Minimum Standards for Higher Agricultural Education (MSHAPE)

DAIRY TECHNOLOGY

Education Division
Indian Council of Agricultural Research
PUSA, New Delhi 110 012
PREFACE

The exemplary initiative taken up by the Indian Council of Agricultural Research to develop Minimum Standards of Higher Education in several disciplines of Agriculture is aimed at harmonizing standards of education cutting across the chosen field of Agricultural sciences. Such an attempt will enforce academic standards and discipline in the institutions offering both the undergraduate and postgraduate programs and ensure that the graduating students are adequately equipped to face the challenges of Indian agriculture. The prescribed standards will also help in identifying the shortfalls of the colleges who fail to qualify the set norms and thus help the universities to facilitate its improvement.

At the outset I take this opportunity to express my sincere thanks to the Indian Council of Agricultural Research for identifying the expert group who have vast experience of guiding dairy education in the country. The council reposed faith in the committee and the members rose to the expectations of the Council by deliberating at length various issues that are critical for strengthening the academic programs. The human resources and the support infrastructure in terms of space, buildings, machineries, analytical equipment, etc. required for operationalizing Dairy Technology education at undergraduate & postgraduate level were identified and specific details worked out in consultation with the faculty involved in running such a program.

I place on record contributions of the members of the committee namely Dr. G. R. Patil, Joint Director (Academic), NDRI, Karnal; Dr. B. V. Venkateshaiah, Former Dean, Dairy Science College, Bangaluru; Dr. B. P. Shah, Dean, SMC College of Dairy Science, Anand, Dr. R. R. B. Singh, Dean, Faculty of Dairy Technology, SGIDT, Patna; Dr. K. L. Khurana, Principal Scientist Education Division, ICAR, KAB-II Pusa, New Delhi – 110012 and Dr. Satish Kulkarni Head, SRS of NDRI, Bangaluru (Special Invitee) in formulating the strategic work plan to develop the document. The contributions of the faculty members of the Sanjay Gandhi Institute of Dairy Technology at Patna are praiseworthy. The support extended by the Vice Chancellor of the Bihar Agricultural University, Sabour in facilitating conduct of the meeting at its Patna based constituent college is duly acknowledged by the committee.

I am sure that framing of the Minimum Standards of Higher Agricultural Education in the field of Dairy Technology will trigger the much needed improvement in the quality of Dairy Technology education and set in motion realization of set objectives of ensuring nutritional security and rural prosperity in the country.

(A. K. Srivastava)
Chairman
Expert Committee
INTRODUCTION

Milk is the largest agricultural commodity in India both in quantitative and value terms. The long strides Indian dairying has made over the last five decades, particularly since the beginning of Operational Flood in 1970, is a success story recognized worldwide and being emulated in many parts of Asia and Africa. India today takes pride in claiming the first place among the milk producing nations (129 MT in 2012) which is anticipated to touch the figure of 170 MT by 2020. This has been made possible by involvement of nearly 14 million farmers who are linked through a strong network of more than 1 lakh village dairy cooperative societies spread across nearly 350 districts of the nation. Indian dairy industry with an estimated size of 70 billion US$ contributes to about 17% of global milk production. The industry has been consistently growing @ 3-4%. Last few years have witnessed the growth rate of around 5%. In India the level of milk processing is around 34% which is highest among all food categories. With expected rise in milk production, more new processing units will come into operation. It is, therefore, estimated that the processed dairy segment will grow at around 15% during the next five years. There has been consistent rise in demand for value added products such as yoghurt, dairy beverages, ice creams & cheeses thereby encouraging the organized dairy industry to go for diversification of product profile. With expected rise in the number of new dairy units and capacity expansion of the existing one’s more human resources would be needed. At the moment, there are 19 dairy technology colleges producing less than 300 dairy graduates every year. It is estimated that the demand for qualified dairy graduates would be around 25000 by 2020. This indicates huge gap in capacity of educational institutions offering Bachelor programme. The employment opportunities for these graduates exist primarily in dairy and food processing plants/companies, manufacturing units of dairy equipment, quality control and analytical laboratories, government organizations related to dairying & food processing, teaching and research organizations, consultancy and entrepreneurship agencies, nationalized, private and developmental banks, production, processing and marketing wings of multinational dairy companies. It is, therefore, envisaged that more Dairy Technology Colleges will be needed in near to medium time frame.

Vision

College/Institute of Dairy Technology will catalyze socio-economic change in the state where it is set up through development of highly skilled human resource in all spheres of Dairy Technology endowed with high integrity, work values and entrepreneurial orientation.

Mission Statement

- College/Institute of Dairy Technology to emerge as a Centre of Excellence in education and research in Dairy Technology committed to providing quality education at undergraduate and postgraduate levels.
The College/Institute will strive to offer world-class academic programme having sound technical knowhow and rich experiential learning as the critical components and make innovative application of research and new technologies in Dairy Technology a tool for improving sustainability in dairy processing system in the state and the country.

It will also use education and research to stimulate industrial innovation and entrepreneurial culture among the graduates and provide knowledge based opportunities to the state based Dairy Processing Industries for using value addition as a vehicle for economic prosperity.

Objectives:

- To develop skilled technical and managerial manpower in Dairy Technology for the Industry, and Research and Development institutions.

- To develop trained manpower with entrepreneurial skill required to establish, manage and direct small and medium dairy processing enterprise in line with the institutions priority to follow ‘Technology for Self Reliance’ and “Creation of Rural Employment”.

- To train graduates with adequate knowledge of design and fabrication of dairy processing equipments aimed at mechanizing traditional technology.

- To develop graduates with potential for higher education and dissemination of knowledge at various academic institutions of higher learning.
Proceedings of the Meeting of the ICAR’s Expert Committee to work out the Minimum Standards of Higher Agricultural Education (MSHAE) held at Sanjay Gandhi Institute of Dairy Technology, Patna

Proceedings of the meeting of the ICAR’s Expert Committee to work out the Minimum Standards of Higher Agricultural Education (MSHAE) in terms of manpower, infrastructure, laboratories, and other support so as to firm up guidelines for establishing Institute/College of Dairy Technology in SAUs/ICAR Institutes/Deemed Universities, in the Committee Room at Patna on March 22, 2014. The members present were: Dr. G. R. Patil, Joint Director (Academic), NDRI, Karnal; Dr. B. V. Venkateshaiah, Former Dean, Dairy Science College, Bangaluru; Dr. B. P. Shah, Dean, SMC College of Dairy Science, Anand, Dr. R. R. B. Singh, Dean, Faculty of Dairy Technology, SGIDT, Patna; Dr. K. L. Khurana, Principal Scientist, Education Division, ICAR, KAB-II Pusa, New Delhi – 110012 and Dr. Satish Kulkarni Head, SRS of NDRI, Bangaluru (Special Invitee).

The chairman of the committee Dr. A. K. Srivastava could not attend the meeting as he was indisposed due to illness. In his absence Dr. G. R. Patil, Joint Director (Academic), NDRI, Karnal chaired the meeting. He extended warm welcome to the learned members of the committee and explained the need to engage in such an exercise.

Dr. R. R. B. Singh, Dean of the host institute greeted the members and expressed sincere thanks to the ICAR and the committee to provide SGIDT an opportunity to organize the meeting. Dr. K. L. Khurana, Principal Scientist, Education Division, ICAR briefed the committee about the different information that need to be incorporated in the document and how it should be deliberated. Dr. R. R. B. Singh made a presentation on the subject and it was discussed threadbare over the whole forenoon session. Subsequently, faculty members of the Sanjay Gandhi Institute of Dairy Technology, Patna joined the committee members to present their points of views. Those present were: Dr. C. Prasad, University Professor-cum- Chief Scientist (DT); Dr. M. N. Singh, University Professor-cum-Chief Scientist (DT), Dr. J. Badshah, Univ. Prof.–cum-Chief Scientist (DE); Dr. A. K. Thakur, Assoc. Prof. cum – Senior Scientist (D. Extn); Dr. K. Murari, Asstt. Prof. (Selection Grade, DE); Dr. A. Kumar, Asstt. Prof. (Senior Scale, DH); Dr.Upendra Singh, Asstt.Prof. (Senior Scale, DT); Dr. (Mrs) Sonia Kumari, Assistant Prof.–cum-Jr Scientist (DM); Dr. A.K. Jha, Asstt. Prof.–cum-Jr Scientist (D.Econ); Sh. B. K. Bharti, Asstt. Prof.–cum-Jr.Scientist (DC) & Sh. Suryamani Kumar, Asstt. Prof.–cum-Junior Scientist (DT). The chairman informed about the background of constitution of the committee and requested the faculty members to express their views freely on the document being developed. Faculty members were very emphatic about the need for prescribing minimum standards particularly in terms of adequate numbers of faculty, facilities for experiential learning and sufficient floor area for accommodating the laboratory and class rooms. They were of the opinion that any university or private body proposing to start such a college should make sufficient budgetary provisions in the beginning itself rather than following a piecemeal approach. Dr. B. V. Venkateshaiah, Former Dean, Dairy Science College, Bangaluru and Dr. B. P. Shah, Dean, SMC College of Dairy Science, Anand not only made valuable contributions but made available to the committee supplementary draft paper. The final report being presented here is an amalgamation of the views of all those who participated in the deliberations.
Annexure-I
Minimum Standards for Establishing a College/Institute of Dairy Technology in State Agricultural Universities/ICAR Institutes/Deemed Universities

1. Divisions/Section: Five Divisions and One Section

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Departments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Dairy Technology</td>
</tr>
<tr>
<td>2.</td>
<td>Dairy Engineering</td>
</tr>
<tr>
<td>3.</td>
<td>Dairy Chemistry</td>
</tr>
<tr>
<td>4.</td>
<td>Dairy Microbiology</td>
</tr>
<tr>
<td>5.</td>
<td>Dairy Trade and Dairy Business Management</td>
</tr>
<tr>
<td>6.</td>
<td>Pilot Dairy Unit cum Business Process Development Centre</td>
</tr>
</tbody>
</table>

2. Undergraduate and Postgraduate Degrees Nomenclature

<table>
<thead>
<tr>
<th>Level of Program</th>
<th>Nomenclature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Undergraduate</td>
<td>B.Tech (Dairy Technology)</td>
</tr>
<tr>
<td>Postgraduate Degrees</td>
<td>M.Tech (Dairy Technology)</td>
</tr>
<tr>
<td></td>
<td>M.Tech (Dairy Engineering)</td>
</tr>
<tr>
<td></td>
<td>M.Tech/M.Sc.(Dairy Chemistry)</td>
</tr>
<tr>
<td></td>
<td>M.Tech/M.Sc.(Dairy Microbiology)</td>
</tr>
<tr>
<td>Doctoral Degrees</td>
<td>Ph.D (Dairy Technology)</td>
</tr>
<tr>
<td></td>
<td>Ph.D (Dairy Engineering)</td>
</tr>
<tr>
<td></td>
<td>Ph.D (Dairy Chemistry)</td>
</tr>
<tr>
<td></td>
<td>Ph.D (Dairy Microbiology)</td>
</tr>
</tbody>
</table>

3. Eligibility Criteria

B.Tech. (Dairy Technology) The eligibility for admission is 10+2 or its equivalent examination with Physics, Chemistry, Mathematics and English from a Board/University recognized by the Institute. Only those candidates who have obtained at least 50% marks or equivalent G.P.A. in the aggregate of Physics, Chemistry and Mathematics are eligible for admission to B.Tech. (Dairy Technology).


<table>
<thead>
<tr>
<th>Degree Type</th>
<th>Courses</th>
</tr>
</thead>
</table>
| B.V.Sc. & A.H. / B.Sc. (Ag.) | B.Sc. Honours(Chemistry)  
B.Sc. Microbiology/ Biotechnology/ Biochemistry  
B.Sc. with Chemistry and any two of the following: Botany, Zoology, Genetics, Microbiology, Mathematics, Physics and Dairy Science, Biotechnology, Industrial Microbiology, Food Science & Quality Control, Biochemistry |
| M.Tech./M.Sc. (Dairy Microbiology) | B.Sc. Dairying/ B.Sc. Dairying (DT)  
B.Tech. (DT)  
B.V.Sc./B.V.Sc. & A.H./ B.Sc. (Ag.)  
B.Sc. Microbiology/Industrial Microbiology/Medical Microbiology, Microbial & Food Technology/Food Tech./Food Science (from SAUs only)  
B.Sc. (Hons.) Microbiology/ Biotechnology  
B.Sc. with Zoology and any two of the following: Chemistry, Genetics, Microbiology, Biochemistry |
| Ph.D. (Dairy Microbiology) | • M.Sc./M.Tech. Dairying (Dairy Bacteriology/ Dairy Microbiology)  
• M.Sc. (Microbiology/Microbial Technology/ Applied Microbiology and Biotechnology/ Medical Microbiology/Industrial Microbiology/Microbial& Food Technology//Biotechnology)  
• M.Sc. (Ag). Microbiology  
• M.V.Sc. (Bacteriology/Microbiology)  
• M.Sc. Hons. (Microbiology) |
• M.Sc. Agric. (Dairy Sci./Animal Husbandry & Dairying)  
• M.Sc. Chemistry/Applied Chemistry  
• M.Sc./M.Tech (Food Science/Food Technology/Food Science & Technology).  
• M.Sc. Animal Biotechnology  
• M.V.Sc. (APT/LPT)  
• M.V.Sc. Biochemistry/Biotechnology |
• M.Sc./ M.V.Sc. (Dairy Science/ Dairy Technology)  
• M.Sc. Agri. (Dairy Science) with at least 5 years experience in teaching dairy technology)  
• M.Sc. (Food Sci.)/M.Sc. (Food Tech.) with UG Degree in Dairy Tech./Food Tech./ Food Sci.  
• M.Sc. (Dairy Sci.)/M.Sc. Agric. (AH&D) with specialization in Dairy Sci. with at least 5 years experience in teaching Dairy Technology or working in a dairy plant. |
| Ph.D. (Dairy Engineering) | • M.Tech. Dairying (Dairy Engineering)  
• M.Tech. (Agril./Agril. Process, Chemical, Dairy,Dairy & Food, |
4. **Medium of Instruction**: English

5. In order to get quality students for B.Tech (DT) course, it is necessary to have common criterion for admission of students. It is suggested to admit the students using AIEEE merit list.

6. **Minimum Intake**

<table>
<thead>
<tr>
<th>Degree</th>
<th>Discipline</th>
<th>Minimum Intake/Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>B.Tech</td>
<td>Dairy Technology</td>
<td>40</td>
</tr>
<tr>
<td>M.Tech</td>
<td>Dairy Technology</td>
<td>5</td>
</tr>
<tr>
<td>M.Tech</td>
<td>Dairy Engineering</td>
<td>5</td>
</tr>
<tr>
<td>M.Tech/M.Sc.</td>
<td>Dairy Chemistry</td>
<td>5</td>
</tr>
<tr>
<td>M.Tech/M.Sc.</td>
<td>Dairy Microbiology</td>
<td>5</td>
</tr>
<tr>
<td>Ph.D</td>
<td>Dairy Technology</td>
<td>5</td>
</tr>
<tr>
<td>Ph.D</td>
<td>Dairy Engineering</td>
<td>5</td>
</tr>
<tr>
<td>Ph.D</td>
<td>Dairy Chemistry</td>
<td>5</td>
</tr>
<tr>
<td>Ph.D</td>
<td>Dairy Microbiology</td>
<td>5</td>
</tr>
</tbody>
</table>

7. **Land Requirements**
   - Main building and hostels: 4 ha
   - Field area: 10 ha
   - Play grounds: From common facility of the institute
   - **Total: 14 ha**

8. **Manpower Requirements of Dean’s Office**

<table>
<thead>
<tr>
<th>Designation</th>
<th>No. of position</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dean</td>
<td>1</td>
</tr>
</tbody>
</table>

   **A. Establishment**

<table>
<thead>
<tr>
<th>Designation</th>
<th>No. of position</th>
</tr>
</thead>
<tbody>
<tr>
<td>PA to Dean</td>
<td>1</td>
</tr>
<tr>
<td>Administrative Officer</td>
<td>1</td>
</tr>
<tr>
<td>Assistant Comptroller/Assistant Accounts Officer</td>
<td>1</td>
</tr>
<tr>
<td>Superintendent</td>
<td>1</td>
</tr>
<tr>
<td>Steno/Computer operator</td>
<td>4</td>
</tr>
<tr>
<td>Assistant</td>
<td>1</td>
</tr>
<tr>
<td>Operator (Audio Visual)</td>
<td>1</td>
</tr>
<tr>
<td>Attendants/Messengers</td>
<td>4</td>
</tr>
<tr>
<td>Clerk (LDC)</td>
<td>4</td>
</tr>
<tr>
<td>Electrician</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------</td>
<td>-------</td>
</tr>
<tr>
<td><strong>B. Dairy Plant and Business Incubation Centre, Laboratories,</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Manager, Pilot plant/ Business Incubation Centre</strong></td>
<td>01</td>
</tr>
<tr>
<td><strong>Laboratory Technician for the college</strong></td>
<td>06</td>
</tr>
<tr>
<td><strong>Plant Supervisors/Technical Assistants (Dairy Processing-10, Refrigeration-2, Electrical-2)</strong></td>
<td>14</td>
</tr>
<tr>
<td><strong>Plant Operators (Processing-6, Boiler-2Refrigeration-2.)</strong></td>
<td>10</td>
</tr>
<tr>
<td><strong>Mechanical Draftsman</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>Jr.Mechanic/wireman</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>Fitter</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>Steno/PA</strong></td>
<td>01</td>
</tr>
<tr>
<td><strong>Assistant</strong></td>
<td>01</td>
</tr>
<tr>
<td><strong>Computer operator</strong></td>
<td>02</td>
</tr>
<tr>
<td><strong>LDC</strong></td>
<td>01</td>
</tr>
<tr>
<td><strong>Attendants</strong></td>
<td>02</td>
</tr>
<tr>
<td><strong>C. Library</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Assistant Librarian</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>Library Assistants</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>Clerks</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>Shelf Assistants</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>D. Students Welfare</strong></td>
<td></td>
</tr>
<tr>
<td><strong>To be provided by the University as Central Facility</strong></td>
<td></td>
</tr>
<tr>
<td><strong>E. Hostel Staff for Two Hostels</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Warden</strong></td>
<td>1+1</td>
</tr>
<tr>
<td><strong>Hostel Superintendents</strong></td>
<td>2</td>
</tr>
<tr>
<td><strong>Clerks</strong></td>
<td>2</td>
</tr>
<tr>
<td><strong>Attendants</strong></td>
<td>8</td>
</tr>
<tr>
<td><strong>Security, Sanitation and Landscaping</strong></td>
<td>To be outsourced</td>
</tr>
</tbody>
</table>

### Faculty Requirements for the Departments

<table>
<thead>
<tr>
<th>Division/Section</th>
<th>Faculty</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Professor</td>
<td>Associate Professor</td>
</tr>
<tr>
<td>Dairy Technology</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Dairy Engineering</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Dairy Chemistry</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Dairy</td>
<td>1</td>
<td>2</td>
</tr>
</tbody>
</table>
**Microbiology**

Dairy Business Management

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Division/ Section</th>
<th>Steno/PA/ Computer Operator (9,300-34,800 +GP 4,200)</th>
<th>Assistant (5200-20200 +GP 2800)</th>
<th>Attendant/ Messenger (5200-20200 +GP 2800)</th>
<th>Clerk (9,300-34,800 +GP 4,200)</th>
<th>Laboratory Assistant/ Attendant (5200-20200 +GP 2800)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dairy Technology</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>Dairy Engineering</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>Dairy Chemistry</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>Dairy Microbiology</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>Dairy Business Management</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>10</td>
<td>5</td>
<td>10</td>
<td>5</td>
<td>10</td>
</tr>
</tbody>
</table>

10. Faculty Expertise

<table>
<thead>
<tr>
<th>Division/Section</th>
<th>Faculty Expertise</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Core</strong></td>
</tr>
<tr>
<td>Dairy Technology</td>
<td>Dairy Processing</td>
</tr>
<tr>
<td></td>
<td>Food Technology</td>
</tr>
<tr>
<td>Dairy Engineering</td>
<td>Dairy Engineering</td>
</tr>
<tr>
<td>Dairy Chemistry</td>
<td>Dairy Chemistry</td>
</tr>
<tr>
<td>Dairy Microbiology</td>
<td>Dairy Microbiology</td>
</tr>
<tr>
<td>Dairy Business Management</td>
<td>Dairy Economics</td>
</tr>
<tr>
<td></td>
<td>Dairy extension</td>
</tr>
<tr>
<td></td>
<td>Cheese and Fermented Dairy Products</td>
</tr>
<tr>
<td></td>
<td>Traditional Dairy Products</td>
</tr>
<tr>
<td></td>
<td>Packaging</td>
</tr>
<tr>
<td></td>
<td>Sensory Science</td>
</tr>
<tr>
<td></td>
<td>Rheology</td>
</tr>
<tr>
<td></td>
<td>Food Process Engineering</td>
</tr>
<tr>
<td></td>
<td>Thermodynamics</td>
</tr>
<tr>
<td></td>
<td>Civil Engineering</td>
</tr>
<tr>
<td></td>
<td>Mechanical Engineering</td>
</tr>
<tr>
<td></td>
<td>Analytical Techniques</td>
</tr>
<tr>
<td></td>
<td>Microbial Techniques</td>
</tr>
<tr>
<td></td>
<td>Business Management</td>
</tr>
</tbody>
</table>

11.
12. Central/Division/Section Laboratories (as per requirements of the teaching and research work of the college)

<table>
<thead>
<tr>
<th>Division/Section</th>
<th>Laboratory</th>
</tr>
</thead>
</table>
| Dairy Technology                 | Product Development Laboratory  
|                                  | Product Characterization and Rheology                                     |
|                                  | Packaging Laboratory                                                        |
|                                  | Sensory Evaluation Laboratory                                               |
|                                  | Central Instruments Laboratory                                              |
|                                  | Food Technology Laboratory                                                  |
| Dairy Engineering                | Bioprocess Engineering Laboratory                                           |
|                                  | Fluid Mechanics Laboratory                                                  |
|                                  | Heat Transfer Laboratory                                                    |
|                                  | Refrigeration and Air Conditioning                                         |
|                                  | Food Engineering Laboratory                                                 |
|                                  | Thermodynamics Laboratory                                                   |
|                                  | Electrical Laboratory                                                       |
|                                  | Instrumentation and Control Laboratory                                      |
|                                  | Dairy Engineering Workshop                                                  |
| Dairy Chemistry                  | Dairy Food Analysis Laboratory                                              |
| Dairy Microbiology               | Dairy Food Quality and Safety Laboratory                                   |
| Dairy Business Management        | Computer Laboratory                                                         |
|                                  | Audio-Visual Laboratory                                                     |
|                                  | Language Laboratory                                                         |

13. Floor Space Requirements

**Central Facilities**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Details</th>
<th>Number of Rooms</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Dean office</td>
<td>1</td>
<td>20’ x 24’</td>
</tr>
<tr>
<td>2.</td>
<td>PA room</td>
<td>1</td>
<td>20’ x 12’</td>
</tr>
<tr>
<td>3.</td>
<td>Committee room with video conferencing facility</td>
<td>1</td>
<td>20’ x 48’</td>
</tr>
<tr>
<td>4.</td>
<td>Administrative officer room</td>
<td>1</td>
<td>20’ x 12</td>
</tr>
<tr>
<td>5.</td>
<td>Admin. staff rooms</td>
<td>3</td>
<td>20’x36’ each</td>
</tr>
<tr>
<td>6.</td>
<td>Examination hall</td>
<td>1</td>
<td>20’ x 12’</td>
</tr>
<tr>
<td>7.</td>
<td>Evaluation room</td>
<td>1</td>
<td>20’ x 36’</td>
</tr>
<tr>
<td>8.</td>
<td>Faculty room</td>
<td>1</td>
<td>20’ x 12’ each</td>
</tr>
<tr>
<td>9.</td>
<td>Placement cell</td>
<td>1</td>
<td>20’ x 48’</td>
</tr>
<tr>
<td>10.</td>
<td>Smart Lecture rooms</td>
<td>5</td>
<td>Seating capacity - 50</td>
</tr>
<tr>
<td>11.</td>
<td>Auditorium (Optional)</td>
<td>1</td>
<td>Seating capacity-300</td>
</tr>
<tr>
<td>12.</td>
<td>Library/Book bank</td>
<td>1</td>
<td>30’x72’</td>
</tr>
<tr>
<td>13.</td>
<td>Examination hall (optional)</td>
<td>1</td>
<td>Seating capacity - 300</td>
</tr>
<tr>
<td>14.</td>
<td>Multipurpose room</td>
<td>1</td>
<td>20’x36’</td>
</tr>
<tr>
<td>Sr. No.</td>
<td>Details</td>
<td>No. of rooms</td>
<td>Dimensions</td>
</tr>
<tr>
<td>---------</td>
<td>---------</td>
<td>--------------</td>
<td>------------</td>
</tr>
<tr>
<td>1.</td>
<td>Office of the Head of Division (05)</td>
<td>05 One for each division</td>
<td>20’ x 24’ each</td>
</tr>
<tr>
<td>2.</td>
<td>Administrative staff</td>
<td>05 (one for every Division)</td>
<td>20’ x 36’ each</td>
</tr>
<tr>
<td>3.</td>
<td>Faculty room</td>
<td>26</td>
<td>20’ x 24’ (05 rooms) 20’ x 12’ (21 rooms)</td>
</tr>
<tr>
<td>4.</td>
<td>Room for research scholar</td>
<td>04 (one for every Division)</td>
<td>20’ x 24’ each</td>
</tr>
<tr>
<td>5.</td>
<td>Committee room cum library</td>
<td>05 (one for every Division)</td>
<td>20’ x 36’ each</td>
</tr>
<tr>
<td>6.</td>
<td>Smart lecture cum seminar room</td>
<td>05 (one for every Division)</td>
<td>Seating capacity - 50 each</td>
</tr>
</tbody>
</table>

Laboratories (no. of laboratories as per requirement and include UG and PG teaching laboratories)

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Details</th>
<th>No. of rooms</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.</td>
<td>Dairy Technology</td>
<td>05</td>
<td>20’ x 60’ (one) 20’ x 36’ (four)</td>
</tr>
<tr>
<td>8.</td>
<td>Dairy Engineering</td>
<td>09</td>
<td>20’ x 60’ (two) 20’ x 36’ (seven)</td>
</tr>
<tr>
<td>9.</td>
<td>Dairy Chemistry</td>
<td>04</td>
<td>20’ x 60’ (one) 20’ x 36’ (three)</td>
</tr>
<tr>
<td>10.</td>
<td>Dairy Microbiology</td>
<td>03</td>
<td>20’ x 60’ (one) 20’ x 36’ (two)</td>
</tr>
<tr>
<td>11.</td>
<td>Dairy Business Management</td>
<td>04</td>
<td>20’ x 60’ (two) 20’ x 36’ (two)</td>
</tr>
</tbody>
</table>
Dairy Plant and Business Incubation Centre

<table>
<thead>
<tr>
<th>Details</th>
<th>Dimensions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Raw Milk receiving Dock, Milk storage tank room, Milk Processing Hall, Cheese Room, Milk Condensing &amp; Drying Plant room, Cheese Drying &amp; Curing room, Milk Cold Store, Ice Cream Hardening Room, Dispatch Dock, Milk Bottling / Pouch Filling Room, Food processing section (Vegetable/cereal/meat processing) Boiler House, Refrigeration &amp; Ice Bank, System room, Store room – Products, Store room – chemicals &amp; accessories, Sales Counter, Office of the Head of the Department, Offices for the Teaching Staff - Assistant professor, Associate Professor, Offices for the Technical Staff – Boiler Attendant, Refrigeration Attendant, Fitter, Office for the Ministerial Staff &amp; Driver, Wash rooms– Staff &amp; Students (both for Male &amp; Female)</td>
<td>200’ x 72’</td>
</tr>
</tbody>
</table>

14. Equipment required

UG/PG Laboratories

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>UV-Vis Spectrophotometer</td>
<td>02</td>
</tr>
<tr>
<td>2.</td>
<td>Analytical balances</td>
<td>04</td>
</tr>
<tr>
<td>3.</td>
<td>Electronic balances</td>
<td>04</td>
</tr>
<tr>
<td>4.</td>
<td>Muffle furnace</td>
<td>02</td>
</tr>
<tr>
<td>5.</td>
<td>Automatic titrator</td>
<td>01</td>
</tr>
<tr>
<td>6.</td>
<td>Soxhlet instrument</td>
<td>01</td>
</tr>
<tr>
<td>7.</td>
<td>Gerber centrifuge</td>
<td>02</td>
</tr>
<tr>
<td>8.</td>
<td>pH meter</td>
<td>04</td>
</tr>
<tr>
<td>9.</td>
<td>Autoclave</td>
<td>02</td>
</tr>
<tr>
<td>10.</td>
<td>Laminar flow/Biosafety cabinet</td>
<td>02</td>
</tr>
<tr>
<td>11.</td>
<td>BOD Incubator</td>
<td>02</td>
</tr>
<tr>
<td>12.</td>
<td>Simple microscope</td>
<td>01</td>
</tr>
<tr>
<td>13.</td>
<td>Simple oil immersion microscope</td>
<td>01</td>
</tr>
<tr>
<td>14.</td>
<td>Hot air oven</td>
<td>04</td>
</tr>
<tr>
<td>15.</td>
<td>Hot water batch</td>
<td>04</td>
</tr>
<tr>
<td>16.</td>
<td>Serological bath</td>
<td>02</td>
</tr>
<tr>
<td>17.</td>
<td>Centrifuge</td>
<td>01</td>
</tr>
<tr>
<td>18.</td>
<td>Low temperature centrifuge</td>
<td>01</td>
</tr>
<tr>
<td>19.</td>
<td>Pipette washer</td>
<td>02</td>
</tr>
<tr>
<td>20.</td>
<td>Rotary shaker</td>
<td>01</td>
</tr>
<tr>
<td>21.</td>
<td>Gas supply and burners</td>
<td>01</td>
</tr>
<tr>
<td>22.</td>
<td>Standard assembly for titrmetric analysis with indicator solutions &amp; buffer tablets; Magnetic stirrer; Cyclomix (vortex mixer)</td>
<td>All items: 02 each</td>
</tr>
</tbody>
</table>
### Central Instrument Facility:

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>High pressure Liquid Chromatography</td>
<td>01</td>
</tr>
<tr>
<td>2.</td>
<td>Atomic absorption spectrophotometer</td>
<td>01</td>
</tr>
<tr>
<td>3.</td>
<td>Hunter LAB Colorimeter</td>
<td>01</td>
</tr>
<tr>
<td>4.</td>
<td>Instron Texture Analyzer</td>
<td>01</td>
</tr>
<tr>
<td>5.</td>
<td>IR Moisture analyser</td>
<td>01</td>
</tr>
<tr>
<td>6.</td>
<td>Water activity meter</td>
<td>01</td>
</tr>
<tr>
<td>7.</td>
<td>Flame photometer</td>
<td>01</td>
</tr>
<tr>
<td>8.</td>
<td>Rheomat</td>
<td>01</td>
</tr>
<tr>
<td>9.</td>
<td>Viscoamylograph</td>
<td>01</td>
</tr>
<tr>
<td>10.</td>
<td>Bench-top Microfluidizer</td>
<td>01</td>
</tr>
<tr>
<td>11.</td>
<td>Rotary evaporator</td>
<td>01</td>
</tr>
<tr>
<td>12.</td>
<td>Differential Scanning Calorimeter</td>
<td>01</td>
</tr>
<tr>
<td>13.</td>
<td>Refrigerator</td>
<td>01</td>
</tr>
<tr>
<td>14.</td>
<td>Deep freezer</td>
<td>01</td>
</tr>
<tr>
<td>15.</td>
<td>Kjeltec</td>
<td>01</td>
</tr>
<tr>
<td>16.</td>
<td>Fibretec unit</td>
<td>01</td>
</tr>
<tr>
<td>17.</td>
<td>Rancimat</td>
<td>01</td>
</tr>
<tr>
<td>18.</td>
<td>Millipore water purifier</td>
<td>01</td>
</tr>
<tr>
<td>19.</td>
<td>Low temperature bath</td>
<td>01</td>
</tr>
</tbody>
</table>

### Packaging Laboratory:

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Weighing balance (Accuracy 0.001 g)</td>
<td>02</td>
</tr>
<tr>
<td>2.</td>
<td>Micrometre</td>
<td>04</td>
</tr>
<tr>
<td>3.</td>
<td>Mullen Bursting strength tester</td>
<td>01</td>
</tr>
<tr>
<td>4.</td>
<td>Mechanical drop tester</td>
<td>01</td>
</tr>
<tr>
<td>5.</td>
<td>Compression strength tester</td>
<td>01</td>
</tr>
<tr>
<td>6.</td>
<td>Smoothness or porosity tester</td>
<td>01</td>
</tr>
<tr>
<td>7.</td>
<td>Cobb tester</td>
<td>01</td>
</tr>
<tr>
<td>8.</td>
<td>Elmendorf tear tester</td>
<td>01</td>
</tr>
<tr>
<td>9.</td>
<td>Water absorption tester</td>
<td>01</td>
</tr>
<tr>
<td>10.</td>
<td>Head space analyser</td>
<td>01</td>
</tr>
<tr>
<td>11.</td>
<td>Universal testing machine</td>
<td>01</td>
</tr>
</tbody>
</table>
Barrier testing instruments

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.</td>
<td>Oxygen</td>
<td>01</td>
</tr>
<tr>
<td>13.</td>
<td>Carbon dioxide</td>
<td>01</td>
</tr>
<tr>
<td>14.</td>
<td>water vapour transmission tester</td>
<td>01</td>
</tr>
</tbody>
</table>

Pilot Plant cum Business Incubation Centre for Dairy and Food Processing

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Milk reception section</td>
<td>01</td>
</tr>
<tr>
<td>2.</td>
<td>Liquid milk processing unit</td>
<td>01</td>
</tr>
<tr>
<td>3.</td>
<td>Cream processing, butter and ghee Section</td>
<td>01</td>
</tr>
<tr>
<td>4.</td>
<td>Powder reconstitution &amp; milk poly pack section</td>
<td>01</td>
</tr>
<tr>
<td>5.</td>
<td>Paneer section</td>
<td>01</td>
</tr>
<tr>
<td>6.</td>
<td>Curd/Lassi/Chhach Section</td>
<td>01</td>
</tr>
<tr>
<td>7.</td>
<td>Ice cream section</td>
<td>01</td>
</tr>
</tbody>
</table>

The total production line to be developed for the Dairy Unit (10,000 LPD) is illustrated in the table below

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Product to be manufactured</th>
<th>Quantity of Milk</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>‘Liquid milk (Different qualities) of milk such as full cream, Standardized milk, Toned milk, double toned, milk as per the requirement by PDP</td>
<td>2,500 litres</td>
</tr>
<tr>
<td>2.</td>
<td>Paneer/Cheese/Shrikhand/Chhana (Production and Channa based sweets packaging)</td>
<td>1000 litres</td>
</tr>
<tr>
<td>3.</td>
<td>Curd/Lassi/Chhach/Yoghurt</td>
<td>1000 litres</td>
</tr>
<tr>
<td>4.</td>
<td>Ice-cream (1000 litres mix)</td>
<td>1000 litres mix</td>
</tr>
<tr>
<td>5.</td>
<td>By-Products: casein, caseinates, whey products, etc.</td>
<td>500 litres (only for practical purpose)</td>
</tr>
<tr>
<td>6.</td>
<td>Heat desiccated products (Khoa, Khoa based sweets like Gulabjamun, Peda, Phirni, Rabri, Kurchan, Kheer, etc.)</td>
<td>500 litres (For practical purpose &amp; also for marketing as per demand)</td>
</tr>
<tr>
<td>7.</td>
<td>Fat rich products Butter, Ghee, etc.</td>
<td>Regular production from cream obtained from market milk industry</td>
</tr>
</tbody>
</table>

Major Common Pilot Plant Equipment:

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>ITEM</th>
<th>Numbers</th>
<th>Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Milk Weighing Scale</td>
<td>1</td>
<td>0-100 kg</td>
</tr>
<tr>
<td>2</td>
<td>Bulk Cooling Tank</td>
<td>1</td>
<td>1000 L</td>
</tr>
<tr>
<td></td>
<td>Equipment Name</td>
<td>Quantity</td>
<td>Specification</td>
</tr>
<tr>
<td>---</td>
<td>-------------------------------------</td>
<td>----------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td>3</td>
<td>Can Washer</td>
<td>1</td>
<td>5 cans/hr</td>
</tr>
<tr>
<td>4</td>
<td>HTST Plate Heat Exchanger</td>
<td>1</td>
<td>500 L/hr</td>
</tr>
<tr>
<td>5</td>
<td>Batch Pasteurizer</td>
<td>1</td>
<td>500 L</td>
</tr>
<tr>
<td>6</td>
<td>Homogenizer</td>
<td>1</td>
<td>500 L/hr</td>
</tr>
<tr>
<td>7</td>
<td>Milk Storage Tank</td>
<td>2</td>
<td>1000 L each</td>
</tr>
<tr>
<td>8</td>
<td>Milk Bottling Plant</td>
<td>1</td>
<td>10 bottles/min</td>
</tr>
<tr>
<td>9</td>
<td>Butter Churn</td>
<td>1</td>
<td>100 kg</td>
</tr>
<tr>
<td>10</td>
<td>Ghee Boiling Vat</td>
<td>1</td>
<td>100 kg</td>
</tr>
<tr>
<td>11</td>
<td>Ice cream Freezer - Batch</td>
<td>1</td>
<td>20 kg/batch</td>
</tr>
<tr>
<td>12</td>
<td>Cheese Vat</td>
<td>3</td>
<td>200 L each</td>
</tr>
<tr>
<td>13</td>
<td>Cheese Cutting Frame</td>
<td>3</td>
<td>1 X 3 ft size</td>
</tr>
<tr>
<td>14</td>
<td>Cheese Press</td>
<td>1</td>
<td>6 block</td>
</tr>
<tr>
<td>15</td>
<td>Milk Condensing Unit</td>
<td>1</td>
<td>40 kg water evaporation/hr</td>
</tr>
<tr>
<td>16</td>
<td>Spray Drying Unit</td>
<td>1</td>
<td>5-10 kg water evaporation/hr</td>
</tr>
<tr>
<td>17</td>
<td>Refrigeration Plant</td>
<td>1</td>
<td>10 Ton</td>
</tr>
<tr>
<td>19</td>
<td>Portable Weighing Scale</td>
<td>2</td>
<td>5 kg</td>
</tr>
<tr>
<td>19</td>
<td>Curd Mill</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>20</td>
<td>Cheese Hoop</td>
<td>6</td>
<td>20 kg size</td>
</tr>
<tr>
<td>21</td>
<td>Milk Cans</td>
<td>50</td>
<td>40 kg each</td>
</tr>
<tr>
<td>22</td>
<td>Auto Clave</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>23</td>
<td>Ice Water Plant</td>
<td>1</td>
<td>5 Ton</td>
</tr>
<tr>
<td>24</td>
<td>Cheese Block Cutter</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>25</td>
<td>Sieve for Shrikhand</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>26</td>
<td>Planetary Mixer</td>
<td>1</td>
<td>10 kg</td>
</tr>
<tr>
<td>27</td>
<td>Hand Bottle Filler</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>28</td>
<td>Can Scrubber Tank</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>29</td>
<td>Pouch Filling Machine</td>
<td>1</td>
<td>100 pouch/hr</td>
</tr>
<tr>
<td>30</td>
<td>Cream Separator</td>
<td>1</td>
<td>500 L/hr</td>
</tr>
<tr>
<td>31</td>
<td>Butter Trolley</td>
<td>1</td>
<td>50 kg</td>
</tr>
<tr>
<td>32</td>
<td>Wet Casein Grinder</td>
<td>1</td>
<td>5 kg/</td>
</tr>
<tr>
<td>33</td>
<td>Casein Shredder</td>
<td>1</td>
<td>5 kg</td>
</tr>
<tr>
<td>34</td>
<td>Casein Dryer</td>
<td>1</td>
<td>5 kg/batch</td>
</tr>
<tr>
<td>35</td>
<td>Bottle Sterilizer</td>
<td>1</td>
<td>40 bottles/batch</td>
</tr>
<tr>
<td>36</td>
<td>Khoa Kettle</td>
<td>1</td>
<td>10 kg/batch</td>
</tr>
<tr>
<td>37</td>
<td>Colloidal Mill</td>
<td>1</td>
<td>1 kg/min</td>
</tr>
<tr>
<td>38</td>
<td>Crown Capping Machine</td>
<td>1</td>
<td>Manual</td>
</tr>
<tr>
<td>39</td>
<td>Sugar Grinder</td>
<td>1</td>
<td>5 kg</td>
</tr>
<tr>
<td>40</td>
<td>Tin Seamer</td>
<td>1</td>
<td>Manual</td>
</tr>
<tr>
<td>41</td>
<td>UF Cum RO Unit</td>
<td>1</td>
<td>50 kg/hr</td>
</tr>
<tr>
<td>42</td>
<td>Crates For Milk Bottles</td>
<td>100</td>
<td>10 kg each</td>
</tr>
<tr>
<td>43</td>
<td>Deep Freezer</td>
<td>4</td>
<td>-</td>
</tr>
<tr>
<td>44</td>
<td>Gerber Centrifuge</td>
<td>2</td>
<td>24 tubes</td>
</tr>
<tr>
<td>45</td>
<td>BOD Incubator</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>46</td>
<td>Hot Air Oven</td>
<td>2</td>
<td>-</td>
</tr>
<tr>
<td>Sr. No.</td>
<td>Name</td>
<td>Number</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>-------------------------------------------</td>
<td>--------</td>
<td>------------------------------</td>
</tr>
<tr>
<td>47</td>
<td>Hot Plate</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>48</td>
<td>Magnetic Stirrer</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>49</td>
<td>Colony Counter</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>50</td>
<td>Weight Box</td>
<td>1 set</td>
<td>100 g</td>
</tr>
<tr>
<td>51</td>
<td>Paraffin Bath</td>
<td>1</td>
<td>50 kg</td>
</tr>
<tr>
<td>52</td>
<td>Vacuum Packaging Machine</td>
<td>1</td>
<td>5 kg/batch</td>
</tr>
<tr>
<td>53</td>
<td>Milk Analyser</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>54</td>
<td>Ice Cream Freezer - Continuous Type</td>
<td>1</td>
<td>50 L/hr</td>
</tr>
<tr>
<td>55</td>
<td>Cooling Unit For Cheese Curing Room</td>
<td>1</td>
<td>2 tonnes</td>
</tr>
<tr>
<td>56</td>
<td>Candy Making Machine</td>
<td>1</td>
<td>50 candy/batch</td>
</tr>
<tr>
<td>57</td>
<td>Candy Moulds</td>
<td>10</td>
<td>24 x 100 ml</td>
</tr>
<tr>
<td>58</td>
<td>Vacuum Tray Dryer</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>59</td>
<td>Extruder</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>60</td>
<td>Ice Cream Cup Filling Machine</td>
<td>1</td>
<td>100 cups/hr</td>
</tr>
<tr>
<td>61</td>
<td>UHT Milk Sterilization Unit with Aseptic Packaging</td>
<td>1</td>
<td>100 L/hr</td>
</tr>
<tr>
<td>62</td>
<td>Tray sealing machine</td>
<td>01</td>
<td>-</td>
</tr>
<tr>
<td>63</td>
<td>Colloid Mill</td>
<td>01</td>
<td>-</td>
</tr>
<tr>
<td>64</td>
<td>Hammer mill</td>
<td>01</td>
<td>-</td>
</tr>
<tr>
<td>65</td>
<td>Planetary mixer</td>
<td>01</td>
<td>-</td>
</tr>
<tr>
<td>66</td>
<td>Pin mill</td>
<td>01</td>
<td>-</td>
</tr>
<tr>
<td>67</td>
<td>Homogenizer</td>
<td>01</td>
<td>-</td>
</tr>
<tr>
<td>68</td>
<td>Steam Jacketed Kettle</td>
<td>03</td>
<td>-</td>
</tr>
<tr>
<td>69</td>
<td>Refrigeration System For Ice Cream Hardening Room</td>
<td>1</td>
<td>2 tonnes</td>
</tr>
<tr>
<td>70</td>
<td>Processed Cheese Kettle</td>
<td>1</td>
<td>5 kg</td>
</tr>
<tr>
<td>71</td>
<td>Steam Boiler</td>
<td>2</td>
<td>500-1000 kg steam/hr</td>
</tr>
<tr>
<td>72</td>
<td>Diesel power generator</td>
<td>01</td>
<td>125 KWA</td>
</tr>
<tr>
<td>73</td>
<td>Effluent Treatment Plant</td>
<td>1</td>
<td>-</td>
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</table>

**Equipment for Fruit and Vegetable Processing:**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Fruit pulper</td>
<td>01</td>
</tr>
<tr>
<td>2.</td>
<td>Screw juice extractor</td>
<td>01</td>
</tr>
<tr>
<td>3.</td>
<td>Bottle filling machine</td>
<td>01</td>
</tr>
<tr>
<td>4.</td>
<td>Mechanical peeler</td>
<td>01</td>
</tr>
<tr>
<td>5.</td>
<td>Peeling knives</td>
<td>Complete set</td>
</tr>
<tr>
<td>6.</td>
<td>Slicing knives</td>
<td>Complete set</td>
</tr>
<tr>
<td>7.</td>
<td>Mechanical slicer</td>
<td>01</td>
</tr>
<tr>
<td>8.</td>
<td>Basket press</td>
<td>01</td>
</tr>
<tr>
<td>9.</td>
<td>Plunger press</td>
<td>01</td>
</tr>
<tr>
<td>10.</td>
<td>Autoclave</td>
<td>01</td>
</tr>
<tr>
<td>11.</td>
<td>Can sealer</td>
<td>01</td>
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</tbody>
</table>
Equipment for Processing of Cereals, Pulses and Oilseeds:

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Dehuller</td>
<td>01</td>
</tr>
<tr>
<td>2.</td>
<td>Screw expeller</td>
<td>01</td>
</tr>
<tr>
<td>3.</td>
<td>Paddy sheller</td>
<td>01</td>
</tr>
<tr>
<td>4.</td>
<td>Corn degermer</td>
<td>01</td>
</tr>
<tr>
<td>5.</td>
<td>Popping unit</td>
<td>01</td>
</tr>
<tr>
<td>6.</td>
<td>Flaking roller</td>
<td>01</td>
</tr>
<tr>
<td>7.</td>
<td>Mini flour mill</td>
<td>01</td>
</tr>
<tr>
<td>8.</td>
<td>Pasta making machine</td>
<td>01</td>
</tr>
<tr>
<td>9.</td>
<td>Deep fat fryer</td>
<td>01</td>
</tr>
</tbody>
</table>

Equipment for Bakery and Confectionary Products:

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<thead>
<tr>
<th>Sr. No.</th>
<th>Name</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Moulding unit</td>
<td>01</td>
</tr>
<tr>
<td>2.</td>
<td>Baking oven</td>
<td>01</td>
</tr>
<tr>
<td>3.</td>
<td>Sugar grinder</td>
<td>01</td>
</tr>
<tr>
<td>4.</td>
<td>Biscuit baking unit</td>
<td>01</td>
</tr>
<tr>
<td>5.</td>
<td>Proofing unit</td>
<td>01</td>
</tr>
<tr>
<td>6.</td>
<td>Slicing unit</td>
<td>01</td>
</tr>
<tr>
<td>7.</td>
<td>Chocolate moulder</td>
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</tbody>
</table>

Equipment for Meat and Fish processing (Optional):

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<thead>
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<th>Sr. No.</th>
<th>Name</th>
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</tr>
</thead>
<tbody>
<tr>
<td>8.</td>
<td>Bowl chopper</td>
<td>01</td>
</tr>
<tr>
<td>9.</td>
<td>Meat mincer</td>
<td>01</td>
</tr>
<tr>
<td>10.</td>
<td>Sausage filler</td>
<td>01</td>
</tr>
<tr>
<td>11.</td>
<td>Ice flaking machine</td>
<td>01</td>
</tr>
<tr>
<td>12.</td>
<td>Chopping table</td>
<td>01</td>
</tr>
<tr>
<td>13.</td>
<td>Combo microwave</td>
<td>01</td>
</tr>
<tr>
<td>14.</td>
<td>Tumblers</td>
<td>01</td>
</tr>
<tr>
<td>15.</td>
<td>Molds for hams</td>
<td>01</td>
</tr>
<tr>
<td>16.</td>
<td>Heating kettle</td>
<td>01</td>
</tr>
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</table>

Equipment for Dairy Engineering Division:

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Orifice and Mouthpiece apparatus</td>
<td>02</td>
</tr>
<tr>
<td>2.</td>
<td>Pipe friction apparatus</td>
<td>01</td>
</tr>
<tr>
<td>3.</td>
<td>Minor head loss apparatus</td>
<td>01</td>
</tr>
<tr>
<td>4.</td>
<td>Flow through channel apparatus</td>
<td>01</td>
</tr>
<tr>
<td>5.</td>
<td>Computerized centrifugal pump test rig</td>
<td>01</td>
</tr>
<tr>
<td>6.</td>
<td>Rotameter</td>
<td>02</td>
</tr>
<tr>
<td>7.</td>
<td>Water flow meters</td>
<td>02</td>
</tr>
<tr>
<td>No.</td>
<td>Description</td>
<td>Quantity</td>
</tr>
<tr>
<td>-----</td>
<td>------------------------------------------------------------------------------</td>
<td>----------</td>
</tr>
<tr>
<td>8.</td>
<td>Reynolds apparatus</td>
<td>01</td>
</tr>
<tr>
<td>9.</td>
<td>Bernoulli’s apparatus</td>
<td>01</td>
</tr>
<tr>
<td>10.</td>
<td>Various types of pipe fittings and valves</td>
<td>02 set</td>
</tr>
<tr>
<td>11.</td>
<td>Self priming pump</td>
<td>02</td>
</tr>
<tr>
<td>12.</td>
<td>Monoblock pump set</td>
<td>02</td>
</tr>
<tr>
<td>13.</td>
<td>Submersible pump</td>
<td>01</td>
</tr>
<tr>
<td>14.</td>
<td>Powder conductivity meter</td>
<td>01</td>
</tr>
<tr>
<td>15.</td>
<td>Computerized counter and parallel flow apparatus</td>
<td>01</td>
</tr>
<tr>
<td>16.</td>
<td>Plate Heat Exchanger</td>
<td>01</td>
</tr>
<tr>
<td>17.</td>
<td>Steam Jacketed kettle</td>
<td>01</td>
</tr>
<tr>
<td>18.</td>
<td>Stefan Boltzmann Apparatus</td>
<td>01</td>
</tr>
<tr>
<td>19.</td>
<td>Jacketed vats</td>
<td>02</td>
</tr>
<tr>
<td>20.</td>
<td>Heat Transfer through composite wall</td>
<td>01</td>
</tr>
<tr>
<td>21.</td>
<td>Heat Transfer through Natural Convention</td>
<td>01</td>
</tr>
<tr>
<td>22.</td>
<td>Critical Heat Flux Apparatus</td>
<td>01</td>
</tr>
<tr>
<td>23.</td>
<td>Heat Transfer through lagged pipe</td>
<td>01</td>
</tr>
<tr>
<td>24.</td>
<td>Digital temperature indicators with probes</td>
<td>05 set</td>
</tr>
<tr>
<td>25.</td>
<td>Multi Channel temperature indicator</td>
<td>02</td>
</tr>
<tr>
<td>26.</td>
<td>Solar water heating system</td>
<td>01</td>
</tr>
<tr>
<td>27.</td>
<td>Computerized refrigeration tutor</td>
<td>01</td>
</tr>
<tr>
<td>28.</td>
<td>Computerized air conditioning tutor</td>
<td>01</td>
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<tr>
<td>29.</td>
<td>Water cooler</td>
<td>01</td>
</tr>
<tr>
<td>30.</td>
<td>Window AC</td>
<td>02</td>
</tr>
<tr>
<td>31.</td>
<td>Split AC</td>
<td>02</td>
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<tr>
<td>32.</td>
<td>Refrigerator</td>
<td>01</td>
</tr>
<tr>
<td>33.</td>
<td>Models of sealed and open type compressor</td>
<td>01 set</td>
</tr>
<tr>
<td>34.</td>
<td>Refrigeration plant controls such as thermostat, pressure switches, solenoid valves</td>
<td>01 set</td>
</tr>
<tr>
<td>35.</td>
<td>Dessert cooler</td>
<td>02</td>
</tr>
<tr>
<td>36.</td>
<td>Dehumidifier</td>
<td>01</td>
</tr>
<tr>
<td>37.</td>
<td>Food Processor</td>
<td>01</td>
</tr>
<tr>
<td>38.</td>
<td>Texture Analyzer</td>
<td>01</td>
</tr>
<tr>
<td>39.</td>
<td>Laboratory scale freeze dryer</td>
<td>01</td>
</tr>
<tr>
<td>40.</td>
<td>Try dryer</td>
<td>01</td>
</tr>
<tr>
<td>41.</td>
<td>Texturometer</td>
<td>01</td>
</tr>
<tr>
<td>42.</td>
<td>Juice extractors</td>
<td>01</td>
</tr>
<tr>
<td>No.</td>
<td>Description</td>
<td>Quantity</td>
</tr>
<tr>
<td>-----</td>
<td>-----------------------------------------------------------------------------</td>
<td>----------</td>
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<tr>
<td>43.</td>
<td>Extruders</td>
<td>01</td>
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<tr>
<td>44.</td>
<td>Sulfuring chamber</td>
<td>01</td>
</tr>
<tr>
<td>45.</td>
<td>Blanching equipment</td>
<td>01</td>
</tr>
<tr>
<td>46.</td>
<td>Clinching equipments</td>
<td>01</td>
</tr>
<tr>
<td>47.</td>
<td>Jacketed kettle</td>
<td>01</td>
</tr>
<tr>
<td>48.</td>
<td>Bomb calorimeter</td>
<td>01</td>
</tr>
<tr>
<td>49.</td>
<td>Flue gas analyzer</td>
<td>01</td>
</tr>
<tr>
<td>50.</td>
<td>Bucket calorimeter</td>
<td>01</td>
</tr>
<tr>
<td>51.</td>
<td>Baby boiler</td>
<td>01</td>
</tr>
<tr>
<td>52.</td>
<td>Models of boiler mountings and accessories.</td>
<td>01 set</td>
</tr>
<tr>
<td>53.</td>
<td>IC Engine test rig</td>
<td>01</td>
</tr>
<tr>
<td>54.</td>
<td>Steam flow meter</td>
<td>02</td>
</tr>
<tr>
<td>55.</td>
<td>Water flow meter</td>
<td>02</td>
</tr>
<tr>
<td>56.</td>
<td>Models of two stroke and four stroke engine</td>
<td>01 each</td>
</tr>
<tr>
<td>57.</td>
<td>Different types of steam traps</td>
<td>02 set</td>
</tr>
<tr>
<td>58.</td>
<td>Pipes and pipe fittings</td>
<td>As per the requirements</td>
</tr>
<tr>
<td>59.</td>
<td>Oil and gas burners</td>
<td>01 each</td>
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<tr>
<td>60.</td>
<td>Water softening plant</td>
<td>01</td>
</tr>
<tr>
<td>61.</td>
<td>Boiler feed water pump</td>
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</tr>
<tr>
<td>62.</td>
<td>Digital clip-on-meters</td>
<td>02</td>
</tr>
<tr>
<td>63.</td>
<td>Digital Energy analyzer</td>
<td>01</td>
</tr>
<tr>
<td>64.</td>
<td>Power measuring instruments such as volt meter, amper meter, energy meter, meger</td>
<td>05 set</td>
</tr>
<tr>
<td>65.</td>
<td>Inverter</td>
<td>01</td>
</tr>
<tr>
<td>66.</td>
<td>Induction Motors with starters</td>
<td>02</td>
</tr>
<tr>
<td>67.</td>
<td>Variable Frequency Drive</td>
<td>02</td>
</tr>
<tr>
<td>68.</td>
<td>Single phase Transformer, 2 kVA</td>
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</tr>
<tr>
<td>69.</td>
<td>Digital three phase Energy meter</td>
<td>02</td>
</tr>
<tr>
<td>70.</td>
<td>Different types of starters such as direct on line starter, star delta starter, Auto-transformer starter etc.</td>
<td>02 set</td>
</tr>
<tr>
<td>71.</td>
<td>Experimental set up for experiment in parallel &amp; series connection, stair case wiring, tube light wiring, motor connection, speed measurement, demonstration of winding etc with necessary power, voltage, and current measuring devices.</td>
<td>02 set each</td>
</tr>
<tr>
<td>72.</td>
<td>Hand tachometer</td>
<td>02</td>
</tr>
<tr>
<td>73.</td>
<td>Non contact type tachometer</td>
<td>02</td>
</tr>
<tr>
<td>74.</td>
<td>Soft starter</td>
<td>02</td>
</tr>
<tr>
<td>Sr. No.</td>
<td>Name</td>
<td>Number</td>
</tr>
<tr>
<td>--------</td>
<td>----------------------------------------------------------------------</td>
<td>--------</td>
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<tr>
<td>75.</td>
<td>Air anemometer</td>
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<tr>
<td>76.</td>
<td>Magnetic flow meter</td>
<td>02</td>
</tr>
<tr>
<td>77.</td>
<td>Digital pocket type thermometers with different types of probes</td>
<td>05</td>
</tr>
<tr>
<td>78.</td>
<td>Multi channel data logger</td>
<td>01</td>
</tr>
<tr>
<td>79.</td>
<td>Various tutors/transducers such as Strain gauge, pressure, LVDT, Inductive, Photo cell, piezometer, etc.</td>
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<tr>
<td>80.</td>
<td>Water Level controller</td>
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</tr>
<tr>
<td>81.</td>
<td>Pneumatic controller</td>
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</tr>
<tr>
<td>82.</td>
<td>PID controller temperature controller system</td>
<td>01</td>
</tr>
<tr>
<td>83.</td>
<td>Digital Tachometer</td>
<td>01</td>
</tr>
<tr>
<td>84.</td>
<td>Lux meter</td>
<td>01</td>
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<tr>
<td>85.</td>
<td>Solar lighting system</td>
<td>02</td>
</tr>
<tr>
<td>86.</td>
<td>Lathe Machine</td>
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<tr>
<td>87.</td>
<td>CNC lathe</td>
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<tr>
<td>88.</td>
<td>Grinding machine</td>
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</tr>
<tr>
<td>89.</td>
<td>Power saw</td>
<td>01</td>
</tr>
<tr>
<td>90.</td>
<td>Drilling machine</td>
<td>01</td>
</tr>
<tr>
<td>91.</td>
<td>Pipe bending machine</td>
<td>01</td>
</tr>
<tr>
<td>92.</td>
<td>Electric welding machine</td>
<td>01</td>
</tr>
<tr>
<td>93.</td>
<td>Portable welding machine</td>
<td>01</td>
</tr>
<tr>
<td>94.</td>
<td>Gas welding set</td>
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</tr>
<tr>
<td>95.</td>
<td>Shear cutting machine</td>
<td>01</td>
</tr>
<tr>
<td>96.</td>
<td>Threading machine</td>
<td>01</td>
</tr>
<tr>
<td>97.</td>
<td>Universal wood working machine</td>
<td>01</td>
</tr>
<tr>
<td>98.</td>
<td>Bench vice</td>
<td>20</td>
</tr>
<tr>
<td>99.</td>
<td>Portable grinding machine</td>
<td>02</td>
</tr>
<tr>
<td>100.</td>
<td>Shaping machine</td>
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</tbody>
</table>

**Dairy Trade and Business Management Division:**

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Name</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Desk top computers with LAN facility and Internet connection</td>
<td>20</td>
</tr>
<tr>
<td>2.</td>
<td>Photocopier</td>
<td>03</td>
</tr>
<tr>
<td>3.</td>
<td>Laser Printer</td>
<td>06</td>
</tr>
<tr>
<td>4.</td>
<td>Colour Laser Printer</td>
<td>01</td>
</tr>
<tr>
<td>5.</td>
<td>Softwares: SPSS/Metlab/Design expert</td>
<td>01 each with multiuse license</td>
</tr>
<tr>
<td>6.</td>
<td>Indian patent database</td>
<td>01</td>
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</tbody>
</table>