & II,
[19]	B.Sc. Networking Multimedia	Semester-III & IV,
[20]	B.Sc. Bioinformatics	Semester-I & II,
[21]	B.Sc. Hardware & Networking	Semester-I & II,
[22]	B.Sc. Animation	Semester-I & II,
[23]	B.Sc. Dairy Science & Technology	Semester-III & IV,
[24]	B.Sc. Biochemistry	Semester-III & IV,
[25]	B.Sc. Analytical Chemistry	Semester-III & IV,
[26]	B.Sc. Textile & Int. Decoration with minor changes	Semester-I & II,
[27]	B.Sc. Textile & Int. Decoration	Semester-III & IV,
[28]	B.Sc. Home Science with minor changes	Semester-I & II,
[29]	B.Sc. Home Science	Semester-III & IV,
[30]	B.Sc. Agro.Chem. & Fertilizers	Semester-III & IV,

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[31]	B.Sc. Geology	Semester-III & IV,
[32]	B.A. Statistics with minor changes	Semester-I & II,
[33]	B.A. Statistics	Semester-III & IV,
[34]	B.Sc. Statistics with minor changes	Semester-I & II,
[35]	B.Sc. Statistics	Semester-III & IV,
[36]	B.Sc. Industrial Chemistry	Semester-III & IV,
[37]	B.Sc. Horticultural	Semester-I & II,
[38]	B.Sc. Dry land Agriculture	Semester-I & II,
[39]	B.Sc. Microbiology	Semester-III & IV,
[40]	M.Sc. Computer Science	Semester-I to IV,
[41]	M.Sc. Information Technology	Semester-I to IV.

हा सुधारीत व नवीन तयार केलेल्या अभ्यासक्रमाचा आराखडा शैक्षणिक वर्ष २०१४-१५ करिता मर्यादित असेल व विद्यापरिषदेच्या अंतिम मान्यतेनंतर हे परिपत्रक नियमित ठेवण्याबाबत या कार्यालयाद्वारे नवीन परिपत्रक पारीत करण्यात येईल. तसेच सुधारीत व नवीन तयार केलेल्या अभ्यासक्रमाची प्रत विद्यापीठाच्या संकेतस्थळावर उपलब्ध आहे.

करिता, या परिपत्रकाची सर्व संबंधितांनी नोंद घ्यावी.

विद्यापीठ प्रांगण,
औरंगाबाद-४३१ ००४.
संदर्भ क्र.एस.यु./सा.शा./सबवि /२०१३-१४/
६५९९-७०२
दिनांक :- २७-०५-२०१४.

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संचालक,
महाविद्यालये व विद्यापीठ
विकास मंडळ.

या परिपत्रकाची एक प्रत :-

- १) मा. परिक्षा नियंत्रक, परिक्षा विभाग,
 - २) मा. प्राचार्य, सर्व संलग्नीत महाविद्यालये,
 - ३) संचालक, युनिक यांना विनंती करण्यात येते की, सदरील अभ्यासक्रम विद्यापीठाच्या संकेतस्थळावर उपलब्ध करुण देण्यात यावेत.
 - ४) संचालक, ई-सुविधा केंद्र, विद्यापीठ परिसर,
 - ५) जनसंपर्क अधिकारी, मुख्य प्रशासकीय इमारत,
 - ६) कक्ष अधिकारी, पात्रता विभाग, मुख्य प्रशासकीय इमारत,
 - ७) कक्ष अधिकारी, बी.ए. / बी.एस्सी./ बी.सी.एस./एम.एस्सी. विभाग, परीक्षा भवन,
 - ८) अभिलेख विभाग, मुख्य प्रशासकीय इमारती मागे,
- डॉ. बाबासाहेब आंबेडकर मराठवाडा विद्यापीठ, औरंगाबाद.

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DR. BABASAHEB AMBEDKAR
MARATHWADA UNIVERSITY,
AURANGABAD.

Revised Syllabus of

B.Sc. Second Year
Dairy Science & Technology
Semester – III & IV
Three Year Degree Course

(Effective for 2014-2015)

Dairy Science & Technology

Semester Pattern

Course Structure

B.Sc. 1st Year

Semester	Course Code	Paper No.	Title of Papers	Period	Marks
I	DST-101	Paper-I	Dairy form Management	45	50
	DST-102	Paper-II	Market Milk Industry	45	50
	DST-103	Paper-III	Practical Based on Paper No. I & II	45	50
II	DST-201	Paper-IV	Lives Stock Health & Hygiene	45	50
	DST-202	P-V	Dairy Processing & Engineering	45	50
	DST-203	P-VI	Practical Based on Paper No. IV & Vth	45	50

B.Sc. 2nd Year

Semester	Course Code	Paper No.	Title of Papers.	Period	Marks
III	DST-301	P-VII	Animal Nutrition	45	50
	DST-302	P-VIII	Indian Dairy Products	45	50
	DST-303	P-IX	Practical Based on Paper VII	45	50
	DST-304	P-X	Practical Based on Paper VIII	45	50
IV	DST-401	P-XI	Fodder Production & Feed Processing	45	50
	DST-402	P-XII	Cheese & Fermented Milk Products	45	50
	DST-403	P-XIII	Practical Based on P-XI	45	50
	DST-404	P-XIV	Practical Based on P-XII	45	50

B.Sc. 3rd Year

Semester	Course Code	Paper No.	Title of Papers	Period	Marks
V	DST-501	P-XV	Animal Reproduction & Artificial Insemination	45	50
	DST-502	P-XVI	Icecream and Fat Rich Dairy Products	45	50
	DST-503	P-XVII	Practical Based on paper No. XV	45	50
	DST-504	P-XVIII	Practical Based on paper No. XVI	45	50
VI	DST-601	XIX	Genetics and Animal Breeding	45	50
	DST-602	XX	Condensed Dried Milk and by-Products.	45	50
	DST-603	XXI	Practical Based on paper XIX	45	50
	DST-604	XXII	Practical Based on Paper XX	45	50

B.Sc. II Year (Semester-III)
Dairy Science & Technology
Paper VII
Title : Animal Nutrition

Max. Marks – 50

Sr. No.	Topics	No. of Periods
1	Livestock Population & Availability of Feeds & fodder	04
2	<p>Study of nutrients & their nutritional importance-</p> <p>i) Water : Sources, requirements in animal body, water loss & functions of water in animal body.</p> <p>ii) Carbohydrates : Defination, classification, importance, digestion & metabolism in ruminants</p> <p>iii) Proteins : Defination, classification, importance, digestion in ruminants.</p> <p>iv) Lipids : Defination, classification, importance digestion in ruminants.</p> <p>v) Minerals ; Defination types & importance in animal nutrition.</p> <p>vi) Vitamins : Defination, classification & importance in animal nutrition.</p> <p>vii) Probiotics, antibiotic, hormones & other growth stimulating substances.</p>	26
3	<p>Classification of feeds & fodder -</p> <p>i) Defination.</p> <p>ii) Classification.</p> <p>iii) Nutritional charactetstics of Roughages.</p> <p>iv) Nutritional charactetstics of Concentrates.</p>	07
4	<p>Anatomy of digestive system in ruminants -</p> <p>i) Anatomy & Physiology of ruminant</p> <p>ii) Factors affecting digestion of feed and digestion coefficient.</p>	08
		45

Reference Books :

1. Animal Nutrition & Feeding practices in India - S.K. Ranjhan
2. A Text book of Animal Husbandry (8th Edn) - G. C. Banerjee
3. Handbook of Animal Husbandry - I.C.A.R., New Delhi
4. Feeds and feeding - G.B. Morrison
5. A Textbook of Animal Nutrition - G. C. Banerjee
6. Principles & Practices of Dairy Farm Management - Jagdish Prasad
7. Modern Dairy Cattle Management - Davis
8. A Textbook of animal Husbandry & Dairy Science - Jagdish Prasad
9. Dairy Cattle feeding & Management - Willtam N.Etgas
10. Live-Stock feeding & Management - Sing & Moor
11. Laboratory Manual for Nutrition Research - S.K.Ranjan & Gopal K.
12. Analytical Techniques in Animal nutrition research - N. N. Pathak
D.N.Kansra
R.C.Jakhmola
13. Analytical Techniques in Animal Nutrition - P.C.Gupta V.K.Sharma
A.B.Maudar
14. The feeding of farm animals in India - P.E. Lander
15. Applied Nutrition - D.V. Reddy
16. Nutritional Microbiology of farm animals - D.N. Karma
N. N. Pathak

B.Sc. II Year (Semester-III)
Dairy Science & Technology
Paper VIII
Title : Indian Dairy Products

Max. Marks – 50

Sr. No.	Topics	No. of Periods
1.	i) Introduction. ii) Indian Dairy Products. iii) Classification of Indian Dairy Products iv) Comparison with western dairy products.	03
2.	Desiccated Milk Products :- i) Khoa : Defination, Classification, types, methods of manufacture, packaging, preservation, factors affecting yield of khoa, physicochemical changes during manufacture and storage of khoa, defects in khoa, khoa sweets :- Defination composition & technology of manufacture. i) Pedra, Burfi, Gulabjamun & Milk Cake. ii) Rabri. iii) Basundi iv) Kheer v) Khurchan	13
3.	Heat and acid coagulated milk products : i) Channa : Definition, methods of manufacture, packaging, yield and defects. Channa based Sweets :- Channa Kheer, Rasogolla, Kalakand, Pantoa, Sandesh, Rasmalai, Rasanguri, Rajbhog & Channa Poda. ii) Panir :- Defination Method of manufacture, Packaging & storage. Physico chemical changes during storage.	13
4.	Fat rich Indian Dairy Products : i) Makkhan : Difination, Method of manufacture, fat losses during manufacture. ii) Ghee : History, Composition, methods of manufacture, grading, packaging and preservation of Ghee, marketing of Ghee. Market quality, Renovation of Ghee. Defects in Ghee AGMARK grading.	16
		45

Reference Books :

1. Outlines of Dairy technology by S. K. De.
2. Technology of Indian Milk Products by R. P. Aneja, B. N. Mathur, R.C. Chandan & A.K. Banjarjee
3. Milk Products in India by M.R. Shrinivasan & C.P. Anantkrishnan.
4. Indigenous Milk products by I.C.A.R. New Delhi
5. Dairy India (2007) by P. R. Gupta.

B.Sc. II Year (Semester-III)
Dairy Science & Technology
Paper IX (Practical)
Title : Animal Nutrition

Max. Marks – 50

Sr. No.	Topics	
1.	Collection & identification of feeds & fodder.	03
2.	Determination of Moisture / Dry matter.	01
3.	Determination of Crude fiber	01
4.	Determination of crude protein	02
5.	Determination of ether extract	01
6.	Determination of ash	01
7.	Study of digestive system of ruminants	02
8.	Computation of ration for milch cattles	02
09.	Visit to animal farms of agricultural college / veterinary college & established dairy farm.	02
		15

B.Sc. II Year (Semester-III)
Dairy Science & Technology
Paper X (Practical)
Title : Indian Dairy Products

Max. Marks – 50

Sr. No.	Topics	
1.	Preparation of Khoa	01
2.	Preparation of Khoa sweets a) Peda b) Burfi c) Gulabjamun	03
3.	Preparation of Rabri	01
4.	Preparation of Basundi	01
5.	Preparation of Kheer	01
6.	Preparation of Chhana	01
7.	Preparation of Chhana Sweets a) Chhana Kheer b) Rosogolla c) Kalakand d) Sandesh e) Rasanguri f) Rasmalai	06
8.	Preparation of Paneer	01
9.	Preparation of Makkhan	01
10.	Preparation of Ghee	01
		17

B.Sc. II Year (Semester-IV)
Dairy Science & Technology
Paper - XI

Title : Fodder Production & Feed Processing

Max. Marks – 50

Sr. No.	Topics	No. of Periods
1.	Cultivation of important fodder crops- i) Legume : Lucerne, berseem, cowpea a& subabul. ii) Non legumes : Jawar, oat, maize iii) Grasses : Hybrid napier, paragrass, Rhodes grass, stylo, guinea grass. Yeshwant grass. iv) Intensive / relay fodder cropping programme.	15
2.	Conservation of green fodders as Silage and Hay	07
3.	Processing of inferior quality roughages	02
4.	Study of agro-industrial by products & unconventional feeds :- Sugar industry by products, mango\ seed kernel, neem cake, urea molasses liquid feed	06
5.	Feeding livestock during scarcity	02
6.	Measures of energy value and protein value of feeding stuff GE, DE, ME, NE, SE, DCP, TDN, Biological value, PER (Protein Efficiency Ratio), Protein replacement value, EAA (Essential Amino Acid)	03
7.	Feedings standards for farm animals	02
8.	Study of compounded feeds, concentrate mixtures, calf starters, milk replacer & mineral mixtures.	04
9.	Study of ration. Defination, types, characterstics of balanced ratio.	05
		46

Reference Books :

- | | | | |
|----|---|---|---------------------|
| 1. | Animal Nutrition & Feeding practices in India | - | S.K. Ranjhan |
| 2. | A Text book of Animal Husbandry (8 th Edn) | - | G. C. Banerjee |
| 3. | Handbook of Animal Husandry | - | I.C.A.R., New Delhi |
| 4. | Feeds and feeding | - | G.B. Morrison |
| 5. | A Textbook of Animal Nutrition | - | G. C. Banerjee |
| 6. | Principles & Practices of Dairy Farm Management | - | Jagdish Prasad |
| 7. | Dairy Cattle feeding & Management | - | Willtam N.Etgas |
| 8. | Live-Stock feeding & Management | - | Sing & Moor |
| 9. | The feeding of farm animals in India | - | P.E. Lander |

B.Sc. II Year (Semester-IV)

Dairy Science & Technology

Paper – XII

Title : Cheese & Fermented Milk Products

Max. Marks – 50

Sr. No.	Topics	No. of Periods
1.	Introduction to the Subject	01
2.	Study of starter culture : Definition, types, factors affecting quality of starters, defects.	07
3.	<p>Cheese :-</p> <ul style="list-style-type: none"> i) History, Defination & Classification. ii) Status & Scope in dairy industry iii) Technology of manufacture of cheese varities. <ul style="list-style-type: none"> a) Cheddar b) Gouda c) Mozzarella d) Cottage e) Processed Cheese iv) Role of milk constituents in ripening. v) Role of starter culture in relation to cheese quality vi) Study of rennet and its action during cheese manufacturer. vii) Packaging and storage. viii) Defects in cheese, causes & prevention. 	25
4.	<p>Fermented milk products :-</p> <p>Defination, Composition, nutritive value & Technology of manufacture.</p> <ul style="list-style-type: none"> i) Dahi / Curd. ii) Chakka, Shrikhand iii) Yoghurt iv) Lassi v) Cultured butter milk. vi) Acidophilus milk <p>Brif study of the following products.</p> <ul style="list-style-type: none"> i) Kefir ii) Kummis iii) Leben iv) Bulgarian Milk 	12

	v) Misthi Dahi	
		45

Reference Books :

- 1) Fundamentals of Cheese Science P.F. Fox, T.P. Guinee, T.M. Cogan and P.L.H. Mcsweeney.
- 2) Microbiology and Biochemistry of Cheese and Fermented Milk, edited by B.A. Law.
- 3) Cheese and Fermented Milk Foods By Frank Kosikowski
- 4) Milk and Dairy Products Technology by Edgar Spreer.
- 5) Outlines of Dairy Technology by S.K. De.
- 6) Technology of Indian Milk Products by R. P. Aneja, B. N. Mathur, R.C. Chandan & A. K. Banarjee.
- 7) Dairy Microbiology by K. C. Mahrt.
- 8) Dairy Bacteriology by Hammer.
- 9) Handbook of Dairy Processing by M/s. Alfa Laval
- 10) Milk and Milk Products Technology - Md. Rajuddin & A. S. Hembade.
- 11) Dairy processing Technology by Germit Smit.

B.Sc. II Year (Semester-IV)
Dairy Science & Technology
Paper XIII (Practical)

Title : Fodder Production & Feed Processing

Max. Marks – 50

Sr. No.	Topics	
1.	Preparation of cropping scheme for fodder crop.	01
2.	Processing of feeds fodder – chaffing, cooking, grinding, soaking, palling, enriching & alkali treatment.	02
3.	Preparation of concentrate mixture.	01
4.	Preparation of Mineral mixtures	01
5.	Preparation of calf starters	01
6.	Preparation of milk replacers	01
7.	Preparation of Hay	01
8.	Preparation of Silage	02
9.	Preparation of urea molasses of liquid feed	02
10.	Preparation of complete feed blocks	02
11.	Visit to feed factory	01
		15

B.Sc. II Year (Semester-IV)
Dairy Science & Technology
Paper XIV (Practical)

Title : Cheese & Fermented Milk Products

Max. Marks – 50

Sr. No.	Topics	
1.	Study of cheese making equipment	01
2.	Manufacturing of cheeses : a) Cheddar cheese b) Mozrella cheese c) Prepration of Pizza	06
3.	Preparation of Dahi	02
4.	Preparation of Chakka & Shrikhand	01
5.	Preparation of Yoghurt	01
6.	Preparation of Lassi	01
7.	Preparation of Cultured butter milk	01
8.	Preparation of Acidophilus milk	01
9.	Visit to dairy plant	01
		15

**D.R. BABASAHEB AMBEDKAR
MARATHWADA UNIVERSITY,
AURANGABAD.**



Revised Syllabus of
B.Sc. [Dairy Science & Technology]
Semester –V & VI

(*Effective from 2011-12 & onwards*)

B.Sc. Third Year
(Dairy Science & Technology)
Semester V & VI

Objectives

The course is planned to acquaint the students with:

- i) Animal reproduction practices in dairy farm.
- ii) Breeding practices in dairy farm
- iii) Manufacturing technology of Ice-cream and frozen desserts
- iv) Fat rich dairy products and their manufacture at industrial level
- v) Production of condensed and dried milks
- vi) Food safety and quality assurance

B.Sc. III Year (Semester – V)
Dairy Science & Technology
Paper-XVII

Title: Animal Reproduction & Artificial Insemination

Max Marks: 50

Sr. No.	Topics	No. of Periods
1.	Anatomy of reproductive system in cattle/Buffalo.	06
2.	Growth, Puberty Gametogenesis, - Growth- Defination, Factors affecting growth. Puberty- Defination, factors affecting puberty. Gametogenesis- Defination, types.	04
3.	Study Of oestrus cycle- Defination, Harmones in reproduction & Stages of Oestrus cycle.	04
4.	Ovulation , Fertilization & Implantation.	04
5.	Gestation- Types of Placenta, Functions of Placenta, Length of gestation in Farm animals, Factors affecting Gestaion.	02
6.	Pregnancy Diagnosis	03
7.	Parturition- Defination ,stages of parturition, evolution of Uterus.	03
8.	Artificial Insemination – a) Defination, advantages & Disadvantages b) Evolution of Semen c) Collection of Semen d Dilution of semen e) Preservation of semen f) Handling & storing of semen	14

9	Bio-techniques in Animal Reproduction a) A.I. –Time, technique b) Super Ovulation c) Oestrus Synchronization d) ETT e) Cloning.	12
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**B.Sc. III Year (Semester –V)
 Dairy Science & Technology
 Paper-XVIII**

Title: Ice-Cream and fat rich dairy products

Max Marks: 50

Sr.No.	Topics	No. of Periods
1.	<p>Ice-cream:</p> <p>i} History, development and status of ice-cream industry. ii} Definition, composition and nutritive value of ice-cream. iii} classification and standard of ice-cream. iv} Role of milk constituents in manufacturing of ice-cream. v} Study and role of dairy and non dairy ingredients in ice-cream. vi} Study of stabilizers and emulsifiers, their classification, properties and role in quality of ice-cream. vii} Types of freezers. viii} manufacturing of ice-cream. ix} physico-chemical properties of ice-cream mix and effect of processing on physico- chemical properties of ice- cream mixes and ice- cream. x} over run in ice-cream and their control. xi} Packaging, hardening, storage and transportation of ice-cream. xii} Defect in ice-cream, their causes and prevention.</p> <p>xii} Manufacturing of indigenous frozen dessert. a} kulfi b} malai ka burf c} milk ices and lollies. d} milk shake</p>	<p>18</p> <p>07</p>

Sr.No.	Topics	No. of Periods
II	Fat rich dairy products	
	A) Cream i) Methods of cream separation ii) Types of cream iii) Factors affecting efficiency of cream iv) Defects of cream	08
	B) Butter: i) History ii) Definition, composition & types of butter iii) Butter churn iv) Method of manufacturing v) Factors affecting fat losses in butter milk vi) Theories of churning vii) Defects, their causes & prevention viii) Continuous butter making machine{ CBMM) ix) Comparison of desi and table butter	08
C) Butter oil i) Composition ii) Method of manufacturing iii) Distribution & uses	07	

**B.Sc. III Year (Semester – V)
Dairy Science & Technology**

Practical paper-XIX

Animal reproduction & artificial insemination

Max Marks: 50

Sr.No.	Topics
1.	Study of reproductive organs of cattle, buffaloes, sheep, goat on chart/model/specimen
2.	Study of section slides of spermatogenesis, oogenesis, maturation of sperm & ova
3	Assembling and preparation of A.V., collection of semen by A.V.
4	Study of A.I. equipments & insemination of cow
5	Examination of semen
6.	Preparation of semen extender/dilutor
7.	Pregnancy diagnosis in cow
8.	Detection of heat in farm animals
9.	Project work
10.	Visit to slaughter house & A.I center

B.Sc. III Year (Semester – V)

Dairy Science & Technology

Practical paper-XX

Ice-cream & fat rich dairy products

Max Marks: 50

Sr. No.	Topics
1.	Study of ice-cream freezer
2.	Calculation & standard of ice-cream mix
3.	Manufacturing of soft serve plain & fruit flavored ice-cream
4.	Preparation of kulfi
5.	Preparation of milk shake
6.	Study of cream separator
7.	Separation of cream
8.	Study of butter churn & butter making equipment
9.	Manufacturing of table butter & white butter
10.	Manufacturing of butter oil
11.	Project work
12.	Visit to ice-cream plant

B.Sc. III Year (Semester – VI)

Dairy Science & Technology

Paper-XXII

Title- Condensed, dried milk and by-products

Max Marks: 50

Sr.No.	Topics	No. of periods
1.	Condensed and evaporated milk. a) History, status and scope. b) Physico-chemical changes taking place during manufacturing of condensed milk c) Heat stability of milk & condensed milk d) Condensed milk, sweetened condensed milk & evaporated milk e) Seeding crystallization & stability of evaporated milk f) Defects in condensed milk, their causes & prevention	14
2.	Dried milk a) history & status in India b) Types, composition, PFA/BIS and international standards c) Manufacturing of skim milk powder (SMP), whole milk powder (WMP) and heat classified powder d) Physical properties of dried milk e) Defects during manufacturing & storage, their causes and prevention f) Study of infant milk food, malted milk food and dairy whitener	14
3	By- products a) Status, scope and utilization of dairy by- products in India b) Physico chemical characteristic of whey, butter milk c) Whey processing, beverages of whey and dried milk d) Butter milk processing, condensed butter milk & dried butter milk e) Casein, industrial and food grade	15

	Lactose	
4	Introduction to food safety, quality assurance: a) international organization for standards (ISO) b) total quality management (TQM) c) hazard analysis critical control point (HACCP)	06

B.Sc. III Year (Semester – VI)

Dairy Science & Technology

Practical Paper-XXIII

Genetics and animal breeding

Max Marks: 50

Sr. No.	Topics
1.	Judging of dairy cattle
2.	Estimation of gene frequency
3.	Estimation of genotype frequency
4.	Estimation of most probable producing ability in cow
5.	Estimation of breeding efficiency of cow
6.	Project work
7.	Visit to cattle breeding farm

B.Sc. III Year (Semester – VI)

Dairy Science & Technology

Practical Paper-XXIV

Condensed, dried milks and by-products

Max Marks: 50

Sr. No.	Topics
1.	Study of vacuum pan
2.	Determination of heat stability of milk
3.	.manufacturing of condensed & evaporated milk
4.	Study of drum dryer
5.	Study of spray drying plant
6.	Manufacturing of skim milk & whole milk powder
7.	Determination of partial & bulk density of dried milks
8.	Preparation of whey beverages
9.	Preparation of casein
10.	Preparation of lactose
11.	Project work

Reference Books

- 1] A Text book of Animal Husbandry by - G.C. Banarjee
- 2] Milk and milk products-----Eckles, Comb and Mary
- 3] Milk and milk products ----Harbonsing and Moore
- 4] Modern Dairy Products-----by Lampert
- 5] Dairy India Year Book – 2007 by - P.R. Gupta
- 6] Dairy Plant Engineering and Management by Tufail Ahmed.
- 7] Handbook of Dairy science----by K. C. Mahanta
- 8] Outlines of Dairy Technology by Sukumar De.
- 9] Milk products in India-----M.R. Shrinivasan & C.P.Anantkrishnan.
- 10] Dairy Technology and Engineering by H.G. Kessler
- 11] Ice-Cream-----by W. S. Arbuckle
- 12] Dairy Processing by Earl.
- 13] Technology of Indian milk products—by R.P.Aneja, B.N.Mathur, R.C. Chandan & A.K. Banerjee.
- 14] Introduction to food safety-----IGNOU, New Delhi.
- 15] Food Safety & Quality Assurance—IGNOU, New Delhi.
- 16] Hazards to food Safety-----IGNOU, New Delhi.
- 17] Reproduction in farm animals----C. N. Sane & others.
- 18] Hand Book of Indian Dairy Farmers---Patrick John.
- 19] A Textbook of Genetics-----Dalela R. C. & S. R. Verma.
- 20] Genetics and Breeding in farm animals---Banerjee & Mukharjee.
- 21] Reproduction in farm animals-----Hafeez.
- 22] Hand book & Physiology of farm animals----R. D. Frandson.
- 23] Anatomy & Physiology of farm animals---R. D. Frandson.
- 24] Principles of Dairy Science----G. H.Schmidt, L. D. Vivek & N. N. Pathak.
- 25] Genes and Evolution-----JHA
- 26] Cattle embryo transfer procedure-----Curtis.
- 27] Genetics of Live stock improvement-----John F. Lesley
- 28] An Introduction to Genetics-----B. K. Jain.
- 29] Population Genetics in animal breeding----Franz pitcher.

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