

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

**WELDER ( Fabrication & Fitting)**

**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 (Fabrication & Fitting)**
- 2. N.C.O. Code No.** : **7212.10, 7212.20, 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 fabrication fitter.
- This course is renamed & restructured as WELDER(FABRICATION & FITTING) from the existing COE Fabrication sector as follows.
  - First year BBT - Basic welding ( 2months) module is converted in to CTS first semester WELDER(FABRICATION & FITTING) course.
  - Second year advanced module STRUCTURAL & PRESSURE PARTS FITTING is converted in to CTS Second semester WELDER(FABRICATION & FITTING) course.

### **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. Measure using Vernier calipers, Micrometer and height gauges to precise dimension
6. Perform drilling, chamfering and beveling operations
7. Tack weld Fillet, Lap, T and Butt joints
8. Practice on straightening, bending of plates and pipes cut to required shape
9. Prepare and fit structural sections and pressure parts
10. Prepare and fit pipes for T, Y, K joints joint for high pressure pipe welding

### **Employment opportunities:**

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

1. Structural Fabrication like Roof and Building construction.
2. Manufacture of utility and power boilers, turbines and generators.
3. Service industries like road transportation and Railways.
4. Ship building.
5. Automobile and body building industries
6. In public sector industries like HAL, BHEL,BEML, NTPC etc. and private industries.
7. 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,
  - WELDER (GTAW &GMAW),
  - WELDER (PIPE),
  - WELDER (STRUCTURAL),
  - 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> <li>- Coding of electrode as per BIS, AWS,</li> </ul>

	SMAW-16	- Straight line beads on M.S. plate 10mm thick in over head position.	- 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	<ul style="list-style-type: none"> <li>- Familiarisation with the machinery Hand tools used in the trade.</li> <li>- Introduction to safety equipment and their use</li> <li>- Handling of measuring instruments - Steel tape, Vernier caliper, Spirit level, Micrometer, Try square, Height gauge, Marking blocks, Bevel protractor etc.</li> </ul>	<ul style="list-style-type: none"> <li>- Outline of the subjects to be covered</li> <li>- Role of fabrication in industry</li> <li>- Basic Trigonometric calculations –</li> <li>- Marking of Angles, Triangles, Square, Rectangle, Parallelogram, Hexagon, Octagon and Circles.</li> </ul>
2	<ul style="list-style-type: none"> <li>- Development practice of surface of prism, cylinder, pyramids, cones, etc.</li> </ul>	<ul style="list-style-type: none"> <li>- Calculation of volume and surface area of rectangular prism, cubes and cylinders</li> <li>- Development of right solids, prisms, cylinders, pyramids, cones, frustum of pyramid, cone etc.</li> </ul>
3	<ul style="list-style-type: none"> <li>- Marking on plates for drilling practice</li> <li>- Drilling required diameter hole</li> </ul>	<ul style="list-style-type: none"> <li>- Workshop practice - Hack sawing, Filing, Chipping, Hand grinding, Marking, Punching, Drilling, Tapping, Die-passing, etc.</li> <li>- Drilling machine - construction and operation feature</li> </ul>
4	<ul style="list-style-type: none"> <li>- Marking on plates for beveling and chamfering</li> <li>- Beveling and chamfering to required Angle</li> </ul>	<ul style="list-style-type: none"> <li>- Machine shop practice - Milling machine construction and operation - Milling cutter - Types of Milling etc. Lathe - construction and operation Turning - Facing - Taper Turning - Threading etc.</li> </ul>
5	<ul style="list-style-type: none"> <li>- Straight line beads on M S plate by SMAW</li> <li>- Tack welding on M S plate &amp; channels by SMAW in different position.</li> <li>- Square butt joint weld on M S plate in down hand position by SMAW</li> </ul>	<ul style="list-style-type: none"> <li>- Principles of Shielded metal Arc welding (SMAW)</li> <li>- Basic Electricity of welding power source</li> <li>- AC / DC power source advantages and disadvantages.</li> <li>- Polarity types &amp; Arc length</li> </ul>
6	<ul style="list-style-type: none"> <li>- Fillet, Tee and Lap joint weld in down hand position by SMAW</li> <li>- Fillet weld open corner joint on MS plate in down hand position by SMAW</li> <li>- Single V butt joint on MS flat in down hand position by SMAW</li> </ul>	<ul style="list-style-type: none"> <li>- Electrode - Types, description &amp; Specification - BIS, AWS, etc..</li> <li>- Functions of flux &amp; Characteristics of flux &amp; arc</li> <li>- Selection of electrodes and coating factors</li> <li>- Tack welding procedure on plate, channels &amp; pipe: Length &amp; pitch</li> </ul>
7	<ul style="list-style-type: none"> <li>- Identification of metals, bars, plates, flats, channels, I section, T section, and box section etc.</li> </ul>	<ul style="list-style-type: none"> <li>- Metals used in fabrication</li> <li>- Types of fabrication joints</li> <li>- Types and classification of steel and application</li> <li>- Framed structures - shell structure - Rolled sections, I section, channel section, angle section, T-section</li> </ul>
8	<ul style="list-style-type: none"> <li>- Study of design drawing related to structural and pressure parts and preparation of fitting square.</li> </ul>	<ul style="list-style-type: none"> <li>- Welding symbols</li> <li>- Structural/ Pressure vessel design drawing reading and understanding the concepts</li> </ul>

9	<ul style="list-style-type: none"> <li>- Using guillotine shearing machine, marking and cutting of sheet metals to required size.</li> </ul>	<ul style="list-style-type: none"> <li>- Description and operation of croppers, shearing machine, Guillotine shears, punching machines, Edge planning machine and nibbling machine etc.</li> <li>- Description and operation of straightening machines</li> </ul>
10	<ul style="list-style-type: none"> <li>- Practice on bending of plates and pipes to required shape.</li> <li>- Straightening plates and section</li> <li>- Edge planning as per requirement.</li> </ul>	<ul style="list-style-type: none"> <li>- Methods of bending plates, angle iron etc.</li> <li>- Cold bending and hot bending etc.</li> <li>- Bending of angles and channels</li> <li>- Press work</li> <li>- Flame straightening methods</li> </ul>
11	<ul style="list-style-type: none"> <li>- Preparation of pipe joint for high pressure pipe welding</li> <li>- Pipe Welding - preparation of edges - cleaning the joint surface -</li> <li>- Fit up the pipes</li> </ul>	<ul style="list-style-type: none"> <li>- Pipes and pipe fitting - Pipe schedule - types - methods of bending - use of bending fixture - pipe bending machine - use of pipe cutter, pipe wrenches - pipe vices - pipe threads - pipe dies and taps etc.</li> </ul>
12	<ul style="list-style-type: none"> <li>- Tack weld two pipes together</li> <li>- Pipe work - cutting - bending - threading - joining and assembly.</li> </ul>	<ul style="list-style-type: none"> <li>- Edge preparation for pressure line pipes</li> <li>- Fit up procedure</li> </ul>
13	<ul style="list-style-type: none"> <li>- Preparation of single riveted lap joint</li> <li>- Double riveted lap joint</li> </ul>	<ul style="list-style-type: none"> <li>- Hand riveting, cold and hot - methods of riveting - use of pneumatic riveting, hydraulic riveting - checking rivets - removing of bad rivets</li> </ul>
14	<ul style="list-style-type: none"> <li>- Single cover plate riveted butt joint</li> <li>- Double cover plate riveted butt joint</li> <li>Bolted joints</li> </ul>	<ul style="list-style-type: none"> <li>- Types of bolts - black bolt, turned bolt, high strength bolt etc. and their application</li> <li>- Development of pipe templates for T, Y, K joints</li> </ul>
15	<ul style="list-style-type: none"> <li>- Preparation of pipes for T, Y, K joints</li> <li>- Marking gusset plates</li> <li>- Marking joint section beam</li> <li>- Marking joint column using height gauge</li> </ul>	<ul style="list-style-type: none"> <li>- Kind of structures - Column base, plate girders, Gantry girders, Root trusses - description, types and use</li> <li>- Beam connection, beam to column connection - framed connection and seated connection</li> </ul>
16	<ul style="list-style-type: none"> <li>- Marking on curved and bend plates and section</li> <li>- Marking on built up section</li> <li>- Usage of pantograph for marking</li> </ul>	<ul style="list-style-type: none"> <li>- Type of pressure vessels - Boilers, Heat exchangers, High pressure pipe lines etc.</li> <li>- Marking for cutting to size, marking for beveling and chamfering and marking for pipes and intersection</li> </ul>
17	<ul style="list-style-type: none"> <li>- Making templates for cutting to size and simple objects</li> </ul>	<ul style="list-style-type: none"> <li>- Jigs and Template making - Design and description of templates for cutting - templates of gussets - templates for marking angle</li> </ul>
18	<ul style="list-style-type: none"> <li>- Making templates for Gussets and joint sections</li> <li>- Making simple fixtures</li> </ul>	<ul style="list-style-type: none"> <li>- Template for marking joint section</li> <li>- Design and development of jigs for drilling and angles</li> <li>- Design of simple fixture and clamping devices</li> </ul>
19	<ul style="list-style-type: none"> <li>- Making simple riveted plate assembly - Girder , trusses</li> <li>- Making a simple lattice structure</li> </ul>	<ul style="list-style-type: none"> <li>- Assembly: Procedure and technique for assembly</li> <li>- Assembling of riveted plates, girders and trusses</li> </ul>
20	<ul style="list-style-type: none"> <li>- Making pressure pipe line assembly</li> <li>- Making welded section assembly</li> <li>- Making cylindrical tanks</li> </ul>	<ul style="list-style-type: none"> <li>- Assembly of welded section</li> <li>- Assembly of cylindrical tanks including fitting and lining of vessels</li> </ul>
21	<ul style="list-style-type: none"> <li>- Rectification of distorted welded structure by flame straightening.</li> </ul>	<ul style="list-style-type: none"> <li>- Distortion &amp; methods of control</li> <li>- Preventing and allowing for weld distortion</li> <li>- Common welding defects</li> <li>- Inspection and testing</li> <li>- Non destructive method of flaw detection - PT, MPT, Ultrasonic &amp; Radiographic inspection</li> </ul>



22	- Dimensional inspection of fit ups Cleaning & Painting	- Chipping & Grinding : Chisels & pneumatic chisels used for chipping- Method of chipping and cutting - Types of grinding machines – Grinding wheels - Method of removing welds and rivets by chipping and grinding. - Finishing &Painting : Common types of painting. Stenciling, marking and colour marking
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

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

Tools & Equipments for a batch 16Trainees + one

**Consumable kit**

Sl.No	Name of the item	Quantity
1	Leather Hand Gloves 14 "	17 Pairs
2	Cotton hand gloves 8 "	17 pairs
3	Leather hand sleeves 16 "	17 pairs
4	Leg guards leather	17 pairs
5	Leather Apron	17 Nos
6	Gas welding Goggles with filter glass3A or 4A DIN	17 Nos
7	Wire brush (M.S & SS) 5 rows and 3 rows	17 Nos each
8	Spark lighter	6 Nos
9	Safety boots for welders	17 pairs
10	Safety goggles with plain glass	17 Nos
11	AG 4 Grinding wheels	10 nos
12	Welding rubber hose, oxygen and acetylene 8 mm dia. As per BIS	30 mtr each
13	Rubber hose clips ½ "	20 nos
14	Arc welding filter glasses (108 mm x 82 mm x 3 mm) DIN 9A 11 A & 13 A	16each
15	Plain glasses for helmets (108 mm x 82 mm x 3 mm)	32 nos
16	Ordinary Wooden Mallet 50 mm	17 Nos

**Trainees tools kit:**

Sl.No	Name of the item	Quantity
1	Welding helmet fibre	17 Nos
2	Welding hand shield fibre	17 Nos
3	Chipping Hammer with metal handle 250 grams	17 Nos
4	Chisel cold flat 19 mmx 150 mm	17 Nos
5	Centre punch 9mm x 127 mm	17 Nos
6	Dividers 200 mm	17 Nos
7	Stainless steel Rule 300 mm	17 Nos
8	Scriber 150 mm	17 Nos
9	Tongs flat 300 mm	17 Nos
10	Hacksaw frame adjustable / fixed 30 cm	17 nos
11	File half round bastard 30 cm	17 nos
12	File flat 35 cm rough/bastard	17 nos
13	Hammer ball peen 1 Kg with handle	17 nos
14	Try square 150 mm	17 nos
15	Protractor with blade 150 mm	17 nos
16	Steel Tape 2 meters	17 nos

**General shop outfit:**

<b>S.No.</b>	<b>Description of tools</b>	<b>Quantity</b>
1.	Steel Square 450mm x 600 mm x 50 mm thick	4 Nos.
2.	Sheet Metal Gauge	2Nos.
3.	Stake Round and Bottom	4 Nos.
4.	Tinmans 300 mm	8 Nos.
5.	Snips straight 250 mm	8 Nos.
6.	Right cut snips 250 mm	4 Nos.
7.	Left cut Snips 250 mm	4 Nos.
8.	Hand Shear Universal 250 mm	4 Nos.
9.	Punch Round 3 mm dia	4 Nos
10.	Rivet set and snap and dolly combined 3 mm ,4 mm, 6mm	4 Nos each
11.	Chisel cold flat 25 mm x 250 mm	4 Nos
12.	Punch Letter 4mm	1 set
13.	Punch Number 4 mm	1 set
14.	Hand Groover 3 mm, 4mm, 5mm	4 Nos. each
15.	Plier Combination 150 mm	2 Nos
16.	Grip Wrench 200mm	2 Nos
17.	H.S.S. Twist Drill 3 mm, 4mm & 6 mm (Parallel Shank)	3 Nos each
18.	Hand Drill 0 to 6 mm, 8mm, 10mm & 12mm	2 Nos. each
19.	Pneumatic rivet gun	2 Nos.
20.	Trammel Point ( with beam 600 mm)	1 No.
21.	Vernier caliper ( 0mm -150mm)	1 No.
22.	Micrometer outside (0 to 25mm)	1 No.
23.	Raspcut file 250 mm	4 Nos.
24.	D.E.Spanner G.P(6mmto32mm)(Setof12spanner)	2set
25.	Hand vice 50mm	16 Nos.
26.	Raising Hammer with handle	4 Nos
27.	Rawl Punch holder and bits ( No.8,10, 12,14)	2 sets
28.	Hollowing Hammer with handle	4 Nos
29.	Tripaning tool 70mm	1 No.
30.	Crow bar 910 x 25mm	2Nos.
31.	Trowel Medium	1 No.
32.	Crow bar 910 x 25mm	2Nos.
33.	Trowel Medium	1 No.
34.	Pop rivet gun	2 Nos.
35.	Screw Driver 250mm	2 Nos.
36.	"C' Clamp 6 "	6 Nos
37.	Bench lever shears 250mm Blade x 3 mm Capacity	1 No.
38.	Air Compressor ( Pressure and displacement of air)	1 No.
39.	Circle Cutting Machine 300 mm Dia	1 No
40.	Pillar type drilling machine 12mm	1 No.

41.	Slip roll former 1.6mm x 1000 mm	1 No.
42.	D.E. Grinder Pedestal motorized 200 mm	1 No.
43.	Anvil 50 Kgs with Stand	1 No.
44.	Bench vice 120mm, 150mm	2 each
45.	Fly press Ball press No.4 single body	1 No.
46.	Pipe Bending Machine ( Hydraulic type) 12mm to 30mm	1 No.
47.	Hand Press Brake Capacity ( 0.8mm)	1 No.
48.	Tin smiths bench folder 600 x 1.6mm	1 No.
49.	Pipe bend machine Manual with Dies	1 No
50.	Plate bending machine (Roller type) capacity upto 8 mm thickness	1 No
51.	Pneumatic Screw Driver with 6 mm, 8mm, 10mm, 16 mm &	1 No
52.	Pneumatic Rivetting machine to depth of 50 mm	1 No
53.	Pneumatic Drilling machine with bits 4,5,6,8 & 12 mm capacity	1 No
54.	Pneumatic Chips 50mm	1 No
55.	Pentagrap machine for marking 1 mt	1 No
56.	Vernier Height gauge range 500 mm	1 No
57.	Surface plate with cover 100cm x 100 cm	1 No
58.	Plums	4 Nos.
59.	Hydraulic Jack 250 mm Capacity 1ton	2 Nos.
60.	Air compressor capacity 10 bar	1 No.
61.	Earth clamps 400A	6
62.	Pipe Cutting machine	1
63.	Oxy Acetylene Gas Welding Torch (H.P) with 5 nozzles	2 sets
64.	Oxy-Acetylene gas cutting torch with cutting nozzle 0.8 mm and 1.2 mm and	2 set
65.	Electrode holder 400 amps	6
66.	Spindle key	2
67.	Pressure regulator oxygen double stage	2
68.	Pressure regulator acetylene double stage	2
69.	Tip cleaner	2
70.	Outfit spanner for Oxy Acetylene	2
71.	Metal Rack (182 cmx152 cmx45 cm)	1 no
72.	Trainees locker (with 8 pigeon holes)	3 nos
73.	Storage shelf/Steel Almirah	2 no
74.	Chalk board	1 no
75.	Flash back arrester (torch mounted)	2 pairs
76.	Flash back arrester (cylinder mounted)	2 pairs
77.	Fire fighting equipment	As required
78.	First aid box	1 no

### List of General Installation

Sl	Description of Tools	Quantity
1.	Welding Transformer with all accessories ( 400A , OCV 60 – 100 V, 60% duty cycle)	2 sets
2.	Welding Transformer or Invertors with all accessories ( 300A , OCV 60 – 100 V, 60% duty cycle)	2 sets
3.	D.C .Arc welding rectifiers set with all accessories (400A,OCV 60-100V,60% duty cycle)	1 set
4.	Spot Welding Machine	1 No.
5.	Welding cables to carry 400 A with flexible rubber as per BIS	30 mtr
6.	Lugs for Cables	20 nos
7.	Trolley for cylinders	2 nos
8.	Suitable Gas welding table	2
9.	Arc welding table/post all metal with positioner	5
10.	Hand shearing machine capacity to cut 6 mm on sheet and flat	1
11.	Power hacksaw	1
12.	Angle Grinder AG4	2
13.	Electrode drying oven Temp. range 0-250°C, 10Kg cap.	1
14.	Dye penetrant Testing kit	2 set
15.	Power shearing machine cutting capacity 4 mm on S.S	1
16.	Work bench approx. size 340x120x75 cm with 4 bench vices of 150 mm jaw	4
17.	Anvil 12 square inch working area	1
18.	Portable abrasive cut-off machine	1No
19.	Oxygen and D.A cylinders (may be hired)	2 each
20.	Pantograph 600mm with 30 adjustments	1No

### Class Room Furniture For Trade Theory

Sl. No	Names & Description Of Furniture	Quantity
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 Configuration Pre Loaded With O.S And Ms Office Package.	1
5	LCD Projector With Screen.	1

## LIST OF TRADE COMMITTEE MEMBERS

Sl. No	Names & Designation	Organisation	Remarks
<b>Members of Sector Mentor council</b>			
1	Dr.G.Buvashekar	AGM, WRI, Trichy - Chairman	Chairman
2	Dr.K.Ashokkumar	AGM, BHEL, Trichy	Member
3	Prof. Jyothi Mukhopadhy	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.Khataokar	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 PC	ITI Chalakudi, Kerala	Member