

COURSE CURRICULUM IN THE AREA / SECTOR OF

PLASTICS PROCESSING

FOR UPGRADATION OF

ITIs into

CENTRES OF EXCELLENCE (CoE)

Upgradation of ITIs into Centers of Excellence-Broad guidelines for implementation of the Broad Based Basic Training in ‘ Plastic Processing’

These Centres will be providing multi skill training to meet the skill requirement of Plastic Processing sector of industry with their active involvement in all aspects of training. The training will be provided in three parts as given below:

- ✓ Training in Basic skill areas for a period of one year.
- ✓ Training in Advanced modules for next six months.
The testing & certification for the Basic skill training during first year & also for advanced training during next six months will be conducted by NCVT.
- ✓ Training in specialized modules mainly in the industry (The course curricula, duration etc will be designed in consultations with the IMC/local industry. The trade testing & certification for this component will be done jointly by the State Government & Industry. Said certificate will be recognized by NCVT

As per the recommendations of the EFC, Training in the shop floor should constitute 25-40% of the curriculum.

The training programme will have multi-entry and multi-exit provisions:

- ✓ trainee can opt to go to the labour market after completing broad based basic training of one year duration as well as after completing 1½ year of training.
- ✓ trainee can join training after some time for advanced/specialised training in another module of same sector .
- ✓ ITI pass out trainee of the particular trade(s) from the conventional system can seek admission for advanced/specialised training in relevant sector.

In first year, curricula in the Area/Sector of “**Plastic Processing**”, uniform rotation for eight weeks each in the Basic Modules as mentioned below will be taken up. The trades from where existing infrastructure i.e. equipment/ instructor etc could be utilized for the training in “**Plastic Processing**” sector is given below:

Basic modules	Name of the Module	Trade(s) from where existing instructor could be utilized
PPBT-01	Basic Fitting and Measurement	Fitter / PPO
PPBT- 02	Basic Electrical & Electronics and Computer Skills	-
PPBT- 03	Injection Moulding	PPO
PPBT- 04	Compression Moulding	PPO
PPBT- 05	Extrusion Moulding	PPO
PPBT- 06	Blow Moulding	PPO

For these modules, Trade Practical will be 28 hours /week and Trade theory for 4 hours /week. Apart from above Generic modules as mentioned below will be taught throughout the year.

PPBT-07- WORKSHOP CALCULATION & SCIENCE.....2 hrs/week

PPBT-08-ENGINEERING DRAWING2hrs/week

G-01-ENTERPRENEURSHIP AND COMMUNICATION SKILLS..... 2hrs/week

In addition, 4 hours/week have been kept for Library studies & Physical Training.

Vocational Instructors:

NAME OF THE MODULE	No. of Vocational Instructors (VIs)
PPBT – 01 to 06	Six VIs one each for 6 module of relevant trades
PPBT-07 & PPBT - 08	One VI having Diploma in relevant field
G-01	One contract/part time / guest faculty for Generic module, ENTREPRENEURSHIP AND COMMUNICATION SKILLS –G-01

The eligibility and other criteria will be as follows:

Eligibility: 10th pass under 10+2 system .

Batch size: 96 trainees, 16 in each module (20% supernumeraries be allowed to take care of drop outs as already exist under CTS)

Admission:

For basic training, admissions are to be made in August / Feb each year.

Fee Structure:

Fee Structure may be decided by States Govt. in consultation with IMCs . It may be desirable to prescribe a uniform tuition fee for a sector in all Centres of Excellence of a state.

Space: Since workshop/theory class rooms are envisaged to be accommodated in the existing building of the ITI, therefore, following norms are prescribed only for new infrastructure is to be created.

- (1) Workshop space of minimum 100 sqm for each basic module
- (2) Three Theory classrooms of 30 sqm each

The Theory classrooms should have latest infrastructure including AV aids as per details given below:

1. Suitable Chairs/ tables*	-	As required
2. OHP/Epidiastope	-	1 No.
3. Laptop computer/PC (latest) & LCD projector**	-	1 No.
4. Magnetic white board	-	1 No.
5. White board	-	1 No.
6. Flip chart	-	1 No.
7. Storage Almirah	-	As required

(* Optimum utilization of space/flexibility may be kept in view)

(**Keeping in view the constraints of funds under the scheme, it is proposed to procure only one set of Laptop computer/PC / LCD projector for CoE. However, States may procure additional Laptop computer/PC/LCD projector from their funds) While selecting furniture, it should be kept in mind that these are meant for Centres of Excellence. Criteria like maximum flexibility/utilization of space should be kept in view.

Office Equipment:

For each CoE one Scanner, one Photocopy Machine and one PC/printer along with suitable accessories/furniture and internet connection (if not already available in the institute) is proposed to be provided for each CoE, in addition to the equipment prescribed in the syllabus.

Addition/alteration/Construction:

For Civil Works, tentative amount of Rs 40.00 lakhs have been proposed per CoE. It is envisaged to have separate block/ wing for the Centres of Excellence in the ITI campus. In case space is available in the existing building of an ITI for taking up new areas as per requirement of the cluster of Industry, the existing space will be renovated as per the need. Alternately, separate block will be built up in the same campus keeping in view the space requirements of the Electrical Sector .

While planning for addition /alteration/Construction of workshop and Class rooms, following may be kept in view:

- ✓ concept of a Centre of Excellence
- ✓ the fact that the requirement of funds for construction /addition /alteration for advanced training will be higher than that of basic training

Publicity

Wide publicity & advertisement be given for better response . The role of the local as well as the concerned Industry is very vital for the success of this program.

States may consider providing additional equipment/ other facilities like separate Library/upgradation of existing Library, Conference Hall/ Committee Room etc. from their own funds.

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BROAD BASED BASIC TRAINING (ONE YEAR)

BASIC MODULE	NAME OF THE BASIC MODULE	DURATION IN WEEKS
PPBT – 01	BASIC FITTING and MEASUREMENT	8 weeks
PPBT - 02	BASIC ELECTRICAL & ELECTRONICS and COMPUTER SKILLS	- do -
PPBT - 03	INJECTION MOULDING	- do -
PPBT – 04	COMPRESSION MOULDING	- do -
PPBT – 05	EXTRUSION MOULDING	- do -
PPBT – 06	BLOW MOULDING	- do -
PPBT – 07	ENGINEERING DRAWING	@ 2 HRS / WEEKS 48 WEEKS
PPBT - 08	WORKSHOP CALCULATION & SCIENCE	- do -
G – 01	ENTREPRENEURSHIP AND COMMUNICATION SKILLS (given separately)	- do -

UPGRADATION OF ITIs into CENTRES of EXCELLENCE (CoE)

SECTOR / AREA : PLASTICS PROCESSING

**BROAD BASED BASIC TRAINING
(One Year)**

BASIC MODULE – PPBT –01: BASIC FITTING and MEASUREMENT

(Duration - 8 weeks)

BROAD BASED BASIC TRAINING

(First Year)

BASIC MODULE – PPBT- 01 : BASIC FITTING and MEASUREMENT (Duration - 8 weeks)

I) COURSE CONTENT

a) Measurement-2 weeks

b) Basic Fitting –6 weeks

Practical	Theory
Physical introduction to measuring instruments – handling of instruments – exercise in the use of Linear measuring instruments such as Steel rule of different ranges.	Introduction to Metrology, Objectives of Metrology – measurements – principles – methods of measurement
Outside calipers, inside calipers for measuring inside, outside parameters.	Terminology used in Metrology – Accuracy – Repeatability – Resolution etc.
Vernier calipers – Least count, exercise in outside measurement, inside measurement s, depth gauge.	SI units of measurements – physical quantities under SI system
Measurement of flat rectangular objects, cylinder objects, hollow components, threaded components	Selection of measuring instruments, care, use and maintenance of measuring instruments – Heading of precision instruments – Vernier Caliper, Micrometer, Height Gauge, Dial Gauge (Plunger and bevel type) with stand (0.01mm Resolution), checking squareness using combination set.
Exercises on external & internal measurements using Micrometers and Height gauges	
Introduction to safety including fire equipments and their uses.	Manufacturing processes in brief. Out line of various subjects to be covered.
Familiarize with Fitter’s hand tools.	Introduction to hand tools and their safety.
Filing a flat surface of Mild steel and cast iron. Check for flatness, straightness and squareness	Environmental Factors and personal Safety.
Simple blue print reading	Marking and punching tools and their uses.
Mark out according to simple blue print	Hacksaw – types, specification and their uses.
Punching.	
Hack sawing to dimension	

Practical	Theory
<p>Filing flat and square to size to an accuracy of + 0.1mm</p> <p>Marking and punching of stepped and angular component and finishing the part of the required shape and size to an accuracy of + 0.1mm</p> <p>Exercise on angular measurement using combination set & Vernier Bevel protector</p>	<p>Classification and specification of files, shapes, sizes & grades.</p> <p>Bench vice—constructional details Selection criteria of files</p> <p>Vernier Bevel Protector – reading and use. Use of thread gauge & screw thread micrometer</p>
<p>Center drilling, drilling, reaming, counter sinking, counter boring and tapping for various sizes of mild steel and tapping on various sizes of mild steel material</p>	<p>Drilling machine – Types – Drilling operation – Drill bits.</p> <p>Reamers – types, care and maintenance</p>
<p>Fitting exercise – simple to complex (Involving drilling, tapping, reaming, counters sinking, counter boring and slide fitting.)</p>	<p>Taps and Dies – Description, care and maintenance</p> <p>Lubrication for tapping</p> <p>Determination of drill size for tapping</p> <p>Selection of Spindle RPM for drilling</p> <p>Tool holding and work holding devices</p> <p>Types of Fasteners</p> <p>Standard size of threads, types</p> <p>Applications of adhesives, Metal Shellac etc.</p>
<p>Manufacturing of different components individually and assembling with fasteners</p>	<p>Limits and fits according to IS :919</p>

I) TOOLS, MACHINERY, EQUIPMENTS etc. for a batch of 16 trainees

Sl. No.	Items	Qty.
1.	Steel rule 30 cm graduated both in English & Metric units	17 Nos.
2.	Outside spring caliper 150 mm	17 Nos.
3.	Inside spring caliper 150 mm	17 Nos.
4.	Hermaphrodite caliper 150 mm	17 Nos.
5.	Divider spring 150 mm	17 Nos.
6.	Center punch 100 mm	17 Nos.
7.	Hammer B.P.0.5 kg	17 Nos.
8.	Combination pliers 150 mm	17 Nos.
9.	Safety glasses	17 Nos.
10.	File flat bastard 300 mm	17 Nos.
11.	File flat 2 nd cut 250 mm	17 Nos.
12.	Engineers screw driver	17 Nos.
13.	File flat smooth 200 mm	17 Nos.
14.	Cold chisel flat 25 X 200 mm	17 Nos.
Tools, Instruments and General shop Out fits		
15.	Granite Surface plate 1000 mm x 630 mm grade 1	4 Nos.
16.	Metal stand Table for surface plate 900 x 900 x 1200 mm	4 Nos.
17.	Screw driver set (multi heads)	1 Set
18.	Scribing block universal 300 mm	2 Nos.
19.	Vee Block universal 300 mm	2 Nos.
20.	Try square 150 mm	2 Nos.
21.	Outside spring caliper 200 mm	2 Nos.
22.	Divider spring 200 mm	2 Nos.
23.	Inside spring caliper 200 mm	2 Nos.
24.	Straight edge steel 1 metre	1 Nos.
25.	Straight edge steel 500 mm	1 Nos.
26.	Steel tape 2 metre in case	1 Nos.
27.	Spirit level 2V 250, 05 metre	1 Nos.

Sl. No.	Items	Qty.
28	Hammer B.P. 800 gms with handle	6 Nos.
29	Screw driver, heavy duty 300 mm with handle	4.Nos.
30	Hammer lead 1 kg	2 Nos.
31	Combination set 300 mm	2 Nos.
32	Spindle blade screw driver 100 mm	2 Nos.
33	Allen hexagonal key 2.5 to 12	2 sets
34	Spanner D.E.C.P. Series 2(7 pcs.each)	6 sets
35	Adjustable spanner 12 Nos.	3 Nos.
36	Reduction sleeve MT as required	1 set
37	Angle plate size 200 x 100 x 200 mm	2 Nos.
38	Angle plate adjustable 250 x 150 x 175	2 Nos.
39	Solid parallels in pairs (different sizes) in Metric	2 parts
40	Oil can pressure feed 500 mg	6 Nos.
41	Oil stone 150 x 50 x 25 mm	2 Nos.
42	Twist drills 3mm to 13 mm (Parallel shank)	1 set
43	Drill chuck 0-20 with taper shank	1 Nos.
44	Center drill A1 to 5	2set
45	Grinding wheel dresser (star type)	1 Nos.
46	Clamps C 100 mm	2 Nos.
47	Clamps C 200 mm	2 Nos.
48	Tap and die set in box metric pitch	1 set
49	Drill HSS taper shank	1set
50	File flat 2 nd cut 250 mm	4 Nos.
51	File flat smooth 200 mm	4 Nos.
52	File H/R 2 nd cut 250 mm	4 Nos.
53	File triangular smooth 200 mm	4 Nos.
54	Needle file set	1 Nos.
55	File square 2 nd cut 250 mm	4 Nos.
56	Reamer 6 mm to 13 mm by 1 mm	1 set
57	Hacksaw adjustable 250 – 300mm with blades	8 Nos.
58	Hand vice 50 mm jaw	2 Nos.
59	Magnifying glass 75 mm	2 Nos.
Measuring Instruments		
60	Micrometer outside 0-25 mm	4 Nos.
61	Micrometer outside 25-50 mm	4 Nos.
62	Micrometer outside 50-75 mm	2 Nos.
63	Micrometer depth gauge 0-150 mm	8 Nos.
64	Direct reading Vernier caliper 0 to 300	4 nos.
65	Vernier height gauge 250 mm	1 No
66	Vernier bevel protractor with least count of 5 minutes	1 No
67	Dial gauge	4 Nos.
68	Lever type dial gauge	4 Nos.
69	Dial gauge stand	4 Nos.
70	Screw pitch gauge for metric pitches (0.5 to 7 mm)	2 Sets
71	Radius gauge metric set (1 – 6 mm)	1 set
72	Feeler gauge	1 No

General installation		
73	Sensitive Drilling machine pillar 12 mm capacity with accessories	2 Nos.
74	Radial drill 1200 mm motorized with tapping attachment	1 No
75	Drilling machine pillar 20 mm capacity with accessories	1 No
76	Pedestal grinder	1 No
77	Hand Drilling Machine Power (10 mm)	1 No

Sl.No.	Workshop furniture	Qty
1	Suitable Work Tables with vices	As required
2	Stools	17 Nos.
3	Discussion Table	1 No
4	Tool Cabinet	2 Nos.
5	Trainees locker	2 Nos.
6	Fire fighting equipments, First aid box etc	As required
7	Book shelf (glass panel)	1 No
8	Storage Rack	As required
9	Storage Shelf	As required

BROAD BASED BASIC TRAINING

(First Year)

BASIC MODULE – PPBT- 02: BASIC ELECTRICAL & ELECTRONICS and COMPUTER SKILLS

(Duration - 8 Weeks)

i) COURSE CONTENT

- a) Electrical & Electronics – 4 weeks
- b) Computer Skills – 4 weeks

Practical	Theory
Demonstration of use of Safety equipments and artificial respiration. Use of hand tools. Joining Practice with single and multi-stand conductors of different wires. Joining practice of bare conductors – soldering Practice on Printed circuit boards – Demonstration & practice on soldering the Aluminium conductor, cable joints. Use of Aluminium flux and Alca 'P' solder. Demonstration and practice of crimping of various wires.	Importance of Safety – description, specification, general care & maintenance of common hand tools. Wires & cables – conductors, Insulators & semiconductors – their shapes, sizes with respect to low, medium & high voltage Soldering Printed circuit boards & and its uses – Different fluxes for different purposes on metals – crimping equipment – Joining of conductors by soldering. Importance of Preventive Maintenance and routine tests Earthing and its importance.
Making of simple circuit with a lamp and battery Study and use of Multimeters – measurement of current, voltage, resistance in DC/AC circuits Demonstration & verification of ohm's law – Series circuits – Parallel circuits Demonstration & practice on connecting & replacement of common electrical accessories in circuits – use of tong tester and megger.	Resistance, Voltage, Current , open circuit and short circuits – Ohm's law – Voltage drop – series & parallel circuits – Power & energy relations – electrical measuring Instruments – Multi-meters Common electrical accessories used in Industries – Bus – bars, Relays, contactors, Circuit Breakers, etc. Fuses and its ratings – materials used.
Simple wiring practice with distribution boards, Junction Boxes, Main switches two way and intermediate Switches. Identification of different parts of DC generators – Testing and measuring the field and armature resistances Identification of different parts of AC	Induction principles – Electro magnetism – Faradays' Laws Single phase & Poly phase system 3 phase star – delta connections, Impedance & power factor- Principle & applications of DC motors, series, Shunt & compound motor – AC motors

<p>motors – Testing and measurement on Induction motors – Demonstration on Alternators. Identification and testing of transformers. Grouping & testing of cells for a specified voltage & current –Preparation of battery charging.</p>	<p>Transformers & its applications Chemical effect of electric current – Rechargeable batteries – care & maintenance of cells AC motor starting with DOL starter and Star – Delta Starter</p>
<p>Identification of different type of capacitors – Testing of capacitors – Identification and Testing of assorted diodes PNP / NPN Transistors – Uni. – junction transistor, Field effect Transistor & Silicon Controlled Rectifiers ICs etc. – Demonstration on rectifiers – Identification of ICs</p>	<p>Static Electricity – capacitors & its applications Fundamentals of a electron theory – semiconductor devices – Symbols – specifications – diodes, Transistors, Uni.-junction Transistor, Field effect Transistor Silicon Controlled Rectifier & ICs. Half wave, full wave & bridge rectifier with filters, DC power supply.</p>
<p>Booting the Computer, Opening Windows, menus, using the mouse, refresh computer desktop using right click of the mouse, create a directory in XP and linux, format a floppy, create a file using notepad, save the file in Floppy, copy the file into hard disc, copy a file from hard disk to floppy, create a directory in floppy, create a directory in hard disk, use my documents, use start menu for opening an application, to open a document recently written, change control panel settings for display, change the volume name of the hard disks using system properties., Familiarise with Key board and Keys.</p>	<p>Introduction To computer fundamentals and its parts, Familiarising with Disk Drives, Booting of a Computer system, Using the mouse, right click, left click and use of operating systems like widows XP , linux, menu system, Tool bars, File structures, directories, Moving and Copying a File from floppy to hard disk, hard disk to floppy disk, creating directories. Formatting floppy disk.</p>
<p>Techniques of Changing desktop wall paper, changing Desktop Screen properties, Control Panel, User Accounts, customizing icons, writing a sample text using Notepad, using paint for drawing figures to get accustomed with mouse. Saving a file. Using windows explore, install a software, remove a software, add new hardware to the system (like a printer, change the system date and time changing the regional setting of the system like country, currency, date format, using start menu, creating desktop short cuts.</p>	<p>Use of desktop, control panel settings, Explorer, regional settings creating shortcuts, Use of simple applications like Paint, notepad.</p>
<p>Open internet explorer, change the settings in IE, customize Internet explorer for default applications, enable cookies, change the security settings, setup an</p>	<p>Study of internet explorer, Modem, settings in the IE and mode, dial up and broadband connections , Outlook express, viewing email from the web site</p>

<p>inter net connection, user ID and password saving the computer for future usage, setup outlook express for an e-mail account, setup server authentication settings receive and send emails from the account. Search using Yahoo and Google for certain topics, download a file from the inter net, save the downloaded file. Set up the net meeting using MSN or Yahoo Messenger.</p>	<p>and outlook express, creating email accounts, using search engines, Video conferencing MS chat.</p>
<p>Open MSWord , create a new file, save a file, open an existing file, save as a text file, type a paragraph, set for left and right margins, change the letters from upper to lower case, vice versa, cut a paragraph, copy a paragraph, set tab positions, set hanging indents, draw a simple table, insert rows, insert columns, erase rows, erase columns, search the document for spelling corrections, print the letter in a printer attached, in portrait and landscape</p> <p>Open excel, and workout the following to understand the theory commands : Prepare a salary bill for ABC organization with Column A for names, Column B for Basic salary, Column C for DA, Column D for addition of B&C to get the full salary. Add the Column D into a new cell as TOTAL amount. Copy the sheet into sheet 2. Sort the sheet 1 as per names. Sort the sheet 2 as per Total Salary. Insert two rows in sheet 1 merge these rows. Enter heading as Salary bill. Use border and shading for the entire used column. Print the sheet using set print area with margins, and use scale factor for reduction and enlargement. Use portrait and Landscape.</p>	<p>Creating sample documents using MSWord, Text wrapping, Text formatting, changing letters to different case, drawing table, mail merging, page formatting, using different font types printing a document.</p> <p>Using Excel as spread sheet, familiarising with cells, formulae, text, numbers and date, using shortcuts for entering date and numbers in progressive cells, copying formulae, text and numbers, using borders, merging cells, un merging, changing cell width, row height, printing an area of the sheet, options of printing like fit to paper, shrinking, etc, using different sheets in a work book, changing colour of cells, fonts, text.</p>

II TOOLS, MACHINERY, EQUIPMENTS etc. for a batch of 16 trainees

SI No.	Item	Qty
1	Combination pliers 200 mm insulated	16 Nos.
2	Screw driver 100mm, 200 mm	16 Nos each
3	Neon tester 500 V pencil bit type	16 Nos
4	Electrician knife	16 Nos
5	Hammer ball pein 0.25 kg	16 Nos
6	File round 150 mm	16 Nos
7	Plier side cutting 200 mm	4 Nos
8	Pliers round nose 200 mm	4 Nos
9	Pliers flat nose 150 mm	4 Nos
10	Pliers long nose 200 mm	4 Nos
11	Firmer chisel 25 mm	4 Nos
12	Hammer ball pein 1.0 kg	1 No.
13	Wall jumper octagonal 37mm x 450 mm	1 No.
14	Center punch 100 mm	1 No.
15	Steel measuring tape 20 mts	1 No.
16	Allen keys	1 Set
17	Spanner double ended set of 6	2 Sets
18	Adjustable spanner	1 No.
19	Steel rule 300 mm	4 Nos
20	Electric soldering iron 35 w	4 Nos
21	Electric soldering iron 125 w	2 Nos
22	Rubber gloves 5000 V	2 pairs
23	Multimeter 0-5, 100, 200, 500, milli amperes 0-100-1000, 10000 ohms 0-150, 300, 600 V AC/ DC	2 Nos
24	Bar magnet	1 No.
25	Horse shoe magnet	1 No.
26	Electric drill machine 6mm capacity universal type 250V	1 No.
27	D.C. shunt motor 1 H.P. 250 V (Laboratory type)	2 No.
28	Universal motor 750 W AC/DC 250 V	2 No.
29	Squirrel cage induction motor 1 H.P. 230 V with DOL starter	1 No.
30	Transformer single phase 500 ma / 250 /12 V	4 Nos.
31	L.F. oscilloscope with attenuation probes	1 No.
32	Star Delta starter (contact type 8 points)	1 No.
33	Tong tester	1 No.
34	Megger	1 No.
35	DC Power Supply 0 V – 110 V / 5 A	1 No.
36	Auto – transformer – variac 230 V	1 No.
37	Tweezers	16 Nos.
38	Crimping tools	1 Set
39	PENTIUM IV COMPUTER or latest WITH 512 MB RAM WITH FOLLOWING ACCESSORIES DVD COMBO DRIVE WITH THE LATEST X VERSION, HARD DISK WITH 80 GB OR ABOVE, 17 MONITOR, AGP GRAPHICS CARD WITH 64 MB, 10/100 ETHERNET CARD, MODEM	9 No.

40	CENTRALISED UPS WITH 5KVA CAPACITY	1 No.
41	LASER PRINTER	1 No.
42	DOT MATRIX PRINTER	1 No.
43	WINDOWS XP OPERATING SYSTEM	09 No.
44	MS – OFFICE 2000	09 No.

Sl. No	Workshop furniture	Qty
1	Suitable Work Tables	As required
2	Stools	17 Nos
3	Discussion Table	1 Nos
4	Tool Cabinet	2 Nos
5	Trainees locker	2 Nos
6	Fire fighting equipment, first aid box etc	As required
7	Book shelf (glass panel)	1 No.
8	Storage Rack	As required
9	Storage shelf	As required

Sl. No	Furniture – Computer Lab	Qty
1	Suitable Computer Tables	As required
2	Computer Chairs	17 Nos
3	Tool Cabinet	2 Nos
4	Trainees Locker	2 Nos
5	Book shelf (glass panel)	1 No.
6	Shoe Rack	As required
7	Vacuum cleaner	1 No.

BROAD BASED BASIC TRAINING

(First Year)

BASIC MODULE – PPBT- 03: INJECTION MOULDING

(Duration - 8 Weeks)

COURSE CONTENT

Practical	Theory
1. 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.	1. Plastic processing machinery Injection moulding machine – Hand operated different parts and their respective function.
2. 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).	2. Polymer – their properties and use, Basic plastics and difference between thermosetting and thermoplastic properties, use and application.
3. –do-	3. Low density polythene, High-density polyethylene, polypropylene, their properties use and application.
4. Operating and controlling of Injection Moulding Machine in TRO (Trial Run Observation) using-thermoplastic material as available.	4. Styrene groups of plastic – ABS and SAN their properties use and application. PVC, Nylon group, polycarbonate, their properties, use and application.
5. –do-	5. Basic parts of mould and construction details involving Injection moulding technique, Injection moulding machine, different parts and their respective function, brief description about Micro processing machine.
6. Operating and controlling of Injection Moulding Machine in TRO using thermosetting material as available.	6. Basic parts of mould and construction details in moulding Injection moulding technique, Injection moulding machine, different parts and their respective function, brief description about Micro processing machine.
7. Oiling , Lubrication and preventive maintenance of injection Moulding Machine.	7. Preventive maintenance of machinery – process of oiling and lubricating and making history sheet of machine.
8. Identification and Testing of plastic	8. Brief description of Identification of plastic different testing machine and their use.
9. Process Optimization	9. Process Controls , Process Parameters and its interaction for optimization.

**MACHINERIES
INJECTION MOULDING**

SL. NO.	DESCRIPTION	UNIT
1	Hand operated Injection moulding M/C, different capacity	4 Nos
2	Automatic Injection moulding mchine 40 T.cap	1 No.
3	Micro processor Injection moulding machines 140 T.cap	1 No.
4	Granulate small & Big size	1 each
5	Master Batch Mixing nut	1 No.
6.	Moulds and accessories	As required

BROAD BASED BASIC TRAINING

(First Year)

BASIC MODULE – PPBT- 04: COMPRESSION MOULDING

(Duration - 8 Weeks)

COURSE CONTENT

Practical	Theory
1. Familiarisation with basic idea of mechanical electrical and hydraulic system of compression Moulding Machine and its different parts and their respective functions.	1. Plastic process machinery, compression moulding machine, Hand operated different parts and their respective function.
2. Operating and controlling of compression Moulding Machine in IRO (movement of platten top or bottom-adjustment and control, adjusting pressure in terms of per-square area, and total lonnage, Fitting and heating of moulds controlling temperature, checking of bulk factor/density etc.)	2. Compression moulding machine automatic different parts and their respective function.
3. –do-	3. Thermosetting plastic material Phenol formaldehyde (PF) Urea Formaldehyde (UF) melamine formaldehyde (MF) polyester Based resin in various form and epoxy resin – properties, use and application.
4. Operating and controlling of compression moulding Machine in IRO using thermoplastic material as available.	4. Thermosetting plastic material Phenol formaldehyde (PF) Urea Formaldehyde (UF) melamine formaldehyde (MF) polyester Based resin in various form and epoxy resin – properties, use and application.
5. –do-	5. Basic parts of mould and construction details
6. Operating and controlling of compression Moulding machine in TRO using thermosetting group of plastic as available.	6. Moulding defects and their remedies.
7. Oiling, Lubricating and preventive maintenance of compression Moulding Machine.	7. Preventive maintenance of machinery – processing of oiling and lubrication.
8. Identification and Testing of plastic.	8. Brief description of Identification of plastic, different testing machine and their use.
9. Process Optimization	Operating parameters and its interaction.

**MACHINERIES
COMPRESSION MOULDING**

SL.NO	DESCRIPTION	Qty
1	Hand operated compression moulding machine – 40 T. cap	2 nos.
2	Automatic compression moulding machine – 100 T cap	1
3	Moulds and accessories	As required

BROAD BASED BASIC TRAINING

(First Year)

BASIC MODULE – PPBT- 05: EXTRUSION PIPE / FILM

(Duration - 8 Weeks)

COURSE CONTENT

Practical	Theory
1. Familiarisation with basic idea of mechanical, electrical and hydraulic system of Extrusion machine and its different parts and their respective functions.	1. Extrusion machine, its description and use different parts and their respective function, operating, controlling, all equipments relating to Extrusion.
2. 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.)	2. Extrusion machine, its description and use different parts and their respective function, operating, controlling, all equipments relating to Extrusion.
3. -do-	3. Extrusion machine, its description and use different parts and their respective function, operating, controlling, all equipments relating to Extrusion.
4. Operating and controlling of Extrusion Machine in TRO using thermoplastic material as available.	4. Polymer their properties use and application involving Extrusion process.
5. -do-	5. Brief description of multi layer Extrusion. Basic parts of Die and construction details.
6. Operating and controlling of extrusion Machine in TRO using thermosetting material as available.	6. Printing Technique involved in Film / Pipe.
7. Oiling, lubricating and preventive maintenance of Extrusion Machine.	7. Preventive maintenance of Extrusion machine, Technique oiling and lubrication.
8. Identification and Testing of Plastic	8. Brief description of Identification of plastic, different testing machine and their use.
9. Process optimization	9. Process parameters and its interaction for optimized production.

MACHINERIES
EXTRUSION PIPE / FILM

SL.NO	DESCRIPTION	UNIT
1	Pipe extrusion machine	1 No.
2	Extrusion for Blow film single layer	1 No.
3	Printing Machine with oxidizing Treatment nut	1 No.
4.	Moulds/die and accessories	As required

BROAD BASED BASIC TRAINING

(First Year)

BASIC MODULE – PPBT- 06: BLOW MOULDING

(Duration - 8 Weeks)

COURSE CONTENT

Practical	Theory
1. Familiarisation with basic idea of mechanical, Electrical and hydraulic system of Blowing Moulding Machine and its different parts and their respective functions.	1. Blow moulding machine & its description, different parts and their respective functions – sequence to be followed in operating the machine.
2. –do-	2. Blow moulding machine its description different parts and their respective functions- sequence to be followed in operating the machine.
3. Operating and controlling of Blow-Moulding Machine in IRO (Setting of die, adjusting mandral, controlling, parison, adjusting thickness uniformity).	3. Polymer, their properties, use and application of LDPE, HDPE, PET, PC,
4. –do-	4. Polymer their properties, use and application of LDPE, HDPE, PET, PC,
5. Operating and controlling of Blow-Moulding Machine in TRO using thermoplastic material as available.	5. Basic parts of mould and construction details, Brief description of multi layer extrusion Blow moulding, Extrusion stretch Blow moulding, Injection stretch Blow moulding, press blow moulding for squeezable container.
6. Operating and controlling of Blow Moulding Machine in TRO using thermosetting material as available	6. Basic parts of mould and construction details, Brief description of multi layer extrusion Blow moulding, Extrusion stretch Blow moulding, Injection stretch Blow moulding, press blow moulding for squeezable container.
7. Preventive maintenance of Blow – Moulding Machine – oiling and Lubrication.	7. Preventive maintenance of machine – process of oiling and lubrication.
8. Identification and Testing of plastic.	8. Brief description of Identification of plastic, different testing machine and their use
9. Process optimization	9. Process variables and its optimization.

**MACHINERIES
BLOW MOULDING**

SL. NO	DESCRIPTION	UNIT
1	Hand operated Blow moulding M/C with accessories. Different sizes	4 No.
2	Full Automatic Double stage Blow moulding machine with Multilayer extrusion with Accessories.	1 No.
3.	Moulds and accessories	As required

SECTOR / AREA : PLASTICS PROCESSING

**BROAD BASED BASIC TRAINING
(First Year)**

GENERIC MODULES

PMBT 07 : ENGINEERING DRAWING – 2 Hours / week – 48 weeks

AND

PMBT 08 : WORKSHOP CALCULATION & SCIENCE – 2 hours / week – 48 weeks

**BROAD BASED BASIC TRAINING
(First Year)**

GENERIC MODULES

PPBT 07 : ENGINEERING DRAWING – 2 Hours / week – 48 weeks

I) COURSE CONTENT

Engineering Drawing
Familiarization with the Institute
Introduction to Engineering Drawing and its importance, Different types of standards used in engineering drawing.
Drawing instruments and their uses – Drawing board, 'T' square, set square, protractor, Drawing sheets, Drawing Pencils- Grade and Selection, eraser. Practice: Layout of drawing sheet
Type of lines—Thickness, shade of lines and its general applications. Practice: Draw type of lines as per IS-70714 – 1983
Draw figures involving horizontal, vertical and inclined lines.
Type of Angle, Triangles and their types.
Practical: construct Scalene triangles, right angle triangles, Isosceles triangles and equilateral triangles
Lettering Styles – single stroke letters, Gothic letters as per IS standard. Practice: Lettering practice
Dimensioning – types of dimensioning elements of dimensioning, methods of indicating values, Arrangement and indicating of dimensioning.
Practice: place dimensioning in the drawing by aligned system and unidirectional system, give dimensioning to the give drawing by following dimensioning principles as per BIS.
Method dimension common feature
Geometrical construction using drawing instruments – lines, Angles, patterns, circle, Arc, Tangents, Triangles, Quadrilaterals, regulars Polygons. Different type of tapers related Exercise on this topic.
Practice : Construct square, rectangle, parallelogram, rhombus, trapezium and quadrilateral
Practice: Draw a regular pentagon by circum scribing & inscribing
Practice: Draw a regular hexagon by arc method
Practice: Draw a regular octagon and various types of tapers
Free hand sketching of straight lines, rectangular, circles, squares, Polygons, ellipse. Practice: Prepare proportionate free hand sketches of plane figures
Practice: Sketch horizontal, vertical and inclined line by free hand, Draw circles by free hand using square and radial line method, Draw arcs and ellipse by free hand.
Orthographic projection I and angle—Simple machine elements, Procedure for preparing a scale drawing.
Practice: Draw a plan, elevation and side view of prism and cylinder
Practice: Draw a plan, elevation and side view of cone and pyramids
Practice: Draw a plan, elevation and side view of frustum of come and pyramids
Practice: draw 1 st and 3 rd angle projection (i) Front View (ii) Top View and (iii) Side

View of object having stepped blocks with curved surface –Simple machine elements.
Practice: draw 1 st and 3 rd angle projection (i) Front View (ii) Top View and (iii) Side View of object having stepped blocks with curved surface –Simple machine elements.
Practice: draw 1 st and 3 rd angle projection (i) Front View (ii) Top View and (iii) Side View of object having stepped blocks with curved surface –Simple machine elements.
Practice: draw 1 st and 3 rd angle projection (i) Front View (ii) Top View and (iii) Side View of object having stepped blocks with curved surface – Simple machine elements.
Drawing Isometric views out of orthographic view- simple Machine Elements
Practice: Construct and isometric scales to a given length
Practice: Draw the isometric projection of cube, hexagonal prism
Practice: Draw the isometric projection of a cylinder and cone
Practice: Draw the isometric view of the objects/blocks with curved surfaces
Practice: Draw the isometric view of the objects/blocks with curved surfaces
Missing lines and views
Practice : Visualize the shape of the object from the given two views and add the third views – simple machine elements
Practice: Identify the lines missed in multi views and supply them. Identify atleast five shapes satisfying a given view.
Identify the third view for the given two view of similar in shapes and size.
Development of regular objects bounded by plan surfaces – cube and prism
Practice: Draw the development of surfaces of a cube and prism
Practice: Draw the development of surfaces of a cylinder and cones
Explanations of full – sectional view, half – sectional view, aligned sections.
Practice: Draw full and half-sectional view of simple machine elements.
Conventions and symbols used in drawing, Abbreviations used in engineering drawing, surfaces finish symbols, welding symbols and Annotations.
Practice: Draw surface Finish symbols, welding symbols and Annotations.
Classification of engineering drawings, different between Assembly drawing and working drawing.
Blue print reading of various Engineering drawing and Machine drawing.
Practice: Blue print reading of Engineering drawing and Machine drawing.
Introduction to free hand sketching of machine parts. Tracing and printing of drawing. Introduction to auto CAD, 3D modeling concept.
Practice: Draw the elevation, Plan and the side view of bench vice and lathe tail stock.

WORKSHOP CALCULATION & SCIENCE – 2 hours / week – 48 weeks

Workshop Calculation & Science
Familiarization with the Institute
Units & Measurements – systems of units, Fundamentals and derived units
Conversion of units and applied problems. FPS, CGS, MKS and SI units
Fraction & decimals – Addition, Subtraction, multiplication and division
Fraction & decimals – Addition, Subtraction, multiplication and division
Mass weight, volume and Density and their units.

Problems on density and volume of steel, Aluminum and copper.
Simplification of fraction and Decimals
Simplification of fraction and Decimals
Definition – Force, Pressure, and their units
Definition -- Stress, Strain and Modulus of Elasticity
Square & square roots
Plotting and reading of simple graph.
Heat, Temperature and conversion of scales Fahrenheit, centigrade, and Kelvin.
Thermometer, Thermocouple and Pyrometer and its application
Transmission of heat and co-efficient of Thermal expansion of solid and related problems.
Ratio and proportion
Ratio proportion – Direct – Indirect and mixed proportions
Simple machines – mechanical advantage, velocity ratio and efficiency
Simple problems on simple machines
Mensuration – area of circle , triangle of polygons
Mensuration – surface area and volume of cone and prism
Mensuration—Surface area and volume of Cylinder and Hollow cylinder
Use of Logarithm and anti logarithm tables
Multiplication and Division – use logarithms
Simplification of Fraction and decimals – use logarithms
Friction, kinds of friction – Advantages & disadvantage
Percentage problems – metal removal by machining
Percentage problems – Metal added by welding
Estimation and cost of finished products.
Classification of ferrous and Non – Ferrous Metals and Alloys.
Physical and mechanical properties of metal
Simple algebraic multiplication and subtraction
Simple algebraic multiplication and division
Algebraic – Simplification problem
Algebraic – Simplification Equation
Meaning of H P, IHP, BHP and FHP
Efficiency, problems on Horse power
Trigonometrical Ratios and simple formulae
Calculate the area of triangle by using trigonometry, Application of Pythagorean theorem
Calculate height and distance by using trigonometry
Heat treatment – process of Annealing, Normalizing, Hardening, and tempering
Case – Hardening process – Carburizing and Nitriding – application and uses.
Basic principles of electricity. Ohms law – series and parallel circuits
Uses of switch, Fuse, Conductor, Insulator and Semi- conductor
Magnetism – natural & Artificial and application.