ADVANCE WELDER

COMPETENCY BASED CURRICULUM

(Duration: 1 Yr. 3 Months)

APPRENTICESHIP TRAINING SCHEME (ATS)

NSQF LEVEL- 4

SECTOR – FABRICATION

सत्यमेव जयते

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

Directorate General of Training

Skill India
कौशल भारत-कुशल भारत

ADVANCE WELDER

(Revised in 2018)

APPRENTICESHIP TRAINING SCHEME (ATS)

NSQF LEVEL - 4

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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1. Larsen & Turbo, Mumbai.
2. BHEL, Noida.

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Co-ordinator for the course: Sh. Nirmalya Nath., ADT, CSTARI, Kolakata

Sl. No.	Name & Designation Sh./Mr./Ms.	Organization	Expert Group Designation
1.	Dr. Krishan Sivaraman	L&T – HE Powai	Expert
2.	M. Thamizharasan, JDT	CSTARI, Kolkata	Expert
3.	N. Nath, ADT	CSTARI, Kolkata	Expert
4.	D.S. Meena T.O.	ATI, Kanpur	Expert

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1. BACKGROUND

1.1 Apprenticeship Training Scheme under Apprentice Act 1961

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

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

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

1.2 Changes in Industrial Scenario

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

1.3 Reformation

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

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

2. TRAINING SYSTEM

2.1 GENERAL

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

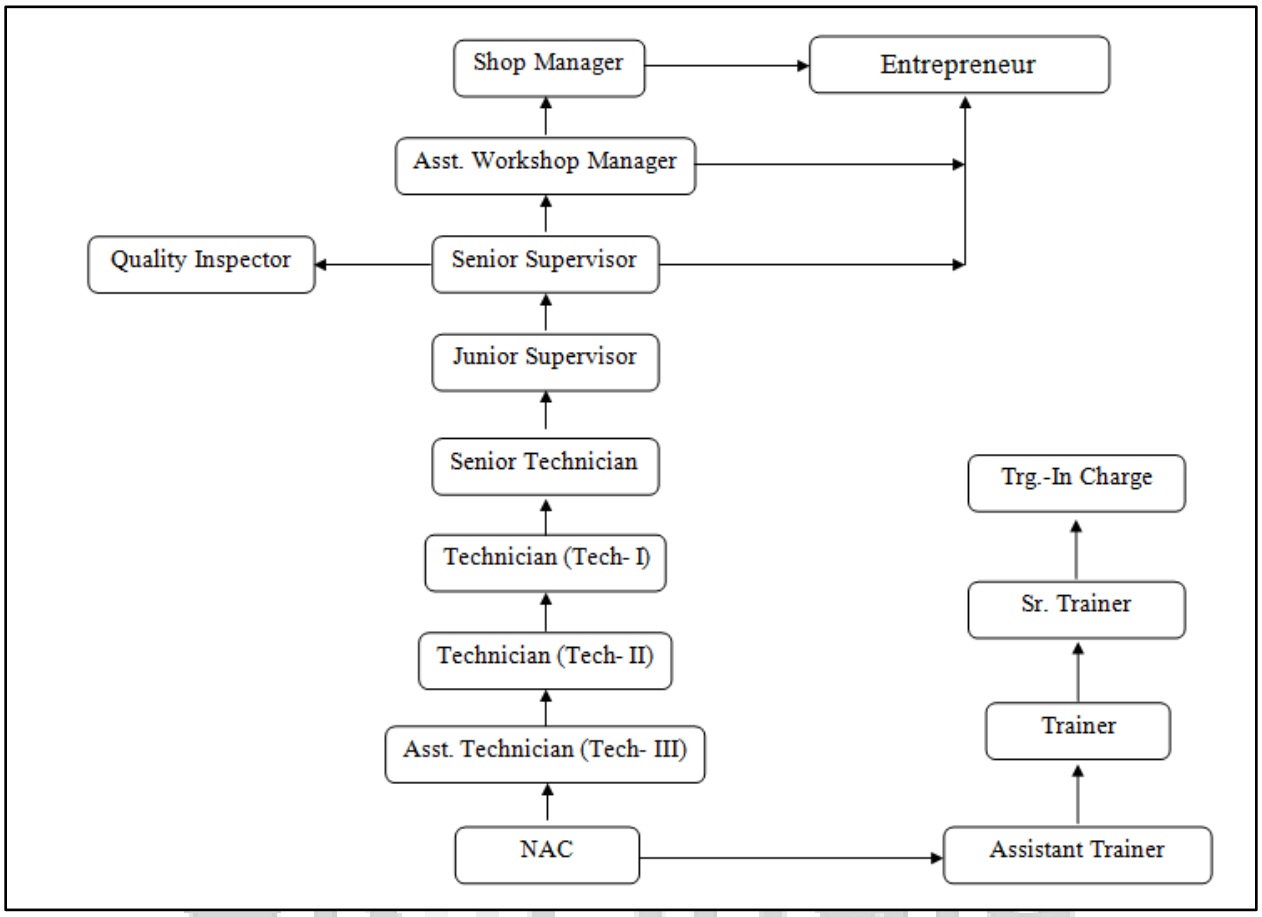
ADVANCE WELDER trade under ATS is one of the most popular courses delivered nationwide through different industries. The course is of 01 year 03 months (01 Block of 15 months including basic training) duration. It mainly consists of Domain area and Core area. In the Domain area Trade Theory & Practical impart professional - skills and knowledge, while Core area - Workshop Calculation and science, Engineering Drawing and Employability Skills imparts requisite core skills & knowledge and life skills. After passing out the training programme, the trainee is being awarded National Apprenticeship Certificate (NAC) by NCVT having worldwide recognition.

Broadly candidates need to demonstrate that they are able to:

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

2.2 CAREER PROGRESSION PATHWAYS:

- Indicative pathways for vertical mobility.



2.3 COURSE STRUCTURE:

Table below depicts the distribution of training hours across various course elements during a period of 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**

A. Basic Training

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

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:

Performance Level	Evidence
(a) Weightage in the range of 60 -75% to be allotted during assessment	

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

3. JOB ROLE

Brief description of Job roles:

Advance 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.

Advance Welder 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.

Advance Welder, Machine operates gas or electric welding machine to joint 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. Is designated as SPOT WELDER, FLASH WELDER, etc. according to machine and type of work done.

Advance Welder, Resistance sets up and operates resistance welding machine to join metal parts, according to blueprints, work orders, or oral instructions. Turns machine dials to set air and hydraulic pressure, amperage, and joining time, according to specified type of metal, weld, and assembly. May select, install, and adjust electrodes. Aligns work pieces, using square and rule. May hold pieces together manually, fasten into jigs, or secure with clamps to align in specified assembly position. Holds part between electrodes or positions on machine worktable. Depresses pedal or pulls trigger to close electrodes and form weld at point of contact. Releases pedal or trigger after specified welding time. Cleans electrodes, using file, tip dresser, emery cloth. May operate machine which automatically releases electrodes from metal after welding cycle. May devise and build fixtures to hold pieces. May inspect finished work. May operate machine equipped with two or more electrodes which weld at several

points simultaneously. Important variations include types of joints welded (seam, spot, butt) and types of materials welded (aluminum, steel).

Advance Welder observes Safety precautions and weld using Oxy-acetylene welding plant. Weld Square butt joint, Fillet weld on M.S. Plate in down hand position of Shielded metal Arc welding (SMAW). Weld Grooved butt joint on plate in 1G,2G, 3G & 4G positions. Prepares the edges, Fit up and weld the pipes in1G,2G, 5G & 6G positions. Prepares and fit pipes for T, Y, K joints joint. Cut metal using Gouging, gas and plasma cutting methods on MS. Welds single V, Double V butt Joint by $C0_2$ welding and Flux Cored Arc Welding. Weld Alumimium and Stainless Steel by MIG/MAG Welding.

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)** 7212.0100 - Welder, Gas
- **ii)** 7212.0200 - Welder, Electric
- **iii)** 7212.0300 - Welder, Machine
- **iv)** 7212.0700 - Welder, Resistance

4. NSQF LEVEL COMPLIANCE

NSQF level for ADVANCE WELDER 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 ADVANCE WELDER 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 political and natural environment.	Responsibility for own work and learning.

5. GENERAL INFORMATION

Name of the Trade	**ADVANCE WELDER**
NCO - 2015	7212.0100,**7**212.0200 ,7212.0300,7212.0700
NSQF Level	Level – 4
Duration of Apprenticeship Training (Basic Training + On-Job Training)	3 months + 1 year (01 Block of 15 months duration including basic training)
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 10th class examination 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 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 & trainees of P&M sector under CoE**
CTS trades eligible for Advance 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.*
- *-up with ITIs having such specific trade and affiliated to NCVT.*

6. LEARNING OUTCOME

6.1 GENERIC LEARNING OUTCOME

The following are minimum broad Common Occupational Skills/ Generic Learning Outcome after completion of the ADVANCE WELDER course of 01 years 03 months 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 etc.]*
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 LEARNINGOUTCOME

Block – I

1. Identify 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 shop floor material handling equipments.
4. Read and interpret fabrication drawing & welding symbols. Interpret and apply mechanical drawings of layout/assemblies and perform measurements.

5. Cut sheet metal to size.
6. Perform edge preparation & fitting practices as applicable to the welder trade and assembling components using clamps, Jigs & Fixtures.
7. Perform Oxy-acetylene welding & cutting (using Oxygen and acetylene cylinders/manifold system) observing safety guidelines.
8. Practise Oxy-acetylene gauging.
9. Prepare surfaces for welding.
10. Identify gas welding and brazing of different joints of MS sheets in down hand, horizontal & vertical positions using different types of gas welding filler rods and flux.
11. Braze welding of Cast iron in down held position (Optional).
12. Practise Silver alloy braze on similar and dissimilar metals.
13. Check gas welding of pipes & tubes in different configuration.
14. Recognize significance of WPS and PQR, its variables and Inspection Test Plan (ITP).
15. Identify Welding defects and their correction.
16. Identify Baking and drying of welding electrodes.
17. Check Groove and fillet joints of MS parts in down hand, horizontal, vertical and overhead positions by SMAW.
18. Prepare Groove joints of grey cast iron/stainless steel parts in down hand positions by SMAW (optional).
19. Prepare Pipe joints in 1G & 2G positions by SMAW.
20. Reclaim worn-out parts by SMAW.
21. Practise hard facing by SMAW.
22. Perform Preheating, post heating of welds and Post weld heat treatment.
23. Carry out Plasma cutting.
24. Check Fillet and groove joints of MS parts in down hand, horizontal, vertical and overhead positions by GMAW.
25. Prepare Fillet& groove joints by GMAW-Pulse and Flux Cored Arc Welding. (Optional)
26. Check Butt and Fillet joints of Aluminium and SS parts in down hand, horizontal and vertical positions by GTAW.
27. Identify Welding of SS by purging techniques.
28. Select operating parameters for the submerged arc welding (SAW) & weld thick plates by SAW.
29. Weld thin sheets by resistance spot and seam welding.
30. Weld objects/assemblies according to drawing.
31. Inspect and test welds and use weld gauges.
32. Test welds by 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 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 etc.]*	2.1	Explain concept -Unit, Basic Mathematics, 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. *[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.]*	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 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 the given drawing/measurement.
5. Explain the concept in productivity, quality tools, and labour welfare legislation and apply such in day to day work to	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

improve productivity & quality.	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.
SPECIFIC OUTCOME	
Block-I (Section:10 in the competency based curriculum)	
*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 surroundings where nature of job is routine type, situation of clear choice & predictable. 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 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.*	

8. SYLLABUS

BASIC TRAINING (Block – I)

Duration: (03) Three Months

Week no.	Professional Skills (Trade Practical)	Professional Knowledge (Trade Theory)
1.	**Induction training:** - Introduction to safety equipment and their use etc. - Machinery used in the trade. - Hack sawing, filing square to dimensions. - Marking out on MS plate and punching.	**General** - Elementary First Aid - Introduction to different process of metal joining methods: Bolting, riveting, soldering, brazing, fusion welding etc. - Introduction and definition of Welding. - Importance of Welding in Industry. - Arc and Gas Welding Equipments, tools and accessories. - Arc and Gas Welding terms and definition. - Types of Welding joint and its application. - Safety precautions in Shielded Metal Arc Welding, Oxy Acetylene Welding and Cutting, EH&S.
2.	**Gas welding Practice** - Setting of oxy-acetylene welding equipment, Lighting and setting of flame. - Fusion run without and with fillerrod 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** - Common gases used for welding & cutting, flame temperatures and uses. - Chemistry of Oxy –Acetylene flame. - Types of Oxy-Acetylene flame and uses. - Oxygen gas and its properties. - Color coding for different gas cylinders. - Gas regulator, types and uses. - Difference between Gas Welding blow pipe and Gas Cutting blow pipe.
3.	**Gas Welding Practice** - Square Butt & Lap joint on MS sheet 2 mm thick by brazing. - Silver brazing on copper tube to tube.	**Gas Welding** - Gas welding techniques- Rightward and Leftward techniques. - 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.
4.	**Gas Cutting Practice** - Marking and straight line cutting of MS plate. 10 mm thick by gas cutting. - Beveling of MS plates 10 mm thick by gas cutting. - Various profile shape cutting like a Square, triangle, hexagon etc.	**Oxy-Fuel Cutting-** - Process fundamentals. - Purity of oxygen. - Choice of fuel gas – Acetylene, Propane, MAPP, Propylene, Natural Gas. - Equipment and Kits. - Set-Up and Operation of equipment.
5.	**MMAW Practices** - 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 MS plate 10mm thick in flat position. - Fillet "T" joint on MS Plate 10 mm thick in flat position.	**MMAW** - 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. - Advantages and disadvantages of A.C. and D.C. welding machines. - Recent advances in power sources which gives better penetration and better root fusion with minimum heat addition.
6.	**MMAW Practices** - Straight line beads and multi layer practice on M.S. Plate 10 mm thick in Horizontal position. - Fillet "T" joint on MS plate 10 mm thick in Horizontal position**.** - Straight line beads and multi-layer practice on M.S. Plate 10 mm thick inVertical position. - Weaved bead on M.S Plate 10mm in Vertical position. - Fillet "T" joint on M.S. plate 10 mm thick in Vertical position.	**MMAW** - Welding positions as per EN & ASME: Flat, Horizontal, Vertical and Overhead position. - Welding symbols as per BIS & AWS. - Arc length – types – effects of arc length. - Polarity: Types and applications. 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. - Arc blow – causes and methods of controlling. - Role of stiffeners in controlling distortion.

7.	**GMAW/FCAW Practices** - Setting up of GMAW/FCAW welding machine & accessories and striking an arc for both processes. - Depositing straight line beads on M.S Plate by GMAW & FCAW. - Fillet weld – "T" joint on MS plate 10mm thick in flat position by GMAW (Dip transfer) & FCAW. - Fillet weld – "T" joint on M.S. sheet 3mmthick in flat position by GMAW (Dip transfer) & FCAW. -	**GMAW/FCAW** - Safety precautions in Gas Metal Arc Welding and Flux Cored Arc Welding. - Introduction to GMAW /FCAW-equipment – accessories. - GMAW torches- Types, parts and their functions. - Process variables of GMAW. - GMAW/FCAW welding wires, coding as per AWS. - Types of shielding gases and gas mixtures used in GMAW /FCAW and its applications. - Stress Relieving or Post Welding Heat Treatment (PWHT).
8.	**GMAW Practices** - Fillet weld – "T" joint on MS plate 10mm thick in Horizontal position by Dip transfer. - Fillet weld – "T" joint on MS sheet 3mm thick in Horizontal position by Dip transfer. - Fillet weld – "T" joint on MS plate 10mm thick in vertical position by Dip transfer. - Fillet weld – corner joint on MS sheet 3mm thick in vertical position by Dip transfer. - Fillet weld – "T" joint on MS sheet 3mm thick in overhead position by Dip transfer.	**GMAW/FCAW** - Modes of metal transfer – dip or short circuiting transfer, spray transfer and globular transfer and Pulsed metal transfer. - Wire feed system – types – care and maintenance. - GMAW/FCAW defects, causes and remedies. - Advantages of GMAW/FCAW welding over SMAW, limitations and applications.
9.	**GTAW practices:** - Depositing bead on Aluminium /SS sheet 2 mm thick in flat position. - Square butt joint on Aluminium /SS sheet 1.6mm thick in flat position.	**GTAW** - 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. - GTAW Torches- Types, parts and their functions. - Safety precautions pertaining to GTAW.

10.	**GTAW practices:** - Fillet weld – "T" joint on Aluminium/SS sheet 1.6 mm thick in flat position. - Depositing bead on SS sheet 2 mm thick in flat position.	**GTAW** - 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. - GTAW Defects causes and remedy. - Advantages & Limitations of GTAW over SMAW & GMAW/FCAW.
11.	**Submerged Arc Welding practices:** - Bead on trials on MS Plate. - Submerged Arc Welding (SAW) on plates and pipes, parameter setting. **Resistance welding practices:** - MS sheets joining by Resistance Spot welding.	**Submerged Arc Welding** - Submerged arc welding process – principles, equipment, advantages and limitations. - SAW consumable specification as per AWS. **Other Processes** - Resistance welding process -types, principles, power sources and welding parameters, Applications and limitations. - Plasma Arc Welding (PAW) and cutting (PAC) process equipments and principles of operation- Types of Plasma arc, advantages and applications. **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. - Welding methods of cast iron.

12.	**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).
13.	**Revision & Internal assessment.**	

9. SYLLABUS - CORE SKILLS

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 :** - 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** : - 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** - 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 - Angle: Measurement and its types, method of bisecting. - Triangle -different types - Rectangle, Square, Rhombus, Parallelogram. - Circle and its elements.
5.	**Material Science :** Definition, properties (physical & mechanical) and uses of Metal, Non-metal, Alloy &Insulator. Types of ferrous and Non-ferrous	**Sizes and Layout of Drawing Sheets** - Selection of sizes - Title Block, its position and content - Item Reference on Drawing Sheet (Item List)

	metals. Difference between Ferrous and Non-Ferrous metals.	
6.	**Mass, Weight and Density:** Mass, Unit of Mass, Weight, difference between mass and weight. Density, unit of density. Relation between mass, weight & density. Simple problems related to mass, weight, and density.	**Method of presentation of Engineering Drawing** - Pictorial View - Orthographic View - Isometric view
7.	**Mensuration :** Area and perimeter of square, rectangle, parallelogram, triangle, circle, semi circle, Volume of solids – cube, cuboid, cylinder and Sphere. Surface area of solids – cube, cuboid, cylinder and Sphere.	**Drawing of Solid figures** (Cube, Cuboids, Cone) with dimensions.
8.	**Elasticity:** Elastic & Plastic material. Stress & strain and their units. Young's modules. Ultimate stress and breaking stress.	**Free hand Drawing of Solid figures** (Prism, Pyramid, Frustum of Cone and Pyramid.) with dimensions.
9.	**Heat & Temperature:** Heat and temperature, their units, difference between heat and temperature, boiling point, melting point, Scale of temperature, relation between different scale of temperature. Thermometer, pyrometer. Transmission of heat, conduction, convection, radiation.	**Free Hand sketch** of hand tools and measuring tools used in respective trades.
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.

9.2 EMPLOYABILITY SKILLS

(DURATION: - 55 HRS.)

Topic No.	Topic	Duration (in hours)
	English Literacy	7
1.	Reading Reading and understanding simple sentences about self, work and environment	
2.	Writing Construction of simple sentences Writing simple English	
3.	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. 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.	
	I.T. Literacy	10
1.	Basics of Computer Introduction, Computer and its applications, Hardware and peripherals, Switching on-Starting and shutting down of computer.	
2.	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. Use of External memory like pen drive, CD, DVD etc,	
3.	Computer Networking and INTERNET 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.	
	Communication Skill	18
1.	Introduction to Communication Skills Communication and its importance Principles of Effective communication Types of communication - verbal, nonverbal, written, email, talking on phone. Nonverbal communication - components-Para-language Body - language Barriers to communication and dealing with barriers.	

2.	Listening Skills Listening-hearing and listening, effective listening, barriers to effective listening guidelines for effective listening.	
3.	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.	
4.	Facing Interviews Manners, Etiquettes, Dress code for an interview Do's & Don'ts for an interview	
	Entrepreneurship skill	8
1.	Concept of Entrepreneurship Entrepreneurship- Entrepreneurship - Enterprises:-Conceptual issue. Source of business ideas, Entrepreneurial opportunities, The process of setting up a business.	
2.	Institutions Support 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.	
	Productivity	
1.	Productivity Definition, Necessity.	
2.	Affecting Factors Skills, Working Aids, Automation, Environment, Motivation How improves or slows down.	
3.	Personal Finance Management Banking processes, Handling ATM, KYC registration, safe cash handling, Personal risk and Insurance.	
	Occupational Safety, Health & Environment Education	6
1.	Safety & Health Introduction to Occupational Safety and Health importance of safety and health at workplace.	
2.	Occupational Hazards Basic Hazards, Chemical Hazards, Vibro-acoustic Hazards, Mechanical Hazards, Electrical Hazards, Thermal Hazards. Occupational health, Occupational hygienic, Occupational Diseases/ Disorders & its prevention.	

3.	Accident & safety Basic principles for protective equipment. Accident Prevention techniques - control of accidents and safety measures.	
4.	First Aid Care of injured & Sick at the workplaces, First-Aid & Transportation of sick person	
	Labour Welfare Legislation	
1.	Welfare Acts Benefits guaranteed under various acts- Factories Act, Apprenticeship Act, Employees State Insurance Act (ESI), Employees Provident Fund Act.	
	Quality Tools	6
1.	Quality Consciousness : Meaning of quality, Quality Characteristic	
2.	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.	
3.	House Keeping : Purpose of Housekeeping, Practice of good Housekeeping.	
4.	Quality Tools Basic quality tools with a few examples	

10. DETAILS OF COMPETENCIES (ON-JOBTRAINING)

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

Block – I

1. Identify 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 shop floor material handling equipments.
4. Read and interpret fabrication drawing & welding symbols. Interpret and apply mechanical drawings of layout/assemblies and perform measurements.
5. Cut sheet metal to size.
6. Perform edge preparation & fitting practices as applicable to the welder trade and assembling components using clamps, Jigs & Fixtures.
7. Perform Oxy-acetylene welding & cutting (using Oxygen and acetylene cylinders/manifold system) observing safety guidelines.
8. Practise Oxy-acetylene gauging.
9. Prepare surfaces for welding.
10. Identify gas welding and brazing of different joints of MS sheets in down hand, horizontal & vertical positions using different types of gas welding filler rods and flux.
11. Braze welding of Cast iron in down held position (Optional).
12. Practise Silver alloy braze on similar and dissimilar metals.
13. Check gas welding of pipes & tubes in different configuration.
14. Recognize significance of WPS and PQR, its variables and Inspection Test Plan (ITP).
15. Identify Welding defects and their correction.
16. Identify Baking and drying of welding electrodes.
17. Check Groove and fillet joints of MS parts in down hand, horizontal, vertical and overhead positions by SMAW.
18. Prepare Groove joints of grey cast iron/stainless steel parts in down hand positions by SMAW (optional).
19. Prepare Pipe joints in 1G & 2G positions by SMAW.
20. Reclaim worn-out parts by SMAW.
21. Practise hard facing by SMAW.
22. Perform Preheating, post heating of welds and Post weld heat treatment.
23. Carry out Plasma cutting.
24. Check Fillet and groove joints of MS parts in down hand, horizontal, vertical and overhead positions by GMAW.

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

ANNEXURE – I

INFRASTRUCTURE FOR PROFESSIONAL SKILL & PROFESSIONAL KNOWLEDGE

ADVANCE WELDER			
LIST OF TOOLS AND EQUIPMENT for Basic Training (For 20 Apprentices)			
A. TRAINEES TOOL KIT (For each additional unit trainees tool kit Sl. 1-18 is required additionally)			
Sl. no.	**Name of the Tool &Equipments**	**Specification**	**Quantity**
1.	Steel Rule	300 mm	20 nos.
2.	Wing Divider	200 mm	20 nos.
3.	Centre Punch	100 mm	20 nos.
4.	Spring Dividers	150 mm	20 nos.
5.	Ordinary Wooden Mallet	50 mm	20 nos.
6.	Cross Peen Hammer	0.25 Kg with handle	20 nos.
7.	Protractor with blade	150 mm	20 nos.
8.	Steel Tape	2 meters	20 nos.
9.	Ball pane Hammer	0.5 Kg with handle	20 nos.
10.	Scriber)	150mm x 3 mm (Engineers	20 nos.
11.	Gloves pair leather	As per standard	20 nos.
12.	Apron leather	As per standard	20 nos.
13.	Screen welding helmet type	As per standard	20 nos.
14.	Screen welding hand	As per standard	20 nos.
15.	Goggles pair welder	As per standard	20 nos.
16.	Hammer scaling	0.25 kg. With handle	20 nos.
17.	Chisel cold flat	19 mm	20 nos.
18.	Centre punch	9mm x 127 mm	20 nos.
19.	Dividers	20 cm	20 nos.
20.	Caliper outside	15 cm	20 nos.
21.	Rule two fold brass tipped to read inches and mm	60 cm	20 nos.
22.	Wire brush (M.S)	As per standard requirement	20 nos.
23.	Spark lighter	As per standard requirement	20 nos.
24.	Chipping screen hand	As per standard requirement	20 nos.
25.	Safety boots for welders	As per standard requirement	20 nos.
26.	Safety goggles	As per standard	20 nos.
27.	Square blade	15 cm	20 nos.
28.	Scriber	15 cm	20 nos.
29.	Tongs holding	30 cm	20 nos.
30.	Wire brush (S.S)		20 nos.
B : INSTRUMENTS & GENERAL SHOP OUTFIT			
31.	Brass Rule / nickel chrome steel rule	30 cm	4

32.	Hammer ball pin with handle	1Kg	4
33.	Chisel cold cross	6-10mm	1
34.	Screw Driver	20-25cm	1 each
35.	Leg vice on stand	150 mm	1
36.	Number punch and letter punch	6 mm	1 set each no.
37.	Hacksaw frame adjustable	30 cm	4
38.	Hammering blocks	5 cm thick 60 sq	2
39.	Magnifying glass	x 6	4
40.	Weld measuring gauge fillet and butt	2	2
41.	File half round bastard	30 cm	6
42.	File flat	35 cm rough	6
43.	Spanner	12 mm and 15 mm double ended	4
44.	Spanner D E	6 mm to 15 mm be 1.5 mm set of Nos.	1 set
45.	Clamps	10 cm 15 cm 20 cm 30 cm	2 each
46.	Hammer sledge double faced	3 Kg.	1
47.	Pipe wrench	25 cm and 35 cm	1 each
48.	Steel tape	182 cm flexible in case	1
49.	“Tinmans” square	60cm x 30 cm	1
50.	Welding torches with	10 nozzles	6 set
51.	Eutalloy micro flow powder welding process	10	1 kit
52.	Rototec powder welding process	As per standard	1 kit
53.	Earth clamps	As per standard	12
54.	Pipe Cutter	As per standard requirement	1 set
55.	Cutting torch Oxy-Acetylene with cutting nozzle	As per standard	2 set
56.	Heavy duty cutting, blow pipe with cutting nozzles	As per standard	1 set
57.	Electrode holder	400 amps	6
58.	Welding rubber hose, oxygen and acetylene	8 mm	100 mtr.
59.	Rubber hose clips	As per standard requirement	50
60.	Spindle key (for opening cylinder valve)	As per standard requirement	8
61.	Pressure regulator oxygen double stage	As per standard requirement	8
62.	Pressure regulator acetylene Regulators	As per standard requirement	8
63.	Tip cleaner		8
64.	Glasses coloured	108 x 82 x 3 mm DIN 9A 11 A & 13 A	20each
65.	Glass white	108 mm x 82 mm	20 dozen
66.	Outfit spanner	As per standard requirement	8

67.	Rubber hose pipe black and red	5 mm	30 mtr.
68.	Leather sleeves	As per noms.	20 pairs
C : GENERAL MACHINERY INSTALLATIONS			
69.	Transformer welding set with all accessories	300 A	1 set
70.	Arc welding set Rectifier type with all accessories.	400 Amps	1 set
71.	CO_2 welding machine complete (Inverter type)	400 amps	1 set
72.	TIG welding set complete AC/DC	300 amps	1 set
73.	Welding cables to carry with flexible rubber	400 amps	50 mte
74.	Lugs for Cables	As per standard requirement	4 nos
75.	CNC Profile cutting machine	As per standard requirement	1
76.	Gas welding table fire bricks on stand	822 x 92 x 60 cm	3
77.	Arc welding table all metal with positioner	As per standard requirement	6
78.	Trolley for cylinder (H P unit)	As per standard requirement	2
79.	Bench shear hand capacity	up to 5 mm	1
80.	D E grinder wheel motorized Pedestal type	30 cm	1
81.	Vice bench	10 cm	6
82.	Power hacksaw	As per standard requirement	1
83.	Electrode drying oven Temp.	range 0-250^{0}C, 10Kg capacity	1
84.	AG 7 Grinder& AG4	4-7AG	2 each
85.	Portable drilling machine	(Cap. 6 mm)	1
86.	Welding helmets	As per standard requirement	16
87.	Steel lockers with	8pigeonholes	2
88.	Dye penetrant Testing kit	As per standard requirement	2 set
89.	Magnetic particle Testing machine	As per standard requirement	1
90.	Ultrasonic flaw detector	As per standard requirement	1
91.	X-ray film reference standard	As per standard requirement	1 set
92.	Submerged Arc welding machine –	600 Amps	1
93.	Micro plasma welding machine –	25 Amps	1
94.	Spot welding machine –	15 KVA	1
95.	Seam welding machine	As per standard requirement	1
96.	Universal Testing machine	As per standard requirement	1
97.	Personnel Computer with latest profile	As per standard requirement	1
98.	Welding CDs (Processes and Inspection methods)	As per standard requirement	1 set
99.	Fibre Welding booth & welding screen	As per standard requirement	8 each
100.	Fume extractors	As per standard requirement	4
101.	Oxygen, Acetylene, Argon & Co_2 cylinders	As per standard requirement	2 each
102.	Firefighting equipment & First aid box	As per standard requirement	**As required**

INFRASTRUCTURE FOR WORKSHOP CALCULATION & SCIENCE AND ENGINEERING DRAWING

TRADE: ADVANCE WELDER

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^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	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

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

Sl. No	**Candidate Name**	**Father's/Mother's Name**	Safety consciousness **15**	Workplace hygiene **5**	Attendance/ Punctuality **10**	Ability to follow Manuals/ Written instructions **5**	Application of Knowledge **10**	Skills to handle tools & equipment **10**	Economical use of materials **5**	Speed in doing work **10**	Quality in workmanship **15**	VIVA **15**	**Total internal assessment Marks**	**Result (Y/N)**
1														
2														