

CURRICULUM FOR SIX MONTH CERTIFICATE COURSE

FOR

COMMUNITY DEVELOPMENT THROUGH POLYTECHNIC SCHEME

IN

FOOD PROCESSING & PRESERVATION

UNDER DEVELOPMENT

Prepared By

CURRICULUM DEVELOPMENT CELL

**INSTITUTE OF RESEARCH, DEVELOPMENT TRAINING,U.P.,
KANPUR-208002**

SIX MONTH CERTIFICATE COURSE
IN
FOOD PROCESSING & PRESERVATION

| Sl. No. | Module | Name of Module | Duration |
|----------------|---------------|------------------------|-----------------|
| 1. | Module 1 | Food Preservation | 8 weeks |
| 2. | Module 2 | Bakery & Confectionary | 8 weeks |
| 3. | Module 3 | Milk & Dairy Product | 8 weeks |

MAIN FEATURES OF THE CURRICULUM

1. Title of the Course : Certificate course in Food Processing & Preservation
2. Duration of the Course : Six Month
3. Type of the Course : Full Time Institutional
4. Entry Qualification : 10 + with Science II and Mathematics II

Module-1: Food Preservation

Theory:

1. **Importance of Food Preservation Technology:**
 - Importance of Food Preservation Technology
 - Common terms used in Food Processing
2. **Categorisation of food :**
 - Food groups on the basis of pH value, technology, physiology changed conditions
3. **Principles of food preservation :**
 - Principle of preservation , Different food Preservation techniques
4. **Drying/ Dehydration of fruits & vegetables:**
 - Principle of food drying/dehydration
 - General Process of fruit drying
 - General Process of vegetable drying
 - General methods of food drying dehydration, sun drying, mechanical drying etc.
 - Types of dryers
 - Quality characteristics of dried fruits and vegetables
 - Treatments prior to drying
6. **Pickles:**
 - Principle of pickle production
 - Theory of different types pickle production
 - Fermented, oil, vinegar pickles
7. **Ketchup, Sauce, and chutney:**
 - Different types of tomato products
 - Preparation of tomato products.
 - Principle and preparation methods of tomato ketchup, sauce, puree, paste, chutneys
8. **Canning fruits & vegetables:**
 - Canning process flow diagramme for fruits & vegetables
 - Pretratments.
 - Canning machinery
 - Knowledge of chemicals required
 - Canning of fruits & vegetables
9. **Jam, jelly and Marmalade:**
 - Principle of jam and jelly preparation
 - Flow diagram for preparation of jam and jellies.
 - Test of pectin for jam and jelly preparation
10. **Fruit preserves, glazed fruits, fruit bar and toffees:**
 - Principle and methods for production of glazed fruits, candy, fruit bar and toffees

- 11. Vinegar production:**
 - Principle of vinegar production.
 - Different types of vinegars.
 - Factors involving good quality vinegar.
- 12. Wastes:**
 - Wastes from fruits and vegetables.
- 13. Utilization from fruit and vegetables:**
 - Processing techniques for proper utilization of wastes from fruits and vegetables.
- 14. Quality Control:**
 - Quality factors in fruit and vegetable processing & preservation
- 15. Nutritional qualities and composition of fruits and vegetables:**
 - Analytical methods for evaluation of chemical and nutritional composition of fruits and vegetables
- 16. Storage and packaging:**
 - Need and importance of storage and packaging Methods
 - Storage techniques for fruits, vegetables and grains
 - Cold storage, refrigeration
 - Packaging materials used
 - Selection of appropriate packing method

Practicals:

1. Identification of different food products available in market
2. Categorise the food items based on properties
3. Principle of preservation
4. Different food Preservation techniques
5. Using dryers dry fruits & vegetables
6. Carry out treatment prior to drying Production of different types pickle e.g. fermented, oil, vinegar pickles from fruits and vegetables, mixed pickles
7. Preparation of tomato ketchup, sauce, puree, paste, chutneys
8. Operation of canning machinery
9. Canning operations
10. Canning of seasonal fruits & vegetables
11. Preparation of seasonal fruits
12. Preparation of different fruit jams like, mango, apple, pineapple, banana, amla, guava, papaya, mixed fruit etc
13. Preparation of jelly from fruits like, apple, guava, jackfruit etc.
14. Preparation of jam and jelly marmalades
15. Testing of pectin in fruits
16. Testing of end point in jam and jelly Preparation of glazed fruits, candy, fruit bar and toffees.
17. Preparation of synthetic vinegar
18. Preparation of fermented vinegar
19. Preparation of different fruit vinegar, flavoured vinegars
20. Preparation of products from wastes e.g. Vinegar from pineapple waste, pectin from citrus fruits wastes, vinegar and protein isolate mango kernel, starches
21. Tests for quality evaluation
22. Analysis of fruits and vegetables for their quality
23. Pack the given food products and seal

| Sl. No. | Trainees Kit Item/ Specification | Quantity proposed for a batch of 16 trainees |
|----------------|--|---|
| 1. | Hand operated moisture meter (to be shared) | 04 |
| 2. | Litmus papers | 16 |
| 3. | Product catalogue of different product | As required |
| 4. | Hand sealing machine (to be shared) | 04 |
| 5. | Bottle cap tightening machine (to be shared) | 04 |
| 6. | Hand operated plastic packaging machine (to be shared) | 04 |
| 7. | Food colour packets | As required |
| 8. | Preservatives packets | As required |
| 9. | Spring balance (to be shared) | 04 |
| 10. | Fruit knife (to be shared) | 08 |
| 11. | Spoons (different sizes) | 16 sets |
| 12. | Measuring glass (to be shared) | 08 |
| 13. | Hand gloves | 16 |
| 14. | Apron | 16 |
| 15. | Cap | 16 |
| 16. | Boots | 16 |
| 17. | Hand bag big size | 16 |

| Sl. No. | Equipment, Machine & Tools Item/ Specification | Quantity proposed for a batch of 16 trainees |
|----------------|---|---|
| 1. | Cabinet dryer (Electrical) | 01 |
| 2. | SS trays | As required |
| 3. | Lemon squeezer | 06 |
| 4. | Bottle washer | 02 |
| 5. | Crown corking machine (Hand operated/ pedal operated) | 01 |
| 6. | Baby Fruit pulper | 02 |
| 7. | Mixer-grinder/Food processors | 04 |
| 8. | Water purifier | 02 |
| 9. | Sulfuring chamber | 01 |
| 10. | Blancher cum sterilizer | 01 |
| 11. | Oven : 5 KW, | 01 |
| 12. | Hand / table model refractometer : Abbes type, 0-32; 28-70. 58-90 of 0-100 (Bench type) | 02 |
| 13. | Storage Bins of different capacity : | As required |
| 14. | Electronic balance | 01 |
| 15. | Electric oven : For moisture determination, 0-250 °C, digital display, 2'X2'X2' | 02 |
| 16. | Moisture box : Aluminum, 100 g capacity cylindrical | 02 |
| 17. | Vinegar generator : | 01 |
| 18. | Fermenter : | 01 |
| 19. | Vegetable slicing machine | 01 |
| 20. | Automatic pouch machine/ filler sealer machine : including a batch coding, perforation and notching unit | 01 |
| 21. | Pulping machine for fruits and vegetables | 01 |
| 22. | Fruit mill Junior Model, 0.5 Ton/h with 1 hp motor. | 01 |

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| 23. | Gel meter . | 01 |
| 24. | Auto clave : For Sterilization of cans, | 01 |
| 25. | Vacuum pan | 01 |
| 26. | Vernier Caliper : 15 cm. 0.01 mm LC | 04 |
| 27. | Screw Gauge : Micrometer, 0.001 mm LC, 10 cm cap | 04 |
| 28. | Steel Scale : 12 “ standard steel | 04 |
| 29. | Steel tape : Scales 1 meter, and of 50 ft | 04 |
| 30. | Weight box : For balances | 01 |
| 31. | Cutting equipments : Different knives, Cutters for fruits / Vegetables | 04 sets |
| 32. | Sinks : standard size | 02 |
| 33. | Hot plate : Electrical 2 KW | 02 |
| 34. | Pickle Mixer : Rotatory type, Contact Parts of SS | 02 |
| 35. | Heat sealing machine : Hand / pedal operated | 01 |
| 36. | Tank SS : 50 liters capacity, cylindrical with cap | 01 |
| 37. | Syrup tanks : 50, 100 lit capacity SS | 01 |
| 38. | Pressure cooker : 5 Kg and 10 Kg SS | 01 each |
| 39. | Liquid filling machine : 200 ml, 500 ml, 1000 ml. Manual | 01 each |
| 40. | SS Filter : Sieve type cloth filter, hydraulic, | 01 |
| 41. | Sugar coating pan : SS, Revolving type with speed control, | 01 |
| 42. | Bottle opener : Heavy duty, Stainless Steel | 04 |
| 43. | Burette : 50 ml digital Automatic/ ordinary glass | 06 |
| 44. | Pipette : 5-50 ml capacities | 06 |
| 45. | Lab glass wares : Different sizes and types | As required |
| 46. | Working tables : Stainless Steel Size 6’ X 3’ | 01 |
| 47. | Improved stoves : Made of MS with proper safety Measures | 02 |

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| 48. | Stainless steel/ Aluminum pots : Different Capacities | As required |
| 49. | Stainless steel knives : 12-15 cm blade | As required |
| 50. | Spoons : Stainless steel, various shapes and sizes | As required |
| 51. | Household sieves : Stainless steel | As required |
| 52. | Wooden spoons : Different sizes | As required |
| 53. | Hand operated pulp extractor : Made of stainless steel | 01 |
| 54. | Solar dryer (cabinet type) : Complete with solar box, Size approx 6' X 3' | 01 |

| A) | | Furniture | |
|-----------------------------------|---|------------------|---------|
| Class Room | : | | 01 No |
| • Instructor Chair & Table | : | | 08 Nos. |
| • Dual Desk | : | | |
| Workshop/Lab | : | | 04 Nos. |
| • Suitable Work tables | : | | 16 Nos. |
| • Stools | : | | 01 No. |
| • Discussion Table | : | | |
| Tool Cabinet | : | | 01 No. |
| Trainees Locker with space for 16 | : | | 01 No. |
| First Aid Box | : | | 01 No. |
| Book Shelf (glass panel) | : | | 01 No. |
| Storage rack | : | | 01 No |

Module-2: Bakery and Confectionary

Theory

1. **Bakery and confectionery in food industry:**
 - Importance of bakery and confectionery in food industry
 - Industrially important cereals
2. **Bakery Products:**
 - Flour
 - Different industrially important bakery products.
 - Flours for the bakery products
 - Quality of flour for the production of bakery items.
 - Bread
 - Principle involved for bread production
 - Different types of breads and their uses
 - Ingredients used in bread production
 - Biscuit and cookies
 - Basic method of biscuit production.
 - Ingredients for biscuit production.
 - Machinery involved in biscuit production
 - Factors affecting the quality of product
2. **Cake:**
 - Methods for the production of cakes
 - Ingredients for cake production
 - Machinery involved in cake production
 - Factors affecting the quality
3. **Starch:**
 - Availability of starch in different cereals
 - Extraction of starch
 - Different products of grain starch
4. **Quality standards:**
 - Quality standards and evaluation of product
5. **Primary processing equipment:**
 - Equipment used e.g. flour mill, mixer, molding machines, oven balance, packing machines
 - Location of faults
 - Safety
6. **Storage and packaging**
 - Need and importance of storage and packaging for bakery items
 - Methods of storage & packaging

PRACTICALS: Bakery and Confectionary

1. Production of quality flour for bread, biscuit and cakes.
2. Production of plain, fermented, malt, rye flour.
3. Flour, fat, bakers yeast, sugar and salt, I.S.I. standards for flour, fat, Baker's yeast.
4. Use of different food machinery for bread production.
5. Production of plain bread, fermented bread, protein rich bread and special breads
6. Production of different types of popular biscuits.
7. Production of different types of specialized biscuits.
8. Production of different types of other products like cookies, crackers.
9. Production of different types of popular cakes.
10. Production of different types of specialized cakes.
11. Preparation of corn starch, starch biscuits, Namkins, snacks.
12. Testing of raw material and product for their quality.
13. Handling of equipment safely.
14. Fault identification and removal of faults.
15. Pack the given food products and seal.

| Sl. No. | Trainees Kit Item/ Specification | Quantity proposed for a batch of 16 trainees |
|----------------|---|---|
| 1. | Hand operated moisture meter (to be shared) | 04 |
| 2. | Moulds of biscuit & breads (to be shared) | 08 |
| 3. | Spring balance (to be shared) | 04 |
| 4. | Bread cutting knife | 16 sets |
| 5. | Knife of different size (set) | 16 sets |
| 6. | Spoons | 16 sets |
| 7. | Measuring glass (to be shared) | 08 |
| 8. | Fruit knife | 16 sets |
| 9. | Dies (to be shared) | 04 |
| 10. | Hand gloves | 16 |
| 11. | Apron | 16 |
| 12. | Cap | 16 |
| 13. | Boots | 16 |
| 14. | Hand bag | 16 |

| Sl. No. | Equipment, Machine & Tools Item/ Specification | Quantity proposed for a batch of 16 trainees |
|----------------|---|---|
| 1. | Flour mill/ mini grain mill : Standard size | 01 |
| 2. | Planetary mixer : 3 gear, | 01 |
| 3. | Moulding machines | 01 |
| 4. | Sheeting machine | 01 |
| 5. | Bread cutting machine | 01 |
| 6. | Oven : Standard size with temperature control | 01 |
| 7. | Packing machine | 01 |
| 8. | Electronic balance | 01 |
| 9. | Physical balance | 01 |
| 10. | Working table SS | 01 |
| 11. | Toffee dies | 01 |
| 12. | Biscuit moulds of different sizes : | As required |
| 13. | Cake dies | As required |
| 14. | Electric oven | 01 |
| 15. | Moisture box | 01 |
| 16. | Flash evaporator | 01 |
| 17. | Can body reformer | 01 |
| 18. | Can seamer | 01 |
| 19. | Exhaust box | 01 |
| 20. | Auto Clave | 01 |
| 21. | Cup sealer | 01 |
| 22. | Vacuum pan | 01 |
| 23. | Vernier Caliper : 15 cm. 0.01 mm LC | 02 |
| 24. | Screw Gauge : Micrometer, 0.001 mm LC, 10 cm cap | 02 |

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| 25. | Steel scale : 12 “ standard steel | 04 |
| 26. | Steel tape : Scales 1 meter, and of 50 ft | 04 |
| 27. | Weight box : For balances up to 2 Kg | 02 |
| 28. | Cutting equipments : Different knives, Cutters for fruits /Veg | As required |
| 29. | Sinks : standard size | 01 |
| 30. | Hot plate : Electrical 2 KW | 01 |
| 31. | Pickle Mixer : Rotatory type, Contact Parts of SS | 01 |
| 32. | Heat sealing machine : Hand / pedal operated | 01 |
| 33. | Tanks SS : 50 liters capacity, cylindrical with cap | 01 |
| 34. | Syrup tanks : 50-100 lit capacity SS | 01 |
| 35. | Pressure Cooker : 5 Kg and 10 Kg SS | 01 each |
| 36. | Liquid filling machine : For filling liquid in bottles, 200 ml, 500 ml, 1000 ml. Manual | 01 each |
| 37. | SS Filter : Sieve type cloth filter, hydraulic, | 01 |
| 38. | Sugar coating pan : SS, Revolving type with speed control, | 01 |
| 39. | Bottle opener : Heavy duty, Stainless Steel | 01 |
| 40. | Burette : 50 ml digital Automatic/ ordinary glass | 06 |
| 41. | Pipette : 5-50 ml capacities, glass | 04 |
| 42. | Working tables : Stainless Steel Size 6’ X 3’ | 01 |
| 43. | Improved stoves : Made of MS with proper safety Measures, Valves etc | 02 |
| 44. | Stainless steel / Aluminum pots : Different Capacities | 01 set |
| 45. | Wooden spoons : Different sizes | 01 set |
| 46. | Solar dryer (cabinet type) : Complete with solar box, Size approx 6’ X 3’ | 01 |

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| Class Room • Instructor Chair & Table • Dual Desk | 01 No 08 Nos. |
| Workshop/Lab • Suitable Work tables • Stools • Discussion Table | 04 Nos. 16 Nos. 01 No. |
| Tool Cabinet | 01 No. |
| Trainees Locker with space for 16 | 01 No. |
| First Aid Box | 01 No. |
| Book Shelf (glass panel) | 01 No. |
| Storage rack | 01 No. |

Module-3: Milk and Dairy Products

Theory

1. **Dairy industry**
2. **Milk:**
 - Property of milk
 - Quality of raw milk
 - Products made from the milk
 - Introduction to different dairy products useful for marketing.
- Processing of Milk
 - Principle of milk processing
 - Method of production of pasteurized milk
 - Standard, toned, double toned flavoured milks.
 - Ingredients of special milks, fermented milk
- Dairy Products
 - Preparation methods of Cheese, Chhana, Mawa,
 - Preparation methods of Dahi, Srikhand, Cream, buttermilk
- Ghee
 - Different methods of Ghee production
 - Quality of ghee
- Butter
 - Method of butter production
 - Quality of butter
- Dairy sweets
 - Preparation methods of different dairy based sweets
 - Storage of sweets.
- Ice-cream
 - Principle of ice-cream production
 - Method of ice-cream production
 - Quality of ice cream
 - Different types of ice creams
- Other Dairy products
 - Different dairy products like dried milk, condensed milk
3. **Processing equipment:**
 - Equipment used e.g. Cream Separator, deep fridge, cheese vat, pasteurizer, kettle, butter churner, boiler,(optionally mini dairy plant)
 - Maintenance of equipment
 - Safety
4. **Storage and packaging:**
 - Need and importance of storage and packaging
 - Methods

PRACTICAL LIST: Milk and Dairy Products

1. Importance of dairy industry.
2. Introduction to operation flood (white revolution).
3. Testing of milk for its quality.
4. Primary processing of market milk.
5. Storage of milk
6. Production of pasteurized milk.
7. Production of standard, toned, double toned.
8. flavoured milks, fermented milk.
9. Storage of products.
10. Preparation of Cheese, Chhana, Mawa.
11. Preparation of Dahi, Srikhand, Ghee, Cream, buttermilk etc.
12. Production of Ghee by different methods.
13. Preparation of butter.
14. Test of quality of butter.
15. Preparation of different dairy based sweets.
16. Preparation of ice cream.
17. Quality evaluation of ice cream.
18. Storage of ice-cream.
19. Preparation of different dairy products like dried milk, condensed milk, cheese.
20. Handling of equipment safely.
21. Fault identification and removal of faults.
22. Safe operation.
23. Pack the given food products and seal.

| Sl. No. | Trainees Kit Item/ Specification | Quantity proposed for a batch of 16 trainees |
|----------------|--|---|
| 1. | Lactometer (to be shared) | 04 |
| 2. | Dairy product catalogue of different product | 02 sets |
| 3. | Packaging machine hand operated (to be shared) | 04 |
| 4. | Milk testing kit (to be shared) | 04 |
| 5. | Hand operated weighting unit (to be shared) | 04 |
| 6. | Hand operated sealing machine (to be shared) | 04 |
| 7. | Fat measuring kit (to be shared) | 04 |
| 8. | Electric Kettle (to be shared) | 04 |
| 9. | Moisture box (to be shared) | 04 |
| 10. | Measuring glass (to be shared) | 08 |
| 11. | Hand gloves | 16 |
| 12. | Apron | 16 |
| 13. | Cap | 16 |
| 14. | Boots | 16 |
| 15. | Hand bag | 16 |

| Sl. No. | Equipment, Machine & Tools Item/ Specification | Quantity proposed for a batch of 16 trainees |
|---------|--|--|
| 1. | Mini dairy plant : Complete Mini-processing unit for milk. | 01 |
| 2. | Milk Chiller : For chilling milk up to a temperature of about –10 °C | 01 |
| 3. | Milk cans : Made of steel/ Aluminium, 40 –100 lit capacity | As required |
| 4. | Cream separator : Motor operated, Centrifugal, capacity up to 1-2 Kg/ cream per min. | 01 |
| 5. | Cheese vat : Made of heavy Stainless steel (306), size approx. 4'X 2.5'X 1' with proper outlet and taps | 01 |
| 6. | Plate pasteurizer | 01 |
| 7. | Butter churner | 01 |
| 8. | Boiler | 01 |
| 9. | Deep fridge | 01 |
| 10. | Steam jacketed kettle with surface scrapper | 01 |
| 11. | Mawa machine | 01 |
| 12. | Crown capping machine | 01 |
| 13. | Form fill seal machine | 01 |
| 14. | Ice cream plant | 01 |
| 15. | Cenfrifuge : For Fat estimation in milk, | 01 |
| 16. | Gerber tubes for fat estimation | 01 |
| 17. | Electric oven | 01 |
| 18. | Moisture box | 01 |
| 19. | Automatic pouch machine / filler sealer machine | 01 |
| 20. | Kettle | 01 |
| 21. | Flash evaporator . | 01 |

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| 22. | Can body reformer | 01 |
| 23. | Can seamer | 01 |
| 24. | Exhaust box. | 01 |
| 25. | Cup sealer | 01 |
| 26. | Vacuum pan | 01 |
| 27. | Vernier caliper : 15 cm. 0.01 mm LC | 02 |
| 28. | Screw Gauge : Micrometer, 0.001 mm LC, 10 cm cap | 04 |
| 29. | Steel scale : 12 “ standard steel | 02 |
| 30. | Steel tape : Scales 1 meter, and of 50 ft | 02 |
| 31. | Weight box : For balances | 01 |
| 32. | Cutting equipments : Different knives, Cutters for fruits /Veg | As required |
| 33. | Sinks : standard size | 01 |
| 34. | Hot plate : Electrical 2 KW | 01 |
| 35. | Pickle mixer : Rotatory type, Contact Parts of SS | 01 |
| 36. | Heat sealing machine : Hand / pedal operated | 01 |
| 37. | Tanks SS : 50 liters capacity, cylindrical with cap | 01 |
| 38. | Syrup tanks : 50, 100 lit capacity SS | 01 |
| 39. | Pressure cooker : 5 Kg and 10 Kg SS | 01 |
| 40. | Liquid filling machine : For filling liquid in bottles, 200 ml, 500 ml, 1000 ml. Manual | As required |
| 41. | SS filter : Sieve type cloth filter, hydraulic, | 01 |
| 42. | Sugar Coating pan : SS, Revolving type with speed control, | 01 |
| 43. | Bottle opener : Heavy duty, Stainless Steel | 01 |
| 44. | Burette : 50 ml digital Automatic/ ordinary glass | 01 |

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| 45. | Pipette : 5-50 ml capacities, glass | As required |
| 46. | Lab glasswares : Different sizes and types | As required |
| 47. | Working tables : Stainless Steel Size 6' X 3' | 01 |
| 48. | Improved stoves : Made of MS with proper safety Measures, Valves etc | 01 |
| 49. | Stainless steel / Aluminum pots : Different Capacities | As required |
| 50. | Wooden spoons : Different sizes | As required |

| A) | | Furniture | |
|-----------------------------------|---|-----------|--|
| Class Room | : | 01 No | |
| • Instructor Chair & Table | : | 08 Nos. | |
| • Dual Desk | | | |
| Workshop/Lab | : | 04 Nos. | |
| • Suitable Work tables | : | 16 Nos. | |
| • Stools | : | 01 No. | |
| • Discussion Table | | | |
| Tool Cabinet | : | 01 No. | |
| Trainees Locker with space for 16 | : | 01 No. | |
| First Aid Box | : | 01 No. | |
| Book Shelf (glass panel) | : | 01 No. | |
| Storage rack | : | 01 No. | |