

**SYLLBUS FOR THE TRADE OF  
“ PLASTIC PROCESSING OPERATOR”  
UNDER THE CRAFTSMEN TRG. SCHEME**

**General Information**

1. Name of the Trade : Plastic Processing Operator
2. N.C.O. code nos. : 901'25, 901'30, 901'35, 901'40, 901'45,901'50, 901'55,  
901'60.
3. Duration of Training : One year.
4. Entry Qualification : Pass in 10<sup>th</sup> class examination under 10+2 system of  
education or its equivalent.
5. Course Break up : (a) Practical instruction : 28 hrs/week.  
(b) Theoretical instruction : 10hrs / week.  
(c) Extra curriculum Activities including library study  
and physical training l: 4 hrs/week.

**MEMBERS OF THE TRADE COMMITTEE FOR THE TRADE OF  
“PLASTIC PROCESSING OPERATOR”  
UNDER CTSS**

S/Shri	
1. Alok Ghosh, President Indian plastic federation, 13-A, Govt. Place East, Calcutta-69.	Chairman
2. G. Jana, Director, CSTARI, Howrah-711105	Member
3. N.K. Guha, Director, SISI, 111 & 112, B.T. road, Calcutta-35.	”
4. R. Santhanam. Dy. Director, Central Instt.of plastic Engg. & Tools, Guindy, Madras-32	”
5. D.K. Dutta, Dy. Director, Dre. Of Indl. Trg., govt. Of west Bengal, 67, bentinck st., cal-69.	”
6. S. Kar, Jt. Director of Ind. (P&S), cottage & small Scale Industries, Govt. of west Bengal, new secretariat Bldg, Calcutta-1.	”
7. G.K. Bhaiya, Neptune plastic, 16, Indian Exchange place Calcutta-1.	”
8. S.C. Bhutoria, Chairman, Indian plastic Instt. (Calcutta Chapter), 13-A, Govt. place East, cal-69.	”
9. Dr. P.K. senguputa, Head, Deptt. Of plastics & rubber Technology, University college of science & Technology, 92, A.P.C. road, cal-9.	”
10. Dr.S.K. sanyal, Polymer Engg. Lab. Chemical Engg. Deptt., Jadavpur University, Calcutta-32.	”
11. B.K. Tekriwal, Indian plastic federation, 13A, govt. place East, Calcutta-69.	”
12. R. Guha. C/o ferroplast Indian plastic Instt. Development Of manpower (Calcutta chapter), 13A, govt. place east, Calcutta-69.	”
13. D. pal, Asstt. Director, SISI, 111 &112, B.T. Road, Calcutta-35.	”
14. P.K. Chakravorty, Jt. Director of training, CSTARI, Howrah-711105.	Secretary
15. S.R.Pal, Dy. Director of training, CSTARI, Howrah-711105.	Member

**WEEK – WISE BREAKUP OF SYLLABUS FOR THE TRADE OF  
“ PLASTIC PROCESSING OPERATOR ”  
UNDER THE CRAFTSMEN TRAINING SCHEME**

<b>Week No.</b>	<b>Practical</b>	<b>Trade Theory</b>	<b>Workshop Science &amp; Calculation</b>	<b>Engg. Drawing</b>
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
<b>1.</b>	Familiarisation 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 equipment and their use.	Importance of safety and general precautions observed in the sec. Importance of the trade in the development of industrial economy of the country. Working system of ITI Including store procedure.	Additions, subtractions multiplication & division of common fractions.	Free hand sketching of straight lines rectangles, circle etc.
<b>2.</b>	Markingout lines, hacksawing to given dimension, sawing of different types of metals of different sections.	Linear measurements-its units description and use of different kinds of hand tools used in bench work. Description, use and care of ‘V’ blocks and marking table.	Mass-Unit of mass, force, weight of a body- Unit of weight.	Free hand sketching of hand tools used in the section.
<b>3.</b>	Filing flat and square to a given dimension.	Bench vice-its types ,use care and maintenance, Hacksaw frames and blocks-their types & method of using.	Application of simple fractions to shop problems.	Free-hand sketching of polygens, simple solids, cubes etc.
<b>4.</b>	Marking of straight and parallel lines with odd leg calipers and steel rule, Marking of areas using scribing blocks & dividers.	Files-description, their grades, cuts and use, Try square, ordinary depth guage, protectors, calipers, their description and use.	C.G.S. & F.P.S. system of units of force, weight etc.	Free hand sketching of rectangular block, cylinders etc. – their dimensioning.
<b>5.</b>	Chipping flat surface along a marked line.	Hammer and chisel-their types and use.	Reduction of common fraction to decimal fractions.	Free hand sketching of nuts and bolts.
<b>6.</b>	Marking according to simple blue prints- locating position of holes. finding centre of round bar with the help of ‘V’	Drilling machines-different types of drills-Bench type, pillar type, radial type gang and multiple drilling machine.	Shop problems involving FPS & CAS system of unit and their conversion.	Free hand sketching of screw with threads

	blocks and scribing block etc.			with dimension.
7.	Marking and drilling of holes on flat surface( through holes and blind holes).	Micrometer-its types & construction features, reading of micrometer – use and care.	Decimal fraction – addition and subtraction.	Sketching of washers and keys with dimension from samples.
8.	Forming internal threads with taps to standard size & preparing studs and bolts.	Locking device – nuts and bolts- their types- description and use. Taps and Die-their description and use.	Heat and temperature thermometric scales conversion of °F to °C and vice versa.	Free hand sketching of nuts and bolts from samples- dimensioning technique.
9.	Safety precaution and first-aid against electricity joints single and standard conductors.	Safety precaution and first-aid for electric shock. Common terms used in electrical work conductors and insulators. Symbols and signs used in Electrical Technology.	Conversion from decimal fraction to simple fraction and vice versa.	-- do --
10.	Measurement of current, voltage, power and energy by using voltmeter, ammeter, wattmeter and energy meter.	Simple electrical circuit, essential requirements of any electrical circuit, series and parallel different types of resistance, fuses, earthing etc.	Temperature measuring instruments used in the workshop-their description and use.	Explanation of simple orthographic projection – 1 <sup>st</sup> angle projection.
11.	Practice in fixing and connecting electrical accessories such as switches, holders, fuse, plug sockets on T.W. boards.	Electrical Units-amps, volts and resistance, ohms law and its application.	Conversion of decimal fraction to simple fraction – shop problems.	Explanation of simple orthographic projection – 3 <sup>rd</sup> angle.
12.	Forming a simple electrical circuits (series and parallel )measuring insulation resistance and earth resistance. <b>Achievement.</b> On Completion of 12 weeks training, trainees will be able to :	Types, grades and size of insulated wires and cables-their proper selection & use.  (1) Use Fitters's hand tools (2) Do marking according to simple blue print. (3) Do filing, hacksawing, chipping and drilling	Heat and temperature conversion of °F to °C and vice versa.	Sketching of simple solid in 1st angle projection.

		(4) Protect himself from electric shock and observe electrical safety precautions while working on machine. (5) Fix and connect electrical accessories such as switches, holders, fuse, plug, sockets etc.		
<b>13.</b>	Familiarisation with the basic idea of mechanical electrical and hydraulic system of Injection moulding Machine( in IRC ) and its different parts and their respective functions.	Plastic processing machinery Injection Moulding Machine description and use, different parts and their respective function Material and their types- Metal, ceramic and earth, polymer-their proper ties & use.	Square root- the square root of perfect square of a whole number and of decimals.	Sketching of different views of simple solid and hollow objects in 3 <sup>rd</sup> angle projection.
<b>14 &amp; 15.</b>	Operating and controlling of Injection Moulding Machine in IRO(Fitting of mould injector, locking and cooling of mould, adjusting feed of screw or ram, Temperature controlling, Fitting and adjusting nozzle, adjusting injector pressure and speed).	Polymer substances- definition of wood, plastics, rubber, body tissues etc. Groups of plastics – Thermoplastic – its properties use and application.	Heat and temperature Heat treatment hardening, annealing, tempering, square root of a whole number and of decimals.	Sketching of different views of hollow objects in Ist angle projection.
<b>16 &amp; 17.</b>	Operating and controlling of Injection Moulding Machine in TRO ( Trial Run Observation ) using thermoplastic material as available.	Low density polythelene, High density polythelene & polypropylene- their properties use and application, Moulding defects- their remedies.	Heat treatment- normalizing, annealing their standards and measurement.	Sketching of different views of irregular shape in 3 <sup>rd</sup> angle projection.
<b>18.</b>	Operating and controlling of Injection Moulding in TRO using thermosetting material as available.	Thermosetting group of plastics P.F. resin and U.F.resin properties use and application .	Percentage and its application shop Problem.	-do-
<b>19.</b>	Oiling ,Lubrication and preventive maintenance of conjection Moulding	Processing technique of low and high density polyethylene PF and	-do-	Use of different types of lines and

	Machine.	UF resin, preventive maintenance of machinery process of oiling and lubrication.		symbols for drawing.
<b>20.</b>	Familiarisation with basic Idea of mechanical electrical And hydraulic system of compression Molding Machine and its different Parts and their respective functions.	Compression Molding Machine its description, different parts and their respective functions styrene group of plastic polystyrene high impact polystyrene their properties use and application.	Properties of metal Meaning of tenacity, elasticity, malleability brittleness with examples.	Use of different types of lines and symbols for drawing. Electrical symbols and velding symbols.
<b>21 &amp; 22.</b>	Operating and controlling of compression Moulding Machine in IRO (movement Of platen top or bottom adjustment and control, adjusting pressure in terms of per –square area and total lonnage, Fetting and heating of modules controlling temperature, checking of bulk factor/ dencity etc.)	Styrene group of plastic ABS and SAN their properties , use and application. Nylone -6, 66,etc. their properties and use. Acatal homopolymer and copolymer, their group, properties and use, MF resin-its properties and application.	Metric system- metric weight and measurement- units and conversion factors. Shop problem on metric weights and measurement.	Drawing of simple isometric views of square, rectangular objects and various types of prism.
<b>23 &amp; 24.</b>	Operating and controlling of compression moulding Machine in IRO using thermoplastic material as available.	PVC- flexible and rigid – their properties and use SMC & DMC group of thermosetting group of plastic their properties and application.	Properties of metal- brittleness, hardness, compressibility, ductility etc. with example.	-- do --
<b>25.</b>	Operating and controlling of compression Moulding machine in TRO using thermosetting group of plastic as available.	Acrylic polycarbonate- their properties, use and application. Processing technique of different plastic material, Moulding defects and their remedies.	Ratio and proportion- shop problem.	-- do --
<b>26.</b>	Oiling, lubricating and preventive maintenance of compression Moulding Machine.	Preventive maintenance of compression Moulding Machine Technique of oiling and lubrication.	-- do --	Use of Drawing instrument . Drawing simple figure and solids with dimension

				and title.
27.	Familiarisation with basic idea of mechanical, electrical and hydraulic system of Extrusion machine and its different parts and their respective functions.	Extrusion machine- its description and use, different parts and their respective functions. Cellulose-description, its properties and use.	Mensuration- area of Triangles, square and rectangle.	Isometric drawing with dimension of various simple objects.
28 to 29.	Operating and controlling of Extrusion machine in IRO. (Changing and cleaning of screws in extruder, adjusting and controlling temperature, adjusting screen pack arrangement, adjusting variable speed, setting and adjusting die head for profile and film etc. )	Cellulose acetate, cellulose nitrate & cellulose CAB-their description and use. Processing technique of different plastic material, moulding defects and their remedies.	Work- Unit of wash. Energy-different form of energy. Simple applied problem.	-- do --
30 to 31.	Operating and controlling of Extrusion Machine in TRO using thermoplastic material as available.	Thermoplastic- PET, PBT polybutylene terephthalate, PET- polyethylene, terephthalate-their description, properties and use. Polyester resin- its properties and use.	Area of circle, regular polygons. Calculation of area. Volume and weight of simple solid bodies.	Drawing of isometric views of various type of prism.
32.	Operating and controlling of extrusion Machine in TRO using thermosetting material as available.	Epoxy resin – its properties and use. Processing techniques of different plastic material.	Calculation of area of square and hexagonal prisms-shop problem.	-- do --
33.	Oiling, lubricating and preventive maintenance of extrusion Machine.	Hydraulic functions- its application in plastic processing machine- preventive maintenance of Extrusion machine.	Power, Horsepower and Brake H.P. Mechanical advantage and velocity ratio Applied problem.	Drawing of simple objects in 1st angle projection using drawing instrument .
34.	Familiarisation with basic idea of mechanical, Electrical and hydraulic system of Blow-Moulding Machine and its different parts and their respective functions.	Blow-Moulding Machine- its description, different parts and their respective functions. Sequence to be followed in operating the machine.	Determination of volume and weight of simple solid bodies and hollow objects.	Drawing of different views of simple solid and hollow objects in 3 <sup>rd</sup> angle projection using

				drawing instrument
<b>35 to 36.</b>	Operating and controlling of Blow-Moulding Machine in IRO(Setting of die, adjusting mandral, controlling parison, adjusting thickness uniformity).	Brief description of Filled thermoplastic(Reinforced).their properties, use and advantage, silicon resin its properties and use, processing technique of different plastic material.	-- do --	-- do --
<b>37.</b>	Operating and controlling of Blow-Moulding Machine in TRO using thermoplastic material as available.	Foamed plastic- its properties,use and application, Processing technique of different plastic material.	Mecahnical advantage and velocity ratio-applied shop problem.	Section & sectioning orthograph ic views of various solid objects.
<b>38.</b>	Operating and controlling of Blow-Moulding Machine in TRO using thermoplastic material as available	Thermoforming – its brief description and use. Processing technique of different plastic material.	-- do --	-- do --
<b>39.</b>	Preventive maintenance of Blow-Moulding Machine-oiling and Lubrication.	Moulding defects- their remedies. Preventive maintenance of Blow Moulding Machine.	Meaning of stress and strain. Modulus of elasticity and ultimate strength with examples.	Sectioning orthograph ic views of hollow objects with section views.
<b>40 to 41.</b>	Testing of mechanical properties-operating testing machine to determine tensile impact, clongation and compressive strength.	Testing and quality control with respect to manufacturing parameters. Brief description of different testing machine and their use.	Trigonometric functions use of trigonometric tables- applied problem.	Sectioning orthograph ic view of hollow objects with section views.
<b>42.</b>	Location of stores concentration and testing of aesthetic property.	Identification of aesthetic property of plastic material.	-- do --	--do --
<b>43.</b>	Cup flow testing- identification of various plastic in relation to properties.	Identification of various plastics in relation to properties.	Logarithm-use of log tables for multiplication & division.	Sectioning orthograph ic views of hollow objects with section views.
<b>44.</b>	/laminating glass fibre	Procedure for laminating	-- do --	-- do --

	polyster etc.	glass fibre, polyste r etc.		
45.	Casting of PVC, eporey etc.	Die and Mould—their types and construction.	Calculation of area of triangles and polygons with the aid of trigonometry.	Blue print reading—preparatio n of simple work ing drawings from sketches.
46.	Fabricating acrylic sheet ABS—sheet etc. involving drilling,screwing,buffing sanding.	Special feature of die and mould in relation to processing.	-- do --	-- do --
47.	Fabricating HIPS sheet,HMHDPE blocks involving drilling,screwing,buffing sanding.	Brief description of machinery used for buffing and sanding—then application.	Reading of simple graphs.Exercises in reading monographs.	-- do --
48.	Industrial visit.	Industrial visit.	Industrial visit.	Industrial visit.
49.	Repetation of previous skills.	Revision of previous lessons.	Revision of previous lessons.	Revision of previous lessons.
50.	-- do --	-- do --	-- do --	-- do --
51.	-- do --	-- do --	-- do --	-- do --
52.	Final test.	Final test.	Final test.	Final test.

**Achievement :** On completion of training the trainees will be able to :

1. Operate processing machineries like –
  - (a) Injection Moulding Machine
  - (b) Compressino Moulding Machine
  - (c) Blow Moulding Machine
  - (d) Extruders etc.
2. Identify various types of plastics in relation to properties.
3. Perform testing and quality control with respect to manufacturing.
4. Perform running maintenance of machines and observe safety precaution thereof.

**TRADE : PLASTIC PROCESSING OPERATOR**  
**LIST OF TOOLS & EQUIPMENT FOR THE FIRST**  
**52 WEEKS ( 1 YEAR )**  
( For a batch of 16 trainees )

Sr No.	Name of the Tools & Equipment	Quantity for Instructor	Trainees	Total
1	2	3	4	5
1.	Rule steel 15 cm with metric graduations.	1	16	17
2.	Square try 10 cm blabd.	1	16	17
3.	Caliper outside 15 cm spring.	1	16	17
4.	Caliper inside 15 cm spring.	1	16	17
5.	Caliper 15 cm hermaphrodite.	1	16	17
6.	Divider 15 cm spring.	1	16	17
7.	Scriber 15 cm.	1	16	17
8.	Punch Centre 10 cm.	1	16	17
9.	Screw driver 15 cm.	1	16	17
10.	Chisel cold 10.	1	16	17
11.	Hammer ball pein 0.45 kg with handle.	1	16	17
12.	Hammer ball pein 0.22 kg with handle.	1	16	17
13.	File flat 25 cm second cut.	1	16	17
14.	File flat 25 cm smooth.	1	16	17
15.	File half round 2 <sup>nd</sup> cut 15 cm.	1	16	17
16.	Hacksaw frame adjustable 20-30 cm.	1	16	17
17.	Safety goggles.	1	16	17
18.	Dot slot punch.	1	16	17

**Tools-Instruments & General Shop Outfit per Unit**

1.	Plate surface 45 cm * 45 cm	2
2.	Marking table 91 * 91 * 122 cm height	1
3.	Portable hand drill (electric) 0 to 6 mm	2
4.	Drill brace hand o to 12 mm	2
5.	Drill twist S/S 1.5 to 12 mm by 0.4 mm	1 set.
6.	Drill twist S/S 8 mm to 15 mm by ½ mm	1 set.
7.	Taps and dies complete set in box B.S.F.	1
8.	Taps and dies complete set in box (Metric)	1
9.	Micrometer 25-50 mm outside	3
10.	Vernier caliper 20 cm	1
11.	Vice Bench 12 cm jaw	16
12.	Bench working 240 cm * 120 cm * 60 cm	4
13.	Lockers with 8 drawers (standard size)	2
14.	Almirah 180 * 90 cm * 30 cm	2
15.	Metal rack 182 cm * 182 cm * 4.5 cm	1
16.	Black Board with easel	1
17.	Fire extinguisher (For 4 units)	2
18.	Fire buckets	2

19. Hand hammer 1 kg with handle	2
20. Rule wooden 4 fold 600 mm	2
21. Saw tennon 250 mm	2
22. C-Clamps ( 100 mm,150 mm and 200 mm )	2 each
23. Drill Machine hand 6 mm cap	2
24. Rawal plug tool and kit	2 sets
25. Ammeter 1 ma to 500 ma DC	10
26. Ammeter 0 to 1 Amp. DC	10
27. Volt Meter 0-300 V A.C.	10 Nos.
28. A.C. Ammeter 0.5 & 0.25 Amp.	5 each
29. Magger 500 volts	1
30. Electric switches, fuses, holders, lamps, teak wood boards, plug sockets, solder, flux, wires and cables, battens, round blicks and other consumables.	As required.

### **General Machinery Installation**

1. Drilling Machine Pilar Sensitive 0-20 mm cap. With swivel table motorized with chuck & key.	1
2. Grinding machine (General purpose) D.E. pedestal with 20 cm dia. Wheels rough & smooth with twist drill grinding attachment.	1
3. 30 mm extruder with downstream lines such as film pipe with re-processing unit to process PVC, IDP & RDP.	1
4. Auto blow Moulding Machine with set of moulds.	1
5. Auto Injection Moulding Machine 80 T Cap.	1
6. Band operated injection moulding machines	
(a) 13 grams capacity	1
(b) 30 grams capacity	1
(c) 60 grams capacity	1
7. Compression press 60 T cap. With moulds.	1
8. Test Equipment ( Tensile, MFI, Hardness, Izod, Impact identifying unit etc. )	1 set
9. Accessories & moulds including scrap grinder	1 set
10. Hand operared Blow Moulding Machine ---	
(a) 1 litre capacity	1
(b) 3 litre	1
11. Hand operated compression moulding machine 60 ton cap.	1 No.
12. Preheater 12 trays of 25 kgs. Of 20 minutes capacity.	1 No.