

**SYLLABUS OF SEMESTER SYSTEM  
FOR THE TRADE OF**

**WELDER**

**SEMESTER-I & II**

**Under**

**Craftsmen Training Scheme (CTS)  
(One year/Two Semesters)**

**Redesigned in  
2014**

**By  
Government of India  
Ministry of Labour & Employment (DGE&T)**

## **GENERAL INFORMATION**

- 1. Name of the Trade** : **WELDER**
- 2. N.C.O. Code No.** : **7212.10, 7212.20, 7212.30, 7212.40 & 7212.50**
- 3. Duration of Craftsmen Training** : 12 months (2 Semesters)
- 4. Power norms** : 16 KW
- 5. Space norms** : Workshop: 80 Square meters. (5 Sq.m/trainee)
- 6. Entry Qualification** : Pass 8<sup>th</sup> Class Examination
- 7. Unit size (No. of student)** : 16

**8. Instructor's /Trainer's qualification Trade theory & trade practical**

(A) : Essential (any one of the below)

- (i) NTC/NAC with Three years Experience in relevant field with Craft Instructors Training Certificate.
- (ii) Diploma in Mechanical and allied with two years experience in relevant field.
- (iii) Degree in Mechanical / Metallurgy / Production Engineering/Mechatronics with one Year experience in relevant field.

(B) Desirable qualification: for (ii) & (iii) Craft Instructors Training Certificate.

**Note:**

- (i) Out of two Instructors required for the unit of 1+1, one must have Degree/Diploma and other must have NTC/NAC qualifications.
- (ii) Instructor qualification for W/shop Calculation, Engg Drawing & Employability Skill would be as per the training manual.

## **COURSE INFORMATION**

### **Introduction:**

- This course is meant for the candidates who aspire to become a professional welder.
- This course is renamed as WELDER from the existing WELDER (GAS & ELECTRIC)

### **Terminal Competencies/Deliverables:**

After successful completion of this course the trainee shall be able to perform the following skills with proper sequence.

1. Welding of M.S. Sheet and M.S. Pipe by GAS welding process.
2. Welding of M.S. Plate in all position by SMAW process.
3. Straight, bevel & circular cutting on MS. Plate by Oxy-acetylene cutting process.
4. Repair & Maintenance works
5. GMAW welding on M.S Sheet & M.S plate.
6. GTAW Welding on of M.S, SS & Aluminum plate & pipes.
7. Operating skills of SPOT Welding machine, PUG cutting machine,
8. Welding C.I using SMAW Process.

### **Employment opportunities:**

On successful completion of this course, the candidates shall be gain fully employed in the following industries:

1. Structural Fabrication like bridges, Roof structures, Building & construction.
2. Automobile and allied industries
3. Site construction activities for power stations, process industries and mining.
4. Service industries like road transportation and Railways.
5. Ship building and repair
6. Infrastructure and defence organisations
7. In public sector industries like BHEL, BEML, NTPC, etc and private industries in India & abroad.
8. Petrochemical industries like ONGC, IOCL, HPCL etc
9. Self employment

### **Further learning pathways:**

- On successful completion of the course trainees can opt for additional NCVT certificates in the following courses by doing the second semester since the first semester is common for all welder courses.
  - WELDER (GTAW &GMAW),
  - WELDER (PIPE),
  - WELDER (STRUCTURAL),
  - WELDER (FABRICATION & FITTING),
  - WELDER (WELDING & INSPECTION)
- Also on successful completion of the course they can pursue Apprenticeship training in the reputed Industries / Organisations.

## SYLLABUS FOR TRADE PRACTICAL AND TRADE THEORY

### SEMESTER-I

Week No	Trade Practical	Trade Theory
1	<ul style="list-style-type: none"> <li>- Induction training:</li> <li>- Familiarisation with the Institute.</li> <li>- Importance of trade Training</li> <li>- Machinery used in the trade.</li> <li>- Introduction to safety equipment and their use etc.</li> <li>- Hack sawing, filing square to dimensions.</li> <li>- Marking out on MS plate and punching .</li> </ul>	<ul style="list-style-type: none"> <li>- General discipline in the Institute</li> <li>- Elementary First Aid.</li> <li>- Importance of Welding in Industry</li> <li>- Safety precautions in Shielded Metal Arc Welding, and Oxy-Acetylene Welding and Cutting.</li> </ul>
2	<ul style="list-style-type: none"> <li>- Setting up of Arc welding machine &amp; accessories and Striking an arc</li> <li>- Setting of oxy-acetylene welding equipment, Lighting and setting of flame.</li> </ul>	<ul style="list-style-type: none"> <li>- Introduction and definition of welding.</li> <li>- Arc and Gas Welding Equipments, tools and accessories .</li> <li>- Various Welding Processes and its applications .</li> <li>- Arc and Gas Welding terms and definitions.</li> </ul>
3	<ul style="list-style-type: none"> <li>OAW-01 - Fusion run without and with filler rod on M.S. sheet 2 mm thick in flat position.</li> <li>OAW-02 - Edge joint on MS sheet 2 mm thick in flat position with out filler rod.</li> <li>OAGC-01 - Marking and straight line cutting of MS plate. 10 mm thick by gas.</li> </ul>	<ul style="list-style-type: none"> <li>- Different process of metal joining methods: Bolting, riveting, soldering, brazing, seaming etc.</li> <li>- Types of welding joints and its applications. Edge preparation and fit up for different thickness.</li> <li>- Surface Cleaning</li> </ul>
4	<ul style="list-style-type: none"> <li>SMAW-01 - Straight line beads on M.S. plate 10 mm thick in flat position.</li> <li>SMAW-02 - Weaved bead on M. S plate 10mm thick in flat position.</li> </ul>	<ul style="list-style-type: none"> <li>- Basic electricity applicable to arc welding and related electrical terms &amp; definitions.</li> <li>- Heat and temperature and its terms related to welding</li> <li>- Principle of arc welding. And characteristics of arc .</li> </ul>
5	<ul style="list-style-type: none"> <li>OAW-03 - Square butt joint on M.S. sheet 2 mm thick in flat Position .</li> <li>SMAW-03 - Fillet “T” joint on M.S. Plate 10 mm thick in flat position.</li> </ul>	<ul style="list-style-type: none"> <li>- Common gases used for welding &amp; cutting, flame temperatures and uses.</li> <li>- Chemistry of oxy-acetylene flame.</li> <li>- Types of oxy-acetylene flames and uses.</li> <li>- Oxy-Acetylene Cutting Equipment principle, parameters and application.</li> </ul>
6	<ul style="list-style-type: none"> <li>OAGC-02 - Beveling of MS plates 10 mm thick. By gas cutting.</li> <li>OAW-04 - Open corner joint on MS sheet 2 mm thick in flat Position</li> <li>SMAW-04 - Fillet lap joint on M.S. plate 10 mm thick in flat position.</li> </ul>	<ul style="list-style-type: none"> <li>- Arc welding power sources: Transformer, Motor Generator set, Rectifier and Inverter type welding machines and its care &amp; maintenance..</li> <li>- Advantages and disadvantages of A.C. and D.C. welding machines</li> </ul>
7	<ul style="list-style-type: none"> <li>OAGC-03 - Circular gas cutting on MS plate 10 mm thick by profile cutting machine.</li> <li>OAW-05 - Fillet “T” joint on MS sheet 2 mm thick in flat position</li> <li>SMAW-05 - Open Corner joint on MS plate 10 mm thick in flat position.</li> </ul>	<ul style="list-style-type: none"> <li>- Welding positions as per EN &amp;ASME : flat, horizontal, vertical and over head position.</li> <li>- Weld slope and rotation.</li> <li>- Welding symbols as per BIS &amp; AWS.</li> </ul>

8	OAW-06 SMAW-06	<ul style="list-style-type: none"> <li>- Fillet Lap joint on MS sheet 2 mm thick in flat position.</li> <li>- Single “V” Butt joint on MS plate 12 mm thick in flat position (1G) .</li> </ul>	<ul style="list-style-type: none"> <li>- Arc length – types – effects of arc length.</li> <li>- Polarity: Types and applications.</li> </ul>
9	OAW-07 SMAW-07 SMAW-08	<ul style="list-style-type: none"> <li>- Square Butt joint on M.S. sheet. 2 mm thick in Horizontal position .</li> <li>- Straight line beads and multi layer practice on M.S. Plate 10 mm thick in Horizontal position.</li> <li>- Fillet “ T” joint on M.S. plate 10 mm thick in Horizontal position.</li> </ul>	<ul style="list-style-type: none"> <li>- Calcium carbide properties and uses.</li> <li>- Acetylene gas properties and generating methods.</li> <li>- Acetylene gas Purifier, Hydraulic back pressure valve and Flash back arrestor</li> </ul>
10	OAW-08 SMAW-09	<ul style="list-style-type: none"> <li>- Fillet Lap joint on M.S. sheet 2 mm thick in horizontal position .</li> <li>- Fillet Lap joint on M.S. plate 10 mm thick in horizontal position .</li> </ul>	<ul style="list-style-type: none"> <li>- Oxygen gas and its properties</li> <li>- Production of oxygen by Air liquefaction .</li> <li>- Charging process of oxygen and acetylene gases</li> <li>- Oxygen and Dissolved Acetylene gas cylinders and Color coding for different gas cylinders.</li> <li>- Gas regulators, types and uses.</li> </ul>
11	OAW-09 OAW-10 SMAW-10	<ul style="list-style-type: none"> <li>- Fusion run with filler rod in vertical position on 2mm thick M.S sheet</li> <li>- Square Butt joint on M.S. sheet. 2 mm thick in vertical position</li> <li>- Single Vee Butt joint on M.S. plate 12 mm thick in horizontal position (2G).</li> <li>-</li> </ul>	<ul style="list-style-type: none"> <li>- Oxy acetylene gas welding Systems (Low pressure and High pressure). Difference between gas welding blow pipe(LP &amp; HP) and gas cutting blow pipe</li> <li>- Gas welding techniques. Rightward and Leftward techniques.</li> </ul>
12	SMAW- 11 OAW-11 SMAW-12	<ul style="list-style-type: none"> <li>- Weaved bead on M.S Plate 10mm in vertical position.</li> <li>- Fillet “T” joint on M.S sheet 2 mm thick in vertical position .</li> <li>-Fillet “T” joint on M.S. plate 10 mm thick in vertical position.</li> </ul>	<ul style="list-style-type: none"> <li>- Arc blow – causes and methods of controlling.</li> <li>- Distortion in arc &amp; gas welding and methods employed to minimize distortion</li> <li>- Arc Welding defects, causes and Remedies.</li> </ul>
13	OAW-12 SMAW-13	<ul style="list-style-type: none"> <li>- Structural pipe welding butt joint on MS pipe Ø 50 and 3mm WT in 1G position.</li> <li>- Fillet Lap joint on M.S. Plate 10 mm in vertical position.</li> </ul>	<ul style="list-style-type: none"> <li>- Specification of pipes, various types of pipe joints, pipe welding positions, and procedure.</li> <li>- Difference between pipe welding and plate welding.</li> </ul>
14	SMAW-14 OAW-13	<ul style="list-style-type: none"> <li>- Open Corner joint on MS plate 10 mm thick in vertical position.</li> <li>-Pipe welding - Elbow joint on MS pipe Ø 50 and 3mm WT.</li> </ul>	<ul style="list-style-type: none"> <li>- Pipe development for Elbow joint, “T” joint, Y joint and branch joint</li> <li>- Manifold system</li> </ul>
15	OAW-14 SMAW-15	<ul style="list-style-type: none"> <li>- Pipe welding “T” joint on MS pipe Ø 50 and 3mm WT.</li> <li>- Single “V” Butt joint on MS plate12 mm thick in vertical position (3G) .</li> </ul>	<ul style="list-style-type: none"> <li>- Gas welding filler rods, specifications and sizes.</li> <li>- Gas welding fluxes – types and functions.</li> <li>- Gas Brazing &amp; Soldering : principles, types fluxes &amp; uses</li> <li>- Gas welding defects, causes and remedies.</li> </ul>
16	OAW-15	<ul style="list-style-type: none"> <li>- Pipe welding 45 ° angle joint on MS pipe Ø 50 and 3mm WT.</li> </ul>	<ul style="list-style-type: none"> <li>- Electrode : types, functions of flux, coating factor, sizes of electrode</li> </ul>

	SMAW-16	- Straight line beads on M.S. plate 10mm thick in over head position.	- Coding of electrode as per BIS, AWS, - Effects of moisture pick up. - Storage and baking of electrodes. - Special purpose electrodes and their applications.
17	SMAW-17 SMAW-18	- Pipe Flange joint on M.S plate with MS pipe Ø 50 mm X 3mm WT - Fillet “T” joint on M.S. plate 10 mm thick in over head position.	- Weldability of metals, importance of pre heating, post heating and maintenance of inter pass temperature.
18	SMAW-19 SMAW-20	- Pipe welding butt joint on MS pipe Ø 50 and 5 mm WT. in 1G position. - Fillet Lap joint on M.S. plate 10 mm thick in over head position.	- Classification of steel. - Welding of low, medium and high carbon steel and alloy steels.
19	SMAW-21 SMAW-22	- Single “V” Butt joint on MS plate 10mm thick in over head position(4G) - Pipe butt joint on M. S. pipe Ø 50mm WT 6mm (1G Rolled).	- Effects of alloying elements on steel - Stainless steel : types- weld decay and weldability.
20	OAW-16 SMAW -23 OAW-17	- Square Butt joint on S.S. sheet. 2 mm thick in flat position. - Square Butt joint on S.S. Sheet 2 mm thick in flat position. - Square Butt joint on Brass sheet 2 mm thick in flat position.	- Brass – types – properties and welding methods. - Copper – types – properties and welding methods.
21	OAW-18 SMAW-24 AG-01	- Square Butt & Lap joint on M.S. sheet 2 mm thick by brazing. - Single “V” butt joint C.I. plate 6mm thick in flat position. - Arc gouging on MS plate 10 mm thick.	- Aluminium and its alloys, properties and weldability, Welding methods - Arc cutting & gouging,
22	OAW-19 OAW-20	- Square Butt joint on Aluminium sheet. 3 mm thick in flat position . - Bronze welding of cast iron (Single “V” butt joint) 6mm thick plate	- Cast iron and its properties types. - Welding methods of cast iron.
23	<b>Industrial Training / Project Work</b>		
24	<b>Industrial Training / Project Work</b>		
25	<b>Revision</b>		
26	<b>Examination</b>		

**Abbreviations:**

- SMAW - Shielded Metal Arc Welding  
OAW - Oxy-Acetylene gas Welding  
OAGC - Oxy-Acetylene Gas Cutting  
F - Fitting  
WT - Wall Thickness.

**SYLLABUS FOR TRADE PRACTICAL AND TRADE THEORY**  
**SEMESTER-II**

Week No	Trade Practical		Trade Theory
1	GMAW- 01 GMAW - 02	<ul style="list-style-type: none"> <li>- Machinery used in the trade.</li> <li>- Introduction to safety equipment and their use etc.</li> <li>- Setting up of GMAW welding machine &amp; accessories and Striking an arc</li> <li>- Depositing straight line beads on M.S Plate.</li> <li>- Fillet weld – “T” joint on M.S plate 10mm thick in flat position by Dip transfer.</li> </ul>	<ul style="list-style-type: none"> <li>- Safety precautions in Gas Metal Arc Welding, and Gas Tungsten Arc welding.</li> <li>- Introduction to GMAW - equipment – accessories.</li> <li>- Various other names of the process. (MIG/MAG/CO<sub>2</sub> welding.)</li> </ul>
2	GMAW -03 GMAW -04 GMAW -05	<ul style="list-style-type: none"> <li>- Fillet weld – Lap joint on M.S. sheet 3mm thick in flat position by Dip transfer.</li> <li>- Fillet weld – “T” joint on M.S.sheet 3mm thick in flat position by Dip transfer.</li> <li>- Fillet weld – corner joint on M.S.sheet 3mm thick in flat position by Dip transfer.</li> </ul>	<ul style="list-style-type: none"> <li>- Advantages of GMAW welding over SMAW , limitations and applications</li> <li>- Process variables of GMAW.</li> <li>- Modes of metal transfer – dip or short circuiting transfer, spray transfer (free flight transfer) and globular transfer (intermittent transfer)and Pulsed metal transfer.</li> </ul>
3	GMAW -06 GMAW -07	<ul style="list-style-type: none"> <li>- Butt weld – Square butt joint on M.S sheet 3mm thick in flat position</li> <li>- Butt weld – Single “V” butt joint on M.S plate 10 mm thick by Dip transfer in flat position..</li> </ul>	<ul style="list-style-type: none"> <li>- Wire feed system – types – care and maintenance.</li> <li>- Welding wires used in GMAW, standard diameter and codification as per AWS.</li> </ul>
4	GMAW -08 GMAW -09	<ul style="list-style-type: none"> <li>- Fillet weld – “T” joint on M.S plate 10mm thick in Horizontal position by Dip transfer.</li> <li>- Fillet weld – corner joint on M.S plate 10mm thick in Horizontal position by Dip transfer.</li> </ul>	<ul style="list-style-type: none"> <li>- Types of shielding gases and gas mixtures used in GMAW and its applications.</li> <li>- Flux cored arc welding – description, advantage, welding wires, coding as per AWS.</li> </ul>
5	GMAW -10 GMAW -11	<ul style="list-style-type: none"> <li>- Fillet weld – “T” joint on M.S. sheet 3mm thick in Horizontal position by Dip transfer.</li> <li>- Fillet weld – corner joint on M.S.sheet 3mm thick in Horizontal position by Dip transfer.</li> </ul>	<ul style="list-style-type: none"> <li>- Edge preparation of various thicknesses of metals for GMAW.</li> <li>- GMAW defects, causes and remedies</li> </ul>
6	GMAW -12 GMAW -13	<ul style="list-style-type: none"> <li>- Fillet weld – “T” joint on M.S plate 10mm thick in vertical position by Dip transfer.</li> <li>- Fillet weld – corner joint on M.S plate 10mm thick in vertical position by dip transfer.</li> </ul>	<ul style="list-style-type: none"> <li>- Heat input and techniques of controlling heat input during welding.</li> <li>- Heat distribution and effect of faster cooling</li> </ul>
7	GMAW -14 GMAW -15	<ul style="list-style-type: none"> <li>- Fillet weld – Lap joint on M.S. sheet 3mm thick in vertical position by Dip transfer.</li> <li>- Fillet weld – corner joint on M.S. sheet 3mm thick in vertical position by Dip</li> </ul>	<ul style="list-style-type: none"> <li>- Pre heating &amp; Post Weld Heat Treatment</li> <li>- Use of temperature indicating crayons</li> </ul>

		transfer.	
8	GMAW -16	- Fillet weld – Lap and “T” joint on M.S sheet 3mm thick in over head position by Dip transfer.	- Submerged arc welding process – principles, equipment, advantages and limitations
9	GMAW -17	- Tee Joints on MS Pipe Ø 60 mm OD x 3 mm WT 1G position – Arc constant (Rolling)	- Electro slag and Electro gas welding processes–principles, equipments, advantages and limitations
10	GMAW -18 GMAW -19	- Depositing bead on S.S sheet - Butt joint on Stainless steel 2 mm thick sheet in flat position by Dip transfer.	- Thermit welding process- types, principles, equipments, thermit mixture types and applications. - Use of backing strips and backing bars
11	GTAW -01 GTAW -02	- Depositing bead on Aluminium sheet 2 mm thick in flat position. - Square butt joint on Aluminium sheet 1.6mm thick in flat position.	- GTAW process - brief description Difference between AC and DC welding, equipments , polarities and applications. - Various other names of the process (TIG, Argonarc) - Power sources for GTAW - AC & DC
12	GTAW -03 GTAW -04	- Fillet weld – “T” joint on Aluminium sheet 1.6 mm thick in flat position. - Fillet weld – Outside corner joint on Aluminium sheet 2 mm thick in flat position.	- Tungsten electrodes –types & uses, sizes and preparation  - GTAW Torches- types, parts and their functions - GTAW filler rods and selection criteria
13	GTAW -05	- Butt weld - Square butt joint on Stainless steel sheet 1.6 mm thick in flat position with purging gas	- 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.
14	GTAW -06	- Fillet weld – “T” joint on Stainless steel sheet 1.6 mm thick in flat position.	- Argon / Helium gas properties – uses. - GTAW Defects, causes and remedy.
15	GTAW -07	- Pipe butt joint on Aluminium pipe Ø 50 mm x 3 mm WT in Flat position.	- Friction welding process- equipment and application - Laser beam welding (LBW)and Electron beam welding(EBW)
16	GTAW -08 PAC-01	- “T” Joints on MS Pipe Ø 50 mm OD x 3 mm WT, position – Flat - Straight cutting on ferrous and non ferrous metals	- Plasma Arc Welding (PAW) and cutting (PAC) process – equipments and principles of operation. - Types of Plasma arc, advantages and applications.
17	RW-01 RW-02	- Lap joint on Stainless steel sheet by Resistance Spot welding - MS sheets joining by Resistance Spot	- Resistance welding process -types, principles, power sources and welding parameters.



		welding -	- Applications and limitations.
18	OAW-01 OAW-02	- Square butt joint on Copper sheet 2mm thick in flat position. - “T” joint on Copper to MS sheet 2mm thick in flat position by Brazing	- Metalizing – types of metalizing principles, equipments, advantages and applications - Manual Oxy – acetylene powder coating process- principles of operation and applications
19	OAW-03 OAW-04	- Silver brazing on S.S Sheet with copper sheet “T” joint. - Silver brazing on copper tube to tube’	- Welding codes and standards - Reading of assembly drawing - Welding Procedure Specification (WPS) and Procedure Qualification Record ( PQR)
20	SMAW-01 SMAW-02	- Repair welding of broken C.I machine parts . - Hard surfacing practice on M.S round rod Ø 25 mm by using Hard facing electrode.	- Hard facing/ surfacing necessity, surface preparation, various hard facing alloys and advantages of hard facing .
21	I&T-01  I&T-02 I&T-03	- Testing of weld joints by visual inspection . - Inspection of welds by using weld gauges. - Dye penetrant test, - Magnetic particle test.	- Weld quality inspection, common welding mistakes and appearance of good and defective welds - Weld gauges & its uses
22	I&T-04 I&T-05 I&T-06	- Nick- break test. - Free bend test. - Fillet fracture test.	- Types of Inspection methods - Classification of destructive and NDT methods - Welding economics and Cost estimation.
23	<b>Industrial training / Project work</b>		
24	<b>Industrial training / Project work</b>		
25	<b>Revision</b>		
26	<b>Examination</b>		

**Abbreviations:**

SMAW	- Shielded Metal Arc Welding
OAW	- Oxy-Acetylene Gas Welding
OAGC	- Oxy-Acetylene Gas Cutting
GMAW	- Gas Metal Arc Welding
GTAW	- Gas Tungsten Arc Welding
PAC	- Plasma Arc Cutting
RW	- Resistance Welding
I&T	- Inspection & Testing
WT	- Wall Thickness.

**LIST OF TOOLS & EQUIPMNT  
FOR SEMESTER I &II**

Tools & Equipments for a batch 16 Trainees + one

**Consumables**

SI. No.	Name of the items	Quantity
1	Leather Hand Gloves 14"	17 pairs .
2	Cotton hand Gloves 8"	17 pairs
3	Leather Apron leather	17 nos.
4	S.S Wire brush 5 rows and 3 rows	17 nos.each
5	Leather hand sleeves 16"	17 pairs
6	Safety boots for welders	17 pairs
7	Leg guards leather	17 pairs
8	Rubber hose clips 1/2"	20 nos
9	Rubber hose oxygen 8 mm dia X 10 Mts long as per BIS	2 nos
10	Rubber hose acetylene 8 mm dia X 10 Mts long as per BIS	2 nos
11	Arc welding cables multi cored copper 400/ 600 amp as per BIS	45 mts each
12	Arc welding single coloured glasses 108 mm x 82 mm x 3 mm. DIN 11A &12 A	34 nos.
13	Arc welding plain glass 108 mm x 82 mm x 3 mm.	68 nos
14	Gas welding Goggles with Colour glass 3 or 4A DIN	34 nos
15	Safety goggles plain	34 nos
16	Spark lighter	6 nos
17	AG 4 Grinding wheels	10 nos

**Trainees Tools Kit**

SI. No.	Name of the items	Quantity
1	Welding helmet fiber	17 nos.
2	Welding hand shield fiber	17 nos.
3	Chipping hammer with metal handle 250 Grams	17 nos.
4	Chisel cold flat 19 mm x 150 mm	17 nos.
5	Centre punch 9 mm x 127 mm	17 nos.
6	Dividers 200 mm	17 nos.
7	Stainless steel rule 300mm	17 nos.
8	Scriber 150 mm double point	17 nos.
9	Flat Tongs 350mm long	17 nos.
10	Hack saw frame fixed 300 mm	17 nos.
11	File half round bastard 300 mm	17 nos.
12	File flat 350 mm bastard	17 nos.
13	Hammer ball pane 1 kg with handle	17 nos.
14	Tip Cleaner	17 nos.
15	Try square 6"	17 nos

## **General Machinery Shop outfit**

<b>SI. No.</b>	<b>Name and Description of Tools</b>	<b>Quantity</b>
16	Spindle key	4
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
21	Universal Weld measuring gauge	2
22	Earth clamp 600A	6
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
26	S.S tape 5 meters flexible in case	1
27	Electrode holder 600 amps	6
28	H.P. Welding torch with 5 nozzles	2 sets
29	Oxygen Gas Pressure regulator double stage	2
30	Acetylene Gas Pressure regulator double stage	2
31	CO <sub>2</sub> Gas pressure regulator, with flow meter	2 set
32	Argon Gas pressure regulator with flow meter	2 set
33	Metal rack 182 cm x 152 cm x 45 cm	1
34	First Aid box	1
35	Steel lockers with 8 Pigeon holes	2
36	Steel almirah / cupboard	2
37	Black board and easel with stand	1
38	Flash back arrester (torch mounted)	4 pairs
39	Flash back arrester (cylinder mounted)	4 pairs

## **General Installation**

40	Welding Transformer with all accessories ( 400A, OCV 60–100 V, 60% duty cycle)	2 sets
41	Welding Transformer (or) Inverter based welding machine with all accessories (300A , OCV 60 – 100 V, 60% duty cycle)	2 sets
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 400A capacity with air cooled torch, Regulator, Gas preheater, Gas hose and Standard accessories	2 set
44	AC/DC GTAW welding machine with water cooled torch 300 A, Argon regulator, Gas hose, water circulating system and standard accessories.	2 set
45	Air Plasma cutting equipment with all accessories, capacity to cut 25 mm clear cut	1 set
46	Air compressor suitable for air plasma cutting system	1
47	Auto Darkening Welding Helmet	2
48	Spot welding machine to 15 KVA with all accessories	1 set
49	Portable gas cutting machine capable of cutting Straight & Circular with all accessories	1 set
50	Pedestal grinder fitted with coarse and medium grain size grinding wheels dia. 300 mm	1
51	Bench grinder fitted with fine grain size silicon carbide green grinding wheel dia. 150 mm	1
52	AG 4 Grinder	2

53	Suitable gas welding table with fire bricks	2
54	Suitable Arc welding table with positioner	9
55	Trolley for cylinder (H.P. Unit)	2
56	Hand shearing machine capacity to cut 6 mm sheets and flats	1
57	Power saw machine 18''	1
58	Portable drilling machine (Cap. 6 mm)	1
59	Oven, electrode drying 0 to 350°C, 10 kg capacity	1
60	Work bench 340x120x75 cm with 4 bench vices of 150 mm jaw opening	4 sets
61	Oxy Acetylene Gas cutting blow pipe	2 sets
62	Oxygen, Acetylene Cylinders	2 each*
63	CO <sub>2</sub> cylinder	2 Nos *
64	Argon gas cylinder	2 Nos *
65	Anvil 12 sq. inches working area with stand	1
66	Swage block	1
67	Die penetrant testing kit	1 set
68	Magnetic particle testing Kit	1 set
69	Fire extinguishers (foam type and CO <sub>2</sub> type)	1
70	Fire buckets with stand	4
71	Portable abrasive cut-off machine	1
72	Suitable Gas cutting table	1
73	Welding Simulators for SMAW/GTAW/GMAW	1 each (Optional)

**NOTE:**

1. \* Optionally Gas cylinders can also be hired as and when required
2. No additional items are required to be provided for unit or batch working in the Second shift except the items under trainee's tool kit and steel lockers.

**Class Room Furniture for Trade Theory**

<b>Sl. No</b>	<b>Names &amp; Description of Furniture</b>	<b>Quantity</b>
1	Instructor's table and Chair (Steel)	1 set
2	Students chairs with writing pads	16
3	White board size 1200mm X 900 mm	1
4	Instructors lap top with latest(vista & above) configuration pre loaded with operating system. and MS Office package.	1
5	LCD projector with screen.	1
6	Welding Process, Inspection & codes DVD/ CDs	1 set each (optional)

## LIST OF TRADE COMMITTEE MEMBERS

Sl. No	Names & Designation	Organisation	Remarks
<b>Members of Sector Mentor council</b>			
1	Dr.G.Buvashekarana	AGM, WRI, Trichy	Chairman
2	Dr.K.Ashokkumar	AGM, BHEL, Trichy	Member
3	Prof. Jyothi Mukhopadhyaya	IIT, Ahmedabad	Member
4	B.Pattabhiraman	MD, GB Engineering, Trichy	Member
5	Dr.Rajeev kumar	IIT, Mandi	Member
6	Dr. Vishalchauhan	IIT, Mandi	Member
7	Shri D.K.Singh	ITI, Kanpur	Member
8	Shri. Navneet Arora	IIT, Roorkee	Member
9	Shri. R. K. Sharma	Head, SDC, JBM Group, Faridabad	Member
10	Shri. Puneet Sinha	Deputy Director, MSME, New Delhi	Member
<b>Mentor</b>			
1	Shri. Deepankar Mallick	Director of Training, DGE&T Hq,	Mentor
<b>Members of Core Group</b>			
1	Shri. M Thamizharasan	JDT, CSTARI, Kolkata	Member
2	Shri. M Kumaravel	DDT, FTI , Bangalore	Team Leader
3	Shri. SushilKumar	DDT, DGE&T Hq,	Member
4	Shri. S.P.Khatokar	T.O. ATI, Mumbai	Member
5	Shri. V.L. Ponmozhi	TO, CTI, Chennai	Member
6	Shri. D.Pani	TO, ATI, Howrah	Member
7	Shri. Amar Singh	TO, ATI, Ludhiyana	Member
8	Shri. Gopalakrishnan	TO, NIMI, Chennai	Member
9	Shri. Manjunatha B.S	JTO, GITI, K.G.F. Karnataka	Member
10	Shri. Venugopal P C	ITI Chalakudi, Kerala	Member