

**DRAFT SYLLABUS FOR THE TRADE OF
TEXTILE WET PROCESSING TECHNICIAN**

(SEMESTER PATTERN) UNDER CRAFTSMEN TRAINING SCHEME (CTS)

General Information

1. Name of the trade	:	TEXTILE WET PROCESSING TECHNICIAN
2. N C O Code No.	:	
3. Duration	:	Two Years (Four semesters)
4. Power Norms	:	8 KW
5. Space Norms	:	104 sq. met.
6. Entry Qualification	:	Passed 10th class examination under 10+2 system of education with Science and Mathematics or its equivalent.
7. Unit Size (No. of Student)	:	16
8a. Instructor's/Trainer's Qualification	:	Degree/Diploma in Engineering in Textile Technology with 1 and 2 years experience respectively. OR NAC/NTC in the trade of Textile Technology with three years experience.
8b. Desirable qualification	:	Preference will be given to a candidate with Craft Instructor Certificate (CIC).

Note: At least one Instructor must have Degree/Diploma in relevant field.

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First Semester: (Duration: Six Months)

Week No.	TRADE PRACTICAL	TRADE THEORY
1	FITTING: Filing Practice	Trade instruction-safety-types of safety-workshop safety- Hand Tools safety-personal safety. Hand tools -Types of hand tools - Types of vices - specification - uses, care and maintenance
2	Filing to size and chipping	Accident - Prevention - Machine -men -Industry - Marking tools -calipers - dividers - Surface plates - Angle plates - Scribers - punches -surface gauges - Types - Uses, Care & maintenance.
3	Marking and Punching	Cutting tools-Files - Chisels -Hacksaw blades - Scrapper -Various cutting angles and their uses - care & maintenance - specification steel flats & strips -specification of steel angle -specification of steel sections
4	Open fitting of sized metals	Measuring tools - Precision and non-precision - steel rule - calipers - Vernier caliper - micrometer -Vernier Height gauge - depth gauge types - uses and specification - calibration and setting as per standard
5	Scrapping to rough and size	Measurement of angles - Vernier Bevel protractor - Graduation on universal Bevel protractor - Reading of universal Bevel Protractor
6	Internal Fitting, Drilling & Fitting	Specification Drill types - reamer types - various cutting angles - taps and dies -types - uses -tap drills and dies calculation-types of hammer.
7	Grinding Machine	Geometrical construction of in volute, oval, and

Week No.	TRADE PRACTICAL	TRADE THEORY
	Practice types - method of drill bit and chisel grinding	helix. Reviewing the various geometrical constructions.
8	Snap gauge filing	Gauges - types - Uses-Care & maintenance - tolerance -limits -fits -definitions & Applications.
9	TURNING: Tool grinding-tool setting & job setting.	Lathe- types - construction -parts-functions - specification. Lathe accessories.
10	Facing and chamfering, plain turning	Different types of operations performed in lathe
11	Different types of shoulder and small radius turning	Cutting tools materials - types -selection-various cutting angles -uses and applications
12	Taper turning and simple thread forming	Types of threads - application -tapping and dyeing process - metrics and inch threads. Different process of paper turning & thread calculation
13	Sheet Metal Work Marking and simple sheet metal joints	Sheet metal hand tools -marking tools - cutting - shaping tools -types and uses
14	Cylinder with brazed joint	Standard wire gauge - soft and hard soldering various allowances - used in sheet metal joint
15	To make simple trays - riveted and solder joints.	Types of sheets & uses - folding -notching -wiring- hemming -allowances and uses.
16	Welding: Welding practice Straight line bead – square butt joint -single V Butt joint	Welding types - Arc Welding -Gas Welding - Welding tools and equipments- Types of welding joints -Electrode and current selection - Specifications and safety precautions
17	Welding practice:	Types of gases used in gas

Week No.	TRADE PRACTICAL	TRADE THEORY
	Using gas welding	welding oxy acetylene flame setting Gas pressure and nozzle selection. Edge preparation for Arc & Gas welding process
18	Carpentry: Simple planning, sawing and chiseling	Carpentry hand tools- Measuring tools -work holding devices - Bench vice. Work bench - Clamps types - sizes -uses- safety methods - saws-Plan types -setting sharpening - uses etc.
19	Simple mortise and Tenon joints practice	Different types of saws – Saw setting -Types of joints - Application - wood working machine - specification and their uses. Adhesives type and uses.
20	Electrical: Demonstration and identification of cables. Soldering practice - Series - Parallel connection Measurement of electrical energy - Multi meter.	Atom & Atomic structure - electrons - Fundamental terms - work power -energy - units -voltage-current - resistance -colour codes. Types of cables – standard wire Gauge-Ohm's law- Kirchoffs law
21	Demonstration Sr. practice on fixing common electrical accessories. Testing of domestic appliances –Building layout assemble of small electrical circuits.	Series and parallel connection -Simple problems - properties of conductor, semi conductor and insulator. Primary and secondary cells common electrical accessories and their specification. Demonstration and description of domestic appliances.
22	Construction of Calling Bell (Electromagnet) Testing. Rewinding of electromagnet - identification of DC generator. Use of Ohmmeter and Megger.	Magnetism and electro magnetism -simple – Motors - generators - principles and rules applied
23	Demonstration and Reading of Electrical Measuring	Explanation of electrical measuring Instruments - Ammeter- Voltmeter Wattmeter- Energy meter

Week No.	TRADE PRACTICAL	TRADE THEORY
	Instruments	
24	Electronics: Testing of active & passive component with suitable meters like Ammeter, Voltmeter & Multimeter-Testing of DC & AC. Assembly and testing of simple electronic circuits (power supply) Testing of amplifier.	Electronic Activities – Passive components - Resistors - Capacitors-inductors -coils- Transformers-Relays- Applications and Uses. All PN diodes Transistor IC's, simple and logic gates, Application and uses. Simple rectifiers, power supply, amplifier-logic gates -Principle of operations.
25	Project work / Industrial visit (optional)	
26	Examination	

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Second Semester: (Duration: Six Months)

Week No.	TRADE PRACTICAL	TRADE THEORY
1	Introduction and Familiarization with the Institute. Importance of trade training machinery equipment used in trade	Orientation programme for recognizing different fibres, yarns and fabric and their-properties
2	Demonstration of all types of Safety precautions to be taken in practice.	Safety precautions related to the trade, machines, materials used in various processes such as under - (i) For steaming, hot air drying, exhaust arrangement, use of gases etc. (ii) Handling of corrosive chemicals and other materials concerned. (iii) Handling of electrical installation for machines in the trade (iv) Introduction and Familiarization and Handling of various machines used for Wet Processing. (v) Fire - hazards and Fire - Extinguisher.
3 & 4	Test of hardness and P_H of water and to find out efficiency of given wetting agent. Calculation for use of Water and steam in general.	Studies on General utilities. Definition of inorganic chemicals, organic chemicals, acids, alkalies, salts - Use of Oxidizing agents, reducing agents, surfactants, sequestering agents in textile processing with commercial names. P_H and its importance in textile processing. Water used for Textile processing and its specification. Water - soft water and hard water, water softening, use of Water, Steam St gases. Cycling & recycling of water and water conservation.

5&6	Identification of different fibres, physical & chemical methods in practice.	Classification of Textile Fibres, description & properties of fibres, cotton, jute, flax, silk, wool, nylon, polyester, acrylic & viscose rayons, Identification of textile fibres & their blends.
7-14	<p>Preparatory Chemical Processing Bleaching of yarn & grey cloth in practice.</p> <p>a) Desizing of cotton.</p> <p>b) Scouring of cotton & wool,</p> <p>c) Degumming of silk</p> <p>d) Bleaching - using hypochlorite & peroxide for cotton. Peroxide bleaching methods for silk and wool.</p> <p>e) Use of optical whitening Agents.</p> <p>f) Washing & drying of different textiles and study of washing & drying machines.</p>	<p>Inspection of grey fabric and repairing /mending, stitching and marking, cropping. Study of shearing, Singeing, Desizing, Scouring Bleaching, Mercirizing, souring process for cotton and other textile fibres and their blended materials. Degumming of silk, Scouring of wool etc.</p> <p>Study of various chemicals and auxiliaries involved in bleaching processes. Study of damages during bleaching, their methods of detection by physical methods and their prevention. Use of optical whitening agents. Washing of Yarns/fabrics after desizing / scouring / bleaching using suitable washing machines. Drying of yarns and fabrics.</p>
15-22	i) Starching of fabric.	Damping, Calendaring, Drying and Stentering.

	<p>ii) Chemical Softening of textile fabrics,</p> <p>iii) Wash - n -wear finishing. (Ant crease Finish)</p> <p>iv) Water repellent and water proofing finish.</p> <p>v) Fire retardant and Fireproof finishes, (vi) Biochemical/ Enzyme assisted softening</p>	<p>Preshrinking of cotton. Calendaring & roller coating / grinding & inspection. Ingredients used in softening & stiffening, their properties and application. Bio-polishing or Enzymatic softening. Study of various functional finishing processes and machine used thereof: -</p> <p>Anti crease and anti shrink finishes, water proofing & water repellency, fire retardency and Ore proofing finish.</p> <p>Heat setting process for synthetic or polyester cotton blended fabric.</p> <p>Finishing of silk and woolen fabric like Decatizing, Weighting of silk, Tampering & breaking of silk, Scroopy finish of silk, Carbonization of wool, Milling, Shrink proofing of woollen fabric etc.</p> <p>Moth proofing.</p> <p>Chemical processing & finishing of Linen fabric.</p> <p>Brief idea about Nano finishes & Plasma Technology.</p>
23 & 24	<p>i) Lubrication of various parts and machine.</p> <p>ii) Maintenance, general observation.</p>	<p>i) Lubrication of various parts of machinery, High density oil, Light oil, Heat resistant oil, and grease etc.</p> <p>ii) Runtime maintenance of various processing machines used in bleaching and finishing sections.</p>
25	Project work / Industrial visit (optional)	
26	Examination	

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Third Semester: (Duration: Six Months)

Week No.	TRADE PRACTICAL	TRADE THEORY		
1-4	<p>(a) Running of a model effluent treatment plant in a laboratory with chemical dosing and filtration and aerations.</p> <p>(b) Calculations of energy consumption.</p> <p>(c) Calculation for Steam requirement.</p>	<p>(a) Awareness about environmental pollution in water/ effluent and air in industry and their control. Working principle of Effluent treatment plant and its running. Water & air pollution parameters and their permissible limits. Noise pollution & its control. Permissible limit of noise in different cases. Health hazards for water, air & noise pollution. Measures for prevention or reduction of level of water/air/noise pollution.</p> <p>(b) Energy saving in Textile Chemical Processing.</p> <p>(c) Awareness about ecofriendliness (eco-mark scheme) of textile products. Eco-parameters and their permissible limits for textiles. Ban of certain azo dyes.</p>		
5-6	<p>Demonstration of running of boilers.</p> <p>Calculation of water, heat, & steam consumption.</p>	<p>Boilers and its efficiency. Efficient, use of steam. Efficient utilization of water & water circulation system. Different heating system and drying system and their efficient uses.</p>		
25	Project work / Industrial visit (optional)			
26	Examination			

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Fourth Semester: (Duration: Six Months)

Week No.	TRADE PRACTICAL	TRADE THEORY
1-10	<p>(a) Dyeing of wool, silk, flax, jute with suitable dyes, using suitable machines.</p> <p>(b) Dyeing of different blended textiles.</p> <p>Familiarization with fabric dyeing machines.</p> <p>(d) Testing of colour fastness properties to different agency.</p> <p>(e) Matching of shades (Both manual and by computer aided colour matching instrument)</p>	<p>Study of tests for colour fastness for dyed textiles against washing, rubbing, hot ironing, UV-light or sunlight exposure and perspiration etc.</p> <p>Detailed Study of Fibre Dyeing machine like Rotary and package dyeing machines. Yarn Dyeing machines. Fabric dyeing machines like jigger, Padding mangle, winch, soft flow, Air flow and multi flow dyeing machines, Continuous dyeing ranges, beam dyeing machine, HTHP, jet dyeing machine, etc. Brief study of Garment dyeing machines.</p> <p>Study of steaming, soaping and developing for dyeing and after treatment.</p> <p>Manual colour matching and computer aided colour matching. Measurement of colour parameters.</p>
11-21	<p>(a) Printing of white/coloured fabrics with different dyes / colourant.</p> <p>Direct/Discharge and resist styles of printing by screen printing method.</p> <p>(b) Screen making for printing.</p> <p>(c) Printing defects and Trouble shooting in Printing.</p> <p>(d) Familiarization with Printing Machines.</p>	<p>Definition of Textile Printing. Difference between Printing and Dyeing. Fabric requirements for Printing. Methods of Printing and Styles of Printing. Study of various printing machines like roller printing, flat bed printing, rotary screen printing machines. Concept of Transfer printing machine. Brief study of Garment Printing machine.</p> <p>Printing with direct, azoic, vats, pigments and reactive dyes on cotton. Printing with acid dyes/pigment colours on Nylon and with disperse dyes/ pigment colours on Polyester fabric.</p> <p>Printing of blended textiles. Specialized printing - Raised printing, Rubber printing, Brasso printing, Bronze printing etc.</p> <p>Principles and applications of CAD systems and their advantages. Brief study on the principles of</p>

		Laser engraving, wax jet engraving and ink jet engraving. Brief study of Digital Inkjet Printing machine for fabric and garments.
22-24	Electronic maintenance of programmer & temperature controller in dyeing machines and Printing machines.	Maintenance of pneumatic controls in Padding mangle Routine maintenance of various processing machines used in dyeing and printing sections. Fire-hazards Extinguisher Need of Quality Control in Textile Wet processing. Flow charts indicating Process Control and Quality Control tests to be carried out in Desizing, Scouring, Bleaching, Mercirizing, Souring, Dyeing, Printing and Finishing. Brief study of ISO 9000, ISO 14000 certification and SA 8000 Certification.
25		Revision
26		Examination

Note:

- 1. The trainees should be taken around the textile mills, to show them the machining processes in the shop floor especially those, which are not possible in the training institutes, in different sections concerned. There should be at least four industrial visits for 1) Preparatory Chemical Processing, 2) Dyeing, 3) Printing 2) Finishing Sections.**
- 2. Necessary workshop calculation should also be taught along with concerned theory portion wherever it is found essential.**

TRADE : TEXTILE WET PROCESSING TECHNICIAN

LIST OF TOOLS AND EQUIPMENT

A. TRAINEES TOOL KIT FOR 16 TRAINEES + 1 INSTRUCTOR

Sl. No.	Name and Description of the Item	Quantity
1	Cement or iron tanks for storing water (1200x1200x1200mm)	2 Nos.
2	Thermometer ranging 0-110°C and 0-300QC	3 Nos. EACH
3	Wooden vats 2100x750x600mm height	4 Nos.
4	Electric water/heater (GiserJ 45 litres)	1 Nos.
5	Water bath for 6 dye pots with electrical heating and temperature control	8 Nos.
6	Stainless steel dye pots of 500 ml each (40 Pes)	40 Nos.
7	Yam reeling arrangement (one big and one small)	2 Nos.
8	Electronic Weighing balance with capacity 1 gm to 200gm and 5gm to 1kg.	4 Nos.
9	Kit boxes with locks for keeping cloth /dyes etc.	16 Nos.
10	Prepared Screens for Printing for single colour with rubber squeeze	8 Nos.
11	Small Capacity Electrode boiler (lab model) 1 Nos.	1 Nos.
12	12 Buckets (enamelled and plastics) 6 each, 10 litres 8 Nos.	8 Nos.
13	13 Basins (enamelled and plastics) 4 in each lab 8 Nos.	8 Nos.
14	14 Wooden Almirah for dyes and chemicals 2 Nos.	2 Nos.
15	15 Scissors, Measuring Tape, Transparency Sheet 3 Nos.	3 Nos.
16	16 Inclined Table (1.5m length x 1.5 breadth 0.75 m depth) for screen and spray printing covered with PVC sheet and padded cloth	2 Nos.
17	Instructor's table and chair 1Set	1Set
18	18 Scientific microscope (10 to 200 magnification) 2 Nos.	2 Nos.
19	19 Fibre staining solution and solvents for solubility tests for fibre identification	As required
20	Electric oven/ air circulating drying woven	1 No.
21	Lab model jigger machine	1 No.
22	Lab model padding mangle with one chamber hot air drying machine	1 No.
23	High temperature (i.e. 130 degree C) glycerin bath lab dyeing machine for polyester dyeing with the dye pots.	6 Nos.
24	Crock meter	1 No.
25	First Aid box	As required
26	Fire extinguisher, (Acid type or as required)	2 Kg
27	Glass rods 200mm long, with ends rounded, thick quality, (10mm dia.)	16 Nos.
28	24 Tables with glass top and 440-Watt tube light for exposure of Printing screen	1 No.
29	Twaddle - Hydrometers No. 1 to IV (full set)	2 Sets
30	Measuring cylinders capacity (1000, 500, 250, 100, 25, 10 ml)	8 sets
31	Monopan Lab-model Electronics balance having 200gram Capacity, With Accuracy of minimum: 0.1gm	4 No.
32	Precision electronic weighing balance Accuracy minimum : 0.0 1gm	2 Nos.
33	Stainless steel vessels capacity (2 lits., 3 lits., 5 lits. With cover) 2 Nos.	2 Nos.
34	34 Kerosene stoves (industrial types) - 4 in each lab. Or Gas cylinder and Gas Burners	4 Nos.
35	Stainless steel rods 12 mm thickness with wooden handle 300mm length	4 Nos.

36	36 Bowls with rods for mixing dyes (Stainless steel) 500 ml	32 Nos.
37	Glass beakers capacity 100,250,400,500 ml. (Thick glass quality) Corning / Borosil	16 Nos. each
38	Steaming Chest (Cottage type) Lab model 500 X 500 X 500 mm, or Lab model steamer	1 No.
39	Pressure cooker (domestic type) 5 &10 lit. Capacity with stainless steel container	2 Nos.
40	Measuring pipette (Graduated)	8 Nos. each Capacity 0ml, 25 ml, 50 ml
41	Measuring flasks with glass cork capacity 250ml, 500ml, 1000ml (for preparing standard solutions)	8 Nos.
42	Asbestos sheets 250x100mm or 200x200mm	32 Nos.
43	Wire gauges 150x150mm or 250x250mm	32 Nos.
44	Test tubes (thick class) 150mm (glass)	144 Nos.
45	Funnels 75mm dia. (glass)& 150mm dia. (glass)	32 Nos. & 6 nos
46	Watch glasses (75mm dia.) & 150mm dia. (glass) for weighing dyes etc.	32 Nos. & 6 nos
47	Plastic Spatulas (flat type) 150mm long	32 Nos.
48	Test tube holders 32 Nos.	32 Nos.
49	Pair of tongs (copper or stainless steels)	32 Nos.
50	Brushes for cleaning apparatus	32 Nos.
51	Plastic bottle with nozzles (spray bottles 500ml capacity) 16 Nos.	16 Nos.
52	Reflectance Spectro-photometer & P - IV computer, printer and associated colour-matching software.	1 No.
53	MBTF - Light fastness tester	1 No.
54	SASMIRA Lander-o-meter	1 No.
55	Grey scale (staining & loss of depth), and Blue wool standard cloth	As required
56	Lab hank dyeing machine/Beaker dyeing open bath machine	1 No.
57	57 Wooden A4 size frame for print screen making.	1 No.
58	Nails and Coarse cotton twine threads, cello tape	As required
59	Sona-coat (Gelatin) or Polyvinyl alcohol gel	As required
60	Binder and Ammonium diachrometer (sensatizer)	As required

B. For Laboratory Stores/Students Lab

Sl. No.	Name and Description of the Item	Quantity
1	Plastic jars capacity 10-15 liters for storing chemicals	12 Nos.
2	2 Glass bottles with stopper 3 lit.	12 Nos.
3	Glass jars with stopper 10-12 lits. 12 nos	12 Nos.
4	Glass siphones for transferring acids/alkalis etc	3 Nos.
5	Rubber gloves (big size not medical type)	3 Nos.
6	Gum boots	3 Nos.
7	Reagent bottles capacity 200ml. with stopper for 2N standard solution on each table	144 Nos.
8	Small water baths (copper) dia 150 - 200 mm.	16 Nos.
9	Sand baths (iron) dia. 150mm (for direct heating on burner/stove etc.)	16 Nos.
10	Glass bottles (embered/dark coloured) 3 lits, (for storing chemicals which may be affected by light)	6 Nos.
11	Pastle and mortars 150mm dia. Porcelain (for making powders 150 dia	8 Nos.

	iron of solids)	
12	Indicator bottles 50 ml capacity	8 Nos.
13	Porcelain beakers 1 lit. capacity for preparing caustic soda solution	3 Nos.
14	Goggles for safety precaution while handling corrosive chemicals	3 Nos.
15	Burette 50 ml capacity	3 Nos.
16	Conical flasks 250 ml	12 Nos.