

## I. INTRODUCTION

Radical changes have taken place in education system in India after independence. It is continuous process and should occur for development. The production of large number of education youth has unfortunately not been commensurated with the development of Job Opportunities.

Agriculture is one of the fields which can absorb a considerable number of unemployed educated youth of the country. For this he should possess technical know how and self confidence to use it effectively. Dairying occupies an allied subject under agriculture. Dairying acquired commercial status, due to introduction of various developmental programmes. The Technical know-how in dairying has not descended to villages level. The annual milk production in India has increased three to four times since independence and the country stand first in milk production in the world. There is lot of scope for generation of good self employment in dairying.

Vocationalization in the field of dairying will definitely change the pace of rural employment. The course in dairying is deisgned to train the youth so that the there will be improvement in the present scenario of effective and efficient management of dairy enterprise. Now the course in dairying has been revised with latest scientific technologies developed and improved management practices. The course corriculum is so designed and presented to mould the students suitable for self employment as well as to seek employment with the state departments, private/public firms, cooperatives, educational institutes etc.

## II. OBJECTIVES OF THE COURSE

### **Main Objective :**

To train the students to scientifically undertake all operations of dairy husbandry and dairy technology and to create employment potential and man power for dairy development.

### **Specific Objectives :**

1. To impart training to develop confidence in the management practices in
  - a) Raising dairy stock
  - b) Care and management of milch, dry animals and bulls
  - c) Production of hygienic milk
  - d) Manufacture of milk products
  - e) Cultivation and preservation of fodder.
2. To train the personel in dairy animal improvement using artificial insemination programme.
3. To prepare young and enthusiastic entrepreneur for self employment through dairying and dairy associated activities.
4. To develop abilities for lab Techniques and quality control, techniques to test milk and milk products.
5. To develop ability for assisting scientific investigation and laboratory work.
6. To prepare dairy processing assistants to assist milk processing and milk products preparation activities.
7. To prepare dairy husbandry workers as capable organizer/ supervisor/Assistant/extension worker for dairy oriented activities in rural as well as urban areas.
8. To train individuals in need based dairy operations like surveying, organization of cattle shows, melas, exhibits etc.
9. To inculcate organizational capability in maintaining dairy societies.
10. To develop facilities for production and sale of cattle feed, fodders, milk products and other dairy based products.

11. To prepare animal husbandry workers as a link between agriculture supporting organizations/institutions and farming community.
12. To inculcate capability for energy conservation through recycling of farm waste.

### **III. SKILLS TO BE PROVIDED**

1. To recognise different cattle and buffalo breeds
2. To prepare project reports for establishment dairy farms and dairy plants
3. To calculate feed and fodder requirement for different classes of animals
4. To prepare quality feeds
5. To test quality of milk and milk products
6. Vaccination of animals
7. First aid and treatment of basic health problems
8. To diagnose heat period
9. Artificial insemination techniques and pregnancy diagnosis
10. Assisting the animal during parturition and removal of retained placenta.
11. Techniques in marketing of milk and milk products
12. Maintenance of dairy equipment
13. Milk collection and transportation
14. Establishing dairy farm and milk plants
15. Production of fodder crops
16. Planning and lay out of dairy farms
17. Formulation of cattle feeds
18. Maintenance of stores for dairy farms and dairy plant
19. To develop entrepreneurship
20. Maintaining of records and registers
21. Survey methods for demand and supply of milk and milk products
22. Advertisements for dairy plants/farms
23. Conducting farmers training
24. Operation and maintenance of audio-visual aids
25. Techniques for improvement of milk production

26. Techniques in disposal of farm waste
27. Teaching ability for assisting in teaching at +2 level
28. Raising of calves, heifers
29. Disposal of dead animal
30. Transportation of Semen

## IV. JOB OPPORTUNITIES

### a) Wage employment :

1. Veterinary Assistant/Livestock assistant/Dairy farm assistant
2. Milk Procurement Supervisor/milk procurement assistant/paid secretary/Dairy Extension assistant
3. Artificial insemination assistant/inseminator/Gopal mithra assistant
4. Dairy Laboratory assistant
5. Farm supervisor/Farm assistant
6. Fodder production assistant/supervisor
7. Dairy products manufacturing assistant/supervisor/processing supervisor/Dairy Technician
8. Milk and milk products sales promotion assistant/marketing supervisor/Distribution assistant
9. Cattle feed Technician/Cattle feed supervisor/feed analysis assistant/cattle feed assistant
10. Assistant in food analysis.
11. Paid secretary cooperative society
12. Instructor/teaching assistant/tutor (+2 level)

### B. Self Employment

1. Dairy farm owner
2. Dairy products manufacturer
3. fodder producer
4. Cattle feed manufacturer
5. Setting up milk parlour
6. Artificial insemination centre owner
7. Milk and milk products distributor
8. Milk collection centre owner
9. Biogas plant operator
10. Contract services for dairy oriented works

## V. ANNUAL SCHEME OF INSTRUCTION AND EXAMINATION FOR VOCATIONAL COURSES 1ST & 2ND YEAR

| <b>Part - A</b>          | Theory     |            | Practicals |            | Total       |            |
|--------------------------|------------|------------|------------|------------|-------------|------------|
|                          | Periods    | Marks      | Periods    | Marks      | Periods     | Marks      |
| 1. English               | 185        | 75         | -          | -          | 185         | 75         |
| 2. G.F.C.                | 185        | 75         | -          | -          | 185         | 75         |
| <b>Part - B</b>          |            |            |            |            |             |            |
| 3. Vocational Subjects   |            |            |            |            |             |            |
| Paper - I                | 160        | 50         | 160        | 50         | 320         | 100        |
| Paper - II               | 160        | 50         | 160        | 50         | 320         | 100        |
| Paper - III              | 160        | 50         | 160        | 50         | 320         | 100        |
| <b>Part - C</b>          |            |            |            |            |             |            |
| 4. On the Job Training - | -          | -          | 210        | 50         | 210         | 50         |
| <b>Total</b>             | <b>840</b> | <b>300</b> | <b>690</b> | <b>200</b> | <b>1540</b> | <b>500</b> |

### Scheme of Instruction per week for Vocational Courses

| <b>Part - A</b>                 | Theory | Practicals | Total |
|---------------------------------|--------|------------|-------|
| 1. Communication Skills/English | 6      | -          | 6     |
| 2. G.F.C.                       | 4      | 2          | 6     |
| <b>Part - B</b>                 |        |            |       |
| 3. Vocational subjects          |        |            |       |
| Paper - I                       | 5      | 5          | 10    |
| Paper - II                      | 5      | 5          | 10    |
| Paper - III                     | 5      | 5          | 10    |

## NEW SCHEME PROPOSED CALCULATION OF WORKING PERIODS

|   |   |                     |
|---|---|---------------------|
| Number of working days per annum                        | = | 220 days            |
| Number of periods per annum $220 \times 7$              | = | 1540 periods        |
| Periods allotted for OJT [30 days $30 \times 7$ ]       | = | 210 periods         |
| Periods allotted to Communication Skills/<br>English    | = | 185 periods         |
| Periods allotted to GFC<br>[125 Theory + 60 Practicals] | = | 185 periods         |
| Periods allotted to Vocational subjects                 |   |                     |
| Paper I [Theory 160 + Practicals 160]                   | = | 320 periods         |
| Paper II [Theory 160 + Practicals 160]                  | = | 320 periods         |
| Paper III [Theory 160 + Practicals 160]                 | = | 320 periods         |
| <b>Total</b>  |   | <b>1540 periods</b> |

### Periods allotted per week

|                                     |   |                   |
|-------------------------------------|---|-------------------|
| 1. Communication skills/English     | = | 6 periods         |
| 2. G.F.C. [Theory 4 = Practicals]   | = | 6 periods         |
| 3. Vocational Subjects              |   |                   |
| Paper I [Theory 5 + Practicals 5]   | = | 10 periods        |
| Paper II [Theory 5 + Practicals 5]  | = | 10 periods        |
| Paper III [Theory 5 + Practicals 5] | = | 10 periods        |
| <b>Total Periods per week</b>       | = | <b>42 periods</b> |

# DAIRY ANIMAL MANAGEMENT

## I<sup>st</sup> YEAR PAPER I

| Sl.No. | Name of the chapter                                   | No.of Periods |
|--------|---|---------------|
| 1.     | Introduction - Confirmation points<br>of Dairy Animal | 10            |
| 2.     | Breeds of dairy cattle and buffaloes                  | 20            |
| 3.     | Breeding of dairy animals                             | 20            |
| 4.     | Housing of dairy cattle                               | 20            |
| 5.     | Care and management of dairy animals                  | 25            |
| 6.     | Activities in a dairy farm                            | 20            |
| 7.     | Reproductive system - A.1                             | 25            |
| 8.     | Lactation and milking methods                         | 20            |
|        | <b>Total</b>  | <b>160</b>    |

- 1. Introduction - confirmation points** **10**
1. Dairy statistics
  2. Role of dairying in Indian economy
  3. Common terms used in dairy animal management
  4. External body parts of dairy animal
- 2. Breeds of dairy cattle and buffallos** **20**
- 2.1. Definition of breed - classification of cattle breeds
  - 2.2. Indian breeds of dairy cattle
  - 2.3. Exotic dairy breeds
  - 2.4. Indian buffalo breeds
- 3. Breeding of dairy animals and farm records** **20**
- 3.1. Selection methods of dairy animals
  - 3.2. Culling of dairy animals
  - 3.3. Economic characters in dairy cattle
  - 3.4. Systems of breeding
  - 3.5. State and national breeding policies
- 4. Housing of dairy animals** **20**
- 4.1. Selection of site for dairy Farm
  - 4.2. Systems of housing-loose, housing system - conventional dairy barn
  - 4.3. Sanitation in dairy farm
- 5. Care and management of dairy animal**
- 5.1. Care and management of calf
  - 5.2. Care and management of heifer
  - 5.3. Care and management of milch animal
  - 5.4. Care and management of dry and pregnant animal
  - 5.5. Care and management of bulls and bullocks

## **6. Activities in the dairy farm**

- 6.1. Dairy farm routine
- 6.2. Restraining methods of dairy animal
- 6.3. Dentition and ageing of animals
- 6.4. Methods of Identification of dairy cattle
- 6.5. Records to be maintained in a dairy farm
- 6.6. Common vices of dairy animals
- 6.7. Weaning of calf
- 6.8. Castration and dehorning
- 6.9. Deworming and vaccination programme

## **7. Reproductive system - Artificial Insemination**

- 7.1. Reproductive organs of cow and bull
- 7.2. Oestrous cycle - symptoms of heat
- 7.3. A.I. advantages - disadvantages  
Definition of Embro transfer Technology and Advantages and disadvantages of E.T.T.
- 7.4. Semen collection methods and evaluation
- 7.5. Insemination methods
- 7.6. Frozen semen and storage
- 7.7. Pregnancy diagnosis
- 7.8. Parturition - precautions

## **8. Lactation**

- 8.1. Mammary gland, structure and development
- 8.2. Lactogenesis and galactopoeises
- 8.3. Milk let down
- 8.4. Milking methods
- 8.5. Clean milk production

## **Practicals**

1. Sketch diagram of external body parts of cow and buffalo
2. Recognition of different breeds of dairy animal
3. Working of cross breeding programmes
4. Floor plans for loose housing system
5. Floor plans for conventional dairy farms
6. Floor plans for single row, double row, face to face and tail to tail system
7. Cleaning and sanitation of dairy sheds
8. Selection of cow and buffalo by score card
9. Culling of dairy animals
10. Feeding of colostrum to the calf
11. Weaning of calf
12. Deworming
13. Vaccination schedule
14. Castration of male calf
15. Dehorning of calf
16. Management of calf
17. Management of heifer
18. Management of milch animal
19. Management of dry and pregnant animal
20. Management of bull and bullock
21. Grooming and washing of animals
22. Restraining methods
23. Preparation of animal for cattle shows
24. Dairy farm routine
25. Study of dairy farm records
26. Reproductive organs of female animal
27. Reproductive organs of male animal

28. Observation of oestrous symptoms
29. Study and preparation of artificial vagina
30. Washing, cleaning and sterilization of A.I. Equipment
31. Semen collection methods
32. Physical evaluation of semen
33. Microscopic examination of semen
34. Preparation of semen dilutors
35. Evaluation of frozen semen
36. Maintenance of A.I. records
37. Palpation of Reproductive organs
38. A.I. Practicing
39. Study of obstetric equipment
40. Hand milking
41. Machine Milking
42. Clean milk production steps
43. Dentition and Ageing of animals
44. Identification methods of dairy animals

**1<sup>st</sup> YEAR PAPER II**  
**SUBJECT : FEEDS & FEEDING OF DAIRY ANIMALS**

| <b>Sl.No.</b> | <b>Name of the Chapter</b> | <b>No.of Periods</b> |
|---------------|----------------------------|----------------------|
| 1.            | Digestive system           | 15                   |
| 2.            | Common Feeds and Fodders   | 15                   |
| 3.            | Formulation of Rations     | 25                   |
| 4.            | Feeding of Dairy Animals   | 25                   |
| 5.            | Quality Control of Feeds   | 15                   |
| 6.            | Feed Plant                 | 20                   |
| 7.            | Fodder Production          | 25                   |
| 8.            | Fodder Conservation        | 20                   |
|               | <b>Total</b>               | <b>160</b>           |

## **1. Digestive System : 15 Hrs**

- 1.1. Sketch Diagram of digestive system of dairy animal
- 1.2. Description of Digestive system
- 1.3. Digestion of carbohydrates, Proteins & Fats in ruminants
- 1.4. Animal Digestion Trails

## **2. Common Feeds and Fodders : (15 Hrs)**

- 2.1. Status of Feed and Fodder availability in the state and country
- 2.2. a) Classification of Nutrients and their role in Animal nutrition .  
water, crude fibre, ether extract, Proteins, Minerals Vitamins and Nitrogen free extract  
b) Importance of analysis (proximate) of feeds
- 2.3. Classification of Feeds
  - a) Roughages-Leguminous, Nonleguminous, green and dry
  - b) Concentrates - Energy and Protein Feeds
  - c) Feed Supplements - Minerals and Vitamins
  - d) Feed additives - Hormones and antibiotics
- 2.4. Importance of unconventional feeds
- 2.5. Composition of Commonly used Feeds and Fodders

## **3. Formulation of Rations :**

- 3.1. Definition of Ration and Feeding Standards
- 3.2. Desirable Characters of Good ration
- 3.3. Thumb rules of Feeding Cattle and Buffalo's
- 3.4. Formulation of rations for different classes of animals - Heifers -  
milch, pregnant, bull and bullocks
- 3.5. Formulation of milk replacer and calf starter
- 3.6. Formulation of concentrate feed

## **4. Feeding of Dairy Cattle**

- 4.1. Importance of Feeding in dairy animal production
- 4.2. Feeding of newly born calf

- 4.3. Feeding of calf upto 1 year age
- 4.4. Feeding of Heifer
- 4.5. Feeding of milch and pregnant animal
- 4.6. Feeding of Dry animal
- 4.7. Feeding newly calved cows and Buffaloes
- 4.8. Feeding of animals during drought and cyclone

#### **5. Quality control of feeds (15 hrs)**

- 5.1. Antinutrient factors in feed stuffs
- 5.2. Procurement and storage of feed ingredients
- 5.3. Methods of detection of Feed Adultrants
- 5.4. Quality control of finished feed
- 5.5. Packing and forwarding of feeds
- 5.6. Storage of concentrates - space requirement
- 5.7. Cleaning and Fumigation of stores
- 5.8. Use of Pesticides in feed stores to control  
Biological Agents

#### **6. Feed plant : (20 hrs)**

- 6.1. Layout of feed plant
- 6.2. Methods of purchasing, procurement of feed ingredients and their  
physical evaluation
- 6.3. Grinding of Feed ingredients - Equipment
- 6.4. Mixing of Feed ingredients - Equipment
- 6.5. Pelleting process - Advantages - Disadvantages
- 6.6. Compounding of Feeds - objectives - Advantages
- 6.7. Machinery used for compounding feeds
- 6.8. Efficient Management of feed plant

#### **7. Fodder production : (25 hrs)**

- 7.1. Study of soils for fodder production
- 7.2. Importance of green fodder feeding for economic milk production

- 7.3. Crop rotation
- 7.4. Study of different forage farm equipment-Ploughing, Harrowing, Planking etc.
- 7.5. General principles of irrigation, fertilizers requirement in fodder production
- 7.6. Cultivation practices of :
  - a. Legume Annuals - cow pea, sunhemp, pillipesera, Berseem
  - b. Legume Perennial - Lucern, field beans
  - c. Non legume Annual - Jowar, Maize, Bajra etc.
  - d. Non legume Perennial - Para, Guinea, Hybrid Napier
  - e. Legume pasture - Styto sps, Siratro etc.
  - f. Non legume pasture - Anjan grass, rhodes etc.
  - g. Fodder trees - Subabul, Avisa, Hedge lucern etc.
- 7.7. Silvi pasture - Hortipastures
- 7.8. Layout for fodder farm

### **8. Fodder Conservation :**

- 8.1. Chaffing of fodders - Advantages - Disadvantages
- 8.2. Improvement of low quality roughages and non conventional feeds
- 8.3. Aims of Fodder conservation - Advantages and disadvantages
- 8.4. Selection and harvesting of crops for silage
- 8.5. Design of silage pit
- 8.6. Method of silage making
- 8.7. Importance of feeding silage to dairy animals
- 8.8. Selection and harvesting of crops for Hay making
- 8.9. Method of Hay making
- 8.10. Importance of Hay making
- 8.11. Fodder Bank uses and Management of fodder Banks
- 8.12. Preparations of vermi culture from compost

**FEEDS AND FEEDING OF DAIRY ANIMALS - PAPER II**  
**PRACTICALS (160 HRS)**

1. Identification of common feed ingredients
2. Identification of common fodder crops
3. Identification of Non conventional fodder sources
4. Identification of Feed supplements
5. Identification of Feed additives
6. Identification of Agro industrial by products
7. Sampling of feed and fodder for analysis
8. Planning for animal digestion traits
9. Collection of Urine and faeces for analysis
10. Preparation of laboratory reagents and standard solutions for analysis
11. Determination of moisture content of feed
12. Determination of Crude Protein (CP)
13. Determination of Crude Fibre (CF)
14. Determination of Ether Extract (EE)
15. Determination of Total Ash (TA)
16. Calculation of NFE (Minerals) content of feed
17. Chaffing of Fodders
18. Grinding of feed ingredients
19. Mixing of feed ingredients
20. Pelleting Process of feeds
21. Study of soils types and their texture
22. Study of different forage farm implements/equipment
23. Application of Fertilizers
24. Irrigation of forage crops
25. Weeding of forage crops
26. Harvesting of fodder crops

27. Layout for forage farms (5,10, hectares)
28. Preparation of cropping programme
29. Compost making - Vermiculture preparation
30. Formulation of milk replacer and calf starter
31. Formulation of ration for milch animals
32. Formulation of ration for pregnant animals
33. Formulation of ration for Dry animals
34. Formulation of ration work animals and bulls
35. a) Formulation of complete diet for Dairy Animals  
b) Calculation of feed and fodder requirement using thumb rules
36. Packing and Labelling of concentrate feeds
37. Cleaning and Fumigation of feed stores
38. Silage preparation
39. Hay making
40. Forage farm records
41. Preparation of urea-molasses, salt bricks etc.
42. Feeding during cyclone
43. Feeding during drought and management of fodder banks
44. Visit to biogas plant and its operation
45. Visit to feed plant
46. Visit to fodder farm
47. Visit to feed laboratory
48. Visit to markets to know prices of ingredients
49. Visit to grass land - Management and harvesting
50. Visit to seed processing centre
51. Visit to meteorological station

**I<sup>st</sup> YEAR**  
**THEORY PAPER III**  
**DAIRY ANIMAL HEALTH**

| <b>Sl.No.</b> | <b>Name of the Chapter</b>               | <b>No.of Periods</b> |
|---------------|--|----------------------|
| 1.            | Health                                   | 10                   |
| 2.            | First Aid                                | 15                   |
| 3.            | Bacterial Diseases                       | 25                   |
| 4.            | Viral Diseases                           | 15                   |
| 5.            | Protozoan diseases                       | 20                   |
| 6.            | Helmenthic & external parasitic diseases | 15                   |
| 7.            | Mycotic diseases                         | 10                   |
| 8.            | Metabolic diseases                       | 10                   |
| 9.            | Reproductive disorders                   | 20                   |
| 10.           | Prevention of animal diseases            | 20                   |
|               | <b>Total</b>                             | <b>160</b>           |

## **1. Health (10)**

- 1.1. Definitions of health and disease
- 1.2. Signs of health
- 1.3. Recording body temperature, pulse and respiration rates
- 1.4. Normal values of body temperature, pulse and respiration rates

## **2. First aid (15)**

- 2.1. Definition of first aid and its principles
- 2.2. Attending to traumatic condition
- 2.3. Attending to poisoning cases
- 2.4. Attending to obstetrical difficulties
- 2.5. First aid to burns and scalds
- 2.6. Attending to fracture
- 2.7. First aid kit

## **3. Bacterial diseases (25)**

- 3.1. Classification of dairy animal diseases - Bacterial, viral, protozoal, helmenthic, metabolic etc.
- 3.2. Anthrax
- 3.3. Black Quarter
- 3.4. Brucellosis
- 3.5. Vibriosis
- 3.6. Haemorrhagic septicaemia
- 3.7. Tuberculosis
- 3.8. Johnes disease
- 3.9. Leptospirosis
- 3.10. Listeriosis
- 3.11. Contagious bovine pleuropneumonia
- 3.12. Tetanus
- 3.13. Calf diptheria

3.14. Mastitis

3.15. Pneumonia

#### **4. Viral diseases (15)**

4.1. Rinderpest

4.2. Foot and mouth disease

4.3. Rabies

4.4. Cow pox

#### **5. Protozoan diseases (20)**

5.1. Anaplasmosis

5.2. Babesiosis

5.3. Theileriasis

5.4. Trypanosomiasis

5.5. Leishmaniasis

5.6. Coccidiosis

5.7. Amaebiasis

#### **6. Helminthic and External parasitic diseases (15)**

6.1. Round worms

6.2. Tape worms

6.3. Liver flukes

6.4. Flies

6.5. Ticks and mites

#### **7. Mycotic diseases (10)**

7.1. Ring worm

7.2. Actinomycosis

7.3. Aspergellosis

#### **8. Metabolic diseases (10)**

8.1. Bloat

8.2. Ketosis

8.3. Milk fever

## **9. Reproductive disorders (20)**

- 9.1. Anaestrus
- 9.2. Dystocia
- 9.3. Retained placenta
- 9.4. Endometritis
- 9.5. Pyometra
- 9.6. Infertility - causes and prevention
- 9.7. Other diseases associated with reproduction

## **10. Prevention of diseases (20)**

- 10.1. Surveillance of animal diseases
- 10.2. Outbreak reports
- 10.3. Action plans for prevention of diseases for different seasons
- 10.4. Isolation
- 10.5. Quarantine
- 10.6. Vaccination
- 10.7. Deworming
- 10.8. Disinfection
- 10.9. Disposal of Carcasses

## **Practicals (160)**

1. Recording body temperature, pulse and respiration rates
2. Identification of sick animals
3. Study of first aid kit
4. Maintenance of first aid kit
5. Attending traumatic condition
6. Wound dressing
7. Attending to poisoning cases
8. Attending obstetrical difficulties
9. First aid to burns and scalds
10. Attending to fractures
11. Practicing drenching
12. Collection of dung sample
13. Examination of dung sample
14. Collection of blood
15. Preparation of blood smear.
16. Examination of blood smear.
17. Operation of compound microscope
18. Collection of various specimens for examination
19. Proper dispatch of specimens
20. Preparation of outbreak report
21. Collection of milk samples from udder for mastitis
22. Deworming programme
23. Preparation of ointments
24. Preparation of tonics / mixtures
25. Collection of skin scrapings
26. Examination of skin scrapings
27. Preparation of vaccination programmes
28. Publicity for vaccination programmes

29. Vaccine indent
30. Maintenance of vaccine storage
31. Practicing Vaccination
32. Attending to vaccine reacted animals
33. Practicing subcutaneous injection
34. Practicing intramuscular injection
35. Practicing intravenous injection
36. Preparation of list of diseases that may occur in differnt seasons.

**II<sup>nd</sup> YEAR**  
**PAPER-I (THERORY):**  
**QUALITY CONTROL OF MILK AND PROCESSING**

| <b>Sl.No.</b> | <b>Name of the Chapter</b>          | <b>No.of Periods</b> |
|---------------|-------------------------------------|----------------------|
| 1.            | Composition of Milk                 | 15                   |
| 2.            | Physico Chemical properties of milk | 10                   |
| 3.            | Adultrants and preservatives        | 10                   |
| 4.            | Microbiology of milk                | 15                   |
| 5.            | Estimation of microbes in milk      | 15                   |
| 6.            | Milk Reception                      | 15                   |
| 7.            | Filtaration and cream separation    | 15                   |
| 8.            | Heat treatment to milk              | 20                   |
| 9.            | Cleaning and sanitization           | 20                   |
| 10.           | Steam and Refrigeration             | 25                   |
|               | <b>Total</b>                        | <b>160</b>           |

## **1. Composition of Milk**

- 1.1. Definition of milk, PFA designated milks
- 1.2. Composition of milk from different species
- 1.3. Detailed composition of milk
- 1.4. Factors affecting composition of milk

## **2. Physico Chemical Properties of milk**

- 2.1. Colour and flavour
- 2.2. P<sup>H</sup> and Acidity
- 2.3. Specific gravity of milk
- 2.4. Off-flavours

## **3. Adultrants and Preservatives**

- 3.1. Adultrants in milk-their detection
- 3.2. Preservatives in Milk- their detection
- 3.3. Adultration of buffalo milk with cowmilk-Hansa test

## **4. Microbiology of milk**

- 4.1. Types of micro-organisms present in milk.
- 4.2. Milk borne diseases (pathogens)
- 4.3. Microbial standards of raw and pasteurized milk

## **5. Estimation of microbes in milk**

- 5.1. MBRT test
- 5.2. Direct Microscopic count (DMC Test)
- 5.3. Standard plate count
- 5.4. Coliform count
- 5.5. Yeast and mould count

## **6. Milk reception**

- 6.1. Milk collection and transportation
- 6.2. Methods of milk preservation

- 6.3. Milk reception at dock (unloading, weighing, sampling, grading, dumping)
- 6.4. Milk chilling methods and storage

## **7. Filtration and cream separation**

- 7.1. Milk Filtration
- 7.2. Milk Clarification
- 7.3. Cream separation-methods
- 7.4. Cream separator-parts and arrangements of parts
- 7.5. Factors affecting efficiency of cream separator
- 7.6. Milk standardisation-procedure

## **8. Heat treatment to milk**

- 8.1. Pasteurisation - definition-objectives, advantages and disadvantages
- 8.2. Types of pasteurisation
- 8.3. Batch pasteurisation
- 8.4. HTST Pasteurisation
- 8.5. UHT Pasteurisation
- 8.6. Sterilisation of milk
- 8.7. Homogenization of milk Definition, advantages, disadvantages
- 8.8. Packing of milk (prepack) and storage

## **9. Cleaning and Sanitization**

- 9.1. Detergents and sanitizers-desirable characters
- 9.2. Cleaning and sanitization-methods-hand, machine and CIP systems
- 9.3. Cleaning and sanitization of cans-Types of can washers
- 9.4. Cleaning and sanitization of HTST pasteurizer and other equipment
- 9.5. Dairy effluents - treatment methods

## **10. Steam and Refrigeration**

- 10.1. Properties of steam
- 10.2. Steam boilers-Types-water tube and fire tube
- 10.3. Steam requirements in dairy
- 10.4. Direct and indirect refrigeration systems
- 10.5. Vapour compression cycle, compressor types and constructional details
- 10.6. Bulk cooler, plate chillers (shell and tube chillers)
- 10.7. Common problems in refrigeration system and remedies

**II<sup>nd</sup> YEAR**  
**PAPER-I (PRACTICAL):**  
**QUALITY CONTROL OF MILK AND PROCESSING**

**160 Periods**

**Practicals**

1. Sampling of milk for physical & chemical examination
2. Plat form tests for milk
3. Study of activities at reception dock
4. Preservation of milk samples for chemical analysis
5. Fat test-by Gerber's method
6. Determination of specific gravity of milk by lactometer
7. Determination of titratable acidity in milk
8. Sediment test
9. Clots-on-boiling test
10. Detection of adultration in milk
11. Detection of preservatives in milk
12. Sampling of milk for Microbiological analysis
13. Methylene blue reduction (MBR) Test
14. Resazurin Test
15. Standard plate count Test (SPC)
16. Direct Microscopic (DMC) Test
17. Coliforms count
18. Yeast and moulds
19. Chilling of milk-plate chiller, and farm milk cooler
20. Study of filters and clarifiers
21. Study of a cream separator parts-assembling
22. Separation of cream
23. Study of HTST pasturizer

24. Packing of milk-bottles and cans
25. Packing of milk-sachets (prepack)
26. Preparation of sterilized milk-batch method
27. Study of milk sterilizer
28. Cleaning and sanitization of dairy equipment
29. Study of refrigeration plant
30. Study of boilers
31. Study of bulk milk cooler
32. Visit to milk chilling centre
33. Visit to Milk products factory.

**II<sup>nd</sup> YEAR**  
**PAPER-II (THERORY):**  
**MILK PRODUCTS**

| S.No. | Name of the Chapter                  | No.of Periods |
|-------|--------------------------------------|---------------|
| 1.    | Liquid milks                         | 20            |
| 2.    | Fat rich milk products               | 25            |
| 3.    | Ice cream                            | 20            |
| 4.    | Fermented milk products              | 25            |
| 5.    | Concentrated and deried milks        | 20            |
| 6.    | Indigenous milk product              | 20            |
| 7.    | Dairy by products                    | 15            |
| 8.    | Packing and storage of milk products | 15            |
|       | <b>Total</b>                         | <b>160</b>    |

## **Detailed Syllabus**

### **1. Liquid milks**

- 1.1. Flavoured milks
- 1.2. Sterilized milk
- 1.3. Toned milk
- 1.4. Double toned milk
- 1.5. Recombined milk
- 1.6. Reconstituted milk
- 1.7. Standardized milk
- 1.8. Irradiated milk

### **2. Fat rich products**

- 2.1. Cream
  - 2.1.1. Definition, composition and types of cream
  - 2.1.2. Methods-gravity and centrifugal
  - 2.1.3. Factors affecting cream separation
- 2.2. Butter
  - 2.2.1. Definition, composition and legal standards
  - 2.2.2. Methods of manufacture-desi method
  - 2.2.3. Creamery method of butter preparation
  - 2.2.4. Types and uses of butter
- 2.3. Ghee
  - 2.3.1. Definition - composition and legal standards
  - 2.3.2. Desi method of ghee preparation
  - 2.3.3. Preparation of ghee from cream
  - 2.3.4. Prestratification method
  - 2.3.5. Agmark grading

### **3. Ice cream**

- 3.1. Definition, composition, legal standards
- 3.2. Classification of icecream
- 3.3. Method of manufacture of ice cream
- 3.4. Role of ingredients in Ice cream
- 3.5. Overrun in Ice cream
- 3.6. Softy Icecream

### **4. Fermented milk products**

- 4.1. Starter cultures
- 4.2. Classification of fermented milks
- 4.3. Dahi-srikhand
- 4.4. Yoghurt
- 4.5. Classification of cheese varieties
- 4.6. Cheddar cheese
- 4.7. Cottage cheese
- 4.8. Processed cheese

### **5. Concentrated and dried milks**

- 5.1. Classification of concentrated milks
- 5.2. Preparation of condensed milk
- 5.3. Evaporated milks
- 5.4. Dried milks-definition-types and standards
- 5.5. Drum dried power
- 5.6. Spray dried milk power

### **6. Indigenous milk products**

- 6.1. Classification of Indigenous milk products with examples
- 6.2. Khoa
- 6.3. Khoa based sweets
- 6.4. Channa

- 6.5. Channa based sweets
- 6.6. Paneer
- 6.7. Kheer
- 6.8. Kulfi

## **7. Dairy by products**

- 7.1. Classification of dairy by products
- 7.2. Skim milk-utilization
- 7.3. Whey-utilization
- 7.4. Buttermilk-utilization
- 7.5. Ghee residue-utilization

## **8. Packing and storage of milk products**

- 8.1. Definiton - objectives of packing
- 8.2. Packing materials
- 8.3. Packing of milk products
- 8.4. Storage of milk products

**II<sup>nd</sup> YEAR**  
**PAPER-II(PRACTICAL) :**  
**MILK PRODUCTS**

1. Preparation of pasteurised flavoured milk
2. Preparation of sterilized flavoured milk
3. Preparation of toned milk
4. Preparation of double toned milk
5. Preparation of Recombined milk
6. Preparation of reconstituted milk
7. Preparation of standaradised milk
8. Study of cream separator
9. Cream Separation
10. Desimethod of butter preparation
11. Creamy method of butter preparation
12. Desi method of ghee preparation
13. Creamey method of ghee preparation
14. Study of Agmark labelling of ghee
15. Study of ingredients for icecream
16. Ice cream preparation
17. Softy ice cream preparation
18. Dahi preparation
19. Srikhand preparation
20. Cottage cheese preparation
21. Study of condensed milk
22. Study of evaporated milk
23. Study of dried milks
24. Khoa preparation

25. Peda preparation
26. Burfi preparation
27. Kalakand Preparation
28. Gulabjamun Preparation
29. Preparation of channa
30. Preparation of Sandesh
31. Preparation of Rosogolla
32. Preparation of paneer
33. Preparation of kheer
34. Preparation of kulfi
35. Preparation of flavoured skim milk
36. Preparation of butter milk
37. Preparation of wheyvit
38. Study of packing materials
39. Visit to dairy plants
40. Survey of dairy products consumption

**II<sup>nd</sup> YEAR**  
**PAPER-III (THERORY) :**  
**DAIRY ECONOMICS EXTENTION & ENTREPRENEURSHIP**

| <b>Sl.No.</b> | <b>Major Topics</b>          | <b>No.of Periods</b> |
|---------------|------------------------------|----------------------|
| 1.            | Dairy economics              | 20                   |
| 2.            | Milk procurement             | 20                   |
| 3.            | Dairy development programmes | 20                   |
| 4.            | Dairy Cooperatives           | 25                   |
| 5.            | Marketting                   | 15                   |
| 6.            | Dairy accounts               | 15                   |
| 7.            | Dairy extension              | 25                   |
| 8.            | Dairy entrepreneurship       | 20                   |
|               | <b>Total</b>                 | <b>160</b>           |

## Detailed Syllabus

### **1. Dairy Economics (20 periods)**

- 1.2. Scope and importance of principles of economics in Dairying
- 1.2. Economic viability for different size of dairy enterprise
- 1.3. Economic principles involved to enhance benefits in dairying
- 1.4. Economic institutions supporting dairy development programmes
- 1.5. Project reports to be submitted for financial institutions for 2,10,50 and 100 animal dairy farms
- 1.6. Project reports for 5,000 litre and 50,000 litres processing centres

### **2. Milk procurement (20 periods)**

- 2.2. Systems of Milk collection
- 2.3. Systems of milk pricing
- 2.4. Principles involved in pricing of milk products
- 2.5. Planning for milk collection and transportation routes
- 2.6. Measures to enhance milk collection during lean season

### **3. Dairy development programmes (20 periods)**

- 3.1. Various dairy development programmes available
- 3.2. White revolution-Aims-impact on economy of rural people
- 3.3. Operation flood-different phases-aims and achievements
- 3.4. National Technology mission for dairy development
- 3.5. Role of voluntary organizations in dairy development
- 3.6. Concept of socio-economic and cultural changes for dairying programmes.

### **4. Dairy cooperatives (25 periods)**

- 4.1. History of cooperative movement in India
- 4.2. Cooperative movement in Dairy Industry
- 4.3. Milk cooperatives-Anand pattern
- 4.4. Aims, and functioning of village milk cooperative society
- 4.5. Structure and activities of district milk union

- 4.6. Role of state milk cooperative federations
- 4.7. Records and registers in a milk society
- 4.8. Coordination with other institutions concerned with dairy development
- 4.9. Insurance of dairy animal and processing center.

### **5. Marketing (15 periods)**

- 5.1 Principles of marketing
- 5.2. Marketing of dairy animals
- 5.3. Marketing plans for liquid milks
- 5.4. Strategy for marketing of milk products
- 5.5. Role of advertisement for market promotion
- 5.6. Analysis of consumer demand and acceptance
- 5.7. Role of salesman and marketing personalities in marketing of dairy products

### **6. Dairy accounts (15 periods)**

- 6.1 General principles of account keeping
- 6.2. Single and double entry system
- 6.3. Various records pertaining to financial aspects
- 6.4. Preparation of balance sheet
- 6.5. Auditing

### **7. Dairy Extension (25 periods)**

- 7.1. Role of Extension in dairy development
- 7.2. Dairy Extension-methods
- 7.3. Role of audiovisuals in Dairy development
- 7.4. Selection of Extension methods for effective transfer technology
- 7.5. Communication process-aims, objectives and problems
- 7.6. Organization of training programmes, cattle shows, exhibitions etc.
- 7.7. Evaluation of training programmes

## **8. Dairy Entrepreneurship**

- 8.1. Entrepreneur- his behaviour
- 8.2. Dairying as self employment
- 8.3. Entrepreneur cycle for dairying
- 8.4. Entrepreneur development for rural youth
- 8.5. Programmes for entrepreneurship development in dairying
- 8.6. Risks in self employment and remedies

**II<sup>nd</sup> YEAR**  
**PAPER-III (PRACTICAL)**  
**DAIRY ECONOMICS, EXTENSION &**  
**ENTREPRENEURSHIP**

1. Maintenance of financial records and registers
2. Preparation of balance sheet
3. Audit systems
4. Survey for selection of milk shed area
5. Report on milk shed area survey
6. Preparation of project reports for 2,10,50 and animal units
7. Preparation of project reports for 5,000 and 50,000 litres units
8. Working on various systems of milk pricing
9. Planning for milk collection
10. Planning for transportation routes
11. Study of dairy animal insurance forms
12. Procedure for claiming insurance benefits
13. Visit to village milk cooperative society
14. Visit to district milk union
15. Preparation of extension teaching materials such as posters, charts, bulletins, models etc
16. Organization of milk producers meeting
17. Planning for farmers training
18. Planning for organization of cattle shows
19. Group discussions for dairy development
20. Handling of audiovisual aids-camera, OHP, slide projector, TV, VCR etc
21. Calculation of cost of milk production
22. Calculation of cost of milk products

23. Planning for marketing of liquid milk
24. Survey for consumers demand and satisfaction
25. Planning for advertisement
26. Developmnt of entrepreneurship among rural youth
27. Records maintained in milk societies
28. Visits to dairy development institutions
29. Case study of successful dairy farmer
30. Case study of successful processing unit

## VII. LIST OF EQUIPMENT

|     |                                     |           |
|-----|-------------------------------------|-----------|
| 1.  | Iron Branding set (Letters 0 to 9 ) | 1         |
| 2.  | Tattooing letter 0-9                |           |
| 3.  | Ear Tagging Machine                 | 2         |
| 4.  | Ear Tags - Plastic                  | 20        |
|     | - Metal                             | 20        |
| 5.  | Tattooing forceps                   | 1         |
| 6.  | Liquid Nitrogen                     | 3 litres  |
| 7.  | Ice packs                           | 2         |
| 8.  | Burdizzo castrator                  | 1         |
| 9.  | Cotton ropes                        | 2 bundles |
| 10. | Ear (Nothcing) pincer (scissor)     | 1         |
| 11. | Bull Nose punch                     | 1         |
| 12. | Bull Nose ring                      | 1         |
| 13. | Bull leader (or) Bull pole          | 1         |
| 14. | Cradles or beads                    | 2 sets    |
| 15. | Drenching Bamboo                    | 2         |
| 16. | First Aid Kit                       | 1         |
| 17. | Enamel Tray                         | 1         |
| 18. | Sterilizer                          | 1         |
| 19. | Hair Clipper                        | 1         |
| 20. | Trocar and Canula                   | 1         |
| 21. | Electric Dehorner                   | 1         |
| 22. | Forceps                             | Set-1     |
| 23. | Scissor                             | Set-1     |
| 24. | Syringes and Needles                | Set-1     |
| 25. | Probang tube                        | 1         |
| 26. | Irrigator                           | 1         |

|     |                                   |        |
|-----|-----------------------------------|--------|
| 27. | Mouth Gag                         | 1      |
| 28. | Trevis                            | 1      |
| 29. | Milking cans 10 ltrs.             | 4      |
| 30. | Measurers (1 ltr, 500 ml, 100 ml) | 3      |
| 31. | Buckets 16 ltrs.                  | 2      |
| 32. | Milk feeding cup                  | 2      |
| 33. | Strip cup                         | 2      |
| 34. | Neck Chains                       | 1      |
| 35. | Chaff Cutter                      | 1      |
| 36. | Grinder                           | 1      |
| 37. | Artificial Vagina Set             | 1      |
| 38. | Liner for A.V.                    | 5      |
| 39. | Cones for A.V.                    | 5      |
| 40. | Refrigerator - 175 Ltrs           | 1      |
| 41. | Speculum                          | 1      |
| 42. | Stiff brushes                     | 2 No.s |
| 43. | Floor Brushes                     | 2 No.s |
| 44. | Insemination Kit                  | 1      |
| 45. | Insemination Guns                 | 2      |
| 46. | Haemocyto meter                   | 2      |
| 47. | Hot plate                         | 1      |
| 48. | Water distillation apparatus      | 1      |
| 49. | Pestle and Mortar                 | 1      |
| 50. | Spirit lamps                      | 3      |
| 51. | Insemination catheters            | 2      |
| 52. | Autoclave                         | 1      |
| 53. | Hot Air oven                      | 1      |
| 54. | PH Meter                          | 1      |
| 55. | Microscope                        | 1      |

|     |                             |                 |
|-----|-----------------------------|-----------------|
| 56. | Waterbath                   | 1               |
| 57. | Sediment Testing equipment  | 1               |
| 58. | Butter scoop                | 1               |
| 59. | Frying pan 2 ltrs           | 2               |
| 60. | Bottle capper               | 1               |
| 61. | Resazurin colour comparator | 1               |
| 62. | Bottle crates               | 2               |
| 63. | Sachet sealing equipment    | 1               |
| 64. | Measuring Tape              | 1               |
| 65. | Knife                       | 2               |
| 66. | Muffle furnace              | 1               |
| 67. | Miko Tester                 | 1               |
| 68. | Milk cans 40 Ltrs           | 2               |
| 69. | Gerbers centrifuge          | 1               |
| 70. | Butter Churn                | 1               |
| 71. | Butter worker               | 1               |
| 72. | Icecream Freezer            | (Hand Operator) |
| 73. | Cream separator             | 1               |
| 74. | Deep Fridge                 | 1               |
| 75. | Bhagona 3 Ltrs              | 5               |
| 76. | Hand Stirrer                | 3               |
| 77. | Karahi                      | 5               |
| 78. | Blender/Mixer               | 1               |

### List of Glassware

|    |                            |       |
|----|----------------------------|-------|
| 1. | Butyrometer                | 2 doz |
| 2. | Lactometer                 | 15    |
| 3. | Milk pipettes (10.75 ml)   | 25    |
| 4. | Pipette (10ml double bulb) | 20    |

|     |  |        |
|-----|--|--------|
| 5.  | Pipettes (10 ml)                             | 15     |
| 6.  | Pipette (1 ml) Single bulb                   | 10     |
| 7.  | Pipettes (1 ml)                              | 10     |
| 8.  | Petridishes                                  | 20 Nos |
| 9.  | Test Tubes                                   | 50     |
| 10. | Clinical Thermometers                        | 5      |
| 11. | Thermometers [°F]                            | 5      |
| 12. | Beakers (1000 ml)                            | 12     |
| 13. | Beakers (500 ml)                             | 12     |
| 14. | Beakers (250 ml)                             | 12     |
| 15. | Beakers (100 ml)                             | 12     |
| 16. | Conical flasks (250 ml)                      | 12     |
| 17. | Ice cream cups                               | 25     |
| 18. | Measuring Cylinders (100ml, 500 ml, 1000 ml) | 5      |
| 19. | Semen Collection vials                       | 2      |
| 20. | Syringe 2ml                                  | 24     |
| 21. | Syringe 5ml                                  | 24     |
| 22. | Syringe 10ml                                 | 24     |
| 23. | Syringe 20ml                                 | 24     |
| 24. | Automatic tilt measure for Acid              | 3      |
| 25. | Automatic tilt measure for Amyl Alcohol      | 3      |
| 26. | Milk Bottles 250ml                           | 50     |
| 27. | Kjeldhal flask 500ml                         | 5      |
| 28. | Round bottom flask 100 ml                    | 5      |
| 29. | Conical flask 1000ml                         | 5      |
| 30. | Funnels 10 cm dia                            | 5      |
| 31. | Volumetric flask 100 ml                      | 2      |
| 32. | Wash bottles 500 ml                          | 5      |
| 33. | Glass rods                                   | 1 kg   |

|     |                            |          |
|-----|----------------------------|----------|
| 34. | Glass tubing               | 1 kg     |
| 35. | Slides and coverslips      | 100      |
| 36. | Indicator bottles          | 100      |
| 37. | Drop bottles               | 2        |
| 38. | Rubber bulbs for suction   | 5        |
| 39. | Gloves                     | 100      |
| 40. | Brushes to clean glassware | 5        |
| 41. | Glass marking pencil       | 12       |
| 42. | Filter paper 11cm          | 2 boxes  |
| 43. | Glass Funnels              | 5        |
| 44. | Centrifuge graduated tubes | 10       |
| 45. | Gumboots                   | 2 pairs  |
| 46. | Glass beads                | 1 packet |

#### **List of Chemical & Consumables**

|     |                          |            |
|-----|--------------------------|------------|
| 1.  | Washing Soda             | 1 kg       |
| 2.  | Liquid Soap              | 5 ltrs.    |
| 3.  | Bleaching powder         | 50 kg      |
| 4.  | Sulphuric commercial     | 10 ltrs.   |
| 5.  | Sulphuric Acid           | 2 ltrs.    |
| 6.  | Oxalic acid              | 500 gm     |
| 7.  | Sodium hydroxide         | 1 kg       |
| 8.  | Phenolphthalin Indicator | 125 ml x 5 |
| 9.  | Methylene blue tablets   | 20         |
| 10. | Nutrient Agar            | 500 gms    |
| 11. | Macconkeys Agar          | 500 gms    |
| 12. | Potato Dextrage Agar     | 500 gms    |
| 13. | Formaldehyde             | 100 ml     |
| 14. | Boric Acid               | 100 gms    |
| 15. | Benzoic Acid             | 100 gms    |

|     |                                    |            |
|-----|------------------------------------|------------|
| 16. | Salicylic Acid                     | 100 gms    |
| 17. | Starch                             | 200 gms    |
| 18. | Urea                               | 250 gms    |
| 19. | Alcohol                            | 500 ml x 2 |
| 20. | Petroleum Ether (40° to 60°C)      | 400 ml x 2 |
| 21. | Resorcinal                         | 500 gm     |
| 22. | Isoamyl Alcohol                    | 500 ml     |
| 23. | Tattooing Ink                      | 500 gms    |
| 24. | Sodium Alginate                    | 500 gms    |
| 25. | Resazin tablets                    | 20         |
| 26. | Spirit 500 ml                      | 4 bot      |
| 27. | Tincture Iodine 500 ml             | 4 bot      |
| 28. | Sodium Carbonate                   | 500 gm     |
| 29. | Litimus paper                      | 1 pak      |
| 30. | Copper Sulphate                    | 500 gms    |
| 31. | Sodium Sulphate                    | 500 gms    |
| 32. | Potassium Dicromate                | 500 gms    |
| 33. | Eosin water soluble                | 125 ml     |
| 34. | Nigrosine water soluble            | 100 ml     |
| 35. | Petroleum Jelly / Liquid paraffine | 50 gms     |
| 36. | Sodium citrate                     | 100 gms    |
| 37. | Distilled water                    | 5 ltrs.    |
| 38. | Glucose                            | 500 gms    |
| 39. | Sodium Chloride                    | 500 gms    |
| 40. | Colours and Flavours               | 1 bot each |
| 41. | RBC diluting fluid                 | 500 ml     |
| 42. | Ammonium Sulphate                  | 500 gms    |
| 43. | Teepal                             | 200 ml     |
| 44. | Potassium iodide                   | 100 gms    |

|     |                      |         |
|-----|----------------------|---------|
| 45. | Iodine               | 25 gms  |
| 46. | Bromothymal blue     | 125 ml  |
| 47. | Quick lime           | 500 gms |
| 48. | Phenol               | 500 gms |
| 49. | Liquor Ammonia       | 500 ml  |
| 50. | Turmeric papers      | 1 box   |
| 51. | Cultures (Bacterial) | 3       |
| 52. | Citric Acid          | 500 gms |
| 53. | Super Phosphate      | 500 gms |
| 54. | Rock Phosphate       | 500 gms |
| 55. | Zinc Sulphate        | 500 gms |
| 56. | Branding ink         | 500 ml  |
| 57. | Tattooing ink        | 500 ml  |
| 58. | Neem oil             | 1 ltr.  |
| 59. | Castor oil           | 1 ltr.  |
| 60. | Zinc Oxide           | 500 gms |
| 61. | Vanaspathi           | 1 kg    |
| 62. | Sugar                | 20 kgs  |
| 63. | Whole Milk Powder    | 3 kgs   |
| 64. | Skin Milk Powder     | 3 kgs   |
| 65. | Baking powder        | 100 gms |

## **ADDRESSES OF THE EQUIPMENT, GLASSWARE, CHEMICALS**

### **EQUIPMENT :**

1. Vet India Pharmaceuticals, Hanuman Tekadi, Opp. Pragathi Mahavidyalaya, Koti, Hyderabad (Surgical & Medical)
2. Andhra Chemicals, Begum Bazar, Hyderabad (Chemicals & Surgicals)
3. Metters Internatinal, Anjali, 2nd Floor, 144 St.Johns Church Road, Bangalore 560 005. (A1 Equipment)
4. Bharath Haeavy Plates & Vessels Ltd. BHPV Visakapatnam 530 012 (AP) (LN<sub>2</sub> Contininem)
5. High glass Chemical, Near Tourist Hotel, Kachiguda, Hyderabad
6. Hardware Engineers Works Pvt. Ltd, Meghji Compound 5-3-325, Mahatma Gandhi Road, Secunderabad - 500 003. (Mixer, Grinders, Chalfculter)
7. Srivenkateswara Engineering works 3-10-44. Reddy Colony, Hanamakonda Dist., Warangal 506001, A.P. (Chalf culter & Groinder, Mixer)
8. Rajasthan Electronics and instrument Ltd. 2, Kanakpura, Industrial Area, Sivaji Road, Jaipur - 302 012.
9. Gupta and Sons, Abids near GPO (For dairy Chemicals cream separators and other dairy equipment)
10. M.C. Dalal and Co, No. 12, Pillayar, Koil Street Madrs -3
11. Delaval, Durgabai Deshmukh Colony, Hyderabad (Milking Machine and dairy equipment)
12. Unicorn machinery manufacturers Ltd, 13/1 Rasulpura, Secunderabad - 3. (Milking machine and other equipments)
13. Southern Chemicals, 504, Meridian apts, Lekehill Road, Hyd-463. (Chemicals, flavour, colours etc)

## WEIGHTAGE OF MARKS FOR PRACTICALS

|       |  |                   |
|-------|--|-------------------|
| IQ.   | Major Experiment                                 | - 12 Marks        |
|       | — Procedure of the experiment<br>(with diagrams) | - 6 Marks         |
|       | — Performing the experiment and result           | - 6 Marks         |
| IIQ.  | Minor Experiment                                 | - 8 Marks         |
|       | — Procedure                                      | - 4 Marks         |
|       | — Result / inference                             | - 4 Marks         |
| IIIQ. | Identification of the spots                      | 10 x 2 = 20 Marks |
|       | — Identification                                 | - 1/2 Mark        |
|       | — Characteristics                                | - 1 Mark          |
|       | — Diagram  | - 1/2 Mark        |
| IVQ.  | Record and Via Voce                              | - 10 Marks        |
|       | — Record   | - 5 Marks         |
|       | — Viva Voce                                      | - 5 Marks         |
|       | <b>Total Marks</b>                               | <b>- 50 Marks</b> |

## **VIII. (A) COLLABORATION INSTITUTIONS FOR CURRICULUM TRANSACTION**

1. Acharya N.G.Ranga Agricultural University R.Nagar, Hyderabad-500 030.
2. College of Veterinary Science, Tirupathi-517502.
3. NTR College of Veterinary Science, Gannavaram, Krishna District, Andhra Pradesh
4. Dairy Science College, Tirupathi 517502
5. Department of Animal Husbandry, Government of Andhra Pradesh Livestock Assistants Training Center - at Kakinada, Karimnagar, Reddipalli, Visakhapatnam, Warangall.
6. Institute of Animal Reproduction Animal Husbandry Department, Government of Andhra Pradesh, Mandapeta, East Godavari District.
7. Jawahar Bharati, Kavali, Nellore Dist-524202.
8. S.K.University, Anantapur, Andhra Pradesh-515003.
9. Department of Animal Husbandry. All Regional A-I centres, polyclinics, veterinary hospitals etc.

## **(B) ON THE JOB TRAINING CENTRES**

### **I. Dairy Farms :**

- A. Ongole Cattle Farm, Lam, Guntur.
- B. Cattle Farm Bonavasi, Kurnool District.
- C. Dairy Experimental Station, College of Veterinary Science, Rajendra Nagar, Hyderabad.
- D. Dairy Farm College of Veterinary Science, Tirupati.
- E. S.V.Dairy Farm, Tirupati.
- F. Military Dairy Farm, Visakhapatnam.
- G. Indoswis Dairy Farm, Visakhapatnam.
- H. Ongole Cattle Breeding Farm, Ramatheertham, Prakasam District.
- I. Livertock Research Station, Chintaldeevi, Nellore District

### **II. Veterinary Hospitals :**

Any veterinary Hospital/Veterinary Polyclinics, near by college, hospital.

### **III. Milk Plant :**

- A. Milk Products Factory Lalapet, Hyderabad.
- B. Milk Dairy, Hayathnagar, Hyderabad.
- C. Milk Products Factory, Vijayawada.
- D. Milk Product Factory, Sangam Dairy, Vadlamudi, Guntur District.
- E. Milk products Factory, Chittoor.
- F. Milk Products Factory, Rajahmundry.
- G. Milk Products Factory, Visakhapatnam.
- H. District Dairy at Nellore, Ongole, Warangal etc.
- I. Cream Line, Jersey Dairy Products, IDA, Uppal, Hyderabad.
- J. Heritage Milk Foods, Chittoor District  
Any Milk Products Factory near by.

**IV. Cooperative Society and Milk Collection Centre :**

Any Village milk cooperative society nearby

**V. Cattle feed Factory**

1. Feed Plant, Buddavaram, Krishna District.
2. Feed Plant Vadlamudi, Guntur District.
3. Feed Plant Visakhapatnam.
4. Feed Plant S.V.Dairy Plant Tirupathi
5. Feed Plant ANGRAU College of veterinary science, Rajendra nagar, Hyderabad and Tirupathi.
6. Any feed plant organised by district cooperative milk union.

**VI. Fodder Farm's :**

1. Fodder farm Banavasi Dairy Form, Kurnool District.
2. Fodder seed multiplication farm, Reddipally, Ananthapur.
3. Indoswiss Dairy Farm and Fodder Unit, Visakapatnam.
4. Fodder Farm College of Veterinary Science, Tirupati .
5. Forage Research Centre College of Veterinary Science, R. Nagar, Hyderabad.
6. Any fodder farm organised by Government and Cooperative Milk Union.

## **IX. QUALIFICATION FOR LECTURERS**

### **1. Vocational Lecturer (Full time)**

#### **Essential**

B.V.Sc. & AH/B.V.Sc/B.Sc.(Dairying)/B.Tech(Dairy Tech)/B.Tech (Dairying)/B.Sc.(Dairy Technology)/B.Sc.(Dairying)/B.Sc. (animal science) with 55% marks.

#### **Desirable :**

B.V.Sc & AH/B.V.Sc./B.Sc(Dairying)B.Tech (Dairy Techonology)B.Tech (Dairying)/B.Sc.(Dairy Technology) B.Sc. (Dairying)/B.Sc.(Animal Science) with 60% marks.

M.V.Sc./M.Tech.(Dairying)/M.Sc.(Dairying) in any branch of dairying, animal husbandry and livestock production and management.

Any Diploma Course of specialization after graduation.

One/two years experience in teaching/research/extension/farm/ dairy plant.

### **2. Laboratory Assistant:**

#### **Essential:**

+2 Course with vocational course in dairying/Diploma in veterinary science with 60% marks.

#### **Desirable:**

1 or 2 years experience in dairy farms/dairy plant/and other dairy related activities.

## **X. VERTICAL MOBILITY**

### **A. With Bridge Course.**

- i. Admission in B.Sc. Dairying/B.Sc.Dairy Science/B.Tech/  
B.Sc.(Dairy Technology)/B.Sc.(Animal Sciences)Dairying
- ii. B.V.Sc. & A.H.
- iii. B.Tech. Dairy Technology  
  
(10% of the seats may be reserved for these who pured reserved  
for these Emcet on merit basis in Angrav, R.Nagar, Hyderabad.
- iv. B.Sc. Biotechnology
- v. B.Sc.Microbiology
- vi. B.Sc. (BZD, ANC)

### **B. Without Bridge Course**

- i. B.A.
- ii. B.Com.

## **XII. REFERENCE BOOKS**

1. Handbook of Animal Husbandry - I.C.A.R.
2. Farm Animal Management & Poultry Production - Sastry, NSR  
Thomes, C.K.L. Singh
3. Textbook of Animal Husbandry-G.C.Banarjee
4. Characteristic of cattle & buffalo breeds of Inida - I.C.A.R. New  
Delhi
5. Dairy India- year book 2004
6. Nutritive value of Indian cattle & feeding of Animals - K.C.Sen  
& S.N.Ray
7. Forage crops of India - T.R.Narayan, & PM Dabadhao
8. Indian Dairy Products - R.C.Rangappa & K.T.Achaya
9. Outlines of Dairy Technology-Sukumar De.
10. Animal Nutrition & feeding practices - Ranjan S.K.
11. Artificial Insemination of Farm Animals - Perry J.Ed.
12. Veterinary Medicine - D.C.Blood & J.A.Henderson, 4th edn.
13. Milk hygiene in Milk Production, processins and distribution -  
FAO, WHO, 1962.
14. Anatomy & Physiology of Farm Animals - Frandson R.D.
15. Dairy Cattle Principles, practice problems and profit - Bath Donald  
& others.
16. Dairy handbook - NDRI.Processing and production, KARNAL
17. Biology of lactation-Schmidt
18. Book keeping & Accounts - R.S.Gupta
19. Dairy Microbiology - Robinsion, Vol.I & Vol.II.
20. Principles & practices of Dairy Farm Management - Jagdish  
Prasad
21. Textbook of clinical veterinary medicine - Amalendu Chakrabarti
22. Animal Reproduction & Artificial Inseuivation - NCERT
23. Milk & Milk Products - NCERT

24. Milk & Milk Products - Eckles, comb and Massey
25. Livestock economy of India - I.S.A.E. Oxford & IBH Publication.
26. Dairy Cattle Management - R.N.Pal, HAU, Hissar.
27. Practical Animal Husbandry-Miller & Rabertson
28. Bovine economy of India, Vidyanathan, Oxford.
29. Diseases of Cattle-Blood, DC (ETAL) London
30. Indian Jornal of Dairy science (periodical)
31. Dairy man (Periodical)
32. Indian Jornal of Animal Science
33. Dairy microbiology-Yadav.



**VOCATIONAL CURRICULUM-2005**  
**(With effect from the Academic Year 2005-2006)**

**Curriculum of Intermediate Vocational Course**  
**in**  
**DAIRYING**



**STATE INSTITUTE OF VOCATIONAL EDUCATION &**  
**BOARD OF INTERMEDIATE EDUCATION A.P.**  
**Nampally, Hyderabad**



## **FOREWORD**

The National Policy on Education (1986) while proposing educational reorganization, placed high priority on the programme of vocationalisation of education. It emphasized that well planned, systematic and rigorously implemented vocational education will create a distinct stream to prepare students for identified occupations encompassing several areas of activity. The primary aim of vocational courses was to cut across several occupational fields and prepare students with employable skills in organized sectors and self employment. Vocationalisation through re-orientation of educational strategies focused on creating a talent pool of skilled youth who are trained in courses relevant to the market and emerging needs of the various sections of the economy.

Inspired by this vision of the National Policy, the Government of Andhra Pradesh introduced Vocational Education at +2 level with an aim to diversify a sizeable segment of students at the senior secondary stage to the world of work. The State Government aimed at reducing the pressures on higher education through empowering youth by harnessing their capabilities. The requirement of skilled manpower industry is being fulfilled by charting a student's career with right options based on aptitude and talent. An right alternative to medical and engineering courses is envisaged in vocationalisation of education in the State.

In view of the changing needs of the students and growing demand for a spectrum of skill competencies in the economy, the Board of Intermediate Education has reviewed the curriculum of Vocational Courses in order to re-orient them based on their viability and practicability. The revised curriculum for Vocational Courses at Intermediate Level will come into effect from the Academic Year 2005-06 1st Year and from Academic Year 2006-07 for 2nd Year students.

I am confident that the revised curriculum will attract more and more students into vocational stream and help them train in need-based, productive courses leading to gainful employment.



**SHASHANK GOEL**

Secretary, BIE



# CONTENTS

|   | <b>Page No.</b> |
|---|-----------------|
| I. Introduction   | 1               |
| II. Objectives of the Course                                    | 2               |
| III. Skills to be provided                                      | 3               |
| IV. Job opportunities   | 6               |
| [a] Wage Employment   |                 |
| [b] Self Employment   |                 |
| V. Scheme of Instruction & Examination                          | 7               |
| VI. Syllabus  | 9               |
| [a] Theory  |                 |
| [b] Practicals  |                 |
| VII. List of equipment  | 44              |
| VIII. [a] Collaboration Institutions for curriculum transaction | 53              |
| [b] On the Job Training Centres                                 | 54              |
| IX. Qualification for Lecturers                                 | 56              |
| X. Vertical Mobility  | 57              |
| [a] With Bridge Course  |                 |
| [b] Without Bridge Course                                       |                 |
| XI. Reference Books   | 58              |
| XII. Model Question Paper                                       | 60              |
| XIII. List of Subject Committee Members                         | 75              |
| XIV. Equivalency Courses  | 76              |