

**SYLLABUS OF SEMESTER SYSTEM
FOR THE TRADE OF**

Fruits and Vegetable Processing

Under

**Craftsmen Training Scheme (CTS)
(One year/Two Semesters)**

**Redesigned in
2014**

By

**Government of India
Ministry of Labour & Employment (DGE&T)**

GENERAL INFORMATION

1. Name of the Trade: **Fruits and Vegetable Processing**
2. NCO Code No. 7414.90
3. Duration : One year (Two semester)
4. Power Norms : 5 KW
5. Space Norm: Lab Space – **96 Sq. m**
Class Room Space - **30 Sq. m**
6. Entry Qualification: Passed 10th Class Examination with Science and Mathematics
7. Unit Size(No. of students): 20
8. Instructor's/Trainer's Qualification:
 - (i) National Trade Certificate in Preservation of Fruits & Vegetables trade with three years experience in relevant field/industry.
OR
 - (ii) Diploma in Food Technology or Post Harvest Management with two years experience in relevant field/industry.
OR
 - (iii) Degree in Food Technology or Post Harvest Management with One years experience in relevant field/industry.
9. Desirable Qualification Preference will be given to craft instructor's certificate (CIC).
10. Job Profile
 - **Quality Analyst** in Fruits and vegetable processing industry.
 - **Supervisor** in Fruits and Vegetable Processing Industry.
 - **Cold Storage Supervisor** in Frozen fruits and vegetables industry.
 - **Packaging Supervisor** in Fruits and Vegetable Processing industry.
 - **Skilled worker** in Food MNC.
 - **Entrepreneur** in Fruits and vegetables processing.

Note: At least one instructor must have Degree/Diploma in particular trade

Syllabus : Fruits and Vegetable Processing**First Semester**

| Week | Practical | Theory |
|-------------|--|--|
| 1 | Admission | |
| 2-3 | Spoilage of fruits and vegetables Industrial visit in fruits and vegetables processing industry. | Introduction - Definition and scope of preservation. History and development of food preservation industry with special reference to India. Different types of spoilages in fresh fruits and vegetables. General principles and methods of food preservation. |
| 4-5. | Identifications of Fruits and vegetables. | Definition of Fruits and vegetables, Difference in between fruits and vegetable, Fruits and vegetables as available in different parts of the country, their preservation, season of maturity. Constituents of food, importance of fruits & Vegetables in the diet. |
| 6-7. | Identification of spices and food additives used in fruits and vegetable processing. | Selection of raw materials including fruits and vegetables for Preparation of various products. Spices and other constituents, their properties, condiments and other additives and ingredients, and their flavouring and preservative properties. |
| 8-9 | Study of common food processing equipments such as pulper, sealers, juice extracting machines, autoclaves, corking machines etc. | Study of various equipments: usage, care/maintenance and precautions. |

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| 10-11. | Refrigeration and other methods for storing perishables. | Storage of fresh fruits and vegetable. Methods and containers used in fresh fruits and vegetable preservation |
| 12-13 | Preparation of Fruit Juice. Preservation of fruits juices with addition of preservative. | Technology of extraction of juices from different types of fruits. Definition of Preservatives-types of preservatives commonly used in food industry limits of usage of preservatives |
| 14-15 | Preparation of common fruit beverages. Determination of Acids in fruits and vegetable products | Fruit beverages: Squashes, syrups, nectars, RTS, crushes, cordial etc. |
| 16-17 | Preparation of tomato juices, puree, sauces, ketchups, soup, paste, chutney etc | Tomato products: Technology of manufacture of tomato products. |
| 18-19 | Various methods of drying: sun drying, cabinet drying and solar drying. | Sun drying & dehydration and its merits and demerits. Principles involved preservation by drying method. Treatment prior to drying. Mechanical Dehydration-Types of Dryers. |
| 20-21 | Preparation of Jam, jelly and marmalades. | Jams, Jellies and marmalades: selection, preparation, production and preservation. Difference in between jam and jelly. |
| 22-23 | Practical demonstration of sealing pouching machine. Examination of the tetra pack | Study of various types of containers like Glass, Tin-merits and demerits of each-scope for new types of containers/ packaging materials, such as plastic pouches, tetra pack, PET bottle and cartons. Understanding the label its importance, and labelling requirements |
| 24-25 | Industrial Training: Fruits and vegetables processing industry. | |
| 26 | Revision/Examination | |

| Syllabus : Fruits and Vegetable Processing | | |
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| Second Semester | | |
| Week No. | Practical | Theory |
| 1 | Admission | |
| 2-5 | Preparation of wine | Fermented beverages-wines |
| 6-7 | Preparation of synthetic vinegars. | Different type of vinegar, methods of Vinegar Production. |
| 8-10 | Preparation of preserves, candies, crystallized and glazed and fruit bars. | Definition of preserves, candied fruits, glazed fruits, crystallized fruits- methods of preparation of these. |
| 11-14 | Demonstration of Canning process in fruits and vegetables canning industry. Visit to canning industry | Canning and bottling- Canning of fruits and vegetables- principles, procedure and steps involved- care in handling of common available fruits and vegetables in the region. |
| 15-16 | Identification of defective cans, Precautions while consuming the canned foods. | Scheme and layout of canning industry. Study about the various defects in canned products, lacquers. |
| 17-18 | Freezing demonstration on market sample of frozen fruits and vegetables. | Study of Frozen Fruits and Vegetables, Blanching and Freezing. |
| 19-21 | Preparations of different types of pickles from fruits and vegetables. | Pickles, chutneys and sauces, Different types of pickles, Methods of preparation curing techniques, defects and remedies. |
| 22-23 | Examination of processed products. Cleaning and maintenance of the equipments. Detection of benzoic acid, sulphur dioxide and KMS in fruits and vegetable products. | Study of Food safety Standards: HACCP, ISO 22000, GMP, and FSSAI. Importance of personal Hygiene, Cleaning & Sanitary standards in Fruits and Vegetable preservation. Good Handling Processes (GHP), Traceability |

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| | | aspects of processed product. |
| 24-25 | Industrial training in canning industry | |
| 26 | Revision/Examination | |

| List of Tool & Equipments | | |
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| Sr.no. | Name of the item | Qty |
| 1 | Vacuum Gauge | 01 no |
| 2 | Pressure Gauge | 01 no |
| 3 | Seam Checking gauge or screw gauge | 01 no |
| 4 | Refractometers (Pocket) 0-32,28-62,58-920 Brix Sugar Scale | 02 no |
| 5 | Brinometer (Salinometer) | 02 no |
| 6 | Hydrometers of different ranges 0-30, 30-60, 60-90, Brixhydrometer | 01 no |
| 7 | PH Meter (Digital) | 01 no |
| 8 | Fruit Trays | 6+2 no |
| 9 | Stainless steel mugs | 8 no |
| 10 | Stainless steel bowls | 8 no |
| 11 | Thermometer (Digital) | 06 no |
| 12 | Pressure Cooker | 02 no |
| 13 | Sandashi (Tongs) | 01 no |
| 14 | Perforated spoons S.S.12"Length 4 " dia | 06 no |
| 15 | Coring knives | 06 no |
| 16 | Pitting knives | 06 no |
| 17 | Cutting knives | 06 no |
| 18 | Juice Extractor (Screw type) 1 HP motor | 01 no |
| 19 | Lime Juice Extractor & orange juice halving & Burring | 01 no |
| 20 | Crown corking machine hand operated one. | 01 no |
| 21 | Pilfer proof capping machine | 01 no |
| 22 | Weighing balance (digital)' | 03 no |
| 23 | Stainless steel knives | 6 pcs+20pcs |
| 24 | Spoons of assorted size | 20pcs |
| 25 | Stainless steel degdhes | 6pcs |
| 26 | Can and cork Remover | As per Requirement |
| 27 | Jell meters | 6 no |
| 28 | Cabinet dryer (electrical):5 to 10 tray capacity drier, | 01 no |

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| | trays of SS/Aluminium, flat or perforated, 3/4 W, with three phase electrical connection, temp control 0 to 150 c, auto on/off. | |
| 29 | Stainless steel trays of assorted size | 20 no |
| 30 | Stainless steel buckets or stainless buckets | 06 no |
| 31 | Gas burner with cylinder. | 06 no |
| 32 | Electric Mixer | 2 no |
| 33 | Spoons, Wooden Ladle | 16 no |
| 34 | Masons Jars for 1 gross bottle | 01 no |
| 35 | Water Tank with tap 4'x4'x3' | 01 no |
| 36 | Refrigerator double door 200 litre | 01 no |
| 37 | Auto claves 20 lit cap | 02 no |
| 38 | S.S.Vessels with lids 20 lit cap. | 10 no |
| 39 | S.S. Vessels with lids 6 lit cap. | 06 no |
| 40 | S.S.Vessels with lids 10 lit cap. | 06 no |
| 41 | Hand Washing basin with tripod stands | 03 no |
| 42 | Micrometer Seam Checking guage' 0.001 LC | 01 no |
| 43 | Oven (drying) (0-250 C) digital Display, with auto temperature controller, suitable insulated, fans , Heating elements. | 01 no |
| 44 | Pulper Electric 1/4 Tonne capacity per 8 hrs with 1 HP Motor and two S.S: Seines (1/16 mesh. 1/32 mesh) | 01 no |
| 45 | Bottle Stand for 1 gross bottle | 01 no |
| 46 | Distilled water Assembly/water purifier with pre filter, activates charcoal / resin unit and UV exposure units. Complete with water supply tank and piping. | 01 no |
| 47 | Fruit mill (junior model, 0.5 ton/hr with 1 hp motor) | 01 no |
| 48 | Stainless Steel Pricker | 06 no |
| 49 | Solar dryer (cabinet type) complete with solar box. Size app 6'*3' | 01 no |
| 50 | Steel scale 12" Standard steel | 04 no |
| 51 | Lemon Squeezer | 06 no |
| 52 | Volume Measuring Stick | 04 no |
| 53 | Vacuum pan (Capacity 500 litre evaporation/Driven by motor reduction gear box/inside vessel made up of thick stainless steel plate/outer jacket is of S.S./with mail hole and sight glasses on 2 sides/Stirrer is made of Teflon blades. Fitted with an outer at the bottom and a condensate receiving vessels. | 01 no |
| 54 | Deep Fridge: Temperature up to -40 C, auto temp controller | 01 no |
| 55 | Mechanical peeler/ Batch type for fruit and vegetable peeling. | 01 no |
| 56 | Steam jacket kettle 50 litre double jacketed with indenting lever, steam inlet and outlet with steel trolley and accessories to be fitted with boiler. | 01 no |

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| 57 | Baby Boiler/Diesel fuel/capacity of boiler as per capacity of steam jacket kettle. | 01 no |
| 58 | Exhausting box: Straight line exhaust box has an exhaust tunnel 3048 mm long and overall length is 3962 mm. Made of strong structural iron frame. | 01 no |
| 59 | Lidding machine for lidding of can/bottles | 01 no |
| 60 | Sulphuring chamber 5 kg Capacity made up of wooden, place for burning sulphur and exhaust. | 01 no |
| 61 | Vaccum Bottle filling machine capacity 5kg/hrs, made up of stainless steel. | 01 no |
| 62 | Bottle washer: with ½ HP motor, single phase, two heads for brushes, water spray unit of 10-12 bottles. | 01 no |
| 63 | Sealer for sealing of jars. | 01 no |
| 64 | Shredder for slicing of fruit and vegetable capacity 5kg/hrs. | 01 no |
| 65 | Sugar coating pan of stainless steel, revolving type with speed controller. | 01 no |
| 66 | Improved stove made up of MS with proper safety measures , with gas cylinders | 01 no |
| 67 | Pickle mixer, Rotatory type and contact part of stainless steel. | 01 no |
| 68 | Heat Sealing Machine Hand/Pedal Operated | 01 no |
| 69 | Stainless Steel Strainer/Sieve | 06 no |
| 70 | Vernier Calliper: 15cm 0.01 mm LC | 04 no |
| 71 | Desicator | 03 no |
| 72 | Microscope | 02 no |
| 73 | Microwave oven | 01 no |
| 74 | Fermenter | 02 no |
| 75 | Moisture box: Aluminium, 100gm capacity. | 02 no |
| 76 | Liquid filling machine: For filling liquid in bottles, 200ml, 500ml, 1000ml. Manually operated | 01 no |
| 77 | Continuous water supply | |
| 78 | Computer/laptop for Faculty with Internet Connection with, colour Printer and photo copy Scanner | 01 no |
| 79 | LED multimedia Projector | 01 no |
| 80 | UPS 650 VA | 02 no |
| 81 | A.C for Theory room | As per requirement |

| CONSUMABLES TOOLS & ITEMS | | |
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| SI. No. | Name of the item/tools | Qty |
| 1 | Beaker 50, 100, 250 ml, 500 ml | 12 no |
| 2 | Conical flask 50, 100, 250 ml, 500 ml | 12 no |
| 3 | Measuring cylinder 100ml, 250ml, 200 ml, 500ml, | 12 no |
| 4 | Measuring flask of assorted sizes | 12 no |
| 5 | Burrete of assorted sizes with Burrete stands | 12 no |
| 6 | Pipettes of assorted sizes | 12 no |
| 7 | Thermometer (10°C to 110°C) Digital | 20Pcs |
| 8 | Rubber Gloves | 12 pair for each trainee |
| 9 | Aprons | 01 for each trainee |
| 10 | Jelly Filter bags | 04Pcs |
| 11 | Glass Funnels of assorted sizes | 12 no |
| 12 | Funnels 500ml. & 100ml. separating | 12 no |
| 13 | Test Tube With Test tube stand | 25 no |
| 14 | Glass rod | 10 no |
| 15 | Gas lighter | 06 no |
| 16 | Ph meter Rod | 02 no |
| 17 | Petri dish with cover | 20 no |
| 18 | Glass slides | 20pcs |
| 19 | Refilling of gas cylinder for lab | As per required |
| 20 | Air tight glass container of different size | As per required |

| CONSUMABLES ITEMS & CHEMICALS | | |
|--|-------------------------|-----------------|
| SI. No. | Name of the item | Qty. |
| 1 | Photo Copy Paper A4 | As per Required |
| 2 | Scale | As per Required |
| 3 | Correcting Fluid pen | As per Required |
| 4 | Dusting Cloth | As per Required |
| 5 | Pen | As per Required |
| 6 | Temporary marker | As per Required |
| 7 | Stapler (Small & Big) | As per Required |
| 8 | Puncher | As per Required |
| 9 | Fevi stick | As per Required |
| 10 | Stapler Pin | As per Required |
| 11 | Ruled Register | As per Required |
| 12 | File Folder | As per Required |
| 13 | Vim Liquid | As per Required |

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| 14 | Dettol Hand wash | As per Required |
| 15 | Scotch Bright | As per Required |
| 16 | Colin | As per Required |
| 17 | Aluminium Foils | As per Required |
| 18 | Duster | As per Required |
| 19 | Juna | As per Required |
| 20 | Seasonal Fruits and Vegetables | As per Required |
| 21 | Salt | As per Required |
| 22 | Sugar | As per Required |
| 23 | red chilly | As per Required |
| 24 | black pepper | As per Required |
| 25 | Dalchini | As per Required |
| 26 | large elaychi | As per Required |
| 27 | Jeera | As per Required |
| 28 | Saunf | As per Required |
| 29 | Laung | As per Required |
| 30 | Vinegar | As per Required |
| 31 | Butter | As per Required |
| 32 | Hing | As per Required |
| 33 | Methi | As per Required |
| 34 | mustard oil | As per Required |
| 35 | Glucose | As per Required |
| 36 | food grade color | As per Required |
| 37 | food grade flavour | As per Required |
| 38 | Sodium Benzoate | As per Required |
| 39 | Potassium met bisulphide | As per Required |
| 40 | citric acid | As per Required |
| 41 | Glacial Acetic acid | As per Required |
| 42 | Other Chemicals/Raw material Require for Practical's | As per Required |
| 43 | Tissue paper roll | As per Required |

| FURNITURE | | |
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| SI. No. | Class Room | Qty. for 20 trainees |
| 1 | Instructor Chair & Table with Glass | 01 no |
| 2 | Magnetic White Board | 01 no |
| 3 | Display Board | 01 no |
| 4 | Table for computer/printer/scanner with chair | 01 Set |
| 5 | Dual Desk | 08 no |
| SI. No. | Workshop/Lab | Qty. for 20 trainees |
| 1 | Working table with 6-3x21/2 Aluminium tops | 05 no |

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| 2 | Stools | 20 no |
| 3 | Laboratory Table with rack (8'*2'-6"-6") and sinks | 04 no |
| 4 | Racks for keeping books (glass panel)etc | 01 sets |
| 5 | Trainee Locker with space for 20 | 01 no |
| 6 | Storage Rack for Chemicals | 01 no |
| 7 | Cup Board (large) | 04 no |
| 8 | First Aid Box | 01 no |
| 9 | Fire Extinguisher | As per required |
| 10 | Goodrej Almirha | 02 no |
| 11 | Wooden Show Case For keeping & Display sample | 02 no |
| 12 | White Board | 01 no |

- Raw material, Testing chemicals and consumables are not included in the list.