

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

WELDER (GMAW & GTAW)

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 (GMAW & GTAW)**
- 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 8th 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 specializing in gas shielded welding processes. In order to increase productivity & quality, GMAW & GTAW process are being employed in large scale in fabrication and manufacturing sectors.
- This course is renamed & restructured as WELDER (GMAW & GTAW) from the existing COE Fabrication sector as follows.
 - First year BBBT - Basic welding (2months) module is converted in to CTS first semester WELDER (GMAW & GTAW) course.
 - Second year Advanced module TIG / MIG WELDING is converted in to CTS Second semester WELDER (GMAW & GTAW) 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. Setup GTAW plant and weld M.S, S.S and Aluminium sheets in all positions
6. Welding of Tubes by GTAW process
7. Setup and Weld Lap, "T", corner and butt joint on M.S, S.S and Aluminium by GMAW process
8. Welding by FCAW 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 organisation
7. In public sector industries like BHEL, BEML, NTPC, etc and private industries in India and 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,
 - 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"> - Induction training: - Familiarisation with the Institute. - Importance of trade Training - Machinery used in the trade. - Introduction to safety equipment and their use etc. - Hack sawing, filing square to dimensions. - Marking out on MS plate and punching . | <ul style="list-style-type: none"> - General discipline in the Institute - Elementary First Aid. - Importance of Welding in Industry - Safety precautions in Shielded Metal Arc Welding, and Oxy-Acetylene Welding and Cutting. |
| 2 | <ul style="list-style-type: none"> - Setting up of Arc welding machine & accessories and Striking an arc - Setting of oxy-acetylene welding equipment, Lighting and setting of flame. | <ul style="list-style-type: none"> - Introduction and definition of welding. - Arc and Gas Welding Equipments, tools and accessories . - Various Welding Processes and its applications . - Arc and Gas Welding terms and definitions. |
| 3 | <ul style="list-style-type: none"> OAW-01 - Fusion run without and with filler rod on M.S. sheet 2 mm thick in flat position. OAW-02 - Edge joint on MS sheet 2 mm thick in flat position with out filler rod. OAGC-01 - Marking and straight line cutting of MS plate. 10 mm thick by gas. | <ul style="list-style-type: none"> - Different process of metal joining methods: Bolting, riveting, soldering, brazing, seaming etc. - Types of welding joints and its applications. Edge preparation and fit up for different thickness. - Surface Cleaning |
| 4 | <ul style="list-style-type: none"> SMAW-01 - Straight line beads on M.S. plate 10 mm thick in flat position. SMAW-02 - Weaved bead on M. S plate 10mm thick in flat position. | <ul style="list-style-type: none"> - Basic electricity applicable to arc welding and related electrical terms & definitions. - Heat and temperature and its terms related to welding - Principle of arc welding. And characteristics of arc . |
| 5 | <ul style="list-style-type: none"> OAW-03 - Square butt joint on M.S. sheet 2 mm thick in flat Position . SMAW-03 - Fillet "T" joint on M.S. Plate 10 mm thick in flat position. | <ul style="list-style-type: none"> - Common gases used for welding & cutting, flame temperatures and uses. - Chemistry of oxy-acetylene flame. - Types of oxy-acetylene flames and uses. - Oxy-Acetylene Cutting Equipment principle, parameters and application. |
| 6 | <ul style="list-style-type: none"> OAGC-02 - Beveling of MS plates 10 mm thick. By gas cutting. OAW-04 - Open corner joint on MS sheet 2 mm thick in flat Position SMAW-04 - Fillet lap joint on M.S. plate 10 mm thick in flat position. | <ul style="list-style-type: none"> - 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 |
| 7 | <ul style="list-style-type: none"> OAGC-03 - Circular gas cutting on MS plate 10 mm thick by profile cutting machine. OAW-05 - Fillet "T" joint on MS sheet 2 mm thick in flat position SMAW-05 - Open Corner joint on MS plate 10 mm thick in flat position. | <ul style="list-style-type: none"> - Welding positions as per EN &ASME : flat, horizontal, vertical and over head position. - Weld slope and rotation. - Welding symbols as per BIS & AWS. |

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

| | | | |
|----|-------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| | 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 | Industrial Training / Project Work | | |
| 24 | Industrial Training / Project Work | | |
| 25 | Revision | | |
| 26 | Examination | | |

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"> - Familiarisation with the machinery used in the trade - Introduction to safety equipment and their use etc. - Setting up of GMAW/GTAW welding machine & accessories | <ul style="list-style-type: none"> - Outline of the subjects to be covered - Safety precautions pertaining to GTAW & GMAW. |
| 2 | GMAW -1 GMAW -2 | <ul style="list-style-type: none"> - Straight line beads on MS plate by GMAW welding - Lap joint on MS plate by GMAW welding in down hand position | <ul style="list-style-type: none"> - Introduction to GMAW – equipment – accessories. - Various names of the process.(MIG-MAG/ CO2 WELDING, FCAW). - Advantages& Limitations |
| 3 | GMAW -3 GMAW -4 | <ul style="list-style-type: none"> - Open corner joint on MS plate in down hand position - “T” joint on MS sheet in flat position | <ul style="list-style-type: none"> - Power source & accessories Wire Feed unit - Types of shielding gases & advantages |
| 4 | GMAW -5 GMAW -6 GMAW -7 | <ul style="list-style-type: none"> - “T” joint on MS sheet in horizontal position - “T” joint on MS sheet in vertical position - “T” joint on MS sheet in overhead position | <ul style="list-style-type: none"> - Welding Gun & its parts - Modes of metal transfer - Dip, Globular, spray &pulsed transfer and its significance |
| 5 | GMAW -8 GMAW -9 | <ul style="list-style-type: none"> - Single "V' butt joint by C02 welding in down hand position - Single "V' butt joint by Argo shield welding in flat position (Gas: Argon and Co2 mixture) | <ul style="list-style-type: none"> - Flux cored arc welding - Welding wire types and specification |
| 6 | GMAW -10 GMAW -11 | <ul style="list-style-type: none"> - Straight line beads on MS plate by Flux cored Arc welding (FCAW) - Single "V' joint by Flux cored Arc welding | <ul style="list-style-type: none"> - Trouble shooting in MIG welding - Data and Tables related to CO2 welding |
| 7 | GMAW -12 GMAW -13 | <ul style="list-style-type: none"> - Straight line beads on S.S plate by GMAW welding - Lap &Square butt and T joint on S.S sheet. | <ul style="list-style-type: none"> - Reading of Welding procedure specifications (WPS) - Reading of Procedure qualification Record (PQR) |
| 8 | GMAW -14 GMAW -15 | <ul style="list-style-type: none"> - Straight line beads on Aluminium plate by GMAW welding - Single "V'and fillet joint on Aluminium plate. | <ul style="list-style-type: none"> - Types of weld defects, causes and remedy in GMAW process |

| | | | |
|----|----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 9 | GTAW -01 GTAW -02 | <ul style="list-style-type: none"> - Setting up GTAW welding plant and establishing the arc.. - Beading practice on MS sheet by GTAW - Square butt joint on MS in down hand position | <ul style="list-style-type: none"> - Introduction to GTAW welding - Various names of the process.(TIG, Argonarc welding). - Equipments & accessories - Advantages & Limitations |
| 10 | GTAW -03 GTAW -04 | <ul style="list-style-type: none"> - Open corner joint on MS sheet in down hand position - Lap joint on MS sheet in down hand position | <ul style="list-style-type: none"> - Power source - Types, polarity and application - Accessories - HF unit and DC suppressor. |
| 11 | GTAW -05 GTAW -06 | <ul style="list-style-type: none"> - Tee joint on MS sheet in down hand position - Lap joint on MS sheet in Horizontal position | <ul style="list-style-type: none"> - Tungsten electrode, Types, sizes, and uses. coding as per BIS & AWS - Type of shielding gases- Types & properties |
| 12 | GTAW -07 GTAW -08 | <ul style="list-style-type: none"> - Square butt joint on MS sheet in Horizontal position - Square butt joint on MS sheet in Vertical position | <ul style="list-style-type: none"> - GTAW Welding consumables - Types & Specifications as per BIS & AWS |
| 13 | GTAW -09 GTAW -10 | <ul style="list-style-type: none"> - Lap & Tee joint on MS sheet in Vertical position - Square butt joint on MS sheet in overhead position | <ul style="list-style-type: none"> - Tables & data relating to TIG welding. - Different type of weld joints- plates & pipes |
| 14 | GTAW -11 GTAW -12 GTAW -13 | <ul style="list-style-type: none"> - Beading practice on SS sheet - Square butt joint on SS sheet by TIG in flat position - Open corner joint on SS sheet by TIG in flat position | <ul style="list-style-type: none"> - Edge preparation of plates & pipes - Fitting of joint plates for TIG Welding |
| 15 | GTAW -14 GTAW -15 | <ul style="list-style-type: none"> - Square butt joint on SS sheet in Vertical position - Lap joint on SS sheet in vertical position | <ul style="list-style-type: none"> - Square wave concept and Wave balancing. - Advantages of root pass welding of pipes by TIG welding |
| 16 | GTAW -16 GTAW -17 | <ul style="list-style-type: none"> - Tee joint on SS sheet in Vertical position - Square butt joint welding of SS sheet with back purging Technique. | <ul style="list-style-type: none"> - Types of weld defects, causes and remedy in GTAW process |
| 17 | GTAW -18 GTAW -19 GTAW -20 | <ul style="list-style-type: none"> - Beading practice on Aluminium sheet by GTAW - Square butt joint on Aluminium sheet by GTAW in flat position - Open corner joint on Aluminium sheet in flat position | <ul style="list-style-type: none"> - Purging : Importance, Method of giving |
| 18 | GTAW -21 GTAW -22 | <ul style="list-style-type: none"> - Square butt joint on Aluminium sheet in Vertical position - Single V butt joint on Aluminum sheet by TIG | <ul style="list-style-type: none"> - Basic welding metallurgy - Weldability of metals |
| 19 | GTAW -23 | <ul style="list-style-type: none"> - Square butt joint on Tube welding practice on M.S. & S.S tube metals in | <ul style="list-style-type: none"> - Preheating and Post heating - Distortion and methods of control |

| | | | |
|----|-------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | | rolled position. | |
| 20 | GTAW -23 | - Square butt joint on Tube welding practice on Aluminium in rolled position. | - Submerged Arc welding - Principles, application-Types of fluxes, welding head, power source and Parameter setting |
| 21 | PAC-1 I&T -1 I&T -2 | - Plasma cutting of SS sheets & Aluminum plates - Dimensional inspection of weldments - Weld test specimen preparation - Visual inspection of weldments - | - Micro plasma welding principles, Equipment, power source, parameter settings, Advantages & limitations - Plasma cutting principles and advantages |
| 22 | I&T -3 I&T -4 | - Dye penetrant - Magnetic particle testing | - Inspection & testing of weldments - Visual inspection methods - Inspection kits - universal gauge, Fillet gauge, etc. - Non-destructive Testing methods, PT, MPT, UT & RT - Destructive testing - Bend test & tensile test |
| 23 | Industrial training / Project work | | |
| 24 | Industrial training / Project work | | |
| 25 | Revision | | |
| 26 | Examination | | |

Abbreviations:

| | |
|------|----------------------------|
| GMAW | – Gas Metal Arc Welding |
| GTAW | – Gas Tungsten Arc Welding |
| FCAW | – Flux Cored Arc Welding |
| PAC | – Plasma Arc Cutting |
| I&T | – Inspection & Testing |

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

Tools & Equipments for a batch 16Trainees + one

Consumable kit

| 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

| SI. No. | Name and Description of Tools | Quantity |
|----------------|---------------------------------------------------------|-----------------|
| 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 nos |
| 21 | Universal Weld measuring gauge | 2 nos |
| 22 | Earth clamp 600A | 6 nos |
| 23 | Spanner D.E. 6 mm to 32mm | 2 sets |
| 24 | C-Clamps 10 cm and 15 cm | 2 each |
| 25 | Hammer sledge double faced 4 kg | 1 |
| 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 ₂ 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 | 01 set |
| 46 | Air compressor suitable for air plasma cutting system | 01 no |
| 47 | Auto Darkening Welding Helmet | 02 no |
| 48 | Portable abrasive cut-off machine | 1 No |
| 49 | Pug cutting machine Capable of cutting Straight & Circular with all accessories | 01 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 Nos |
| 53 | Suitable gas welding table with fire bricks | 2 Nos |
| 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 250°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 ₂ cylinder | 2 Nos * |
| 64 | Argon gas cylinder | 2 Nos * |
| 65 | Anvil 12 sq. inches working area with stand | 1 No. |
| 66 | Swage block | 1 No. |
| 67 | Die penetrant testing kit | 1 set |
| 68 | Magnetic particle testing Kit | 1 set |
| 69 | Fire extinguishers (foam type and CO ₂ type) | 1 |
| 70 | Fire buckets with stand | 4 nos |
| 71 | Suitable gas cutting table | 1 No. |
| 72 | 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

| 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 |
| 6 | Welding Process, Inspection & codes DVD/ CDs | 1 set each (optional) |

LIST OF TRADE COMMITTEE MEMBERS

| Sl. No | Names & Designation | Organisation | Remarks |
|-----------------------------------------|-------------------------|----------------------------------|-------------|
| Members of Sector Mentor council | | | |
| 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 |
| Mentor | | | |
| 1 | Shri. Deepankar Mallick | Director of Training, DGE&T Hq, | Mentor |
| Members of Core Group | | | |
| 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 | NIMI, Chennai | Member |
| 9 | Shri. Manjunatha B.S | JTO, GITI, K.G.F. Karnataka | Member |
| 10 | Shri. Venugopal PC | ITI Chalakudi, Kerala | Member |