

WELDER (GAS & ELECTRIC)

COMPETENCY BASED CURRICULUM

(Duration: 1 Yr. 3 Months)

APPRENTICESHIP TRAINING SCHEME (ATS)

NSQF LEVEL- 4



India
कौशल भारत - कशल भारत

SECTOR – FABRICATION



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

Welder (Gas & Electric)

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(Revised in 2018)

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Skill India
कौशल भारत - कुशल भारत

Developed By

Ministry of Skill Development and Entrepreneurship
Directorate General of Training
CENTRAL STAFF TRAINING AND RESEARCH INSTITUTE
EN-81, Sector-V, Salt Lake City,
Kolkata – 700 091

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Co-ordinator for the course: ShriNirmalyaNath, ADT CSTARI, Kolkata

Sl. No.	Name & Designation Sh./Mr./Ms.	Organization	Expert Group Designation
1.	K V Reddy, W/S In-Charge & Sr. Faculty	LTIT – Mahape, Navi Mumbai	Expert
2.	M. K. Verma, Sr. Manager	SNTI, TATA Steel Ltd.	Expert
3.	B. C. Hara, Sr. Instructor	SNTI, TATA Steel Ltd.	Expert
4.	M. Thamizharasan, JDT	CSTARI, Kolkata	Expert
5.	N. Nath, ADT	CSTARI, Kolkata	Expert

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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:

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- 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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2.1 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.

Welder (Gas & Electric) trade under ATS is one of the most popular courses delivered nationwide through different industries. The course is of one year (01 Block) 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.

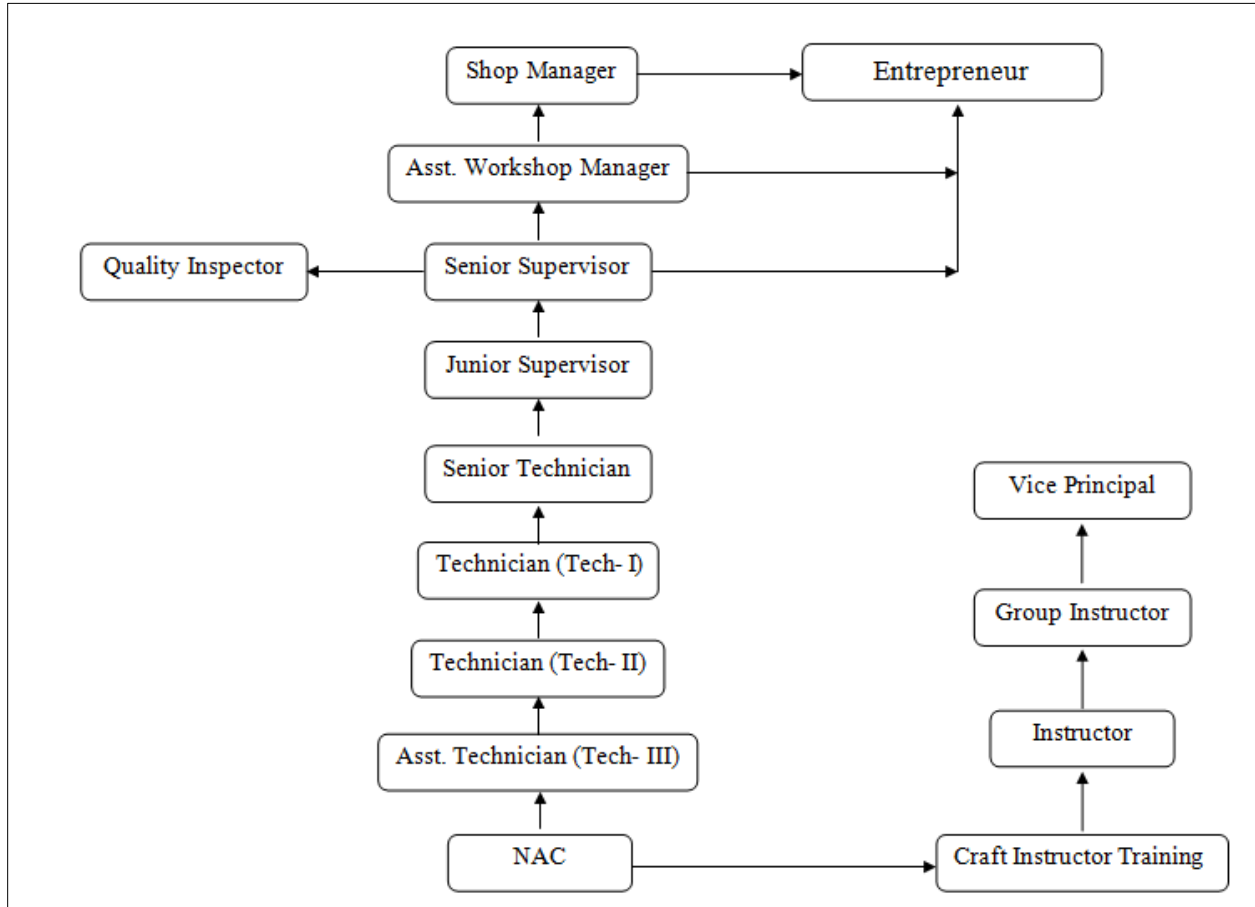
Broadly candidates need to demonstrate that they are able to:

- 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.

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2.2 CAREER PROGRESSION PATHWAYS:

- Can join Crafts Instructor Training Scheme (CITS) in the trade for becoming instructor in ITIs.
- 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 one year (*Basic Training and On-Job Training*) :-

Total training duration details: -

Time (in months)	1-3	4 - 15
Basic Training	Block– I	-----
Practical Training (On - job training)	----	Block – I

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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 1st yr.)

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.

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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 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 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	
<p>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.</p>	<ul style="list-style-type: none"> • 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 above75% - 90% to be allotted during assessment	
<p>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.</p>	<ul style="list-style-type: none"> • 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	
<p>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.</p>	<ul style="list-style-type: none"> • 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:

Welder (Gas & Electric) while doing gas welding 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 heat it to melting point, simultaneously melting welding rod and spreading molten metal along joint shape, size etc. and rectifies defects if any.

Welder (Gas & Electric) while doing Arc welding fuses metals using arc-welding power source and electrodes. Examines parts to be welded, cleans them and sets joints together with clamps or any other suitable device. Starts welding power source and regulates current according to material and thickness of welding. Connect one lead to part to be welded, selects required type of electrode and clamps other lead to electrode holder. May join parts first at various points for holding at specified angles, shape, form and dimension by tack welding. Establish arc between electrode and joint and maintain it throughout the length of the joint.

Welder (Gas & Electric) operates spot welding machine to joint metal sheet by resistance welding method. Feeds metal sheets to be welded according to type of machine and welds them by pressing paddle, or by automatic arrangements.

Welder (Gas & Electric) while doing gas cutting, cuts metal to require shape and size by gas flame either manually or by machine. Examines material to be cut and marks it according to instruction of specification. Makes necessary connections and fits required size of nozzle in welding torch. Releases and regulates flow of gas in nozzle, ignites and adjusts flame. Guides flame by hand or machine along cutting line at required speed and cuts metal to required size.

Welder (Gas & Electric) while doing gas brazing, joints metal parts by heating using flux and filler rods. Cleans and fastens parts to be joined face to face by wire brush. Apply flux on the joint and heats by torch to melt filler rods into joint. Allows it to cool down. Clean and examines the joint.

Welder (Gas & Electric) while doing Gas Tungsten Arc welding also known as Tungsten Inert Gas (TIG) welding reads fabrication drawing, examines parts to be welded, cleans them and sets joints with clamps or any other suitable device. Selects suitable tungsten electrode, grinds the edges and fit in to the GTA welding torch. Selects gas nozzle and fit in to the GTA welding torch. Selects suitable filler rods and cleans them. Connects work piece with earth cable, Connects the machine with Inert gas Cylinder, regulator and flow meter. Starts the Constant current GTA welding machine, sets suitable welding current & polarity and inert gas flow.

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Establish arc through across a column of highly ionized inert gas between work piece and Tungsten electrode. Melts the metal and deposit weld beads on metal surfaces by passing the suitable filler rod in to the weld puddle. Joins metal pieces such as Steel, Stainless steel and Aluminium metals.

Welder (Gas & Electric) while doing Gas Metal Arc welding also known as MIG/MAG Welding, reads fabrication drawing, examines parts to be welded, cleans them and sets joints with clamps or any other suitable device. Connects work piece with earth cable. Connects the machine with suitable gas Cylinder, regulator and flow meter. Connects pre-heater when CO₂ is used as shielding gas. Selects suitable wire electrode, feed it to welding GMA Welding torch through wire feeder. Selects contact tip gas nozzle and fit in to the GMA welding torch. Preheats joints as required. Starts the Constant Voltage GMA welding machine, sets suitable welding voltage & wire feed speed and shielding gas flow, produces arc between work piece and continuously fed wire electrode. Melts the metal and deposit weld beads on the surface of metals or joins metal pieces such as Steel, and Stainless steel metals.

Plan and organize assigned work and detect & resolve issues during execution in his own work area within defined limit. Demonstrate possible solutions and agree tasks within the team. Communicate with required clarity and understand technical English. Sensitive to environment, self-learning and productivity.

Reference NCO -2015

- i) 7212 .0200 (Gas welder)
- ii) 7212.0200 (Electric welder)
- iii) 7212 .0301 (Welder)
- iv) 7212.0302 (Welding Technician)
- v) 7212.0303 (MIG/MAG/GMAW Welder)
- vi) 7212.0700 (Resistance welder)
- vii) 7212.0801 (Welding Assistance)
- viii) 7212.9900(welder and flame cutter)

NSQF level for WELDER (GAS & ELECTRIC) trade under ATS: **Level 4**

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 Welder (Gas & Electric) trade under ATS mostly matches with the Level descriptor at Level- 4.

The NSQF level-4 descriptor is given below:

LEVEL	Process required	Professional knowledge	Professional skill	Core skill	Responsibility
Level 4	Work in familiar, predictable, routine, situation of clear choice.	Factual knowledge of field of knowledge or study	Recall and demonstrate practical skill, routine and repetitive in narrow range of application, using appropriate rule and tool, using quality concepts	Language to Communicate written or oral, with required clarity, skill to basic Arithmetic and algebraic principles, basic understanding of social and natural environment.	Responsibility for own work and learning.

5. GENERAL INFORMATION

Name of the Trade	Welder (Gas & Electric)
NCO - 2015	7212.0200,7212.0200, 7212.0301,7212.0302, 7212.0303,7212.0700,7212.0801,7212.9900,
NSQF Level	Level – 4
Duration of Apprenticeship Training (Basic Training + On-Job Training)	3 months+ One year (01 Blocks of 15 month duration).
Duration of Basic Training	a) Block –I : 3 months Total duration of Basic Training: 3 months
Duration of On-Job Training	a) Block–I: 12 months Total duration of Practical Training: 12 months
Entry Qualification	Passed 8 th Class Examination
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 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	Three month in the trade of Welder
CTS trades eligible for Welder Apprenticeship	1.Welder

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.

6.1 GENERIC LEARNING OUTCOME

The following are minimum broad Common Occupational Skills/ Generic Learning Outcome after completion of the WELDER (GAS & ELECTRIC) course of 01 years duration under ATS.

Block I:-

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* -Unit, Basic Mathematics, Percentage, Material Science, Mass, Weight and Density, Mensuration, Elasticity, Heat & Temperature, Basic Electricity.
3. Interpret specifications, different engineering drawing and apply for different application in the field of work. [*Different engineering drawing*-Lines, Free hand drawing, Drawing of Geometrical Figures, Sizes and Layout of Drawing Sheets, Method of presentation of Engineering Drawing, Drawing of Solid figures, Free hand Drawing of Solid figures, Free Hand sketch, Projections, Drawing of Orthographic projection in 3rd angle.
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. Practice and understand precautions to be followed while working in fitting jobs.
2. Prepare different types of documentation as per industrial need by different methods of recording information. The candidate should be competent to execute following operation/ skills after completion of the industrial training: - Instructions in safety precautions on the shop floor and use of PPE.
3. Use of shop floor material handling equipments
4. Reading and interpreting of fabrication drawing & welding symbols. Interpret and apply mechanical drawings of layout/assemblies and perform measurements

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5. Cutting of sheet metal to size
6. Edge preparation & fitting practices as applicable to the welder trade and assembling components using clamps, Jigs & Fixtures
7. Practice Oxy-acetylene welding & cutting (using Oxygen and acetylene cylinders/manifold system) observing safety guidelines
8. Practice Oxy-acetylene gauging.
9. Preparation of surfaces for welding
10. Gas welding and brazing of different joints of MS sheets in Down hand, horizontal & vertical positions using of different types of gas welding filler rods and flux
11. Braze welding of Cast iron in down held position (Optional)
12. Practice Silver alloy braze on similar and dissimilar metals.
13. Gas welding of pipe & tubes in different configuration
14. Significance of WPS and PQR, its variables and Inspection Test Plan (ITP).
15. Identify Welding defects and their correction.
16. Baking and drying of welding electrodes
17. Groove and fillet joints of MS parts in down hand, horizontal, vertical and overhead positions by SMAW
18. Groove joints of grey cast iron/stainless steel parts in down hand positions by SMAW (optional)
19. Pipe joints in 1G & 2G positions by SMAW
20. Reclamation of worn-out parts by SMAW
21. Hard facing practice by SMAW
22. Preheating, post heating of welds and Post weld heat treatment of welds
23. Plasma cutting
24. Fillet and groove joints of MS parts in down hand, horizontal, vertical and overhead positions by GMAW
25. Fillet & groove joints by GMAW-Pulse and Flux Cored Arc Welding. (Optional)
26. Butt and Fillet joints of Aluminium and SS parts in down hand, horizontal and vertical positions by GTAW.
27. Welding of SS by purging techniques
28. Select operating parameters for the submerged arc welding (SAW) & weld thick plates by SAW
29. Welding of thin sheets by resistance spot and seam welding
30. Welding objects/assemblies according to drawing
31. Inspection and testing of welds and use of weld gauges
32. Testing of welds destructive and non destructive methods

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 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, explain different mathematical calculation & science-Unit, Basic Mathematics,	2.1 Explain concept -Unit,, Basic Mathematics, Percentage , Material Science , Mass, Weight and Density , Mensuration , Elasticity , Heat & Temperature , Basic Electricity.

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Percentage, Material Science, Mass, Weight and Density, Mensuration, Elasticity, Heat & Temperature, Basic Electricity.	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 Lines, Free hand drawing, Drawing of Geometrical Figures, Sizes and Layout of Drawing Sheets, Method of presentation of Engineering Drawing, Drawing of Solid figures, Free hand Drawing of Solid figures, Free Hand sketch, Projections, Drawing of Orthographic projection in 3rd angle. engineering drawing-</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, verniercalipers, 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 & 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

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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 resources 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	
<p><i>Assessment Criteria i.e. the standard of performance, for each specific learning outcome mentioned under Block – I (section: 10) must ensure that the trainee works in familiar, predictable, routine, situation of clear choice. Assessment criteria should broadly cover the aspect of Planning (Identify, ascertain, etc.); Execution apply factual knowledge of field of knowledge, recall and demonstrate practical skill during performing the work in routine and repetitive in narrow range of application, using appropriate rule and tool, complying with basic arithmetic and algebraic principles and language to communicate in written or oral with required clarity; Checking/ Testing to ensure functionality during the assessment of each outcome. The assessments parameters must also ascertain that the candidate is responsible for his/her own work and learning.</i></p>	

BASIC TRAINING (Block – I)**Duration: (03) Three Months**

Week No.	Professional Skills (Trade Practical)	Professional Knowledge (Trade Theory)
1	Induction training: <ul style="list-style-type: none"> - Familiarization with the Institute. - Importance of trade Training - Machinery used in the trade. - Introduction to safety equipment and their use etc. - Hack sawing, filing square to dimensions. Marking out on MS plate and punching.	General <ul style="list-style-type: none"> - Importance of Welding in Industry - Safety precautions in Shielded - Metal Arc Welding and Oxy-Acetylene Welding and Cutting. - Introduction and definition of welding. - Arc and Gas Welding Equipments, tools and accessories. - Arc and Gas Welding terms and definitions. Different process of metal joining methods: Bolting, riveting, soldering, brazing, seaming etc. - Types of welding joints and its applications.
2	Gas welding Practice <ul style="list-style-type: none"> - Setting of oxy-acetylene welding equipment, Lighting and setting of flame. - Fusion run without and with filler rod on M.S. sheet 2 mm thick in flat position. - Butt joint on MS sheet 2 mm thick in flat Position Fillet "T" joint on MS sheet 2 mm thick in flat position	Gas Welding <ul style="list-style-type: none"> - Types of oxy-acetylene flames and uses. - Acetylene gas properties and generating methods. - Oxygen gas and its properties
3	Gas welding Practice <ul style="list-style-type: none"> - Square Butt & Lap joint on M.S. sheet 2 mm thick by brazing - Silver brazing on copper tube to tube 	Gas Welding <ul style="list-style-type: none"> - Oxygen and Dissolved Acetylene gas cylinders and Color coding for different gas cylinders. - Gas regulators, types and uses. - Difference between gas welding blow pipe and gas cutting blow pipe
4	Gas Cutting Practice <ul style="list-style-type: none"> - Marking and straight line cutting of MS plate. 10 mm thick by gas. 	Gas Welding <ul style="list-style-type: none"> - Gas Welding - Oxygen and Dissolved Acetylene gas

Welder (Gas & Electric)

	<p>Beveling of MS plates 10 mm thick by gas cutting.</p>	<p>cylinders and Color coding for different gas cylinders.</p> <ul style="list-style-type: none"> - Manifold system - Gas welding filler rods, specifications and sizes. - Gas welding fluxes – types and functions. - Gas Brazing & Soldering : principles, types fluxes & uses - Gas welding defects, causes and remedies <p>Oxy-Acetylene Cutting- Equipment principle, parameters and application.</p>
5	<p>MMAW Practices</p> <ul style="list-style-type: none"> - Setting up of Arc welding machine & accessories and Striking an arc - Straight line beads on M.S. plate 10 mm thick in flat position. - Weaved bead on M. S plate 10mm thick in flat position. <p>Fillet “T” joint on M.S. Plate 10 mm thick in flat position.</p>	<p>MMAW</p> <ul style="list-style-type: none"> - Basic electricity applicable to arc welding and related electrical terms & definitions. - Principle of arc welding. - Arc welding power sources: Transformer, Motor Generator set, Rectifier and Inverter type welding machines and its care & maintenance. <p>Advantages and disadvantages of A.C. and D.C. welding machines</p>
6	<p>MMAW practical</p> <ul style="list-style-type: none"> - Straight line beads and multi layer practice on M.S. Plate 10 mm thick in Horizontal position. - Fillet “T” joint on M.S. plate 10 mm thick in Horizontal position. - Straight line beads and multi layer practice on M.S. Plate 10 mm thick in Vertical position. - Weaved bead on M.S Plate 10mm in vertical position. - Fillet “T” joint on M.S. plate 10 mm thick in vertical position. 	<p>MMAW</p> <ul style="list-style-type: none"> - Welding positions as per EN & ASME: flat, horizontal, vertical and over head position. - Welding symbols as per BIS & AWS. - Arc length – types – effects of arc length. - Polarity: Types and applications. - Arc blow – causes and methods of controlling.
7	<p>GMAW Practices</p> <ul style="list-style-type: none"> - Setting up of GMAW welding machine & accessories and Striking an arc - Depositing straight line beads on M.S Plate. - Fillet weld – “T” joint on M.S plate 10mm thick in flat position by Dip transfer. 	<p>MMAW</p> <ul style="list-style-type: none"> - Electrode : types, functions of flux, coating factor, sizes of electrode Coding of electrode as per BIS, AWS, - Effects of moisture pick up. - Storage and baking of electrodes. - Arc Welding defects, causes and Remedies.

Welder (Gas & Electric)

	<ul style="list-style-type: none"> - Fillet weld – “T” joint on M.S. sheet 3mm thick in flat position by Dip transfer. 	<ul style="list-style-type: none"> - Safety precautions in Gas - Metal Arc Welding and Gas Tungsten Arc welding. - Introduction to GMAW -equipment – accessories. - Advantages of GMAW welding over SMAW , limitations and applications - Process variables of GMAW. <p>Modes of metal transfer – dip or short circuiting transfer spray transfer and globular transfer and Pulsed metal transfer.</p>
8	<p>GMAW Practices</p> <ul style="list-style-type: none"> - Fillet weld – “T” joint on M.S plate 10mm thick in Horizontal position by Dip transfer. - Fillet weld – “T” joint on M.S. sheet 3mm thick in Horizontal position by Dip transfer. - Fillet weld – “T” joint on M.S plate 10mm thick in vertical position by Dip transfer. - Fillet weld – corner joint on M.S. sheet 3mm thick in vertical position by Dip transfer. <p>Fillet weld – “T” joint on M.S sheet 3mm thick in over head position by Dip transfer.</p>	<p>GMAW</p> <ul style="list-style-type: none"> - Wire feed system – types – care and maintenance. - Welding wires used in GMAW, standard diameter and codification as per AWS. - Types of shielding gases and gas mixtures used in GMAW and its applications. - Flux cored arc welding – description, advantage, welding wires, coding as per AWS. <p>GMAW defects, causes and remedies</p>
9	<p>GTAW practices:</p> <ul style="list-style-type: none"> - Depositing bead on Aluminium sheet 2 mm thick in flat position. - Square butt joint on Aluminium sheet 1.6mm thick in flat position. 	<p>GTAW</p> <ul style="list-style-type: none"> - GTAW process - brief description - Difference between AC and DC welding, equipments, polarities and applications. - Power sources for GTAW - AC & DC - Tungsten electrodes –types & uses, sizes and preparation <p>GTAW Torches- types, parts and their functions</p>
10	<p>GTAW practices:</p> <ul style="list-style-type: none"> - Fillet weld – “T” joint on Aluminium sheet 1.6 mm thick in flat position. - Depositing bead on SS sheet 2 mm thick in flat position. - Fillet weld – “T” joint on Stainless steel sheet 1.6 mmthick in flat position. 	<p>GTAW</p> <ul style="list-style-type: none"> - GTAW filler rods and selection criteria - Edge preparation and fit up. - GTAW parameters for welding of different thickness of metals - Pulsed TIG welding - brief description, pulse parameters slope up and slope down. - Argon / Helium gas properties – uses.

Welder (Gas & Electric)

		- GTAW Defects causes and remedy.
11-12	Resistance welding practices: - MS sheets joining by Resistance Spot welding	Other Processes - Resistance welding process -types, principles, power sources and welding parameters, Applications and limitations. - Submerged arc welding process – principles, equipment, advantages and limitations Metals & Properties - Classification of steel. - Welding of low, medium and high carbon steel and alloy steels. - Effects of alloying elements on steel - Weldability of metals and importance of pre heating, post heating - Stainless steel: types- weld decay and weldability. - Aluminium and its alloys, properties and weldability, Welding methods - Arc cutting & gouging, - Cast iron and its properties types. - Welding methods of cast iron.
13	Testing practices - Testing of weld joints by visual inspection. - Inspection of welds by using weld gauges. - Dye penetrant test, - Magnetic particle test. - Nick- break test. - Free bend test. - Fillet fracture test.	Inspection - Weld quality inspection, common welding mistakes and appearance of good and defective welds - Weld gauges & its uses - Types of Inspection methods - Classification of destructive and NDT methods - Welding codes and standards - Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR)
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.

9.1 WORKSHOP CALCULATION SCIENCE & ENGINEERING DRAWING

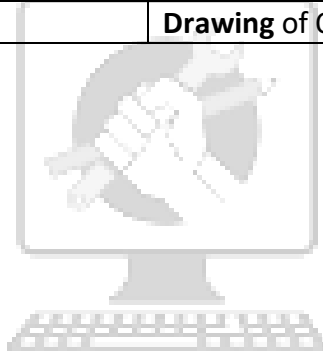
Block – I		
Sl. No.	Workshop Calculation and Science (Duration: - 20 hrs.)	Engineering Drawing (Duration: - 30 hrs.)
1.	Unit: Systems of unit- FPS, CGS, MKS/SI unit, unit of length, Mass and time, Conversion of units	Introduction to Engineering Drawing and Drawing Instruments : <ul style="list-style-type: none"> - Conventions - Viewing of engineering drawing sheets. - Method of Folding of printed Drawing Sheet as per BIS SP:46-2003 - 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.
2.	Basic Mathematics - BODMAS rule Fraction-Addition, Subtraction, multiplication and Division-Problem solving, Decimal-Addition. Simple calculation using Scientific Calculator.	Lines : <ul style="list-style-type: none"> - 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
3.	Conversion of Fraction to Decimal and vice-versa.	Free hand drawing of <ul style="list-style-type: none"> - Lines, polygons, ellipse, etc. - Geometrical figures and blocks with dimension Transferring measurement from the given object to the free hand sketches.
4.	Percentage: Introduction, Simple calculation. Changing percentage to fraction and decimal & vice-versa.	Drawing of Geometrical Figures: Definition, nomenclature and practice of <ul style="list-style-type: none"> - Angle: Measurement and its types, method of bisecting. - Triangle -different types - Rectangle, Square, Rhombus, Parallelogram. - Circle and its elements.

Welder (Gas & Electric)

5.	<p>Material Science :</p> <p>Definition, properties (physical & mechanical) and uses of Metal, Non-metal, Alloy & Insulator.</p> <p>Types of ferrous and Non-ferrous metals.</p> <p>Difference between Ferrous and Non-Ferrous metals.</p>	<p>Sizes and Layout of Drawing Sheets</p> <ul style="list-style-type: none"> - Selection of sizes - Title Block, its position and content - Item Reference on Drawing Sheet (Item List)
6.	<p>Mass, Weight and Density:</p> <p>Mass, Unit of Mass, Weight, difference between mass and weight.</p> <p>Density, unit of density. Relation between mass, weight & density.</p> <p>Simple problems related to mass, weight, and density.</p>	<p>Method of presentation of Engineering Drawing</p> <ul style="list-style-type: none"> - Pictorial View - Orthographic View - Isometric view
7.	<p>Mensuration :</p> <p>Area and perimeter of square, rectangle, parallelogram, triangle, circle, semi circle,</p> <p>Volume of solids – cube, cuboid, cylinder and Sphere.</p> <p>Surface area of solids – cube, cuboid, cylinder and Sphere.</p>	<p>Drawing of Solid figures</p> <p>(Cube, Cuboids, Cone) with dimensions.</p>
8.	<p>Elasticity:</p> <p>Elastic & Plastic material. Stress & strain and their units. Young's modules. Ultimate stress and breaking stress.</p>	<p>Free hand Drawing of Solid figures</p> <p>(Prism, Pyramid, Frustum of Cone and Pyramid.) with dimensions.</p>
9.	<p>Heat & Temperature:</p> <p>Heat and temperature, their units, difference between heat and temperature, boiling point, melting point,</p> <p>Scale of temperature, relation between different scale of temperature.</p> <p>Thermometer, pyrometer.</p>	<p>Free Hand sketch of hand tools and measuring tools used in respective trades.</p>

Welder (Gas & Electric)

	Transmission of heat, conduction, convection, radiation.	
10.	Basic Electricity: Introduction and use of Electricity. AC, DC & their comparisons. Current, Voltage, Resistance & their units. Power, Energy & their units. Insulator and conductors & their uses.	Projections: - Concept of axes plane and quadrant. - Orthographic projections - Method of first angle and third angle projections (definition and difference) - Symbol of 1st angle and 3rd angle projection as per IS specification.
11.		Drawing of Orthographic projection in 3rd angle.



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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 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

Welder (Gas & Electric)

	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	
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 & 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	Project formation, Feasibility, Legal formalities i.e., Shop Act,	

Welder (Gas & Electric)

Procurement	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

Welder (Gas & Electric)

	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.	



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10. DETAILS OF COMPETENCIES (ON-JOB TRAINING)

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

Block – I

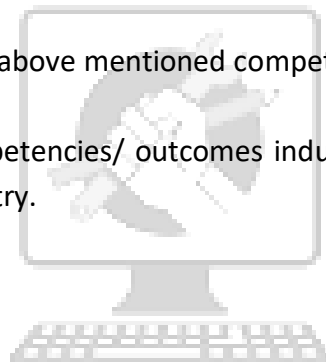
1. Practice and understand precautions to be followed while working in welding jobs.
2. Prepare different types of documentation as per industrial need by different methods of recording information. The candidate should be competent to execute following operation/ skills after completion of the industrial training: - Instructions in safety precautions on the shop floor and use of PPE.
3. Use of shop floor material handling equipments
4. Reading and interpreting of fabrication drawing & welding symbols. Interpret and apply mechanical drawings of layout/assemblies and perform measurements
5. Cutting of sheet metal to size
6. Edge preparation & fitting practices as applicable to the welder trade and assembling components using clamps, Jigs & Fixtures
7. Practice Oxy-acetylene welding & cutting (using Oxygen and acetylene cylinders/manifold system) observing safety guidelines
8. Practice Oxy-acetylene gauging.
9. Preparation of surfaces for welding
10. Gas welding and brazing of different joints of MS sheets in Down hand, horizontal & vertical positions using of different types of gas welding filler rods and flux
11. Braze welding of Cast iron in down held position (Optional)
12. Practice Silver alloy braze on similar and dissimilar metals.
13. Gas welding of pipe & tubes in different configuration
14. Significance of WPS and PQR, its variables and Inspection Test Plan (ITP).
15. Identify Welding defects and their correction.
16. Baking and drying of welding electrodes
17. Groove and fillet joints of MS parts in down hand, horizontal, vertical and overhead positions by SMAW
18. Groove joints of grey cast iron/stainless steel parts in down hand positions by SMAW (optional)
19. Pipe joints in 1G & 2G positions by SMAW
20. Reclamation of worn-out parts by SMAW
21. Hard facing practice by SMAW
22. Preheating, post heating of welds and Post weld heat treatment of welds
23. Plasma cutting
24. Fillet and groove joints of MS parts in down hand, horizontal, vertical and overhead positions by GMAW

Welder (Gas & Electric)

25. Fillet & groove joints by GMAW-Pulse and Flux Cored Arc Welding. (Optional)
26. Butt and Fillet joints of Aluminium and SS parts in down hand, horizontal and vertical positions by GTAW.
27. Welding of SS by purging techniques
28. Select operating parameters for the submerged arc welding (SAW) & weld thick plates by SAW
29. Welding of thin sheets by resistance spot and seam welding
30. Welding objects/assemblies according to drawing
31. Inspection and testing of welds and use of weld gauges
32. Testing of welds destructive and non destructive methods

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.



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INFRASTRUCTURE FOR PROFESSIONAL SKILL & PROFESSIONAL KNOWLEDGE

WELDER (GAS & ELECTRIC)			
LIST OF TOOLS AND EQUIPMENT for Basic Training (For 20 Apprentices)			
A. TRAINEES TOOL KIT			
Sl. no.	Name of the Tool & Equipments	Specification	Quantity
1.	Welding helmet fiber	As per standard MMA welding	20
2.	Welding hand shield fiber	As per standard MMA welding	20
3.	Chipping hammer with metal handle	250 Grams	20
4.	Chisel cold flat	19 mm x 150 mm	20
5.	Centre punch	9 mm x 127 mm	20
6.	Dividers	200 mm	20
7.	Stainless steel rule	300mm	20
8.	Scriber double point	150 mm	20
9.	Flat Tongs	350mm long	20
10.	Hack saw frame fixed	300 mm	20
11.	File half round bastard	300 mm	20
12.	File flat	350 mm bastard	20
13.	Hammer ball pane with handle	1 kg	20
14.	Tip Cleaner	As per standard GAS welding	20
15.	Try square	6"	20
B : INSTRUMENTS & GENERAL SHOP OUTFIT			
16.	Spindle key	As per cylinder	4 nos.
17.	Screw Driver	300mm blade and 250 mm blade	1 each
18.	Number punch	6 mm	2 set
19.	Letter punch	6 mm	2 set
20.	Magnifying glass	100 mm .dia	2 nos.
21.	Universal Weld measuring gauge	As per standard	2 nos.
22.	Earth clamp	600Amps	6 nos.
23.	Spanner D.E	6 mm to 32mm	2 sets
24.	C-Clamps	10 cm and 15 cm	2 each
25.	Hammer sledge double faced	4 kg	1 no.
26.	S.S tape flexible in case	5 meters	1 no.
27.	Electrode holder	600 amps	6 nos.
28.	H.P. Welding torch with	5 nozzles	2 sets

Welder (Gas & Electric)

29.	Oxygen Gas Pressure regulator	double stage	2 nos.
30.	Acetylene Gas Pressure regulator	double stage	2 nos.
31.	CO ₂ Gas pressure regulator, with flow meter	As per standard	2 set
32.	Argon Gas pressure regulator with flow meter	As per standard	2 set
33.	Metal rack	182 cm x 152 cm x 45 cm	1 no.
34.	First Aid box		1 no.
35.	Steel lockers .	8 Pigeon holes	2 nos.
36.	Steel almirah / cupboard	As per standard	2 nos.
37.	Black board and easel with stand	As per standard	1 no.
38.	Flash back arrester (torch mounted)	As per standard	4 pairs
39.	Flash back arrester (cylinder mounted)	As per standard	4 pairs
C : GENERAL MACHINERY INSTALLATIONS			
40.	Welding Transformer with all accessories	(400A, OCV 60–100 V, 60% duty cycle)	1 set
41.	Welding Transformer (or) Inverter based welding machine with all accessories	(300A , OCV 60 – 100 V, 60% duty cycle)	1 set
42.	D.C Arc welding rectifiers set with all accessories	(400 A. OCV 60 – 100 V, 60% duty cycle)	1 sets
43.	GMAW welding machine with air cooled torch, Regulator, Gas preheater, Gas hose and Standard accessories	400A capacity	1 set
44.	AC/DC GTAW welding machine with water cooled torch, Argon regulator, Gas hose, water circulating system and standard accessories.	300 A	1 set
45.	Air Plasma cutting equipment with all accessories, clear cut	capacity to cut 12 mm thick plat	01 set
46.	Air compressor suitable for above air plasma cutting system.	As per standard	01 no
47.	Auto Darkening Welding Helmet	400AMPS capacity	2 nos.
48.	Spot welding machine to with all accessories	15 KVA	01 set
49.	Portable gas cutting machine capable of cutting Straight & Circular with all accessories	As per standard	01 set
50.	Pedestal grinder fitted with coarse and medium grain size grinding	dia. 300 mm	1 no.

Welder (Gas & Electric)

	wheels		
51.	Bench grinder fitted with fine grain size silicon carbide green grinding wheel.	dia 150 mm	1 no.
52.	AG 4 Grinder	As per standard	2 Nos
53.	Suitable gas welding table with fire bricks	As per standard	2 Nos
54.	Suitable Arc welding table with positioner	As per standard	6 nos.
55.	Trolley for cylinder (H.P. Unit)	As par standard	2 nos.
56.	Hand shearing machine capacity to cut sheets and flats	6mm thick	1 no.
57.	Power saw machine	14"	1 no.
58.	Portable drilling machine	(Cap. 6 mm)	1 no.
59.	Oven, electrode drying 0 to 350°C,	10 kg capacity	1 no.
60.	Work bench with 4 bench vices of 150 mm jaw opening	340x120x75 cm	4 sets
61.	Oxy Acetylene Gas cutting blow pipe	As per standard	2 sets
62.	Oxygen, Acetylene Cylinders	As per standard	2 each*
63.	CO ₂ cylinder	As per standard	2 Nos. *
64.	Argon gas cylinder	As per standard	2 Nos. *
65.	Anvil working area with stand	12 sq. inches	1 No.
66.	Swage block	As per standard	1 No.
67.	Die penetrant testing kit	As per standard	1 set
68.	Magnetic particle testing Kit	As per standard	1 set
69.	Fire extinguishers (foam type and CO ₂ type)	As per standard	1 no.
70.	Fire buckets with stand	As per standard	4 nos.
71.	Portable abrasive cut-off machine	As per standard	1 no.
72.	Suitable Gas cutting table	250mm x150mm	1 no.
73.	Welding Simulators for SMAW/GTAW/GMAW	As per standard	1 each (Optional)

Welder (Gas & Electric)

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

TRADE: WELDER (GAS & ELECTRIC)

LIST OF TOOLS& EQUIPMENTS FOR -20APPRENTICES

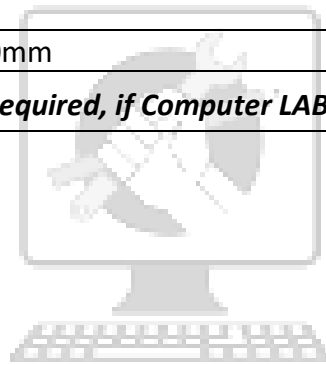
- 1) Space Norms : 45 Sq.m.(For Engineering Drawing)
2) Infrastructure:

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

Welder (Gas & Electric)

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.



Skill India
कौशल भारत - कुशल भारत

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														