

8. RESOURCE REQUIREMENT FOR FOOD TECHNOLOGY

8.1 Physical Resources

8.1.1 Space Requirement:

Library and LRDC 150
sq.m

Class Rooms (4 Nos. 18 sq.m. per room) 72
sq.m

Drawing Hall 32.5
sq.m

Other Space Requirements

Please refer to norms and standard given by AICTE

8.1.2 Equipment Requirement:

| Sr. No | Item | Qty | Tentative Cost (Rs) |
|-----------------------------|--|-----|---------------------|
| PACKAGING TECHNOLOGY | | | |
| 1. | Bow Compensation Tester | 1 | 95,000/- |
| 2. | Bursting strength tester | 1 | 60,000/- |
| 3. | Chain Metric | 1 | 3,300/- |
| 4. | Concentric Tube Heat Exchanger | 1 | 13,896/- |
| 5. | Conductivity Meter | 1 | 3,520/- |
| 6. | Conductivity Meter | 1 | 3,550/- |
| 7. | Drop Tester | 1 | 29,950/- |
| 8. | Free And Forced Convection Heat Transfer Apparants | 1 | 36,225/- |
| 9. | Gauge Metal Dial Type | 1 | 3,000/- |
| 10. | Hypsometer | 1 | 220/- |
| 11. | Puncture Resistance Tester | 1 | 47,000/- |
| 12. | Refrigeration Tutor | 1 | 26,000/- |
| 13. | Reynolds Apparatus | 1 | 7,524/- |
| 14. | Seal and Shrink Packing Machine | 1 | 99,750/- |
| 15. | Static Tensile Tester | 1 | 30,250/- |
| 16. | Stop Watch | 1 | 450/- |
| 17. | Substance Indicator | 1 | 16,500/- |
| 18. | Thermal Conductivity of Metal Rod | 1 | 22,500/- |
| 19. | Thermal Radiation Apparatus | 1 | 48,400/- |
| 20. | Thermocouple | 1 | 400/- |
| 21. | Vacuum Packaging Machine | 1 | 1,99,500/- |
| 22. | Tensile strength Unit | 1 | 50,000/- |
| 23. | Humidity Chamber (Temp and RH controlled) | 1 | 30,000/- |

| Sr. No | Item | Qty | Tentative Cost (Rs) |
|--|-----------------------------|-----|---------------------|
| DAIRY TECHNOLOGY | | | |
| 1. | Butter Churner | 1 | 17,500/- |
| 2. | Butter Moisture Balance | | 850/- |
| 3. | Butter Weighing Scale | 1 | 585/- |
| 4. | Centrifuge Gerber | 1 | 1,845/- |
| 5. | Butter Worker | 1 | 2,340/- |
| 6. | Centrifuge solubility Index | 1 | 6,600/- |
| 7. | Cream Separator | 1 | 11,025/- |
| 8. | Deep Freezer | 1 | 29,000/- |
| 9. | Densitometer Bulk | 1 | 6,500/- |
| 10. | Homogenizer | 1 | 99,750/- |
| 11. | Hot Plate | 1 | 390/- |
| 12. | Magnetic Stirrer | 1 | 850/- |
| 13. | Milk Tester | 1 | 22,500/- |
| 14. | Muffle Furnace | 1 | 19,200/- |
| 15. | Refractometer | 1 | 1,265/- |
| 16. | Refractometer (Batyro) | 1 | 5,000/- |
| 17. | ROUF | 1 | 28,600/- |
| 18. | Softy Making Machine | 1 | 22,500/- |
| 19. | Solubility Index Mixer | 1 | 4,630/- |
| 20. | Water Bath Circulating | 1 | 2,500/- |
| 21. | Viscometer | 1 | 15,000/- |
| 22. | Infra red moisture meter | 1 | 15,000/- |
| FRUITS AND VEGETABLE TECHNOLOGY | | | |
| 1. | Centrifuge | 1 | 1,050/- |
| 2. | Citrus Juicer | 1 | 800/- |
| 3. | Rown Corking Machine | 1 | 350/- |
| 4. | Food Processor | 1 | 8,850/- |
| 5. | Freeze | 1 | |
| 6. | Fruit Mill | 1 | 7,400/- |
| 7. | Gas Burner | 1 | |
| 8. | Hydraulic Juicer Press | 1 | 13,250/- |
| 9. | Juicer Screw | 1 | 1,600/- |
| 10. | Juicer Vegetable | 1 | 2,500/- |
| 11. | Microwave Oven | 1 | 17,200/- |
| 12. | Potato Peeler | 1 | 18,989/- |
| 13. | PP Cap Sealing Machine | 1 | 139/- |
| 14. | Pulper 100 kg Cap | 1 | 9,200/- |
| 15. | Refractometer | 1 | 1,265/- |
| 16. | Refractometer Hand | 1 | 940/- |

| Sr. No | Item | Qty | Tentative Cost (Rs) |
|--------|-------------------------------------|--------|---------------------|
| 17. | Sulphur Box | 1 | 22,500/- |
| 18. | Temperature Indicator Digital | 1 | 900/- |
| 19. | Tray Dryer | 1 | 23950/- |
| 20. | Vacuum Filling Machine | 1 | 24,750/- |
| 21. | Peeling and Slicing Knives | 4 each | 1,000/- |
| 22. | Stainless Steel Cookwares | 1 | 10,000/- |
| 23. | Bottling Unit (Filling and copping) | 1 | 50,000/- |
| 24. | pH meter | 1 | 10,000/- |
| 25. | Electronic Balance | 1 | 10,000/- |
| 26. | Hot Air Oven | 1 | 14,000/- |
| 27. | Carbonation Unit | 1 | 5,000/- |

FOOD ANALYSIS AND QUALITY CONTROL

| | | | |
|-----|-------------------------------------|---|------------|
| 1. | Centrifuge | 1 | 1,050/- |
| 2. | Demineralizer | 1 | 6,345/- |
| 3. | Distillation Unit | 1 | 1,200/- |
| 4. | Divider Gammet Type | 1 | 15,995/- |
| 5. | Fire Point Apparatus | 1 | 1,400/- |
| 6. | Flash Point Apparatus | 1 | 2,200/- |
| 7. | Infrared Moisture Balance | 1 | 6,000/- |
| 8. | Lovibond Tintometer | 1 | 1,18,406/- |
| 9. | Micro Kjeldhal Apparatus | 1 | 3,800/- |
| 10. | Photo Electric colorimeter | 1 | 22,500/- |
| 11. | Polarimeter 200 ml | 1 | 7,000/- |
| 12. | Rotary Vacuum Evaporator | 1 | 27,000/- |
| 13. | Smoke Point Apparatus | 1 | 2,000/- |
| 14. | Spectrophotometer | 1 | 18,740/- |
| 15. | Thin Layer Chromatography Apparatus | 1 | 12,432/- |
| 16. | Water Bulb Constant | 1 | 6,800/- |
| 17. | Electronic Balance | 2 | 20,000/- |
| 18. | Top Loading Balance | 1 | 18,000/- |
| 19. | Physical Balance | 4 | 8,000/- |
| 20. | pH meter | 1 | 10,000/- |
| 21. | Hot Air Oven | 1 | 14,000/- |
| 22. | Vacuum Oven | 1 | 20,000/- |
| 23. | Sample Grinder 1 | 1 | 500/- |
| 24. | Digestion Assembly | 1 | 10,000/- |
| 25. | Hand Refractometer different range | 3 | 10,000/- |
| 26. | Magnetic Stirrer | 1 | 4,000/- |
| 27. | Soxhlet Apparatus | 1 | 6,000/- |
| 28. | Muffle Furnace | 1 | 15,000/- |
| 29. | Spectronic 20 | 1 | 1,00,000/- |

| Sr. No | Item | Qty | Tentative Cost (Rs) |
|----------------------|--|-----|---------------------|
| 30. | Refrigerator | 1 | 10,000/- |
| 31. | Steam Bath | 1 | 5,000/- |
| BIOTECHNOLOGY | | | |
| 1. | Autoclave | 1 | 48,500/- |
| 2. | Balance | 1 | 18,500/- |
| 3. | Colony Counter | 1 | 3,150/- |
| 4. | Colorimeter (Big) | 1 | 22,500/- |
| 5. | DO Analyzer | 1 | |
| 6. | Fermenter | 1 | 4,97,000/- |
| 7. | Furnigator | 1 | 700/- |
| 8. | Heating Mantle | 1 | 624/- |
| 9. | Incubator | 1 | 27,000/- |
| 10. | Incubator BOD | 1 | 87,977/- |
| 11. | KF Titrimeter | 1 | 9,680/- |
| 12. | Laminar Flow Bench | 1 | 33,300/- |
| 13. | Magnetic Stirrer (Hot Plate) | 1 | 850/- |
| 14. | Microscope Photographic | 1 | |
| 15. | Microscopes | 1 | 850/- |
| 16. | pH Meter | 1 | 5,900/- |
| 17. | Refrigerator | 1 | |
| 18. | Retort | 1 | |
| 19. | UV Cabinet | 1 | 3,250/- |
| 20. | Cooling Contrifuge | 1 | 1,25,000/- |
| 21. | Cooling Incubator | 1 | 72,000/- |
| 22. | Incubator Cum Shaker | 1 | 90,000/- |
| 213. | Centrifuge | 1 | 35,000/- |
| 24. | Vortex Mixing Machine | 1 | 5,000/- |
| 25. | UV – Vis Spectro photometer | 1 | 1,20,000/- |
| 26. | Pressure Cooker 10 liter | 1 | 5,000/- |
| 27. | Hot Air Oven/Glass Ware Sterilize | 1 | |
| 28. | Water Bath | 2 | |
| PILOT PLANT | | | |
| 1. | Cabinet Dryer | 1 | 37,400/- |
| 2. | Can Reformer and Plunger | 1 | 24,400/- |
| 3. | Exhaust Box | 1 | 32,500/- |
| 4. | Fermenter (Solid State/Aeration Apparatus) | 1 | |
| 5. | Mono Block Motor | 1 | 6,050/- |
| 6. | Moulder and Sheeter | 1 | 21,500/- |
| 7. | Seamer | 1 | 22,900/- |
| 8. | Seed Grader | 1 | 49,650/- |
| 9. | Steam Jacketed Kettle | 1 | 34,450/- |

| Sr. No | Item | Qty | Tentative Cost (Rs) |
|---|----------------------------|-----|---------------------|
| 10. | Mechanical Peeler | 1 | 15,000/- |
| 11. | Beam Balance | 2 | 10,000/- |
| 12. | Drum Drier (small) | 1 | 50,000/- |
| 13. | Spray Drier (bench Model) | 1 | 2,00,000/- |
| 14. | Extruder (small) | 1 | 2,50,000/- |
| 15. | Vibro Extractor | 1 | 50,000/- |
| 16. | Ice-cream Freezer | 1 | 50,000/- |
| BAKERY TECHNOLOGY | | | |
| 1. | Baking Oven | 1 | 44,000/- |
| 2. | Freezer (Ultra Low) | 1 | 59,000/- |
| 3. | Hot Air Oven | 1 | |
| 4. | Microwave Oven | 1 | 12,200/- |
| 5. | Mixer Grinder Fletrocome | 1 | 2,300/- |
| 6. | PASTA Making Machine | 1 | 2,150/- |
| 7. | Planetary Mixer | 1 | 42,500/- |
| 8. | Refrigerator (Display) | 1 | 35,000/- |
| 9. | Refrigerator 4 Door | 1 | 48,000/- |
| 10. | Beam Balance | 1 | |
| 11. | Electronic Balance | 1 | 10,000/- |
| 12. | Fermentation Cabinet | 1 | 30,000/- |
| 13. | Sheeting-cum-moulding Unit | 1 | 20,000/- |
| 14. | Proofing Chamber | 1 | 30,000/- |
| 15. | Biscuits Making Unit | 1 | 25,000/- |
| 16. | Muffle Furnace | 1 | 15,000/- |
| 17. | Color Grader (Kent Jones) | 1 | 2,00,000/- |
| 18. | Loaf Volume Meter | 1 | 3,000/- |
| 19. | Slicing Unit | 1 | 5,000/- |
| 20. | Heat Sealing Unit | 1 | 2,000/- |
| UNIT OPERATOR (CEREALS, PULSES AND OIL SEEDS LABORATORY) | | | |
| 1. | Ball Grinding Mill | 1 | 6,142/- |
| 2. | Dehusker | 1 | 23,750/- |
| 3. | Grain Divider | 1 | 19,250/- |
| 4. | Grain Testing Mill | 1 | 18,500/- |
| 5. | Grinding Mill | 1 | 4,250/- |
| 6. | Plate Mill (Atta Chukki) | 1 | 5,000/- |
| 7. | Purity Work Board | 1 | 2,398/- |
| 8. | Seed Blower | 1 | 27,115/- |
| 9. | Universal Moisture Meter | 1 | 11,612/- |
| 10. | Wed and Dry Grinder | 1 | 25,200/- |

| Sr. No | Item | Qty | Tentative Cost (Rs) |
|--|---|------------|----------------------------|
| 11. | Buhler Mill | 1 | 5,00,000/- |
| 12. | Rice Grader | 1 | 10,000/- |
| 13. | Pulse Milling Unit | 1 | 50,000/- |
| 14. | Popping Machine | 1 | 10,000/- |
| 15. | Noodle Press | 1 | 500/- |
| 16. | D ehuller | 1 | 40,000/- |
| 17. | Polisher | 1 | 50,000/- |
| 18. | Verneer Calipers | 3 | 1,500/- |
| 19. | Screw Gauge | 3 | 1,500/- |
| 20. | Stone Mill | 1 | 10,000/- |
| HI-TECH | | | |
| 1. | Alveo Graph Consisto Graph | 1 | 2,07,895/- |
| 2. | Falling No. Apparatus | 1 | |
| 3. | Viscometer | 1 | 2,00,326/- |
| MEAT FISH AND POULTRY PRODUCTS LABORATORY | | | |
| 1. | Poultry slaughter unit (Lab Model) | 1 | 50,000/- |
| 2. | Meat Cutter | 1 | 3,000/- |
| 3. | Meat Mixer | 1 | 15,000/- |
| 4. | Emulsion Making Unit | 1 | 25,000/- |
| 5. | Deep fat Fryer | 1 | |
| 6. | Oven Toaster Grill | 1 | 10,000/- |
| 7. | Sausage filler | 1 | 10,000/- |
| 8. | Pressure Cooker 5 litre | 2 | 10,000/- |
| 9. | Hot Air Oven | 1 | |
| 10. | Deep Freeze | 1 | 25,000/- |
| 11. | Refrigerator | 1 | |
| 12. | Stainless Cook wares set | 1 | 10,000/- |
| 13. | Egg Candling unit | 1 | 5,000/- |
| OTHER EQUIPMENT | | | |
| 1. | Spray Dryer | 1 | 6,00,000/- |
| 2. | Plate Heat Exchanger | 1 | 10,00,000/- |
| 3. | Freeze drier | 1 | 10,00,000/- |
| 4. | Higher Pressure Gas Liquid chromatograph | 1 | 13,00,000/- |
| 5. | Food Biochemistry Analyzer | 1 | 5,00,000/- |
| 6. | Electrophoresis Apparatus with Power Supply | 1 | 5,00,000/- |
| 7. | Gel-filtration and fraction collector | 1 | 5,00,000/- |
| 8. | Twin Screw Food Extruder | 1 | 10,00,000/- |

NOTE: Some of the equipment mentioned in different laboratories may be shared

8.1.3 Furniture Requirement

Norms and standards laid down by AICTE be followed for working out furniture requirement for this course.

8.2 Human Resources Development:

Weekly work schedule, annual work schedule, student teacher ratio for various group and class size, staffing pattern, work load norms, qualifications, experience and job description of teaching staff workshop staff and other administrative and supporting staff be worked out as per norms and standards laid down by the AICTE

Following are the qualifications and experience for the teaching faculty and technician staff

9. RECOMMENDATIONS FOR EFFECTIVE IMPLEMENTATION OF CURRICULUM

The following recommendations are made for effective implementation of this curriculum.

- a) While imparting instructions, stress should be laid on the development of practical skills in the students.
- b) Field visits be organized as and when required to clarify the concepts, principles and practices involved. For this purpose, time has already been provided in student centred activities
- c) Extension lectures from professionals should be organised to impart instructions in specialised areas
- d) There is no need of purchasing very costly equipment. Efforts may be made to establish linkages with local industries/field organizations
- e) Considerable stress should be laid on personality development of the student, which is very essential for any diploma holder
- f) Teachers should generate competitiveness among the students for the development of professional skills.
- g) Teachers should take interest in establishing linkages with industries and field organizations for imparting field experiences to their students
- h) Hobby clubs and other co-curricular activities be promoted to develop creativity in the students
- i) Teachers should be sent for training in the new areas relevant to their field of specialization
- j) Students should be given relevant and well thought out project assignments. This will help students in developing creativity and confidence in them for gainful employment (wage and self)
- k) A **project bank** should be developed by the Food Technology department of the polytechnic in consultation with Food Industry, Food Research Institutes and other important Food institutions in the state.

10. LIST OF PARTICIPANTS

The following experts participated/contributed in the revision of curriculum for diploma programme in **Food Technology** during the workshop for revision of subjects of first year for Haryana state held on 08-09 May, 2003 at National Institute of Technical Teachers' Training and Research, Chandigarh.

From Field/Industries/Institutions of Higher Learning

1. Dr. US Shivhare, Professor, Deptt. Of Chemical Engineering & Technology Punjab University, Chandigarh
2. Dr MB Bera, Dean (Academic), SLIET- Longowal
3. PS Panesar, Assistant Professor, Deptt. Of Food Technology, SLIET-Longowal
4. Dr. DC Saxena, Assistant Professor, Deptt. Of Food Technology, SLIET-Longowal
5. Dr.GS Chauhan, Professor, Deptt of Food Science & Technology, GB Pant University of Agriculture & Technical, Pantnagar-263145
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From Polytechnics

7. BP Jain, H.O.D. Applied Science, Govt. Polytechnic, Sirsa (Haryana)
8. Dr.GH Hugar, Lecturer, C.C.E.T, Sector-26, Chandigarh

From NITTTR, Chandigarh

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(Coordinator)

The following experts participated/contributed in the revision of curriculum for diploma programme in Food Technology during the workshop for revision of complete Curriculum for Haryana state held from 06 – 07 October, 2003 and 19th January, 2004 at National Institute of Technical Teachers' Training and Research, Chandigarh.

From Field/Industries/Institutions of Higher Learning

11. Dr. Ashok Kumar, Deptt P.A.S, P.A.U, Ludhiana
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17. Shir Kulveer Singh Allawat, Lecturer, Govt. Polytechnic Adampur, Hissar
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21. Dr. KM Rastogi, Professor & Head Curriculum Development Centre, NITTTR
22. PK Singla, Asstt. Professor, Curriculum Development Centre, NITTTR, Chandigarh **(Coordinator)**