

PLASTIC MOULD MAKER

COMPETENCY BASED CURRICULUM

(Duration: 2 Yrs.)

APPRENTICESHIP TRAINING SCHEME (ATS)

NSQF LEVEL- 5



SECTOR – PRODUCTION & MANUFACTURING



GOVERNMENT OF INDIA
MINISTRY OF SKILL DEVELOPMENT & ENTREPRENEURSHIP
DIRECTORATE GENERAL OF TRAINING

PLASTIC MOULD MAKER

(Revised in 2018)

APPRENTICESHIP TRAINING SCHEME (ATS)



Skill India
कौशल भारत - कुशल भारत

Developed By

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1. BACKGROUND

1.1 Apprenticeship Training Scheme under Apprentice Act 1961

The Apprentices Act, 1961 was enacted with the objective of regulating the programme of training of apprentices in the industry by utilizing the facilities available therein for imparting on-the-job training. The Act makes it obligatory for employers in specified industries to engage apprentices in designated trades to impart Apprenticeship Training on the job in industry to school leavers and person having National Trade Certificate (ITI pass-outs) issued by National Council for Vocational Training (NCVT) to develop skilled manpower for the industry. There are four categories of apprentices namely; **trade apprentice, graduate, technician and technician (vocational) apprentices.**

Qualifications and period of apprenticeship training of **trade apprentices** vary from trade to trade. The apprenticeship training for trade apprentices consists of basic training followed by practical training. At the end of the training, the apprentices are required to appear in a trade test conducted by NCVT and those successful in the trade tests are awarded the National Apprenticeship Certificate.

The period of apprenticeship training for graduate (engineers), technician (diploma holders and technician (vocational) apprentices is one year. Certificates are awarded on completion of training by the Department of Education, Ministry of Human Resource Development.

1.2 Changes in Industrial Scenario

Recently we have seen huge changes in the Indian industry. The Indian Industry registered an impressive growth during the last decade and half. The number of industries in India have increased manifold in the last fifteen years especially in services and manufacturing sectors. It has been realized that India would become a prosperous and a modern state by raising skill levels, including by engaging a larger proportion of apprentices, will be critical to success; as will stronger collaboration between industry and the trainees to ensure the supply of skilled workforce and drive development through employment. Various initiatives to build up an adequate infrastructure for rapid industrialization and improve the industrial scenario in India have been taken.

1.3 Reformation

The Apprentices Act, 1961 has been amended and brought into effect from 22nd December, 2014 to make it more responsive to industry and youth. Key amendments are as given below:

- Prescription of number of apprentices to be engaged at establishment level instead of trade-wise.
- Establishment can also engage apprentices in optional trades which are not designated, with the discretion of entry level qualification and syllabus.
- Scope has been extended also to non-engineering occupations.
- Establishments have been permitted to outsource basic training in an institute of their choice.
- The burden of compliance on industry has been reduced significantly.



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2. TRAINING SYSTEM

2.1 GENERAL

Directorate General of Training (DGT) under Ministry of Skill Development & Entrepreneurship offers range of vocational training courses catering to the need of different sectors of economy/ Labour market. The vocational training programmes are delivered under aegis of National Council of Vocational Training (NCVT). Craftsman Training Scheme (CTS) and Apprenticeship Training Scheme (ATS) are two pioneer programmes of NCVT for propagating vocational training.

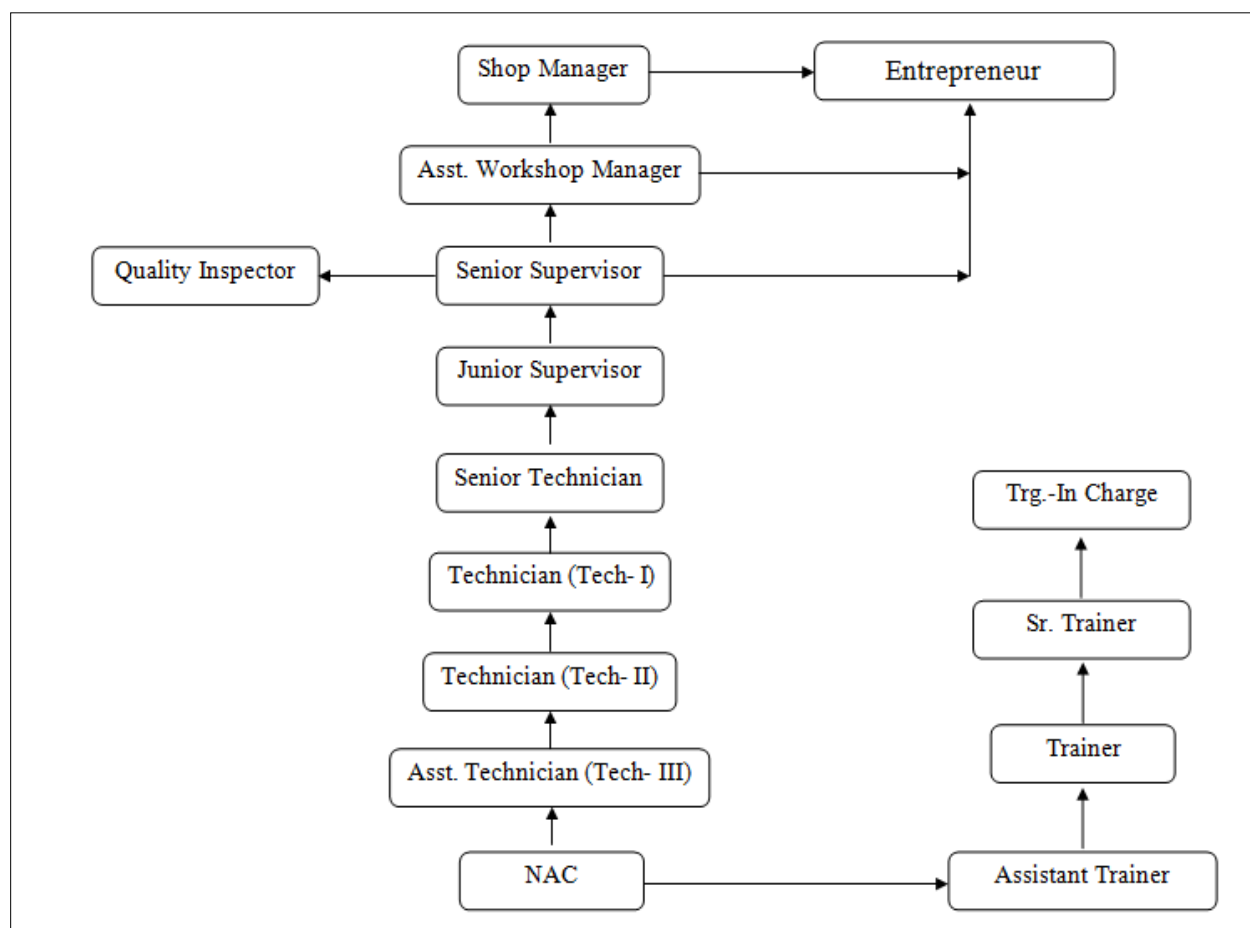
Plastic Mould Maker trade under ATS is one of the courses delivered nationwide through different industries. The course is of two years (02 Blocks) duration. It mainly consists of Domain area and Core area. In the Domain area Trade Theory & Practical impart professional - skills and knowledge, while Core area - Workshop Calculation and science, Engineering Drawing and Employability Skills imparts requisite core skills & knowledge and life skills. After passing out the training programme, the trainee is being awarded National Apprenticeship Certificate (NAC) by NCVT having worldwide recognition.

Broadly candidates need to demonstrate that they are able to:

- Read & interpret technical parameters/document, plan and organize work processes, identify necessary materials and tools;
- Perform task with due consideration to safety rules, accident prevention regulations and environmental protection stipulations;
- Apply professional skill, knowledge, core skills & employability skills while performing jobs and solve problem during execution.
- Check the job/assembly as per drawing for functioning, identify and rectify errors in job/assembly.
- Document the technical parameters related to the task undertaken.

2.2 CAREER PROGRESSION PATHWAYS:

- Indicative pathways for vertical mobility.



2.3 COURSE STRUCTURE:

Table below depicts the distribution of training hours across various course elements during a period of two years (*Basic Training and On-Job Training*): -

Total training duration details: -

Time (in months)	1-3	4-12	13-15	16-24
Basic Training	Block– II	-----	Block – II	-----
Practical Training (On - job training)	----	Block – II	-----	Block – II

A. Basic Training

For 02 yrs. course (Engg.) :-(**Total 06 months:** 03 months in 1styr. + 03 months in 2nd yr.)

For 01 yr. course (Engg.) :-(**Total 03 months:** 03 months in 1styr.)

S No.	Course Element	Total Notional Training Hours	
		For 02 Yrs. course	For 01 Yr. course
1.	Professional Skill (Trade Practical)	550	275
2.	Professional Knowledge (Trade Theory)	240	120
3.	Workshop Calculation & Science	40	20
4.	Engineering Drawing	60	30
5.	Employability Skills	110	55
	Total (Including internal assessment)	1000	500

B. On-Job Training:-

For 02 yrs. Course (Engg.) :-(**Total 18 months:** 09 months in 1st yr. + 09 months in 2nd yr.)

Notional Training Hours for On-Job Training: 3120 Hrs.

For 01 yr. course (Engg.) :-(**Total 12 months**)

Notional Training Hours for On-Job Training: 2080 Hrs.

C. Total training hours:-

Duration	Basic Training	On-Job Training	Total
For 02 yrs. course (Engg.)	1000 hrs.	3120 hrs.	4120 hrs.
For 01 yr. course (Engg.)	500 hrs.	2080 hrs.	2580 hrs.

2.4 ASSESSMENT & CERTIFICATION:

The trainee will be tested for his skill, knowledge and attitude during the period of course and at the end of the training programme as notified by Govt of India from time to time. The Employability skills will be tested in first two semesters only.

a) The **Internal assessment** during the period of training will be done by **Formative assessment method** by testing for assessment criteria listed against learning outcomes. The training institute have to maintain individual trainee portfolio as detailed in assessment guideline (section-2.4.2). The marks of internal assessment will be as per the template (Annexure – II).

b) The final assessment will be in the form of summative assessment method. The All India Trade Test for awarding NAC will be conducted by NCVT on completion of course as per guideline of Govt of India. The pattern and marking structure is being notified by govt of India from time to time. **The learning outcome and assessment criteria will be basis for setting question papers for final assessment. The examiner during final examination will also check individual trainee's profile as detailed in assessment guideline (section-2.4.2) before giving marks for practical examination.**

2.4.1 PASS REGULATION

The minimum pass percent for Practical is 60% & minimum pass percent for Theory subjects 40%. The candidate pass in each subject conducted under all India trade test.

2.4.2 ASSESSMENT GUIDELINE

Appropriate arrangements should be made to ensure that there will be no artificial barriers to assessment. The nature of special needs should be taken into account while undertaking assessment. Due consideration should be given while assessing for team work, avoidance/reduction of scrap/wastage and disposal of scarp/wastage as per procedure, behavioral attitude, sensitivity to environment and regularity in training. The sensitivity towards OSHE and self-learning attitude are to be considered while assessing competency.

Assessment will be evidence based comprising the following:

- Job carried out in labs/workshop
- Record book/ daily diary
- Answer sheet of assessment
- Viva-voce
- Progress chart
- Attendance and punctuality
- Assignment
- Project work

Evidences of internal assessments are to be preserved until forthcoming semester examination for audit and verification by examination body. The following marking pattern to be adopted while assessing:

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Performance Level	Evidence
(a) Weightage in the range of 60 -75% to be allotted during assessment	
For performance in this grade, the candidate with occasional guidance and showing due regard for safety procedures and practices, has produced work which demonstrates attainment of an acceptable standard of craftsmanship.	• Demonstration of good skill in the use of hand tools, machine tools and workshop equipment • Below 70% tolerance dimension/accuracy achieved while undertaking different work with those demanded by the component/job/set standards. • A fairly good level of neatness and consistency in the finish • Occasional support in completing the project/job.
(b) Weightage in the range of above 75% - 90% to be allotted during assessment	
For this grade, the candidate, with little guidance and showing due regard for safety procedures and practices, has produced work which demonstrates attainment of a reasonable standard of craftsmanship.	• Good skill levels in the use of hand tools, machine tools and workshop equipment • 70-80% tolerance dimension/accuracy achieved while undertaking different work with those demanded by the component/job/set standards. • A good level of neatness and consistency in the finish • Little support in completing the project/job
(c) Weightage in the range of above 90% to be allotted during assessment	
For performance in this grade, the candidate, with minimal or no support in organization and execution and with due regard for safety procedures and practices, has produced work which demonstrates attainment of a high standard of craftsmanship.	• High skill levels in the use of hand tools, machine tools and workshop equipment • Above 80% tolerance dimension/accuracy achieved while undertaking different work with those demanded by the component/job/set standards. • A high level of neatness and consistency in the finish. • Minimal or no support in completing the project.

Brief description of Job roles:

Plastic Mould Maker (Die Maker; Die Fitter; Press Tool Fitter) makes metal dies to prescribed dimension for punching, cutting, forging and forming of metal or synthetic components for mass production. Studies drawing and specifications of dies to be made. Selects required type of metal or rough cast metal block. Machines or grinds one surface and dimensions and other working details. Cuts shapes, drill holes and mills metal according to marking on various machines. Checks dimensions while working with gauges and other measuring tools. Finishes made die (punch) by filing to required dimension and fits female to it. Files cutting angle and clearance accurately in female die and checks for sizes. Drills holes and cuts thread in female die for driving guide pin and fitting guide plates. Gets male and female dies tempered and grinds them to finish ensuring correct shear, cutting angle, clearances, etc. Sets finished dies in press and cuts or forms some trial pieces to ensure accuracy and correct production. May shape female die block to required angle for fitting it in bolster. May repair used dies and grind them to desired finish. May operate lathe, milling and shaping machines and harden and temper dies. Marks it with template or otherwise to indicate

Mould Setter (Plastics) sets up and adjusts compression, injection and similar type of machines used to mould plastic materials to specified shape. Positions assembled mould on press bed of moulding machine or bolts matrix of unassembled mould to bed and aligns die (attached to ram) with matrix; adjusts stroke of ram, using hand tools. Connects steam, oil or water lines to mould or moves controls to regulate mould temperature; sets machine controls to regulate forming pressure of machine and curing time of plastic in mould; installs knock-out pins in mould, and makes other adjustments, using hand-tools; starts machine to produce sample products; examines sample for surface defects, such as bumps, bubbles, and scratches, and adjusts machine set up to eliminate defects; removes, cleans, and greases moulds and places them in storage racks. May supply plastic materials to moulding machines. May direct supplying of necessary equipment, such as jigs, containers or forms to workers engaged in tending moulding machines. May be designated according to type of machine set up, as Compression-Moulding Machine Set-Up Man; Injection Moulding Machine Set-Up Man.

Plan and organize assigned work and detect & resolve issues during execution. Demonstrate possible solutions and agree tasks within the team. Communicate with required clarity and understand technical English. Sensitive to environment, self-learning and productivity. Perform TPM (Total Production Management), TQM (Total Quality Management) and record keeping system.

Reference NCO-2015:

- i) 7211.0100 Moulder, General
- ii) 7222.0500 Die Maker
- iii) 7211.9900 Metal Moulders and Core Makers, Other

4. NSQF LEVEL COMPLIANCE

NSQF level for Plastic Mould Maker trade under ATS: **Level 5**

As per notification issued by Govt. of India dated- 27.12.2013 on National Skill Qualification Framework total 10 (Ten) Levels are defined.

Each level of the NSQF is associated with a set of descriptors made up of five outcome statements, which describe in general terms, the minimum knowledge, skills and attributes that a learner needs to acquire in order to be certified for that level.

Each level of the NSQF is described by a statement of learning outcomes in five domains, known as level descriptors. These five domains are:

- a) Process
- b) Professional Knowledge,
- c) Professional Skill,
- d) Core Skill and
- e) Responsibility.



The Broad Learning outcome of Fitter (Steel Plant) trade under ATS mostly matches with the Level descriptor at Level- 5.

The NSQF level-5 descriptor is given below:

Level	Process Required	Professional Knowledge	Professional Skill	Core Skill	Responsibility
Level 5	Job that requires well developed skill, with clear choice of procedures in familiar context.	Knowledge of facts, principles, processes and general concepts, in a field of Work or study	A range of cognitive and practical skills required to accomplish tasks and solve problem by selecting and applying basic methods, tools, materials and information.	Desired mathematical skill, understanding of social, political and some skill of collecting and organizing information, communication.	Responsibility for own work and Learning and some responsibility for other's works and learning.

5. GENERAL INFORMATION

Name of the Trade	PLASTIC MOULD MAKER
NCO-2015	7211.0100, 7222.0500, 7211.9900
NSQF Level	Level – 5
Duration of Apprenticeship Training (Basic Training + On-Job Training)	Two years (02 Blocks each of one year duration).
Duration of Basic Training	a) Block –I : 3 months b) Block – II : 3 months Total duration of Basic Training: 6 months
Duration of On-Job Training	a) Block–I: 9 months b) Block–II : 9 months Total duration of Practical Training: 18 months
Entry Qualification	Passed 10 th Class with Science and Mathematics under 10+2 system of Education or its equivalent
Selection of Apprentices	The apprentices will be selected as per Apprenticeship Act amended time to time.
Instructors Qualification for Basic Training	As per ITI instructors qualifications as amended time to time for the specific trade.
Infrastructure for Basic Training	As per related trade of ITI
Examination	The internal examination/ assessment will be held on completion of each block. Final examination for all subjects will be held at the end of course and same will be conducted by NCVT.
Rebate to Ex-ITI Trainees	01 year.
CTS trades eligible for Plastic Mould Maker Apprenticeship	Tool and Die Maker

Note:

- Industry may impart training as per above time schedule for different block, however this is not fixed. The industry may adjust the duration of training considering the fact that all the components under the syllabus must be covered. However the flexibility should be given keeping in view that no safety aspects is compromised.
- For imparting Basic Training the industry to tie-up with ITIs having such specific trade and affiliated to NCVT.

6. LEARNING OUTCOME

6.1 GENERIC LEARNING OUTCOME

The following are minimum broad Common Occupational Skills/ Generic Learning Outcome after completion of the Plastic Mould Maker course of 02 years duration under ATS.

Block I & II:-

1. Recognize & comply safe working practices, environment regulation and housekeeping.
2. Understand and explain different mathematical calculation & science in the field of study including basic electrical. *[Different mathematical calculation & science -Work, Power & Energy, Algebra, Geometry & Mensuration, Trigonometry, Heat & Temperature, Levers & Simple machine, graph, Statistics, Centre of gravity, Power transmission, Pressure]*
3. Interpret specifications, different engineering drawing and apply for different application in the field of work. *[Different engineering drawing-Geometrical construction, Dimensioning, Layout, Method of representation, Symbol, scales, Different Projections, Machined components & different thread forms, Assembly drawing, Sectional views, Estimation of material, Electrical & electronic symbol]*
4. Select and ascertain measuring instrument and measure dimension of components and record data.
5. Explain the concept in productivity, quality tools, and labour welfare legislation and apply such in day to day work to improve productivity & quality.
6. Explain energy conservation, global warming and pollution and contribute in day to day work by optimally using available resources.
7. Explain personnel finance, entrepreneurship and manage/organize related task in day to day work for personal & societal growth.
8. Plan and organize the work related to the occupation.

6.2 SPECIFIC LEARNING OUTCOME

Block – I

1. Identify and apply the methods for general shop floor safety
2. Identify the desired specification of tools and equipments to perform metal cutting and measuring work.
3. Perform various drilling operations using different drilling machines and tools.
4. Develop skill on machine setting to perform different operations on lathe.
5. Maintain dimensional accuracy in various metal cutting operations on turning machines.
6. Perform various milling operations by proper setting of tools and fixtures.
7. Identify the proper measuring instrument to perform precise measurement of the job produced.
8. Prepare certain value of surface finish in different grinding machines.
9. Join metal pieces by different welding and brazing methods.

Block – II

1. Prepare job on vertical milling machines.
2. Prepare finished surfaces on grinding machines and measure the finished jobs.
3. Measure an integrated part using depth gauge micrometer and telescopic gauge.
4. Perform fitting through actual job preparations.
5. Practice on wire cut machine.
6. Practice on hydraulic and pneumatic circuits.
7. Practice programming and simulation using CAD/CAM software.
8. Practice assembly of machined components.

NOTE: Learning outcomes are reflection of total competencies of a trainee and assessment will be carried out as per assessment criteria.

7. LEARNING OUTCOME WITH ASSESSMENT CRITERIA

GENERIC LEARNING OUTCOME	
LEARNING OUTCOMES	ASSESSMENT CRITERIA
1. Recognize & comply safe working practices, environment regulation and housekeeping.	1. 1. Follow and maintain procedures to achieve a safe working environment in line with occupational health and safety regulations and requirements.
	1. 2. Recognize and report all unsafe situations according to site policy.
	1. 3. Identify and take necessary precautions on fire and safety hazards and report according to site policy and procedures.
	1. 4. Identify, handle and store / dispose off dangerous/unsalvageable goods and substances according to site policy and procedures following safety regulations and requirements.
	1. 5. Identify and observe site policies and procedures in regard to illness or accident.
	1. 6. Identify safety alarms accurately.
	1. 7. Report supervisor/ Competent of authority in the event of accident or sickness of any staff and record accident details correctly according to site accident/injury procedures.
	1. 8. Identify and observe site evacuation procedures according to site policy.
	1. 9. Identify Personal Protective Equipment (PPE) and use the same as per related working environment.
	1. 10. Identify basic first aid and use them under different circumstances.
	1. 11. Identify different fire extinguisher and use the same as per requirement.
	1. 12. Identify environmental pollution & contribute to avoidance of same.
	1. 13. Take opportunities to use energy and materials in an environmentally friendly manner
	1. 14. Avoid waste and dispose waste as per procedure
	1. 15. Recognize different components of 5S and apply the same in the working environment.
2. Understand, explain different mathematical calculation & science in the field of study including basic	2.1 Explain concept of basic science related to the field such as Material science, Mass, weight, density, speed, velocity, heat & temperature, force, motion, pressure, heat treatment, centre of gravity, friction.

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electrical and apply in day to day work. <i>[Different mathematical calculation & science -Work, Power & Energy, Algebra, Geometry & Mensuration, Trigonometry, Heat & Temperature, Levers & Simple machine, graph, Statistics, Centre of gravity, Power transmission, Pressure]</i>	2.2 Measure dimensions as per drawing
	2.3 Use scale/ tapes to measure for fitting to specification.
	2.4 Comply given tolerance.
	2.5 Prepare list of appropriate materials by interpreting detail drawings and determine quantities of such materials.
	2.6 Ensure dimensional accuracy of assembly by using different instruments/gauges.
	2.7 Explain basic electricity, insulation & earthing.
3. Interpret specifications, different engineering drawing and apply for different application in the field of work. <i>[Different engineering drawing-Geometrical construction, Dimensioning, Layout, Method of representation, Symbol, scales, Different Projections, Machined components & different thread forms, Assembly drawing, Sectional views, Estimation of material, Electrical & electronic symbol]</i>	3. 1. Read & interpret the information on drawings and apply in executing practical work.
	3. 2. Read & analyse the specification to ascertain the material requirement, tools, and machining /assembly /maintenance parameters.
	3. 3. Encounter drawings with missing/unspecified key information and make own calculations to fill in missing dimension/parameters to carry out the work.
4. Select and ascertain measuring instrument and measure dimension of components and record data.	4.1 Select appropriate measuring instruments such as micrometers, vernier calipers, dial gauge, bevel protector and height gauge (as per tool list).
	4.2 Ascertain the functionality & correctness of the instrument.
	4.3 Measure dimension of the components & record data to analyse the with given drawing/measurement.
5. Explain the concept in productivity, quality tools, and labour welfare legislation and apply such in day to day work to improve productivity	5.1 Explain the concept of productivity and quality tools and apply during execution of job.
	5.2 Understand the basic concept of labour welfare legislation and adhere to responsibilities and remain sensitive towards such laws.

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& quality.	5.3 Knows benefits guaranteed under various acts
6. Explain energy conservation, global warming and pollution and contribute in day to day work by optimally using available resources.	6.1 Explain the concept of energy conservation, global warming, pollution and utilize the available recourses optimally & remain sensitive to avoid environment pollution.
	6.2 Dispose waste following standard procedure.
7. Explain personnel finance, entrepreneurship and manage/organize related task in day to day work for personal & societal growth.	7. 1. Explain personnel finance and entrepreneurship.
	7. 2. Explain role of Various Schemes and Institutes for self-employment i.e. DIC, SIDA, SISI, NSIC, SIDO, Idea for financing/ non financing support agencies to familiarizes with the Policies /Programmes & procedure & the available scheme.
	7. 3. Prepare Project report to become an entrepreneur for submission to financial institutions.
8. Plan and organize the work related to the occupation.	8. 1. Use documents, drawings and recognize hazards in the work site.
	8. 2. Plan workplace/ assembly location with due consideration to operational stipulation
	8. 3. Communicate effectively with others and plan project tasks
	8. 4. Assign roles and responsibilities of the co-trainees for execution of the task effectively and monitor the same.
SPECIFIC OUTCOME	
Block- I & II (Section:10)	
Assessment Criteria i.e. the standard of performance, for each specific learning outcome mentioned under block – I & II (section: 10) must ensure that the trainee achieves well developed skill with clear choice of procedure in familiar context. Assessment criteria should broadly cover the aspect of Planning (Identify, ascertain, estimate etc.); Execution (perform, illustration, demonstration etc. by applying 1) a range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information 2) Knowledge of facts, principles, processes, and general concepts, in a field of work or study 3) Desired Mathematical Skills and some skill of collecting and organizing information, communication) and Checking/ Testing to ensure functionality during the assessment of each outcome. The assessments parameters must also ascertain that the candidate is responsible for own work and learning and some responsibility for other's work and learning.	

BASIC TRAINING (Block – I)

Duration: (03) Three Months

Week No.	Professional Skills	Professional Knowledge
1.	Safety: - its importance, classification, personal, general, workshop and job safety. Occupational health and safety. Basic injury prevention, Basic first aid, Hazard identification and avoidance, safety signs for Danger, Warning, caution & personal safety message. Preventive measures for electrical accidents & steps to be taken in such accidents. Importance of housekeeping & good shop floor practices. Disposal procedure of waste materials like cotton waste, metal chips/burrs etc. Fire & safety: Use of Fire extinguishers.	Importance of safety and general precautions observed in the in the industry/shop floor. All necessary guidance to be provided to the new comers to become familiar with the working of Institute system including stores procedures. Introduction of First aid. Safety attitude development of the trainee by educating him to use Personal Protective Equipment (PPE). Response to emergencies eg; power failure, fire, and system failure. Accidents- Definition types and causes. First-Aid, nature and causes of injury and utilization of first-aid. Introduction to 5S concept & its application. Fire: - Types, causes and prevention methods. Fire Extinguisher, its types. Global warming its causes and remedies. Industrial Waste its types, sources and waste Management.
2.	Identification of tools & equipments as per desired specifications for marking & sawing (Hand tools , Fitting tools & Measuring tools) Uses of marking tools, Punch, Try square & basic measuring tools, caliper, steel rule. Marking out lines, gripping suitably in vice jaws, hacksawing to given dimensions, sawing different types of metals of different sections. Filing, Chipping & scraping flat surfaces and measure using different measuring	Introduction hacksaw cutting, marking, filling operation, need and application, types of files and their construction and usage Perpendicularity, parallelism. Hand tools and its importance, steel rule, Try square, chisel, surface gauge and care & maintenance, Hacksaw frame, blades. Classification and types of chisels, files & uses, vices - its constructions and uses. Hammers and its types. Related safety. Marking block, Steel rule, and calipers-different types and uses. Hacksaw blade, Hacksaw frame and its types. Drill bits-

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	instruments.	parts, Types & uses. Different measuring instruments and gauges used in shop floor, their construction and usage.
3.	Mounting and dismantling of different drills on machines and different practical exercises. Marking and Drilling holes on flat pieces. Tapping as per simple drawing. Exercise on use of pillar drill in drilling, counter sinking, counter boring. Spot facing and use of spot facing tools. Further practice of drilling of Radial drills. Practice of reaming on drilled holes.	Identification of different parts, accessories, attachments', operations and tools used in drilling machines. Introduction to Hand Taps & Dies and their types, applications, care and maintenance. Familiar with tap and drill size, Thread Terminology.
4.	Lathe: Holding of round job in an independent chuck and truing it. Holding the tool in a tool post, centering the job with the tool. Facing & drilling. Parallel turning between centers, parting off, chamfering using roughing, finishing and parting off tools. Holding the job in three jaw chuck truing, centering facing. Step turning undercutting, knurling drilling and boring.	Introduction to lathe. Its types, engine lathe construction, detail function of parts size and specification. Safety points to be observed while working on a lathe. Lathe tools their angles & uses. Driving mechanism, speed and feed mechanism & lathe accessories.
5.	Taper turning by swiveling compound rest, setting the compound rest to correct degree, checking the tool height, clamping the saddle for no longitudinal movement, checking up with precision instruments. Cutting V thread external and internal in a lathe. Checking up with screw pitch gauge. Cutting square thread external & internal on a lathe. Cutting square threads (right hand only) on a lathe-checking with thread gauge-grinding of tool and setting in correct position.	Chucks-different types of job holding devices on lathe and advantages of each type. Mounting and dismounting of chucks. Taper introduction, types and uses. Calculations of tapers. Measurement of taper by sine bar and slip gauges. Different thread forms their related dimensions and calculations screw cutting in a lathe.

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6.	Introduction to milling machine, demonstration on working principle, setting of job, setting of cutter in arbor, setting of vice on table. Safety points to be observed while working on a milling machine. Sequence of milling six faces of a solid block. Checking the accuracy with the help of try-square scribing block and vernier height gauge. Step milling using side and face cutter checking with micrometer.	Milling machine importance of milling machine, types and specification of milling machine, driving and feed mechanism of milling machine. Classification & different types of milling cutters & their use. Parts and nomenclature. Vernier height gauge construction, graduations vernier setting & reading, vernier bevel protractor, construction graduation setting and reading. Care and maintenance of vernier height gauge and bevel protractor.
7.	Straddle and gang milling operations including up-milling and down milling. Milling concave and convex surfaces. Introduction to indexing head types, setting and aligning of indexing head with reference to job on milling machine. Milling square and hexagonal job by simple indexing method.	Different milling operations plain-face, angular, form, slot, gang and straddle milling etc. Up and down milling. Different types of milling attachments and their uses. Indexing-introduction & types. Indexing head-constructural details, function of indexing plates and the sector arms. Calculation for various types of indexing.
8.	Milling dovetail and 'T'slots both male & female matching each other. Milling of spur gear. Introduction to grinding machine surface grinder, cylindrical grinder. Driving and feed mechanism, job holding devices mounting of wheels. Different practical exercises with different accuracy levels. Wheel balancing & truing. Grinding of parallel and stepped jobs. Dressing of grinding wheels.	Introduction surface and cylindrical grinding machine, identification of different parts, accessories, attachments', operations and tools used in grinding machines. Selection of grinding wheels, balancing and mounting of grinding wheels. Types of Abrasives and their uses, Glazing and loading of wheels. Explain the importance and necessity of quality.

9.	Precision measurement: Use of different precision measuring instruments viz., Vernier caliper, micrometer, vernier height gauge, dial indicator, slip gauges, etc.	Precision measurement: Different precision measuring instruments, its use and care. Surface finish - importance, symbol, measuring techniques. Lapping & honing process. Gauges: Classification and uses of Sine bar, Slip gauge, Limit gauge, Feeler gauge, thread gauge, screw pitch gauge, taper gauge. Tolerances & interchangeability -Definition and its necessity, basic size, actual size, limits, deviation, Tolerance, allowance, clearance, interference, Fits- definition, types, description with sketches. Method of expressing Tolerance as per BIS, Hole and Shaft basis (BIS standard). Related calculation on Limit, Fit and Tolerance.
10 - 11	Demonstration on selection of grinding wheels for grinding different metals, selection of suitable wheel to obtain rough and IS: 1249- 1958. Grinding different metals with suitable grinding wheels. Setting grinding wheel on wheel flange, truing and balancing of wheels. Dressing of grinding wheel Grinding practice on surface and cylindrical grinding machine. Checking measuring various types of jobs using micrometers, Vernier caliper, Vernier Height gauge etc.	General dressing tools used in grinding section such as wheel, diamond dresser, steel type dresser, abrasive dresser and nonferrous dresser. Precision instruments English and metric micrometer, vernier caliper, dial test indicator etc. their description and uses. Principle and value of grinding in finishing process, various types of grinding wheels their construction and characteristic glazed and loaded wheels. Marking system of grinding wheels IS: 551-1966.
12	Introduction to gas welding equipment/arc welding equipment, Simple welding practice. Practice on brazing.	Explanation of gas welding and arc welding techniques. Description of welding equipment, types of welding joints. Knowledge about flux, filler rod material. Die welding techniques.
13.	Revision & Internal Assessment	

Note: - More emphasis to be given on video/real-life pictures during theoretical classes. Some real-life pictures/videos of related industry operations may be shown to the trainees to give a feel of Industry and their future assignment.

BASIC TRAINING (Block – II)

Duration: (03) Three Months

Week No.	Professional Skills	Professional Knowledge
1 - 2	Boring a cast block on a vertical milling machine, measurement of bore size. Demonstration of marking system of Grinding wheels. Surface grinding practices.	Vertical milling machines its parts, construction, method of boring in a vertical milling. Difference between horizontal and vertical milling machine. Elements of milling cutter Rake angle, primary, secondary and clearance angles, lead etc. Selection procedure of grinding wheels. Abrasives its types Bonds, Grade Grit, structure, different shape of wheels and their uses. Inside micrometer, Principle, construction graduation reading both in English and metric system gauge types and uses.
3	Parallel block grinding on surface grinding machine within close limits. Wheels dressing for rough and finishing grinding.	Bonding materials their kinds description and uses. Grade and structure at grinding wheels. Brief about I.S.O. 9000. Importance of Quality. Specification and types (shapes & size) of grinding wheels. Mounting of grinding wheels, grinding wheels, collets and mandrels.
4 - 5	Grinding sockets and checking depth by depth gauge micrometer. Grinding internal bore of cylindrical job and use of telescopic gauge.	Depth micrometer and vernier caliper. Common types of surface grinding machine, plain surface, rotary surface, horizontal and vertical surface grinder etc. Method of grinding tapers. Grinding defects vibration, chattering, glazing and loading their causes and remedies. Grinding different defects and remedies on its. Applications of diamond wheel in grinding and grinding of tipped tools.
6	Achieving interference fit of guide pillar and bush Exposure to Quality of finished products, Exposure to fitting through actual job preparations.	Calculation for Wheel speed and work speed, traverse feed, In-feed and machining time. Concept of dowel pins and its use. Geometrical features. Introduction to mould. Types of mould & uses.
7 - 8	Wire Cut EDM: Machining practice / observation on Wire cut/EDM Machine.	Wire Cut EDM: Electrical discharge machining (EDM) - Introduction, principle of operation, advantages & disadvantages and its applications. Wire cut machine - introduction, principle of operation, advantages & disadvantages and its applications.

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9	Hydraulics & Pneumatics Identification and familiarization of various types of hydraulic & pneumatic elements such as cylinder, valves, actuators and filters. Study of simple hydraulic & pneumatic circuits.	Hydraulics & Pneumatics Basic principles of hydraulic & pneumatic system. Advantages & disadvantages of hydraulic and pneumatic system. Theory of Pascal's law, Brahma's press, pressure & flow. Type of valves used in hydraulic and pneumatic system.
10 - 11	Program generation & Simulation with CAD/CAM software for dies & moulds. Inspection of dies with measuring instruments.	Concepts of CAD/CAM Basic concepts of inspection of 3D surfaces. Part program generation and setting up the machine for producing punch/dies. Importance of Technical English terms used in industry –(in simple definition only) Technical forms, process charts, activity logs, in required formats of industry, estimation, cycle time, productivity reports, job cards. Concept of TPM & TQM.
12	Assembling of different machined components with fasteners and steps to be taken to maintain alignment of assembled components. Video Demonstration of functioning of Jig Boring, Jig Grinding & CNC machines.	Jig Boring & Jig Grinding machine: Constructional features, function and machining parameters. CNC technology basics: Difference between CNC and conventional lathes. Advantages and disadvantages of CNC machines over conventional machines. Schematic diagram of CNC system. Axes convention. Working of parts explained using multimedia CNC teachware. Parts shown on machine. Programming – G code & M code, sequence, formats, different codes, canned cycles. Absolute and incremental programming. Tool nose radius compensation (G41/42). Cutting tool materials, cutting tool geometry – insert types, holder types, insert cutting edge geometry. Cutting parameters - cutting speed, feed rate and depth of cut. Process planning, tool selection and cutting parameters selection. Explained using multimedia CNC teach ware and CNC machine simulator.
13	Assessment / Examination (03 days)	

Note: - More emphasis to be given on video/real-life pictures during theoretical classes. Some real-life pictures/videos of related industry operations may be shown to the trainees to give a feel of Industry and their future assignment.

9. SYLLABUS - CORE SKILLS

9.1 WORKSHOP CALCULATION SCIENCE & ENGINEERING DRAWING

BLOCK - I

Topic No.	Engineering Drawing (Duration: 30 hours)	Workshop Science & Calculation (Duration: 20 hours)
1	Engineering Drawing: Introduction and its importance -Viewing of engineering drawing sheets. Method of Folding of printed Drawing Sheet as per BIS SP:46-2003 Drawing Instruments : their Standard and uses - Drawing board, T-Square, Drafter (Drafting M/c), Set Squares, Protractor, Drawing Instrument Box (Compass, Dividers, Scale, Diagonal Scales etc.), Pencils of different Grades, Drawing pins / Clips.	Unit: Systems of unit- FPS, CGS, MKS/SI unit, unit of length, Mass and time, Conversion of units.
2	Lines : - Definition, types and applications in Drawing as per BIS SP:46-2003 - Classification of lines (Hidden, centre, construction, Extension, Dimension, Section) - Drawing lines of given length (Straight, curved) - Drawing of parallel lines, perpendicular line - Methods of Division of line segment	Fractions & Simplification: Fractions, Decimal fraction, Multiplication and Division of Fractions and Decimals, conversion of Fraction to Decimal and vice versa. Simple problems Simplification using BODMAS.
3	Drawing of Geometrical Figures: Definition, nomenclature and practice of - - Angle: Measurement and its types, method of bisecting. - Triangle -different types - Rectangle, Square, Rhombus, Parallelogram. - Circle and its elements.	Square Root : Square and Square Root, method of finding out square roots, Simple problem using calculator

4	Lettering and Numbering as per BIS SP46-2003: - Single Stroke, Double Stroke, inclined, Upper case and Lower case.	Ratio &Proportion: Simple calculation on related problems.
5	Free Hand sketch: Hand tools and measuring instruments used in electronics mechanics Trades	Percentage: Introduction, Simple calculation. Changing percentage to decimal and fraction and vice-versa.
6	Free hand drawing : - Lines, polygons, ellipse, etc. - Geometrical figures and blocks with dimension. -Transferring measurement from the given object to the free hand sketches.	Material Science : Properties -Physical & Mechanical, Types –Ferrous & Non-Ferrous, difference between Ferrous and Non-Ferrous metals, introduction of Iron, Cast Iron, Wrought Iron, Steel, difference between Iron and Steel, Alloy steel, carbon steel, stainless steel, Non-Ferrous metals, Non-Ferrous Alloys.



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B. Block- II

Topic No.	Engineering Drawing (Duration: 30 hours)	Workshop Science & Calculation (Duration: 20 hours)
1	Symbolic Representation (as per BIS SP:46-2003) of : - Fastener (Rivets, Bolts and Nuts) - Bars and profile sections - Weld, brazed and soldered joints. - Electrical and electronics element - Piping joints and fittings	Mass ,Weight and Density : Mass, Unit of Mass, Weight, difference between mass and weight, Density, unit of density, specific gravity of metals
2	Construction of Scales and diagonal scale	Work, Power and Energy: work, unit of work, power, unit of power, Horse power of engines, mechanical efficiency, energy, use of energy, potential and kinetic energy, examples of potential energy and kinetic energy.
3	LED, IRLED, photo diode, photo transistor, opto-coupler symbols symbol of Logic gates	
4	Half adder, full adder, multiplexer and de-multiplexer	Algebra: Addition, Subtraction, Multiplication, Division, Algebraic formula, Linear equations (with two variables).
5	UJT, FET, MOSFET, DIAC, TRIC, SCR, IGBT symbols and circuits of FET Amplifier, SCR using UJT triggering, snubber circuit, light dimmer circuit using TRIAC, UJT based free running oscillator.	Mensuration: Area and perimeter of square, rectangle, parallelogram, triangle, circle, semi circle. Volume of solids – cube, cuboid, cylinder and Sphere. Surface area of solids – cube, cuboid, cylinder and Sphere. Trigonometry: Trigonometrical ratios, measurement of angles. Trigonometric tables. Finding height and distance by trigonometry.

9.2 EMPLOYABILITY SKILLS

(DURATION: - 110 HRS.)

Block – I (Duration – 55 hrs.)	
1. English Literacy Duration : 20 Hrs. Marks : 09	
Pronunciation	Accentuation (mode of pronunciation) on simple words, Diction (use of word and speech)
Functional Grammar	Transformation of sentences, Voice change, Change of tense, Spellings.
Reading	Reading and understanding simple sentences about self, work and environment
Writing	Construction of simple sentences Writing simple English
Speaking / Spoken English	Speaking with preparation on self, on family, on friends/ classmates, on know, picture reading gain confidence through role-playing and discussions on current happening job description, asking about someone's job habitual actions. Cardinal (fundamental) numbers ordinal numbers. Taking messages, passing messages on and filling in message forms Greeting and introductions office hospitality, Resumes or curriculum vita essential parts, letters of application reference to previous communication.
2. I.T. Literacy Duration : 20 Hrs. Marks : 09	
Basics of Computer	Introduction, Computer and its applications, Hardware and peripherals, Switching on-Starting and shutting down of computer.
Computer Operating System	Basics of Operating System, WINDOWS, The user interface of Windows OS, Create, Copy, Move and delete Files and Folders, Use of External memory like pen drive, CD, DVD etc, Use of Common applications.
Word processing and Worksheet	Basic operating of Word Processing, Creating, opening and closing Documents, use of shortcuts, Creating and Editing of Text, Formatting the Text, Insertion & creation of Tables. Printing document. Basics of Excel worksheet, understanding basic commands, creating simple worksheets, understanding sample worksheets, use of simple formulas and functions, Printing of simple excel sheets.
Computer Networking and	Basic of computer Networks (using real life examples), Definitions of Local Area Network (LAN), Wide Area Network (WAN), Internet,

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Internet	Concept of Internet (Network of Networks), Meaning of World Wide Web (WWW), Web Browser, Web Site, Web page and Search Engines. Accessing the Internet using Web Browser, Downloading and Printing Web Pages, Opening an email account and use of email. Social media sites and its implication. Information Security and antivirus tools, Do's and Don'ts in Information Security, Awareness of IT - ACT, types of cyber crimes.
3. Communication Skills	
Duration : 15 Hrs. Marks : 07	
Introduction to Communication Skills	Communication and its importance Principles of Effective communication Types of communication - verbal, non verbal, written, email, talking on phone. Non verbal communication -characteristics, components-Para-language Body language Barriers to communication and dealing with barriers. Handling nervousness/ discomfort.
Listening Skills	Listening-hearing and listening, effective listening, barriers to effective listening guidelines for effective listening. Triple- A Listening - Attitude, Attention & Adjustment. Active Listening Skills.
Motivational Training	Characteristics Essential to Achieving Success. The Power of Positive Attitude. Self awareness Importance of Commitment Ethics and Values Ways to Motivate Oneself Personal Goal setting and Employability Planning.
Facing Interviews	Manners, Etiquettes, Dress code for an interview Do's & Don'ts for an interview.
Behavioral Skills	Problem Solving Confidence Building Attitude
Block – II	
Duration – 55 hrs.	
4. Entrepreneurship Skills	
Duration : 15 Hrs. Marks : 06	

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Concept of Entrepreneurship	Entrepreneur - Entrepreneurship - Enterprises:-Conceptual issue Entrepreneurship vs. Management, Entrepreneurial motivation. Performance & Record, Role & Function of entrepreneurs in relation to the enterprise & relation to the economy, Source of business ideas, Entrepreneurial opportunities, The process of setting up a business.
Project Preparation & Marketing analysis	Qualities of a good Entrepreneur, SWOT and Risk Analysis. Concept & application of PLC, Sales & distribution Management. Different Between Small Scale & Large Scale Business, Market Survey, Method of marketing, Publicity and advertisement, Marketing Mix.
Institutions Support	Preparation of Project. Role of Various Schemes and Institutes for self-employment i.e. DIC, SIDA, SISI, NSIC, SIDO, Idea for financing/ non financing support agencies to familiarizes with the Policies /Programmes & procedure & the available scheme.
Investment Procurement	Project formation, Feasibility, Legal formalities i.e., Shop Act, Estimation & Costing, Investment procedure - Loan procurement - Banking Processes.
5. Productivity Duration : 10 Hrs. Marks : 05	
Benefits	Personal / Workman - Incentive, Production linked Bonus, Improvement in living standard.
Affecting Factors	Skills, Working Aids, Automation, Environment, Motivation - How improves or slows down.
Comparison with developed countries	Comparative productivity in developed countries (viz. Germany, Japan and Australia) in selected industries e.g. Manufacturing, Steel, Mining, Construction etc. Living standards of those countries, wages.
Personal Finance Management	Banking processes, Handling ATM, KYC registration, safe cash handling, Personal risk and Insurance.
6. Occupational Safety, Health and Environment Education Marks : 06 Duration : 15 Hrs.	
Safety & Health	Introduction to Occupational Safety and Health importance of safety and health at workplace.
Occupational Hazards	Basic Hazards, Chemical Hazards, Vibroacoustic Hazards, Mechanical Hazards, Electrical Hazards, Thermal Hazards. Occupational health, Occupational hygienic, Occupational Diseases/ Disorders & its prevention.
Accident & safety	Basic principles for protective equipment. Accident Prevention techniques - control of accidents and safety

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	measures.
First Aid	Care of injured & Sick at the workplaces, First-Aid & Transportation of sick person.
Basic Provisions	Idea of basic provision legislation of India. safety, health, welfare under legislative of India.
Ecosystem	Introduction to Environment. Relationship between Society and Environment, Ecosystem and Factors causing imbalance.
Pollution	Pollution and pollutants including liquid, gaseous, solid and hazardous waste.
Energy Conservation	Conservation of Energy, re-use and recycle.
Global warming	Global warming, climate change and Ozone layer depletion.
Ground Water	Hydrological cycle, ground and surface water, Conservation and Harvesting of water.
Environment	Right attitude towards environment, Maintenance of in -house environment.
7. Labour Welfare Legislation	
Duration : 05 Hrs. Marks : 03	
Welfare Acts	Benefits guaranteed under various acts- Factories Act, Apprenticeship Act, Employees State Insurance Act (ESI), Payment Wages Act, Employees Provident Fund Act, The Workmen's compensation Act.
8. Quality Tools	
Duration : 10 Hrs. Marks : 05	
Quality Consciousness	Meaning of quality, Quality characteristic.
Quality Circles	Definition, Advantage of small group activity, objectives of quality Circle, Roles and function of Quality Circles in Organization, Operation of Quality circle. Approaches to starting Quality Circles, Steps for continuation Quality Circles.
Quality Management System	Idea of ISO 9000 and BIS systems and its importance in maintaining qualities.
House Keeping	Purpose of House-keeping, Practice of good Housekeeping.
Quality Tools	Basic quality tools with a few examples.

10. DETAILS OF COMPETENCIES (ON-JOB TRAINING)

Broad learning to be covered in industry for plastic mould maker trade:

1. Safety and best practices /Basic Industrial Culture (5S, KAIZEN, etc.)
2. Record keeping and documentation
3. Fitting components using different metal fitting procedure and perform testing of the assembly.
4. Assembling of different components as per requirement and check functionality.
5. Carryout maintenance of different systems.

Note: Actual training will depend on the existing facilities available in the establishments.

The **competencies/ specific outcomes** on completion of On-Job Training are detailed below:

Block – I

10. Identify and apply the methods for general shop floor safety
11. Identify the desired specification of tools and equipments to perform metal cutting and measuring work.
12. Perform various drilling operations using different drilling machines and tools.
13. Develop skill on machine setting to perform different operations on lathe.
14. Maintain dimensional accuracy in various metal cutting operations on turning machines.
15. Perform various milling operations by proper setting of tools and fixtures.
16. Identify the proper measuring instrument to perform precise measurement of the job produced.
17. Prepare certain value of surface finish in different grinding machines.
18. Join metal pieces by different welding and brazing methods.

Block – II

9. Prepare job on vertical milling machines.
10. Prepare finished surfaces on grinding machines and measure the finished jobs.
11. Measure an integrated part using depth gauge micrometer and telescopic gauge.
12. Perform fitting through actual job preparations.
13. Practice on wire cut machine.
14. Practice on hydraulic and pneumatic circuits.
15. Practice programming and simulation using CAD/CAM software.
16. Practice assembly of machined components.

Note:

1. Industry must ensure that above mentioned competencies are achieved by the trainees during their on job training.
2. In addition to above competencies/ outcomes industry may impart additional training relevant to the specific industry.

INFRASTRUCTURE FOR PROFESSIONAL SKILL & PROFESSIONAL KNOWLEDGE

PLASTIC MOULD MAKER			
LIST OF TOOLS AND EQUIPMENT for Basic Training (For 20 Apprentices)			
Sl. No.	Item	Specification	Qty
1.	Steel Rule English and Metric combined	150 mm	As required
2.	Engineer's Square with knife edge	150 mm	As required
3.	Hacksaw frame adjustable with pistol grip for blade	200-300 mm	As required
4.	Centre punch	100 mm	As required
5.	Prick punch	150 mm	As required
6.	File flat bastard	300 mm	As required
7.	File flat 2 nd cut	250 mm	As required
8.	File flat safe edge	200 mm	As required
9.	File triangular smooth	200 mm	As required
10.	Caliper inside spring type	150 mm	As required
11.	Caliper outside spring type	150 mm	As required
12.	Divider spring type	150 mm	As required
13.	Odd leg caliper firm joint	0- 150 mm	As required
14.	Screw driver	150 mm	As required
15.	Screw driver	200 mm	As required
16.	Centre gauge	55° and 60°	As required
17.	Oil can	250 ml	As required
18.	File flat smooth	200 mm	As required
19.	File flat smooth with safe edge	200 mm	As required
20.	File half round bastard	300 mm	
21.	File half round smooth	250 mm	

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22.	File triangular bastard	250 mm	
23.	File triangular smooth	200 mm	
24.	File round bastard	250 mm	
25.	File square bastard	300 mm	
26.	File square smooth	250 mm	
27.	Knife edge file	150 mm	
28.	Needle file assorted	150 mm	12 nos.
29.	File card		
30.	Scraper flat	250 mm	
31.	Hammer Ball Peen with handle	0.5 kg	
32.	Hammer Cross Peen with handle	0.75 kg	
33.	Chisel cold flat	18 x 150 mm	
34.	Chisel Cross Cut	10 x 3 x 200 mm	
35.	Chisel Half Round	10 x 250 mm	
36.	Chisel diamond point	10 x 200 mm	
37.	Scribing block universal	300 mm	
38.	C.I. Surface plate	300 x 300 mm	
39.	Granite Surface plate	600 x 600x80 mm	
40.	Tap extractor (ezzy out)	3 mm to 12 mm x 1.5 mm	
41.	Screw extractor sizes	1 to 8	
42.	Taps and dies metric complete set in a box	5 mm to 12 mm	
43.	Twist Drill with St. Shank	Ø 5 to Ø 12 mm in steps of 0.5 mm	
44.	Twist Drill St. Shank	Ø 8 mm to Ø 12 mm in steps of 2 mm	
45.	Taper shank drills	Ø 6 mm to Ø 20 mm in steps of 1 mm	
46.	D.E spanners	3-4 , 6-8, 10-12, 13-14, 15-16, 18-19, 20-22, 24-26 (8 spanners)	
47.	Letter punch	5 mm set	
48.	Number punch	5 mm set	
49.	Drill chuck with key	12 mm capacity	
50.	Allen key metric	3 to 12 mm set	
51.	Centre drills 3, 4,5 mm		
52.	Parallel hand reamer	6 mm to 12 mm in steps of 1 mm	

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53.	Star dresser		
54.	Diamond dresser with holder		
55.	Safety goggles (Personal Protective Equipments)		
56.	Demagnetizer		
57.	Snips blade	200 mm	
58.	Workbench (Each bench fitted with 4 vices)	240 cm x 120 cm x 75 cm with 150 mm vice	
59.	Bench Vice	150 mm	
60.	Steel lockers for (Pigeon Cup Board)		16 trainees
61.	Steel cupboard	180 cm x 60 cm x 45 cm	
62.	Metal rack	180 cm x 60 cm x 45 cm	
63.	Fire extinguisher		
64.	Fire buckets with stand		
65.	Feeler gauge	0.05 mm to 0.3 mm by 0.05 and 0.4 mm to 1 mm by 0.1 mm	13 leaves
66.	Metric Screw pitch gauge-Range	0.4 -6 mm pitch 60°	21 leaves
67.	Radius gauge	1 - 3 mm by 0.25 mm and 3.5-7mm by 0.5 mm	34 leaves
68.	Vernier height gauge	Range 300 mm, with 0.02 mm least count	
69.	Universal vernier caliper	Range 200 mm, with 0.02 mm least count	
70.	Dial vernier caliper	0-200 mm, with 0.02 mm least count	
71.	Vernier caliper	Range 300 mm Vernier scale 0.02 mm	
72.	Vernier bevel protractor	Blade range 150 and 300 mm, dial 1°, least count 5' (min.) with head, Acute Angle attachment	
73.	Outside micrometer	0-25 mm, with 0.01 mm least count	
74.	Outside micrometer	25-50 mm, with 0.01 mm least count	
75.	Outside micrometer	50-75mm, with 0.01	

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		mm least count	
76.	Combination square sets with square head, centre head, protractor head	300 mm blade	
77.	Telescopic gauge range	8 -150 mm	6 pcs/set
78.	Sine bar with stopper plate	150 mm	
79.	Sine table length with magnetic bed	200 mm	
80.	Slip Gauge Box (workshop grade)	87 pieces per set	
81.	Gauge block accessories consisting holders, half round jaws, scriber point, centre point , triangular straight edge		14 pcs/set
82.	Central square blade	Size 400 x 250 mm	
83.	V-Block-Approx with clamping capacity of	32 x 32 x 41 mm	25 mm with clamps
84.	V-Block-Approx with clamping capacity of	65x65x80 mm 50 mm with clamps	
85.	Magnetic V-Block	100x100x125 mm	
86.	Angle plate	150 x 150 x 200 mm	
87.	Angle plate-adjustable	250x250x300 mm	
88.	Inside micrometer – Range with std extension rods upto 200mm..	50-63 mm	
89.	Depth micrometer with std set of extension rods.	Range 0-25 mm, accuracy 0.01 mm	
90.	Magnetic stand with magnetic base and with universal swivel clamp, dial holding rod (150 mm) scriber	60 x 47.5 mm	
91.	Dial test indicator-Lever type	Range 0-0.8 mm – Graduation 0.01mm, reading 0-50-0 with accessories	
92.	Dial test indicator – Plunger type	Range 0-10 mm , Graduation 0.01 mm, Reading 0-100 with revolution counter	
93.	Bore gauge with dial indicator	1 mm range, 0-0.01 mm graduation-Range of bore gauge 18-150 mm	
94.	Straight edge-Single beveled-	Size 150 mm and 250 mm	
95.	Tool makers clamp	50 mm & 75 mm	

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96.	C – clamp-	50 mm & 75 mm	
97.	Side and face milling cutter	Ø 100 x 10 X Ø 25 mm	
98.	Side and face cutter	Ø 80 x 10 X Ø 27 mm	
99.	Cylindrical milling cutter	Ø 63 x 70 x Ø 27 mm	
100.	Slitting Saw cutter	Ø 75 x 3 X Ø 27 mm	
101.	Slitting Saw cutter	Ø 100 x 6 X Ø 27 mm	
102.	Single angle cutter	Ø 75 x 16 x Ø 27mm - 60°	
103.	Single angle cutter	Ø 75 x 20 x Ø 27 - 45°	
104.	Equal angle cutter	Ø75x 30 x Ø 27 - 90°	
105.	Shell End Mill (preferably inserted tip type)	Ø 50 x 36 x Ø 22	
106.	Shell End Mill (preferably inserted tip type)	Ø 75 mm x 50 x Ø 22	
107.	Parallel shank end mills	Ø6, Ø10 and Ø 16 are (double fluted), Ø 20 mm & Ø 25mm (four fluted)	
108.	'T' slot cutter with parallel shank	Ø 17.5 x 8 mm width x dia. of shank 8 mm	
109.	Concave Milling cutter	Ø 63 x 6 radius x Ø 27 mm	
110.	Convex Milling cutter	Ø 63 x 6 radius x Ø 27 mm	
111.	Disc type form milling cutter	involute form -2 module, 20° pressure angle	
112.	Tool holder (straight) to suit	6, 8 mm sq. bit size	
113.	Parting tool holders to suit	3 and 4 mm thick tool blade	
114.	Boring bars with holders to accommodate	4, 6 and 8 mm HSS tool bits	
115.	Knurling tool (straight & diamond)		

The specifications of the items in the above list have been given in Metric Units. The items which are available in the market nearest of the specification as mentioned above, if not available as prescribed should be procured Measuring instruments such as steel rule which are graduated both English and Metric Units may be procured, if available.

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General Machinery Installation

Sl. No.	Name of Machineries and Equipment	Qty.
1.	Sensitive drilling machine - capacity 12 mm Motorized –with drill chuck and key etc.	1No.
2.	Pillar/column type Drilling machine – 25 mm capacity-motorized with drill chuck, key etc.	1No.
3.	Radial Drill machine to drill up to 32 mm diameter.	1No.
4.	Power hacksaw machine to accommodate 21" or more length blade.	1no.
5.	Double ended Pedestal Grinder with 178 mm wheels(one fine and one rough wheel)	1 no.
6.	SS and SC centre lathe (all geared) with centre height 150 mm and centre distance 1000 mm along with 3 jaws, 4 jaw chuck, auto feed system, taper turning attachment, coolant pump, safety guard and machine light arrangement.	3 nos.
7.	Shearing machine (lever type)hand operated complete with 300 mm blade length	1 no.
8.	Arc and gas welding and cutting equipment (Not required if Welding Trade is available in the Institute)	1No.
	(i) Transformer welding set 300 amps-continuous welding current with all accessories and electrode holder	1 set
	(ii) Welding cable to carry 400 amps 50 meter with flexible rubber cover.	12 nos.
	(iii) Lugs for cable	2 nos.
	(iv) Earth clamps	1 set
	(v) Arc welding table (all metal top) 122cm x 12 cm x 60 cm with positioner	1 no.
	(vi) Oxy-acetylene gas welding set-equipment with hoses, regulator and other accessories	1 set
	(vii) Gas welding table with positioner	6 nos.
	(viii) Welding torch tips of different sizes	1 no
	(ix) Gas lighter	2 nos.
	(x) Trolley for gas cylinders	2 pairs
	(xi) Chipping hammer	2 nos.
	(xii) Gloves (Leather)	1 set
	(xiii) Leather apron	2 nos.
	(xiv) Welding torches 5 to 10 nozzles	4 pair
	(xv) Spindle key for cylinder valve	2 nos.
	(xvi) Welding goggles	10 sets
	(xvii) Welding helmets with coloured glass	2 nos.
	(xviii) Tip cleaner	1 no.
9.	Universal Milling Machine -	1 no

Plastic Mould Maker

	Longitudinal traverse 700 - 800 mm Cross traverse 300 - 400 mm Vertical traverse 200 - 350 mm Swivel of table on either side 45° Speed range rpm 30 to 1800 With universal dividing head, circular table, long arbors, slab arbor, slotting attachment, vertical indexing head, etc.	
10.	Horizontal and Vertical milling machine	2 Nos. each
	Table Length x width 1350x310 mm Longitudinal traverse 700 - 800 mm Cross traverse 200 - 265 mm Vertical traverse 300 - 400 mm Speed range rpm 20 to 1800	
11.	Hydraulic Surface Grinding Machine	2 Nos.
	Table Clamping area 600 x 178 mm Grinding area 400 x 200 mm Distance table-centre of spindle 400 - 500 mm Table speed 1-25 m/min. With standard accessories like dust extractor with water separator, balancing device, table-mounted Radius-tangent wheel dresser, wheel flanges, etc.	
12.	Universal cylindrical Grinding Machine	1No.
	Max. dia ground (effective) 250 mm Max. grinding length 300 mm Height of centre 130 mm Max. distance between centers 340 mm With special accessories like face plate, steady, radius and face dressers, find hand feed attachment etc.	
13.	Rockwell Hardness Testing Machine with standard accessories	1No.
14.	Spark erosion EDM with standard accessories	1 No.
15.	Polishing kit	1 No.
16.	Hand Injection Moulding Machine 103 hand injection	1 No.
17.	CAD/CAM software (Program generation and simulation software for moulds and dies)	4 nos.

Plastic Mould Maker

18.	Desktop computers with latest configuration suitable for CAD/CAM software with necessary furniture	5 sets
19.	Vertical machining centre (VMC) (Optional)	01
20.	Co-ordinate measuring machine (Optional)	01
21.	Profile projector (Optional)	01



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**INFRASTRUCTURE FOR WORKSHOP CALCULATION & SCIENCE AND ENGINEERING
DRAWING**

TRADE: Plastic Mould Maker

LIST OF TOOLS& EQUIPMENTS FOR -20APPRENTICES

1) **Space Norms** : 45 Sq. m.(For Engineering Drawing)

2) **Infrastructure:**

A : TRAINEES TOOL KIT:-			
Sl. No.	Name of the items	Specification	Quantity
1.	Draughtsman drawing instrument box		20+1 set
2.	Set square celluloid	45° (250 X 1.5 mm)	20+1 set
3.	Set square celluloid	30°-60° (250 X 1.5 mm)	20+1 set
4.	Mini drafter		20+1 set
5.	Drawing board	(700mm x500 mm) IS: 1444	20+1 set
B : Furniture Required			
Sl. No.	Name of the items	Specification	Quantity
1	Drawing Board		20
2	Models : Solid & cut section		As required
3	Drawing Table for trainees		As required
4	Stool for trainees		As required
5	Cupboard (big)		01
6	White Board (size: 8ft. x 4ft.)		01
7	Trainer's Table		01
8	Trainer's Chair		01

TOOLS & EQUIPMENTS FOR EMPLOYABILITY SKILLS		
Sl. No.	Name of the Equipment	Quantity
1.	Computer (PC) with latest configurations and Internet connection with standard operating system and standard word processor and worksheet software	10 Nos.
2.	UPS - 500VA	10 Nos.
3.	Scanner cum Printer	1 No.
4.	Computer Tables	10 Nos.
5.	Computer Chairs	20 Nos.
6.	LCD Projector	1 No.
7.	White Board 1200mm x 900mm	1 No.
Note: - Above Tools & Equipments not required, if Computer LAB is available in the institute.		

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FORMAT FOR INTERNAL ASSESSMENT

Name & Address of the Assessor :						Year of Enrollment :							
Name & Address of ITI (Govt./Pvt.) :						Date of Assessment :							
Name & Address of the Industry :						Assessment location: Industry / ITI							
Trade Name :			Semester:			Duration of the Trade/course:							
Learning Outcome:													
Sl. No	Maximum Marks (Total 100 Marks)	15	5	10	5	10	10	5	10	15	15	Total internal assessment Marks	Result (Y/N)
	Candidate Name	Father's/Mother's Name	Safety consciousness	Workplace hygiene	Attendance/ Punctuality	Ability to follow Manuals/ Written instructions	Application of Knowledge	Skills to handle tools & equipment	Economical use of materials	Speed in doing work	Quality in workmanship	VIVA	
1													
2													