TECHNICIAN FABRICATOR

COMPETENCY BASED CURRICULUM

(Duration: 2 Yrs.)

APPRENTICESHIP TRAINING SCHEME (ATS)

NSQF LEVEL- 5

SECTOR – Capital Goods & Manufacturing

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

TECHNICIAN FABRICATOR

(Revised in 2018)

APPRENTICESHIP TRAINING SCHEME (ATS)

NSQF LEVEL - 5

Developed By

Ministry of Skill Development and Entrepreneurship
Directorate General of Training
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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 Directorate General of training(DGT) to develop skilled manpower for the industry**.** There are four categories of apprentices namely**; trade apprentice, graduate (engineers), technician (diploma) and technician (vocational) apprentices.**

Entry 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 DGT and those successful in the trade tests are awarded the National Apprenticeship Certificate (NAC) by DGT having worldwide recognition.

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. It will ensure stronger collaboration between industry and the trainees which will augment supply of skilled workforce and enable 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.

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 Directorate General of training(DGT). Craftsman Training Scheme (CTS) and Apprenticeship Training Scheme (ATS) are two pioneer programmes of DGT for propagating vocational training.

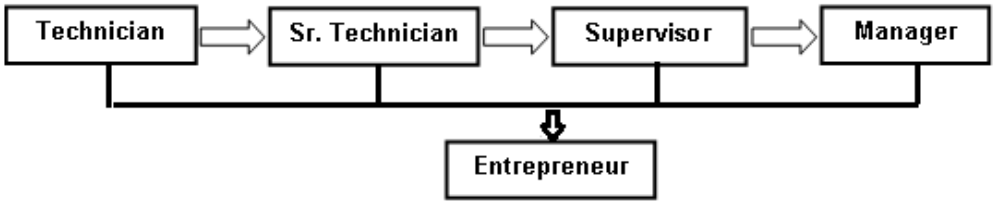
TECHNICIAN FABRICATOR trade under ATS is one of the most popular courses delivered nationwide through different industries. The course is of two years duration. It mainly consists of Domain area and Core area. In the Domain area Trade Theory & Practical impart professional - skills and knowledge, while 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 DGT 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:

- On completion of the training the trainee will have an opportunity to move in vertical/horizontal pathways to promote to higher designations. The trainee can further undergo other specialised courses to excel in the relevant field.



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	**BT– I**	**-----**	**BT – II**	**------**
Practical Training (On - job training)	**----**	**OJT – I**	**------**	**OJT – II**

A. Basic Training

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

S No.	Course Element	Total Notional Training Hours (For 02 Yrs. Course)
1.	Professional Skill (Trade Practical)	550
2.	Professional Knowledge (Trade Theory)	240
3.	Workshop Calculation & Science	40
4.	Engineering Drawing	60
5.	Employability Skills	110
	Total (Including formative assessment)	**1000**

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.

C. Total training hours:-

Duration	Basic Training	On-Job Training	Total
For 02 yrs. course (Engg.)	1000 hrs.	3120 hrs.	4120 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.

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. 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 DGT 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 before giving marks for practical examination.

2.4.1 PASS REGULATION

The minimum pass percentage is 40% for each Theory Examination (except for Employability Skill it is 34%) and 60% marks for each Trade practical Examination. The candidate should 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 examination for audit and verification by examination body. The following marking pattern to be adopted while assessing:

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 • 60-70% 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 above75% - 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% 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	• High skill levels in the use of hand tools, machine tools and workshop equipment • Above 80% accuracy achieved while undertaking different work with those

practices, has produced work which demonstrates attainment of a high standard of craftsmanship.	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.

3. JOB ROLE

Brief description of Job roles:

Welder, Machine operates gas or electric welding machine to join metal parts by fusion. Sets machine for operation by igniting burners and adjusting flames or by switching on current. Regulates flow of gas or current and adjusts machine according to material to be welded.
Checks cooling system and adjusts movement of conveyor, if any. Feeds material to be welded with either one by one or in batch according to type of machine and welds them by pressing paddle, or by automatic arrangements. May use fixtures or other suitable devices for mass production work.

Welder, Gas fuses metal parts together using welding rod and oxygen acetylene flame. Examines parts to be welded, cleans portion to be joined, holds them together by some suitable device and if necessary makes narrow groove to direct flow of molten metal to strengthen joint.
Selects correct type and size of welding rod, nozzle etc. and tests welding, torch. Wears dark glasses and other protective devices while welding. Releases and regulates valves of oxygen and acetylene cylinders to control their flow into torch. Ignites torch and regulates flame gradually. Guides flame along joint and heats it to melting point, simultaneously melting welding rod and spreading molten metal along joint shape, size etc. and rectifies defects if any. May join part at
various spots to prevent distortion of shape, form dimension etc. May preheat materials like cast iron prior to welding. May also weld by other gases such as argon coal etc.

Welder, Electric Arc Welder fuses metals using arc-welding apparatus and electrodes (welding material). Examines parts to be welded, cleans them and sets joints together with clamps or any other suitable device. Starts generator or transformer (welding apparatus and regulates current according to material and thickness of welding. Clamps one lead (insulated wire carrying current from generator) to part to be welded, selects required type of electrode and clamps it to holder connected with other lead). Generates sparks between electrode and joint, simultaneously guiding and depositing melting electrode uniformly for welding. Takes Precautionary measures such as wearing rubber gloves, holding welding screen of dark glass etc. May join parts first at various points for holding at specified angles, shape, form and dimension.

Iron and Steel **(Tungsten Inert Gas Welder)** performs manual TIG (GTAW) welding for a range of standard welding job requirements. This is for skilled welder who can weld different materials (carbon steel, aluminum, nickel, titanium, copper and stainless steel) in various positions and prepare various joints including corner, butt, fillet and tee. Set-up and prepare for operations interpreting the right information from the WPS.

Gas Metal Arc Welder/Metal Inert Gas/Metal Active Gas/Gas Metal Arc Welder (MIG/MAG/GMAW) perform manual (semi-automatic) MIG/MAG (GMAW) welding for a range of standard welding job requirements and weld different materials (carbon steel, aluminum and stainless steel) in various positions. The welder can prepare various joints including corner, butt, fillet and tee. Set-up and prepare for operations interpreting the right information from the WPS.

Iron and Steel **Plasma Cutter- Manual** cuts different materials (mild carbon steel, stainless steel, aluminum, high tensile and special steels, and other materials) in various profiles. This involve setting-up and preparing operations interpreting the right information from the specification documents, obtaining the right consumables and other materials, etc.

Fitter-Fabrication identifies metals, tools; carrying out fitting and fabrication operations like measuring, marking out, sawing, grinding, drilling, chiseling, threading, tapping, scraping, manual lapping and inspecting of components in order to fit a component as per specifications. It also involves basic oxy fuel gas cutting and basic manual arc welding as per given instructions and under supervision.

Reference NCO-2015:

i. 7212.0300 - Welder, Machine
ii. 7212.0100- Welder, Gas
iii. 7212.0200- Welder, Electric
iv. 7212.0105- Tungsten Inert Gas Welder
v. 7212.0303- Gas Metal Arc Welder/Metal Inert Gas/Metal Active Gas/Gas Metal Arc Welder (MIG/MAG/GMAW)
vi. 7212.0402- Plasma Cutter – Manual
vii. 7224.0102-Fitter-Fabrication

4. NSQF LEVEL COMPLIANCE

NSQF level for Technician Fabricator 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 Technician Fabricator 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	Technician Fabricator
NCO - 2015	7212.0100, 7212.0200, 7212.0105, 7212.0303, 7212.0111 7212.0402, 7224.0102
Trade Code	DGT/3200
NSQF Level	Level – 5
Duration of Apprenticeship Training (Basic Training + On-Job Training)	Two years
Duration of Basic Training	a) BT –I : 3 months b) BT – II : 3 months **Total duration of Basic Training: 6 months**
Duration of On-Job Training	a) OJT–I: 9 months b) OJT–II : 9 months **Total duration of Practical Training: 18 months**
Entry Qualification	Passed class 10th exam with Science under 10+2 system of education or its equivalent.
Selection of Apprenticeship	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 year. Final examination for all subjects will be held at the end of course and same will be conducted by DGT.
Rebate to Ex-ITI Trainees	01 year
CTS trades eligible for Technician Fabricator Apprenticeship	Broad Based Basic Training in Process Plant Maintenance Sector under Centre of Excellence Scheme and Advanced Module of Centre of Excellence Scheme in Fabrication and Designing of Steel Structure.

Note:

- *Industry may impart training as per above time schedule for different OJT, 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 DGT.*

6. LEARNING OUTCOME

6.1 SPECIFIC LEARNING OUTCOME

The following are minimum broad Specific Learning Outcome after completion of the Technician Fabricator course of 02 years duration under ATS.

1st Year:-

1. Arrange various measuring instruments viz. Callipers, depth gauge etc. and handle the same.
2. Set the welding plant, join different types of metals and check their correctness. *[Different metals – SS, Copper, Brass, Aluminium]*
3. Set engine lathe and parts and perform facing and plain turning operations.
4. Perform CO_2welding and Agro shield welding.
5. Plan and execute appropriate Gas welding process, lighting and adjustment of flame.
6. Set arc welding & gas welding machineries and perform cutting operations on MS plate.
7. Plan and execute MIG & TIG welding plant for single V and T butt joint on Aluminium sheet.
8. Use gas cutter & plasma cutter etc. for cutting metal sheets.

2nd Year:-

9. Demonstrate flange jointing operation to perform pipe joints.
10. Perform micro plasma welding on SS sheets & foils.
11. Perform fillet welding on MS plate by SMAW.
12. Test welding defects using DPT, MPT and ultrasonic testing method.
13. Execute V, T by SMAW, root inspection and back gouging.
14. Adopt weld sequence for controlling distortion.
15. Perform different types simple structures with L angles, I section and channel sections using welding fixture by SMAW.

6.2 GENERIC LEARNING OUTCOME

The following are minimum broad Common Occupational Skills/Generic Learning Outcome after completion of the Technician Fabricator course of 02 years duration under ATS:

YEAR 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. *[Different mathematical calculation & science – Conversion of Units, Mass, weight, volume & their units, Ferrous & non-ferrous metals, Heat, temperature &*

conversion of scales, Meaning of HP, IHP, BHP, FHP, efficiency, problems on horse power, Estimation & cost of finished products etc.]

3. Interpret specifications, different engineering drawing and apply for different application in the field of work. *[Different engineering drawing-Geometrical construction, Dimensioning, Orthographic projection I & III angle, isometric projection, Development of regular objects bounded by plane surfaces, Blue print reading of various drawings etc.]*
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.

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

SPECIFIC LEARNING OUTCOME	
LEARNING OUTCOMES	**ASSESSMENT CRITERIA**
1st Year 1. Arrange various measuring instruments viz. Callipers, depth gauge etc. and handle the same. 2. Set the welding plant, join different types of metals and check their correctness. *[Different metals – SS, Copper, Brass, Aluminium]* 3. Set engine lathe and parts and perform facing and plain turning operations. 4. Perform CO_2welding and Agro shield welding. 5. Plan and execute appropriate Gas welding process, lighting and adjustment of flame. 6. Set arc welding & gas welding machineries and perform cutting operations on MS plate. 7. Plan and execute MIG & TIG welding plant for single V and T butt joint on Aluminium sheet. 8. Use gas cutter & plasma cutter etc. for cutting metal sheets. **2nd Year** 9. Demonstrate flange jointing operation to perform pipe joints. 10. Perform micro plasma welding on SS sheets & foils. 11. Perform fillet welding on MS plate by SMAW. 12. Test welding defects using DPT, MPT and ultrasonic testing method. 13. Execute V, T by SMAW, root inspection and back gouging. 14. Adopt weld sequence for controlling distortion. 15. Perform different types simple structures with L angles, I section and channel sections using welding fixture by SMAW.	*Assessment Criteria for each specific learning outcome mentioned under **1st year & 2nd year** (section: 10) ensures 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 the 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 also ascertain that the candidate is responsible for own work and learning and some responsibility for other's work and learning.*

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 Productive 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 and explain different mathematical calculation & science in the field of study. *[Different mathematical calculation & science –*	2.1 Explain concept of basic science related to the field such as Material science - Properties of materials, Ferrous & non-ferrous metals, etc.
	2.2 Use scale/ tapes to measure as per specification.
	2.3 Calculate area / volume of the materials.

	Conversion of Units, Mass, weight, volume & their units, Heat, temperature & conversion of scales, Meaning of HP, IHP, BHP, FHP, efficiency, problems on horse power, Estimation & cost of finished products etc.]	2.4 Prepare list of appropriate materials by interpreting detail drawings and determine quantities of such materials.
		2.5 Ensure dimensional accuracy of assembly by using different instruments/gauges.
3.	Interpret specifications, different engineering drawing and apply for different application in the field of work. *[Different engineering drawing-Geometrical construction, Dimensioning, Orthographic projection I & III angle, isometric projection, Development of regular objects bounded by plane surfaces, Blue print reading of various drawings etc.]*	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 Calipers, Depth gauge etc. (as per tool list).
		4.2 Ascertain the functionality & correctness of the instrument.
		4.3 Measure dimension of the components & record data to analyse 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 & quality.	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.
		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.

8. SYLLABUS

BASIC TRAINING (BT – I) Duration: (03) Three Months		
Week No.	**Professional Skills (Trade Practical)**	**Professional Knowledge (Trade Theory)**
1	Physical introduction to measuring instruments- Handling of Instruments- Exercise in the use of liner measuring instruments Such as steel rule of different ranges. Outside calipers, in side Calipers for measuring inside. Outside measurement, in side measurement, depth gauge.	Introduction to metrology objectives of metrology- measurement-Principles-methods. Terminology used in metrology-accuracy- repeatability-resolution etc. SI units of measurements - physical quantities under SI system.
2	Introduction to the trade area & the type of jobs made by the trainees in the workshop. Safety on handling tools & equipment related to the trade. Setting up of arc & gas apparatus. Lighting & adjustment of oxyacetylene flame & fusion runs with & without filter rode on 2 to 3 mm thick M.S sheet (in flat position in gas). Striking & maintaining of arc & drawing shot heads of M.S. plate 10 to 12 mm thick (in flat position in arc). Lap, fillet & fillet joints on MS sheet 3mm in flat position (gas). Oxyacetylene cutting hand & machine square & level on 12 mm MS plate. Brazing on MS & Copper.	Introduction to welding trade, importance of welding in industrial development. Subject to be taught & achievement of be made. Safety precautions in gas & electric welding, elementary knowledge of first aid. Description & uses of welding tools & equipments, Method of shaping & jointing of metals, riveting, bolting, brazing, soldering &welding. Basic methods of production of oxygen & acetylene on commercial basis. Types of flame. Chemistry of neutral flame, principle of acetylene cutting, objects of using fluxes & rods.
3	Introduction of engine lathe and parts, holding the job in three & four jaw chuck. Facing and plain turning operations use of measuring tools required for turning. Balancing and truing of grinding wheel. Mounting and dressing of grinding wheel. Re sharpen of plain turning tool on Pedestal grinder to an accuracy of one degree; check the tool angle using bevel protector.	Manufacturing process in brief outline of various subjects to be covered. Disciplinary rules of the Institute. Training and other facilities available. Introduction to lathe description. Lathe-types of lathe machine, parts of centre lathe and function, lathe operation. Size and specification of a centre lathe. Lathe cutting tools- Types & tools, angle. Grinding machine- Introduction. Types specification and used. Grinding wheel, types and construction and mounting of

		wheel, wheel balancing & wheel turning. Metallurgy- types of metals, properties of metals, classification of steel, alloy steels and effect of alloying elements.
4	Types, application & use of Gas welding, setting up of flames. Lighting & adjustment of oxyacetylene flame & fusion runs with & without filler rod on 2 to 3 mm thick M.S. sheet Lap & T Fillet joints on MS sheet 3 mm is flat position (gas). Brazing on MS & Copper.	Gas welding process. Gas flame combination their flame temp. & application. System of oxy-acetylene welding brief description of gas cylinders, regulators & blow pipes. Chemistry of neutral flame, Principle of acetylene cutting, object of using fluxes & rods
5-6	Temperature & flow measurement: Various types of flow meters, maintenance of orifice, venture, flow nozzle & its use. Dismantling, overhauling & calibration of DP cell/ transmitters. Fitting of tapered glass tube Rota meter checking & testing. Performing practical on temperature measurement with different sensors in temp. Controlled oil bath. Practical on various thermocouples, RTDs & pyrometer. Temperature measuring instrument maintenance & calibration.	Basic properties of fluids, its motion, flow & rate, Reynolds number. Flow measuring devices, study of Rota meter. Temperature, types of heats, various temp. Scales. Bimetallic, fluid filled & electrical temperature instrument (bulbs, capillary, Bourdon tubes, temp. transmitters, and RTD bridge circuits). Pyrometer.
7	Gas cutting of MS plate, Plasma cutting of SS sheets & Aluminum plates, Cutting of sheet metal to size, Bending of sheet metal into various curvatures.	Gas welding principles and applications, Safety in Oxy-acetylene welding and cutting, Types of Flames and their uses, Gas welding, brazing & soldering procedures, Gas cutting principles, Plasma cutting principles and advantages, Welding fixture and manipulators, Manual metal arc cutting & Gouging, Carbon Arc cutting and gouging.
8	Facing, Plain and Turning. Taper Turning by compound rest slide methods. Setting threading tool and cutting the external "V" threads. Straight line beads on MS plate by CO_2 welding - Lap T & corner joint on MS plate by CO_2 welding in down hand position Single 'V' butt joint by CO_2 welding in	Work and tools, holding devices of lathe machine. Methods of mounting and dismounting chucks. Taper- types of Taper and their used. Taper turning methods and their calculation. MIG / MAG welding - Power source & accessories - Wire Feed unit Welding Gun & its parts

	down hand position - Single 'V' butt joint by Argo shield welding.	- Modes of metal transfer – Dip, Globular, spray & pulsed transfer and its significance.
9	Straight line beads on M S plate by SMAW, Weaved bead on M S plate by SMAW, Square butt joint on M S plate in down hand position by SMAW. Fillet weld on Tee joint and Lap joint in down hand position by SMAW. Fillet weld open corner joint on MS plate in down hand position by SMAW. Single V butt joint on MS flat in down hand position by SMAW.	Principles of Shielded metal Arc welding (SMAW). Basic Electricity of welding power source. AC / DC power source advantages and disadvantages. Arc and its characteristics. Polarity types & Arc length. Electrode – Types, description & Specification – BIS, AWS, etc. Functions of flux & Characteristics of flux. Selection of electrodes and coating factors
10	Setting up TIG welding plant. - Beading practice on MS sheet by TIG - Square butt and corner joint on MS by TIG in down hand position - Edge preparation of plates & pipes - Fitting of joint plates for TIG Welding.	- Introduction to TIG welding - TIG welding equipments - Advantages of TIG welding process -Power source – Types, polarity and application - Accessories - HF unit and DC suppressor.
11	- Beading practice on SS by TIG - Square butt and corner joint on SS by TIG - Welding of SS with back purging Technique. - Beading practice on Aluminum by TIG - Butt, T and Corner joint on Aluminum sheet by TIG - Single V butt joint on Aluminum sheet by TIG.	- Tungsten electrode, Types, sizes, and uses. - Type of shielding gases - Square wave concept and Wave balancing. - Advantages of root pass welding of pipes by TIG welding - Purging Methods - Tables / Data relating to TIG welding. - Different type of weld joints- plates & pipes.
12	- Identification of materials - Setting up of Gas welding equipment - Simple gas welding exercises on sheet metals (Butt & Fillet welds)	- Types of welding process - Advantages & limitations - Various types of welding power sources - Welding parameters - Different types of weld joints - Gas welding principle and application - Safety in welding and cutting.
13	**Assessment/Examination (03days)**	

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 (BT – II) **Duration: (03) Three Months**		
Week No.	**Professional Skills (Trade Practical)**	**Professional Knowledge (Trade Theory)**
1	- Root pass welding in plates by TIG in 1G, 2G, 3G & 4G - Root pass cleaning / Dressing up - Intermediate and cover pass welding of plates by SMAW - Root pass welding of pipes by TIG in 5G & 6 G - Intermediate and cover pass welding of pipes by MMAW. - Pipe Flange welding by TIG & ARC.	- Pipes classification and Pipe schedule - Difference between pipe welding and plate welding - Edge preparation and tack welding procedure - Welding positions and its significance. - Plate welding procedure in 1G, 2G, 3G & 4G positions. - Pipe welding procedure in 5G & 6G. - Root pass welding Procedure of pipe by TIG welding - Pipe welding intermediate and Cover pass by SMAW – Procedure.
2	- Double 'V' joint by Flux cored Arc welding - Lap T & corner joint on MS sheet in vertical down ward position by CO_2 welding - Lap T & corner joint on MS sheet in horizontal position by CO_2 welding - Lap T & corner joint on MS sheet in overhead position by CO_2 welding.	- Welding wire types and specification - Types of shielding gases - Argo shield gas - advantages - Flux cored arc welding
3	- Square butt and T joint on SS sheet by MIG welding. - Single 'V' and fillet joint on Aluminum plate by MIG welding. - Single 'V' joint on MS plate by SAW - Fillet weld on MS plate by SAW - Micro plasma welding on SS sheets & Foils.	- Trouble shooting in MIG welding - Data and Tables related to CO_2welding - Basic welding metallurgy - Weldability of metals - Preheating and Post heating - Distortion and methods of control - Submerged Arc welding – Principles, application-Types of fluxes, welding head, power source and Parameter setting - Plasma welding - Micro Plasma welding – Principle & parameter setting - Welding automation, Robots in welding.
4	Weld joint preparation for fillet welds (cutting to size, fit up, tack weld etc.) - Fillet, Lap and T joint on MS flat by	- Basic Electricity applicable to welding - Arc welding power source AC/DC - advantages and disadvantages

	SMAW, position – 1F - Fillet, lap and T joint on MS flat by SMAW position – 2F - Inspection & clearance using LPI testing	- Types of metal and their characteristics - Classification of steel and their Weldability - Heat affected zone and requirement for pre-heating and maintaining inter pass temperature - Welding symbols and their importance -Welding positions and necessity of positional welding - Weld joint edge preparation - Welding procedure and techniques - Tack welding, root run welding, intermediate and cover pass welding, cleaning, checking etc.
5	- Weld joint preparation for pipe fillet welding - Pipe to plate fillet weld flange joint on MS by SMAW, position – 5 F - Pipe to pipe fillet weld on MS pipes by SMAW, position -5F	- Effect of Heat on Weldments - Welding distortion and stresses - Methods of controlling distortion by various methods - Methods of relieving stress on Weldments -Advantages of welded structures over riveted structures.
6	Setting up DC TIG welding equipment and making beading practice on MS in down hand position. - Square butt joint on M.S Sheet by TIG Welding in down hand position.	- TIG Welding equipments - Advantages of TIG Welding process - Power source types AC/DC - Types of polarity and application - Accessories – HF unit and DC Supressor - Tungsten electrode, types, sizes and uses - Types of shielding gases TIG Welding parameters for welding MS.
7	- Full penetration Single “V” butt on M.S. flat by TIG and SMAW, positions 1G & 2G - Root pass welding by TIG & LPI testing - Cover pass by SMAW, inspection & clearance Full penetration Single “V” butt join on M.S. Flat by TIG and SMAW, positions 3G & 4 G - Root pass welding by TIG & LPI testing - Cover pass by SMAW, inspection &	- Necessity of root pass welding by TIG. - Inspection of root pass welding by die – penetrant testing - Preparation for TIG Welding under drift conditions - Necessity of back purging - Types of Tubular structures used on structural fabrication - Development of templates for marking and preparation of pipe elbow,

	clearance Double "V"' butt joint on MS Flats in dissimilar thickness in down hand positions by SMAW - Root Inspection - Back Gouging - Adopting weld sequence for controlling distortion.	- T, Y and K joints (Similar and dissimilar diameter pipe connections) Welding defects causes and remedy. - Procedure of rectifying, weld defects – Gouging methods / grinding, testing with die penetrant, pre-heating and re welding.
8	- Pipe Elbow and T joints on MS pipes by SMAW in flat position - Pipe Y and K connection on M.S. pipe by SMAW, positions – Horizontal	- Procedure of structural fabrication - Planning for structural members, marking and edge preparation, assembling, tack welding, measurement of weldment size, root pass welding, inspection of root pass welding, making cover pass and Inspection & Testing etc.
9	- Practice on CO_2 welding and Flux Cored Arc Welding - Practice on Automatic Submerged Arc Welding machine Beading practice by TIG on MS sheets Root pass welding of plates and pipes in all positions by TIG - Cover pass by SMAW.	- Introduction to MIG / Flux cored arc welding – Advantages – Power source – Wire feeder – Electrode wires - shielding gases – Types of metal transfer and welding parameters - Introduction to Submerged arc welding (SAW). Advantage, limitation, Equipment and operating conditions. Introduction to TIG welding – Advantages, Equipment – Electrode – Shielding Gas and Advantage of root pass welding by TIG.
10	- Practice on CO_2 welding and Flux Cored Arc Welding - Practice on Automatic Submerged Arc Welding machine	- Introduction to MIG / Flux cored arc welding – Advantages – Power source – Wire feeder – Electrode wires - shielding gases – Types of metal transfer and welding parameters - Introduction to Submerged arc welding (SAW). Advantage, limitation, Equipment and operating conditions.
11	- Evaluation of welding defects using Dye penetrant testing method and Magnetic Particle Testing.	- Non destructive Testing of Metals. - Visual inspection - Dye penetrant test(DPT) - Principles - Advantages - Limitations - Types of Penetrants - Cleaners - Dwelling time - - Magnetic Particle Test(MPT) - Principles - Advantages - Limitations - Types of Magnetation - Current

		requirements - Testing equipments - Indication and Interpretations.
12	- Evaluation of welding defects using Ultrasonic Flaw detector	- Ultrasonic Testing – Principles – Advantage – Limitation - Types of UT Waves – Attenuation - Types of Transducers - Couplants - Equipments and controls - Type of scans - Measuring Techniques - Standard reference blocks - Contact Testing procedure - Indications and interpretations
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

BT – I		
Sl. No.	**Workshop Calculation and Science (Duration: - 20 hrs.)**	**Engineering Drawing (Duration: - 30 hrs.)**
1.	Units & measurement- system of units, fundamentals & derived units.	Familiarization with the institute.
2.	Conversion of units & applied problems. FPS, CGS, MKS & SI units.	Introduction to engineering drawing & its importance. Different types of standards used in engineering drawing
3.	Fraction & decimals- addition, subtraction, multiplication & division.	Drawing instruments & their uses- drawing board, T square, set square, protector, drawing sheet, drawing pencils-grade & selection, eraser. Practice lay out of drawing sheet.
4.	Mass, weight, volume & their units. Problems on these, volume of steel, aluminum & copper.	Types of lines- thickness, shade of lines & its general application. Draw types of lines of lines as per IS-70714-1983. Draw figures involving horizontal, vertical & inclined lines.
5.	Simplification of fraction & decimals.	Type of angle, triangle and their types.
6.	Definition- force, pressure, stress, strain & modulus of elasticity.	Practical- construct scalene triangle, right angle, isosceles & equilateral triangle.
7.	Square, square. root, cube root	Lettering style-single stroke letters, gothic letters as per IS standards. Lettering practice.
8.	Plotting & reading of simple graph.	Dimensioning- types of dimension, elements if dimension, method of indicating values, arrangement & indication if dimensions.
9.	Heat, temperature & conversion of scales. Thermometer, thermocouple, pyrometer & its application. Transmission of heat & Coefficient of thermal expansion of solids, liquid & gas & related problems.	Practice- place dimension in the drawing by aligned system & unidirectional system. Give dimension to given drawing by following dimensioning principles as per BIS. Method of dimension common features.
10.	Ratio & proportion – mechanical advantage, velocity ratio & efficiency.	Geometrical construction using drawing instruments-linear, angles, patterns, circle, arc, tangent, quadrilateral, regular polygons, tapers. Related exercise on this topic.

11.	Simple machines – mechanical advantage, v velocity ratio & efficiency.	Practice- constructs square, rectangle, parallelogram, rhombus, trapezium, and quadrilateral. Draw a regular pentagon by circumscribing & inscribing, regular hexagon by arc method, octagon &various types of tapers.

BT – II		
Sl. No.	**Workshop Calculation and Science (Duration: - 20 hrs.)**	**Engineering Drawing (Duration: - 30 hrs.)**
1.	Use of logarithms & antilogarithms tables & problems their on multiplication, division, fraction.	Orthographic projection I & III angle- simple machine elements, procedure for preparing a scale drawing.
2.	Newton's law of motion & related problems. Friction & its kinds – advantages & division, fractions.	Draw a plan, elevation & side view of prism, cylinder, frustum of cone, pyramid.
3.	Estimation & cost of finished products.	Draw a plan, elevation & side view of object having stepped blocks with curved surfaces in I &lll angle.
4.	Classification of ferrous &nonferrous metals & alloys, physical &mechanical properties of metal.	Drawing isometric views out of orthographic views.
5.	Algebraic addition, subtraction, multiplication & division. Simultaneous equation, factors & related problems.	Draw the isometric projection of cube, hexagonal prism, cylinder, cone, objects/ blocks with curved surfaces.
6.	Meaning of HP, IHP, BHP, FHP, efficiency, problems on horse power.	Visualize the shape of object from the given two views and add third view- simple machine element.
7.	Trigonometry- ratio, formulae, area of triangle, height & distance by using trigonometry. Pythagoras theorem.	Identify the lines missed in multi views and supply them, third view for the given two views of similar in shapes & size.
8.	Heat treatment – process of annealing, normalizing, hardening, tempering, case hardening, carburizing, nitriding.	Development of regular objects bounded by plane surfaces- cube, prism, cylinder & cones.
9.	Basic principles of electricity. Ohms law. Use of switch, fuse, conductor, insulator &semiconductor. Series & parallel circuits.	Draw the development of surfaces of a cube & prism, cylinder, cones.
10.		Explanation of full- sectional view, half sectional view, aligned sections.
11.		Conventions & symbols used on drawing, abbreviations used on engineering

		drawing, surface finish symbols, welding symbols & annotation.
12.		Blue print reading of various drawings; take out blue print from blue print machine.

9.2 EMPLOYABILITY SKILLS

(DURATION: - 110 HRS.)

BT – 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 Internet	Basic of computer Networks (using real life examples), Definitions of Local Area Network (LAN), Wide Area Network (WAN), 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 cybercrimes.
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
BT – II **Duration – 55 hrs.**	
4. Entrepreneurship Skills Duration: 15 Hrs.	Marks : 06
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	Qualities of a good Entrepreneur, SWOT and Risk Analysis. Concept &

& Marketing analysis	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 Duration: 15 Hrs. Marks : 06	
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 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)

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

OJT – I

1. Arrange various measuring instruments viz. Callipers, depth gauge etc. and handle the same.
2. Set the welding plant, join different types of metals and check their correctness. *[Different metals – SS, Copper, Brass, Aluminium]*
3. Set engine lathe and parts and perform facing and plain turning operations.
4. Perform CO_2welding and Agro shield welding.
5. Plan and execute appropriate Gas welding process, lighting and adjustment of flame.
6. Set arc welding & gas welding machineries and perform cutting operations on MS plate.
7. Plan and execute MIG & TIG welding plant for single V and T butt joint on Aluminium sheet.
8. Use gas cutter & plasma cutter etc. for cutting metal sheets.

OJT – II

9. Demonstrate flange jointing operation to perform pipe joints.
10. Perform micro plasma welding on SS sheets & foils.
11. Perform fillet welding on MS plate by SMAW.
12. Test welding defects using DPT, MPT and ultrasonic testing method.
13. Execute V, T by SMAW, root inspection and back gouging.
14. Adopt weld sequence for controlling distortion.
15. Perform different types simple structures with L angles, I section and channel sections using welding fixture by SMAW.

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.

ANNEXURE – I

INFRASTRUCTURE FOR PROFESSIONAL SKILL & PROFESSIONAL KNOWLEDGE

TECHNICIAN FABRICATOR			
LIST OF TOOLS AND EQUIPMENT for Basic Training			
A. TRAINEES TOOL KIT			
Sl. no.	**Name of the Tool &Equipments**	**Specification**	**Quantity**
1.	Steel rule graduated both in English & metric units	30 cm	17 Nos.
2.	Outside spring caliper	150 mm	17 Nos.
3.	In side spring caliper	150 mm	17 Nos.
4.	Hermaphrodite caliper	150 mm	17 Nos.
5.	Divider spring	150 mm	17 Nos.
6.	Centre punch	100 mm	17 Nos.
7.	Hammer Ball pein	0.5 kg	17 Nos.
8.	Combination pliers	150 mm	17 Nos.
9.	File flat bastard	300mm	17 Nos.
10.	File flat 2nd cut	250mm	17 Nos.
11.	Engineers screw driver		17 Nos.
12.	File flat smooth	200mm	17 Nos.
13.	Cold chisel flat	25x200mm	17 Nos.
14.	Granite surface plate	1000x 630 mm grade 1	2 Nos.
15.	Metal stand table for surface plate	900x900x1200mm	2 Nos.
16.	Screw driver set (multi heads)		1 No.
17.	Scribing block universal	300mm	2 Nos.
18.	V block universal	300mm	2 Nos.
19.	Tri square	150mm	2 Nos.
20.	Out side spring caliper	200mm	2 Nos.
21.	Divider spring	200mm	2 Nos.
22.	Inside spring caliper	200mm	2 Nos.
23.	Straight edge steel	1 mtr	1 No.
24.	Straight edge steel	500mm	1 No.
25.	Steel tape	2 mtrs	1 No.
26.	Sprit level		1 No.
27.	Hammer ball pein	800gms	3 Nos.
28.	Screw driver heavy duty	300mm	2 Nos.
29.	Hammer lead	1 kg	1 No.
30.	Combination set	300mm	2 Nos.
31.	Spindle blade screw driver	100mm	2 Nos.
32.	Dial gauge	o/ 50mm	4 Nos.

33.	Lever type dial gauge	o/ 50mm	2 Nos.
34.	Dial gauge stand		4 Nos.
35.	Screw pitch gauge set for metric pitches	(0,5-7mm)	2 Nos.
36.	Radius gauge set metric	1-6mm	1 No.
37.	Allen hexagonal key set	2.5-12mm	2 Nos.
38.	Spanner double ended set (seven pcs.) in metric.		4 Nos.
39.	Adjustable spanner	300mm	2 Nos.
40.	Reduction sleeve MT as required		1 No.
41.	Angle plate	size 200x100x200mm	2 Nos.
42.	Angle plat adjustable	250 x 150 x175mm	1 No.
43.	Solid parallels in metric		6 Nos.
44.	Oil can pressure feed	500mtrs	3 Nos.
45.	Oil stone	150x50x25mm	2 Nos.
46.	Twist drills (paraller shank)	3-13mm	2 Nos.
47.	Drill chuck with taper shank	0-20mm	1 No.
48.	Centre drill	A 1-5	2 Nos.
49.	Grinding wheel dresser (star type)		1 No.
50.	C clamps	100mm	2 Nos.
51.	C clamps	200mm	2 Nos.
52.	Tap & die set in box metric		1 No.
53.	Drill HSS taper shank	10-20mm	1 No.
54.	File flat IInd cut	250mm	4 Nos.
55.	File flat smooth	200mm	4 Nos.
56.	File Half round IInd cut	250mm	4 Nos.
57.	File triangular smooth	200mm	4 Nos.
58.	Needle file set		1 No.
59.	File square IInd cut	250mm	4 Nos.
60.	Reamer set	6-13mm by 1mm	1 No.
61.	Hacksaw adjustable	300mm	8 Nos.
62.	Bench vice jaw	150mm	8 Nos.
63.	Magnifying glasses	75mm	2 Nos.
64.	Micrometer out side	0-25mm	4 Nos.
65.	Micrometer out side	25-50mm	2 Nos.
66.	Micrometer depth gauge	0-150mm	2 Nos.
67.	Direct reading vernier caliper	300mm	4 Nos.
68.	Vernier height gauge	250mm	1 No.
69.	Digital vernier caliper	200mm	1 No.
70.	Vernier bevel protector with least count of 5 minutes		1 No.
71.	Feeler gauge	0.1-1.0mm	1 No.
72.	Pillar type drilling machine cap with accessories	12mm	1 No.

73.	Redial drill machine Motorized with tapping attachment	120mm	1 No.
74.	Pillar type drill machine with accessories	20 mm caps.	1 No.
75.	Two wheel pedestal grinder	300mm	1 No.
76.	Hand drill machine capacity	10mm	1 No.
77.	Sledge hammer pound	10mm	1 No.
78.	Welding torch with tips assorted		2 Nos.
79.	Anvil		1 No.
80.	Mallet	1lb.	2 Nos.
81.	Number/alphabetic punch	100mm	1 No.
82.	Welding transformer	200A	1 No.
83.	Welding cable for above capacity in mtrs		50 Nos.
84.	Electrode holder		4 Nos.
85.	Chipping hammer		4 Nos.
86.	Screen helmet		4 Nos.
87.	Pressure Regulator Oxygen double stage		1 No.
88.	Leather gloves pair		4 Nos.
89.	Tongs holding	300mm	4 Nos.
90.	Pressure Regulator Acetylene double stage		1 No.
91.	Arc welding table		4 Nos.
92.	Lugs for cable		20 Nos.
93.	Rubber Hose pope for Oxy. & Ace. in mtrs		50 Nos.
94.	Cutting torch Oxy-acetylene with tips		2 Nos.
95.	Spark lighter		6 Nos.
96.	Arc welding Generator set	350A	1 No.
B : INSTRUMENTS & GENERAL SHOP OUTFIT			
	Gas welding equipments		
97.	Goggle pair welder type		16 Nos.
98.	Spark lighter		16 Nos.
99.	Pressure regulator oxygen double stage		5 Nos.
100.	Pressure regulator oxygen double stage		5 Nos.
101.	Out fit spanner		6 Nos.
102.	Rubber hose clip		50 Nos.
103.	Spindle key for opening		6 Nos.
104.	Trolley for cylinder		2 Nos.
105.	Welding torch tips assorted		5 set
106.	Cutting torch oxy acetylene with cutting & gauging tips		2 set
107.	Gas welding tables 1200x920x600 mm		5
108.	Fire bricks on stand with petitioners Tip cleaner		8
109.	Rubber hose pipe black & red	8mm (each)	3 mtrs.

			each
110.	Oxygen cylinder empty		1 No.
111.	Acetylene cylinder empty		1 No.
112.	Hack saw frame	300 mm	2 Nos.
113.	Chisel cold flat	25x125mm	16 Nos.
114.	Tongs holding	300 mm	6 Nos.
115.	Spanner double ended	12 mm and 15 mm	4 Nos.
116.	Spanner D E	6 mm to 15 mm be 1.5 mm set of Nos.	1 set
117.	Clamps	10 cm 15 cm 20 cm 30 cm	2 each
118.	Hammer sledge double faced	3 Kg.	1 No.
119.	Pipe wrench	25 cm and 35 cm	1 each
120.	Steel tape flexible in case	182 cm	1 No.
121.	Pipe Cutter		1 set
122.	Cutting torch Oxy-Acetylene with cutting nozzle		2 set
123.	Heavy duty cutting, blow pipe with cutting nozzles		1 set
124.	Electrode holder	400 amps	6 Nos.
125.	Welding rubber hose,	oxygen and acetylene 8 mm	100 m
126.	Rubber hose clips		50 Nos.
127.	Spindle key (for opening cylinder valve)		8 Nos.
128.	Pressure regulator oxygen double stage		8 Nos.
129.	Pressure regulator acetylene Regulators		8 Nos.
130.	Tip cleaner		8 Nos.
131.	Glasses coloured	108x82x3 mm DIN 9A 11A & 13 A	16 each
132.	Glass white	108 mm x 82 mm	20 dozen
133.	Outfit spanner		8 Nos.
134.	Rubber hose pipe black and red 5 mm		30 m
135.	Leather sleeves		16 pairs
C : GENERAL MACHINERY INSTALLATIONS			
136.	Transformer welding set with all accessories	300 A	2 sets
137.	Arc welding set Rectifier type with all accessories.	400 Amps	2 sets
138.	TIG welding set complete AC / DC with water cooled torch	300 Amps	2 sets
139.	CO_2 welding machine complete	400 amps with gas cooled goose necked torch 300A	2 sets
140.	Welding cables to carry with flexible rubber	400 Amps	50 m
141.	Lugs for Cables		4 Nos.

142.	PUG cutting machine		1 No.
143.	Gas welding table fire bricks on stand	822 x 92 cm + 60 cm	3 Nos.
144.	Dye penetrant Testing kit		2 set
145.	Magnetic particle Testing machine		1 No.
146.	Ultrasonic flaw detector		1 No.
147.	IIW / ASTM reference radiographic standard		1 set
148.	Submerged Arc welding machine	600 Amps	1 No.
149.	Arc welding table all metal with positioner		6 Nos.
150.	Trolley for cylinder (H P unit)		2 Nos.
151.	Gullitine shearing machine		1 No.
152.	D E grinder wheel motorized Pedestal type	30 cm	1 No.
153.	Vice bench	10 cm	6 Nos.
154.	Power hacksaw		1 No.
155.	Electrode drying oven Temp.	range 0-250^0 C, 10Kg capacity	1 No.
156.	AG 7 Grinder & AG4		2 each
157.	Portable drilling machine	Cap. 6 mm	1 No.
158.	Welding helmets		16 Nos.
159.	Steel lockers with 8 pigeon holes		2 Nos.
160.	Micro plasma welding machine	25 Amps	1 No.
161.	Impact testing machine		1 No.
162.	Air plasma cutting system with standard accessories & compressor		1 No.
163.	Universal Testing machine		1 No.
164.	Personnel Computer with latest profile		1 No.
165.	Welding CDs (Processes and Inspection methods)		1 set
166.	Fibre Welding booth & welding screen		8 each
167.	Fume extractors		4 Nos.
168.	Oxygen, Acetylene, Argon & Co_2 cylinders		2 each
169.	Fire fighting equipment & First aid box		As reqd.
170.	Steel lockers with 8 pigeon holes		2 Nos.
171.	Air plasma cutting system with accessories & compressor		1 No.
172.	Carbon arc gouging torch	300 A	1 No.
D. FURNITURE:			
173.	Instructor table	1200x760x760mm	1 No.
174.	Instructor chair with arm		1 No.
175.	Steel stools	300x300x450mm	16 Nos.
176.	Work bench	3000x1500x760mm	4 Nos.
177.	Discuss table	3000x1200x760mm	1 No.
178.	Steel locker with eight compartments		4 Nos.

179.	Steel almirah	1980x900x450mm	4 Nos.
180.	Book shelf 4 drawer		1 No.
181.	Steel rack 4shelf		3 Nos.
182.	Black board with stand		1 No.
183.	Fire extinguisher CO_2		2 Nos.
184.	Fire bucket with stand		4 Nos.
185.	Artificial respiration chart		4 Nos.
186.	First aid box		1 No.

INFRASTRUCTURE FOR WORKSHOP CALCULATION & SCIENCE AND ENGINEERING DRAWING

TRADE: TECHNICIAN FABRICATOR

LIST OF TOOLS & EQUIPMENTS FOR - 20 APPRENTICES

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^o (250 X 1.5 mm)	20+1 set
3.	Set square celluloid	30^o-60^o (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			
1	Drawing Board		20 Nos.
2	Models : Solid & cut section		as required
3	Drawing Table for trainees		as required
4	Stool for trainees		as required
5	Cupboard (big)		01 No.
6	White Board	(size: 8ft. x 4ft.)	01 No.
7	Trainer's Table		01 No.
8	Trainer's Chair		01 No.
9	Instructor table	1200x760 mm	1 No.
10	Instructor chair with arm		1 No.
11	Student table	600x450x760 mm	20 Nos.
12	Student chair		20 Nos.
13	Steel almirah	1980x450x900 mm	2 Nos.
14	Book shelf		1 No.
15	Mini drafter		17 Nos.
16	Drawing board with pins & clips	600x450 mm	17 Nos.
17	Magnetic white board with accessories.	1500x1200 mm	01set
18	Black board with stand		1 No.

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.		

ANNEXURE-II

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 :	**Examination:**		**Duration of the Trade/course:**
Learning Outcome:			

Sl. No	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	Total internal assessment Marks	Result (Y/N)
Maximum Marks (Total 100 Marks)			**15**	**5**	**10**	**5**	**10**	**10**	**5**	**10**	**15**	**15**		
1														
2														