Syllabus for the trade
of

PLASTIC PROCESSING OPERATOR

(SEMESTER PATTERN)

UNDER

CRAFTSMEN TRAINING SCHEME

Designed in: 2013

By

Government of India
Central Staff Training and Research Institute
Directorate General of Employment & Training
Ministry of Labour & Employment
EN -81, Sector-V, Salt Lake City,
Kolkata-700091

List of the Members of Trade Committee Meeting for the trade of **"Plastic processing Operator"** held on 26.03.2012 at ITI, Panvel, Raigardh, Maharashtra.

Sl. No.	Name and Designation ,Shri	Organization	Remarks
1.	Mr. R. K. Pathak, Director	ATI, Mumbai – 400 022	Chairman
2.	Mr. R.N. Bidnur, Ex.GM	Reliance Industries	Member
3.	Mr. Vikash Rane, Plant Incharge	Reliance Industries	Member
4.	Mr. Shenoy, Director	Indian Plastic Institute	Member
5.	Mr. N.P.Shinde	Dipak Fartilizers, Taloja	Member
6.	Mr. Kulkarni	Godson Electronics, Panvel	Member
7.	Mr. Thomas Joshep	Kisan Group, Boieser, Taloja	Member
8.	Mr. Pankaj Gore	Weener Plastic, Boieser, Taloja	Member
9.	Mr. D.S.Jagtap, Principal	I. T. I, Panvel	Member
10.	Mr. R.S.Sankhe, Vice Principal	I. T. I, Panvel	Member
11.	Mr.S.W.Kale,Training Officer, PPO	COE Wada, Thane.	Member
12.	Mr. M. T. Tamboli, Instructor, PPO	I. T. I, Vangaon	Member
13.	Mr. P.G. Chavan, Instructor, PPO	I. T. I, Ambarnath	Member
14.	Mr. V.K. More, Instructor, PPO	I. T. I, Panvel	Member
15.	Mr. G.M.Pachbhoi, Instructor, PPO	I. T. I, Panvel	Member
16.	Mr. Abhinoy Nandi, Dy. Director	ATI, Mumbai	Member

List of members attended the Workshop to finalize the syllabi of existing CTS into Semester Pattern held from 6th to 10th May'2013 at CSTARI, Kolkata.

Sl. No.	Name & Designation	Organisation	Remarks
1.	R.N. Bandyopadhyaya, Director	CSTARI, Kolkata-91	Chairman
2.	K. L. Kuli, Joint Director of Training	CSTARI, Kolkata-91	Member
3.	K. Srinivasa Rao, Joint Director of Training	CSTARI, Kolkata-91	Member
4.	L.K. Muhkerjee, Deputy Director of Training	CSTARI, Kolkata-91	Member
5.	Ashoke Rarhi, Deputy Director of Training	ATI-EPI, Dehradun	Member
6.	N. Nath, Assistant Director of Training	CSTARI, Kolkata-91	Member
7.	S. Srinivasu, Assistant Director of Training	ATI-EPI, Hyderabad-13	Member
8.	Sharanappa, Assistant Director of Training	ATI-EPI, Hyderabad-13	Member
9.	Ramakrishne Gowda, Assistant Director of Training	FTI, Bangalore	Member
10.	Goutam Das Modak, Assistant Director of Trg./Principal	RVTI, Kolkata-91	Member
11.	Venketesh. Ch. , Principal	Govt. ITI, Dollygunj, Andaman & Nicobar Island	Member
12.	A.K. Ghate, Training Officer	ATI, Mumbai	Member
13.	V.B. Zumbre, Training Officer	ATI, Mumbai	Member
14.	P.M. Radhakrishna pillai, Training Officer	CTI, Chennai-32	Member
15.	A.Jayaraman, Training officer	CTI Chennai-32,	Member
16.	S. Bandyopadhyay, Training Officer	ATI, Kanpur	Member
17.	Suriya Kumari .K , Training Officer	RVTI, Kolkata-91	Member
18.	R.K. Bhattacharyya, Training Officer	RVTI, Trivandrum	Member
19.	Vijay Kumar, Training Officer	ATI, Ludhiana	Member
20.	Anil Kumar, Training Officer	ATI, Ludhiana	Member
21.	Sunil M.K. Training Officer	ATI, Kolkata	Member
22.	Devender, Training Officer	ATI, Kolkata	Member
23.	R. N. Manna, Training Officer	CSTARI, Kolkata-91	Member
24.	Mrs. S. Das, Training Officer	CSTARI, Kolkata-91	Member
25.	Jyoti Balwani, Training Officer	RVTI, Kolkata-91	Member
26.	Pragna H. Ravat, Training Officer	RVTI, Kolkata-91	Member
27.	Sarbojit Neogi, Vocational Instructor	RVTI, Kolkata-91	Member
28.	Nilotpal Saha, Vocational Instructor	I.T.I., Berhampore, Murshidabad, (W.B.)	Member
29.	Vijay Kumar, Data Entry Operator	RVTI, Kolkata-91	Member

GENERAL INFORMATION

1.	Name of the Trade	: **PLASTIC PROCESSING OPERATOR**
2.	NCO Code No.	:
3.	Duration	: one year (2 Semesters)
4.	Power Norms	: 13.6 Kw
5.	Space Norms	: Adequate space need to be decided
6.	Entry qualification	: Passed 10th class examination under 10+2 system of education with Science and Mathematics or its equivalent.
7.	Unit Size	: 16 (No. of Trainees)
8.	Instructor's/ Trainer's Qualification:	a) Tenth Class Passed + NTC + NAC
		: b) Preference will be given to a Candidate with Craft Instructor Certificate

Note : At Least One Instructor must have Degree/Diploma in Mechanical Engg

Syllabus for the Trade of
"PLASTIC PROCESSING OPERATOR " under C.T.S.
(Semester Code No. PPO-01)

SEMESTER – I

SI. NO	TRADE PRACTICAL	TRADE THEORY	ENGINEERING DRAWING	WORKSHOP CALCULATION AND SCIENCE
1.	Familiarization with the institute, importance of trade training , machinery used in the trade, types of jobs made by the trainees in the trade : introduction to safety and fire fighting equipments and their use related to plastic processing	Introduction about safety ,fire fighting equipments its precautions observed in the section. Introduction about occupational health hazards followed in plastic industries	Free hand sketching of straight lines rectangles, circles, polygons, simple solids, cubes etc.	Introduction to Iron & Steel – its properties & uses. Difference between Iron & Steel.
2.	Marking, Hacksawing, Filiing on mild steel flat as per required dimensions using steel rule, calipers, punches etc.	Linear measuring tools. Introduction to hand tools used for marking, punching, sawing, filing etc. marking table.	Free hand sketching of hand tools used in the section.	Definition of Various heat treatment processes of Steel and its alloys.
3.	Practice of drilling (through & blind holes)on flat surfaces . Forming internal threads with taps to standard size and preparing studs and bolts	Bench vice-its types and parts. Files – its description types, grades & cut. Hacksaw - its type use and care.	Introduction about Lettering – its practice – types of lettering (single stroke & gothic letters)	-do -
4.	-do-	Introduction to dies and taps its use and care. Introduction to precision measuring instruments - varnier caliper, micrometer, height gauge, bevel protector. Least count calculation and its measurements.	Introduction to Engineering drawing, drawing board, T- square, set- squares, scales, French curves and its uses.	Decimal & fractions. Algebra – addition, subtraction, multiplication and division.

5.	Safety precaution and first aid about electricity while working on machines. Basic knowledge about fixing and connecting of electrical accessories like switches, holders, fuse, plug sockets on electrical board.	Safety precaution and first aid while working on machine. Drilling machines-its type – (portable, bench type, pillar type), parts & working procedure.	Free hand sketching of nuts bolts and screw threads with dimension.	-do-
6.	-do-	-do-	Dimensioning – its types, terms, notations, placing of dimensions, unit of dimensioning and its general rules. Scales - its introduction, types and application in drawing.	Algebra - solving of simple equations, quadratic equations.
7 & 8	Testing of various plastics material.	Identification of various plastics material (Thermoplastic & Thermosetting plastic), its properties and applications.	Introduction of Projection - its principle and method of projections. Draw orthographic projections in I & III angle (simple components to complex components).	-do-
9 - 11	**Injection Moulding** Familiarization with the basic idea of mechanical electrical and hydraulic system of injection moulding machines in IRO and its different parts and their respective functions. Operating and controlling of injection	**Injection Moulding** Introduction to Injection Moulding Process. Introduction about injection moulding machine – its types (plunger type, screw type). Description about different types of	-do-	Definition of heat & temperature and their differences. Relation between Fahrenheit, Celsius scale.

	moulding machine in IRO & TRO (fitting of mould ejector, locking and cooling of mould, adjusting feed of screw or ram, temperature controlling, fitting and adjusting nozzle, controlling of injection pressure and speed).	injection Moulds and its parts. Processing defects, causes, remedies. Trouble shooting of injection moulding machine.		
12 & 13	Microprocessor Controlled & PLC Injection Moulding Machine Machine setting procedure, setting for process-parameters.	Microprocessor Controlled & PLC Injection Moulding machine. Introduction to basic concepts of Micro-processor control, comparison of Micro-processor controlled machine with conventional machine. Introduction to basic principles & features of Thermoset Injection Moulding Process, All electrical Injection Moulding Machines, Multi injection Moulding Machines	- do -	Square root – the square root of perfect square of a whole number and decimals.
14.	Oiling, lubrication and preventive maintenance of injection moulding machine	Introduction about Oiling, lubrication and preventive maintenance of injection moulding machine	Drawing of Isometric views from orthographic projection and vice-versa.	Temperature measuring instruments used in the workshop – their description and use
15	**Compression Moulding**: Familiarization with basic idea of mechanical electrical and hydraulic system of compression moulding machine and its different parts and their	**Compression Moulding** Introduction to Compression Moulding Process. Compression moulding machine – (Hand operated & Semi automatic) its	- do-	Definition of mass & weight, their units and differences.

	respective functions.	description, different parts and their respective functions.		
16 & 17	Operating and controlling of compression moulding machine in IRO & TRO, movement of platen top or bottom adjustment and its control. adjusting pressure in terms of per square area and total tonnage, fitting and heating of moulds, controlling temperature, checking of bulk factor/density etc.	Description about different types of compression Moulds and its parts. Processing Defects, Causes,and Remedies etc. Trouble shooting of Compression Moulding Machine.	- do -	Forces – definition its unit, compressive, tensile and shear force. Newton's laws of motion & gravitation.
18	Oiling, lubrication and preventive maintenance of compression moulding machine	Transfer Moulding Process. Introduction about Oiling, lubrication and preventive maintenance of compression moulding machine	Draw third view from the given two orthographic views.	Definition and calculation of speed, velocity, acceleration & their units. Difference between speed & velocity.
19 & 20	Fibre Reinforce Plastic (FRP) process (hand layup process).	Introduction abut fibre reinforce plastic process method.	- do -	-do-
21 to 24	Revision			
25	Project Work / Industrial Visit			
26	Examination			

Syllabus for the Trade of
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(Semester Code No. PPO-02)

SEMESTER – II

Sl. NO.	TRADE PRACTICAL	TRADE THEORY	ENGINEERING DRAWING	WORKSHOP CALCULATION & SCIENCE
1-3	Blow Moulding Process Familiarization with basic idea of mechanical, electrical, hydraulic and pneumatic system of blow moulding machine and its different parts and their respective functions.	Blow Moulding Process Introduction to Blow Moulding Process and its latest processing techniques. Blow moulding machine (Hand operated & Automatic) –its description, different parts and their respective functions. Sequence of operation.	Sectional views – introduction, application, section line, full sections, half sections, aligned, section, revolve section, remove section.	Calculation of areas of plane figures formed by the combination of standard figures.
4-6	Operating and controlling of blow moulding machine in IRO & TRO (setting of die, adjusting mandrel, controlling Parisian, adjusting thickness uniformity).	Description about Blow Moulds and its parts. Processing defects, causes, remedies etc. Trouble shooting of Blow moulding machine.	-do-	Calculation of volumes of standard solids prisms, cylinder, spheres, cone, pyramid, frustum of cone and pyramids.
7	Oiling, lubrication and preventive maintenance of Blow moulding machine	Introduction about Oiling, lubrication and preventive maintenance of Blow moulding machine	-do-	-do-
8-10	Extrusion Process Familiarization with basic idea of mechanical, electrical and hydraulic system of extrusion machine and its different parts and	Extrusion Process Introduction to different extrusion process and its latest processing	Reading of assembly drawing for Injection Moulding Die Assy. Draw different parts with dimensions, fits	Definition of work, Power & energy – their units'. Calculations of work, Power & energy.

	their respective functions.	techniques. Extrusion machine – its description, use of different parts and their functions.	and tolerance.	
11-13	Operating and controlling of extrusion machine in IRO & TRO. (changing and cleaning of screws in extruder, adjusting and controlling temperature, adjusting screen pack arrangement, adjusting variable speed, setting and adjusting die head for pipe, profile, reprocessing and blown film etc).	Description about extrusion dies and its parts. Processing defects, causes, remedies etc. Trouble shooting of extruder machine.	. -do-	-do-
14	Oiling, lubricating and preventive maintenance of extruder machine.	Introduction about Oiling, lubrication and preventive maintenance of extruder machine.	Reading of assembly drawing for Compound Moulding Die Assy. Draw different parts with dimensions, fits and tolerance.	Friction its definitions, and component its effect. Laws of friction, angle of friction and its related calculations.
15-17	Operating and controlling of thermoforming & vacuum forming machine in IRO & TRO.	Thermoforming & vacuum forming – its brief description and use. Processing technique of different plastic material.	-do-	-do-
18-19	Demo about rotational moulding machine.	Introduction about Rotational Moulding process.	Reading of assembly drawing of Blow Moulding Die Assy. Draw different parts with dimensions, fits and tolerance.	Electricity – definitions, Ohm's Law, electrical work, power, energy and units.
20	Practice for Annealing, Stress Relieving, Warpage Control, De-flashing and Printing of	Post Moulding Operaions: Annealing, Stress Relieving, Warpage	-do-	-do -

	finish products.	Control, De-flashing and Printing.		
21	Practice of Pre-drying of Plastics Materials	Importance of Pre-drying of Plastics Materials	-do-	Ratio, proportion and its problems.
22-23	Fabricating acrylic sheet ABS- sheet, HIPS sheet, HMHDPE blocks etc. involving, drilling screwing buffing sanding.	Brief description of machinery used for buffing, sanding, welding and their application.	Reading of assembly drawing of Extrusion Die Assy. Draw different parts with dimensions, fits and tolerance.	-do-
24	Statistical Process Control (SPC) Statistical Quality Control (SQC) Product Dimensions Measurements	Introduction to Statistical Process Control (SPC), Statistical Quality Control (SQC). Product Dimensions Measurements	-do-	-do-
25	i) Revision			
26	Examination			

LIST OF TOOLS AND EQUIPMENT FOR 16 TRAINEES + 0NE
FOR THE TRADE OF "PLASTIC PROCESSING OPERATOR"

A. TRAINEE'S TOOL KIT (SEMESTER – I & II)

Sl. No.	Name of the Items	Quantity
1	Steel Rule 300 mm in English and Metric combined	17 nos.
2	Engineer's Square 150 mm with knife edge	17 nos.
3	Hacksaw frame adjustable with pistol grip for 200-300 mm blade	17 nos.
4	Centre punch 100 mm	17 nos.
5	Prick punch 150 mm	17 nos.
6	File flat Medium 250 mm	17 nos.
7	File flat 2nd cut Medium 250 mm	17 nos.
8	File flat safe edge 200 mm	17 nos.
9	File triangular smooth 200 mm	17 nos.
		17 nos.

B. TOOLS AND EQUIPMENTS (SEMESTER – I & II)

Sl. No.	Name of the Items	Quantity
1	Caliper inside spring type-150 mm	17 nos.
2	Caliper outside spring type-150 mm	17 nos.
3	Divider spring type – 150 mm	17 nos.
4	Odd leg caliper firm joint 0- 150 mm	17 nos.
5	Screw driver – 150 mm	17 nos.
6	Screw driver – 200 mm	17 nos.
8	File card	17 nos.
9	Hammer Ball Peen 0.5 kg with handle	17 nos.
10	Workbench 240 cm x 120 cm x 75 cm (Each bench fitted with 4 vices)	4 nos.
12	Bench Vice of 150 mm	17 nos.
13	Outside micrometer 0-25 mm, with 0.01 mm least count	4 nos.
14	Vernier caliper-Range 200 mm, with 0.02 mm least count	4 nos.
15	Vernier bevel protractor-Blade range 150 and 300 mm, dial 1^0, least count 5' (min.) with head, Acute Angle attachment	2 nos. each
16	Vernier height gauge - Range 300 mm, with 0.02 mm least count	2 nos. each
17	Surface plate 300 x 300 x 80 mm	2 nos. each
18	HSS Twist Drill with St. Shank Ø5 to Ø12 mm in steps of 0.5 mm	2 nos. each
19	HSS Twist Drill St. Shank Ø5 mm to Ø12 mm in steps of 1 mm	2 nos. each
20	Portable hand drill (electric)	2 nos. each
21	Drill Chuck with key with 12 mm capacity	2 nos. each
22	Taps and dies complete set in box M5, M6, M8, M10	2 nos. .

23	Steel lockers for 8 trainees each (Pigeon Cup Board)	2 nos.
24	Steel Almirah 180 cm x 60 cm x 45 cm	2 nos.
25	Fire Extinguisher	2 nos.
26	Fire buckets with stand	2 nos.
27	Electric switches, fuses, holders, lamps, wood boards, plug sockets, solder, flux, wires and cables, battens, and other consumables.	As required

- **General Machinery Shop Outfit (as per the table)**

Sl.No.	Name and description of Machines	Quantity
1	Pillar Drilling Machine 0-20 mm capacity.	1 no
2	Bench Pedestal Grinding machine (General purpose) D.E. with 20 cm dia. capacity	1 no.
3	Test Equipment for plastic (MFI & Hardness Tester)	1 no
4	Plastic scrap grinder	1 no.
5	Pre heater 12 trays of 25 kgs. of 20 minutes capacity.	1 no.
	Injection Moulding (SEMESTER –I I)	
1	Hand operated Injection Moulding machine with (a) 13 grams capacity (b) 30 grams capacity	1 no. each
2	Automatic Injection Moulding Machine with moulds and accessories as required 40 T capacity (with Microprocessor/PLC controller)	1 No.
	Compression Moulding (SEMESTER –I)	
1	Hand operated Compression Moulding Machine with moulds – 40 T. capacity	2 nos.
2	Automatic compression moulding machine with moulds and accessories as required – 40 T capacity (with Microprocessor /PLC controller)	1
	Blow Moulding (SEMESTER – II)	
1	Hand operated Blow Moulding Machine with moulds and accessories of 1/4 liter capacity	1 no.
2	Auto Blow Moulding Machine with set of moulds and accessories 1 liter capacity (with Microprocessor/PLC controller)	1 no.
	Extrusion Process (SEMESTER – II)	
1	30 mm extruder with downstream lines such as film pipe with re-processing unit.	1 no.
2	Pipe extrusion machine of 30 mm capacity	1 no.
3	Extrusion for Blow film single layer of 30 mm capacity	1 no.
4.	Printing Machine with oxidizing Treatment nut	1 no.