

Syllabus

of

TRADE THEORY & TRADE PRACTICAL

For

WELDER

for CTS Trades

- (a) Welder, (b) Welder (Gas Tungsten Arc Welding/ Gas Metal Arc Welding),
(c) Welder (pipe), (d) Welder (Structural), (e) Welder (fabrication & fitting)
(f) Welder (Welding & inspection)

Under

CRAFT INSTRUCTORS TRAINING SCHEME (CITS)

Re-Designed in

- 2014 -

**Government of India
Ministry of Labour & Employment
Directorate General of Employment & Training**

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A. RATIONALE

Success & Sustainability of any Training System mainly depends upon availability of good quality instructors. An Instructor should possess good trade skills to impart skill training. To cope up this quality possession of trade skills is imperative.

Ability to understand and interpret the course content is essential to perform a job / task of Engineering Trades. It is the Skills, Knowledge and Attitude which enables comprehending the given job and subsequent planning to complete the task/job. Thus it is imperative for any trade instructor to have skill so that same can be transferred.

For an instructor it is essential to have in depth knowledge set which enables analyzing the given job and subsequent detail planning. To transfer skill the practical know how is most important criteria as in ITI system skill is the ultimate requirement. To perform a task/job both theoretical and practical knowledge are very much needed. Thus Trade Technology is regarded as basic/hard skills which are base of all skill based training.

Recognizing this importance maximum weightage has been given to the Trade Technology in all Engineering Trades in Craft Instructors Training Scheme (CITS) under NCVT.

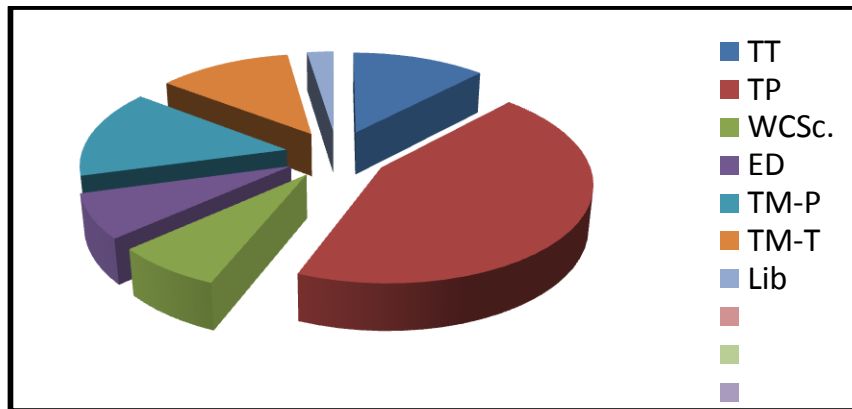
B. GENERAL INFORMATION

1. Name of the Course : CITS (Welder)
2. Duration of Instructor Training : 1 Year (Two semesters each of six months duration).
3. Subjects covered in the Semesters : Detailed in Section - C
4. Name of the Subject : **TRADE THEORY –I & II and TRADE PRACTICAL-I & II**
5. Applicability : ALL WELDER TRADES {Welder, Welder (GMAW & GTAW),Welder (Pipe), Welder (Structural),Welder (Fabrication & Fitting) and Welder (Welding & Inspection)}
6. Examination : AITT to be held at the end of each semester.
7. Space Norms :
 - (a) One class room of minimum 30 sq. meter. area having Minimum width of 5 m. and with 6000
 - (b) Workshop : 120 sq. meter having minimum Width of 8 m. and with 30000 lumen**The electrical equipments of Class room should conform to minimum 3 star Building energy rating as per Bureau of Energy Efficiency (B.E.E.)**
8. Power Norms :
 - (a) 1 KW for Class room
 - (b) 20 KW for Workshop.
9. Unit strength(Batch Size) : 20
10. Entry qualification : Diploma/Degree in Mechanical/Production/ Metallurgy / Mechatronics Engineering from AICTE recognized Board / University.
OR
National Trade Certificate in the relevant trade OR
National Apprenticeship Certificate in the relevant trade

C. SEMESTER WISE ALLOTMENT OF TIME & MARKS AMONG THE SUBJECTS FOR CITs

	SUBJECTS	Hrs. / Week	% of time allotted	Marks	Sessional	Full Marks	Pass Marks		
							Exam.	Sessional	Total
First semester	Trade Practical – 1	20	50	200	30	230	120	18	138
	Trade Theory - 1	6	15	100	20	120	60	12	72
	Workshop Cal. & Sc.	6	15	50	-	50	30	-	30
	Engineering Drawing	6	15	100	-	100	60	-	60
	Library	2	5	-	-				
	TOTAL for Sem. - I	40		450	50	500	270	30	300
Second semester	Trade Practical – 2	16	40	200	30	230	120	18	138
	Trade Theory - 2	4	10	100	20	120	60	12	72
	Training Methodology - Practical	12	30	200	30	230	120	18	138
	Training Methodology - Theory + IT	6+2	20	100	20	120	60	12	72
	TOTAL	40		600	100	700	360	60	420
	GRAND TOTAL	80		1050	150	1200	630	90	720

Hourly Distribution TOTAL: 1200 marks for 2 semesters Pass marks: 720



Subject	Time in %	Marks in %
Trade Practical	45	38.3
Trade Theory	12.5	20
1) Total for Trade	57.5	58.3
Training Methodology (Practical)	15	19.2
Training Methodology (Theory) + IT	10	10
2) Total for Training Methodology & IT	25	29.2
3) Engineering Drawing	7.5	8.3
4) Workshop Cal. & Sc.	7.5	4.2
5) Library	2.5	-
TOTAL of 1 - 5	100	100

D. Details of Syllabus

Syllabus for Trade Practical and Trade Theory(CITS)

SEMESTER - I

WEEK No	Trade Practical	Trade Theory
1	<ul style="list-style-type: none"> - Familiarisation with the Institute. - Machinery used in the trade. - Introduction to safety equipment and their use etc. 	<ul style="list-style-type: none"> - Importance of Welding in Industry - Course objectives - Safety precautions in Shielded Metal Arc Welding (SMAW), Oxy Acetylene Welding (OAW) and Oxy Acetylene Gas Cutting (OAGC) - Fire and firefighting equipments.
2	<ul style="list-style-type: none"> - Oxy-Acetylene gas cutting (manual) straight, bevel and circular cutting on Mild steel plate. (10 mm. thick). - Weld joint preparation for fillet weld (Cutting to size, fit up, tack weld etc.) 	<ul style="list-style-type: none"> - Introduction of Arc, Gas and other welding process and their applications. - Oxy-Acetylene gas cutting of metals-cut ability, cutting parameters and faults in cutting
3	<ul style="list-style-type: none"> - Lap, Tee and Corner joints on M.S. plate (10 mm. thick plate) in flat position by SMAW. - Single 'V' butt joint on M.S. (10 mm. thick plate) in flat position by SMAW 	<ul style="list-style-type: none"> - Basic electricity applicable to arc welding, - Heat and temperature and its terms related to welding - Principle of arc welding and characteristics of arc. - Types of weld joints. Edge preparation.
4	<ul style="list-style-type: none"> - Lap, Tee and Corner joints on M.S. plate (10 mm. thick plate) in horizontal position by SMAW. - Single 'V' butt joint on M.S. (10 mm. thick plate) in horizontal position by SMAW 	<ul style="list-style-type: none"> - Arc welding power sources- AC welding Transformer –DC welding Motor generator set –Welding Rectifier and inverter type welding machines. - Advantages and disadvantages of A.C. and D.C. welding machines.
5	<ul style="list-style-type: none"> - Lap, Tee and Corner joints on M.S. plate (10 mm. thick plate) in vertical position by SMAW. - Single 'V' butt joint on M.S. (10 mm. thick plate) in Vertical position by SMAW. 	<ul style="list-style-type: none"> - Arc length – types – effects of arc length. - Welding position – slope and rotation as per ASME and EURO standard. - Polarity: Types and applications.
6	<ul style="list-style-type: none"> - Lap, Tee and Corner joints on M.S. plate (10 mm. thick plate) in Overhead 	<ul style="list-style-type: none"> - Arc blow and methods to control arc blow. - Weld stresses, Distortion and methods of

	<p>position by SMAW.</p> <ul style="list-style-type: none"> - Single 'V' butt joint on M.S. (10 mm. thick plate) in overhead position by SMAW 	<p>control.</p> <ul style="list-style-type: none"> - Arc Welding defects, causes and Remedies.
7	<ul style="list-style-type: none"> - Square butt joint on M.S Sheet (2 mm. thick sheet) in flat position by OAW - Lap & Tee joint on M.S. Sheet (2 mm. thick sheet) in flat position by OAW. 	<ul style="list-style-type: none"> - Common gases used for welding & cutting. - Chemistry of Oxy-Acetylene flame. Types of Oxy-Acetylene flame and applications
8	<ul style="list-style-type: none"> - Square butt joint on M.S Sheet (2 mm. thick sheet) in Horizontal position by OAW - Lap & Tee joint on M.S. Sheet (2 mm. thick sheet) in Horizontal position by OAW. 	<ul style="list-style-type: none"> - Production of calcium carbide. Acetylene gas properties, manufacturing methods Acetylene gas Purifier, Hydraulic back pressure valve and Flash back arrestor.
9	<ul style="list-style-type: none"> - Square butt joint on M.S Sheet (2 mm. thick sheet) in Vertical position by OAW - Lap & Tee joint on M.S. Sheet (2 mm. thick sheet) in Vertical position by OAW. 	<ul style="list-style-type: none"> - Oxygen – properties – manufacturing methods. Oxygen and Acetylene gas cylinders-charging methods-Colour coding for different gas cylinders, safe handling and storage - Gas pressure regulator, Gas welding and cutting blow pipe.
10	<ul style="list-style-type: none"> - Square But, Lap and Tee joints on M.S. Sheet 1.6 mm thick by brazing. 	<ul style="list-style-type: none"> - Gas welding techniques. Rightward and Leftward techniques. - Gas welding filler rods, specifications and sizes. - Gas welding fluxes – types and functions. - Gas welding defects, causes and remedies.
11	<ul style="list-style-type: none"> - Square butt joint on Aluminium Sheet (3 mm. thick) in flat position by OAW. - Square butt joint on copper Sheet (2 mm thick) in flat position by OAW 	<ul style="list-style-type: none"> - Classification of steel. - Welding of low, medium and high carbon steel and alloy steels - Aluminium- properties and weldability, welding methods. - Copper – types- properties and welding methods.
12	<ul style="list-style-type: none"> - Square butt joint on Brass Sheet (2 thick sheet) in flat position by OAW. - Square butt joint on Stainless steel (2 mm. thick sheet) in flat position by OAW - Pipe butt joint on M.S. pipe outer dia. 50 mm x 3 mm. wall thickness in down hand position by OAW 	<ul style="list-style-type: none"> - Brass – types – properties and welding methods. - Stainless steel - types- weld decay and weldability

13	<ul style="list-style-type: none"> - Pipe elbow and “T” joint on M.S. pipe outer dia. 50 mm x 3 mm wall thickness in down hand position by OAW - Pipe welding 45 ° angle joint on MS pipe Ø 50 and 3mm WT by OAW 	<ul style="list-style-type: none"> - Development drawings for pipe Elbow joint. - Development drawings for pipe ’T’ Joint. - Development drawings for pipe Branch ‘Y’ Joints.
14	<ul style="list-style-type: none"> - Square Butt joint on S.S. Sheet 3 mm thick in flat position by SMAW. - Repairing welds by Arc gouging and re-welding by SMAW - Single ‘V’ butt joint on cast iron (6 mm. thick) in flat position by SMAW 	<ul style="list-style-type: none"> - Electrode – types – functions of flux, types of flux, coating factor, sizes of electrode. - Coding of electrode as per IS and AWS. Criteria for selection of electrode. - Effects of moisture pickup and backing of Electrodes.
15	<ul style="list-style-type: none"> - Hard surfacing practice on M.S. round rod Ø 25 mm by using Hard facing electrode. - Silver brazing on S.S Sheet with copper sheet “T” joint. - Silver brazing on copper tube to tube - Bronze welding of cast iron (6mm. thick) in flat position By OAW 	<ul style="list-style-type: none"> - Brazing-principles, types of brazing, applications, filler rods and fluxes, necessity of cleaning, brazing parameters, brazing techniques and cleaning.
16	<ul style="list-style-type: none"> - Pipe butt joint on M.S. pipe outer dia. 50 mm x 3 mm. wall thickness in down hand position by SMAW - Pipe elbow & ‘T’ joint on M.S. pipe outer dia. 50 mm x 3 mm. wall thickness in down hand position by SMAW 	<ul style="list-style-type: none"> - Introduction to pipe welding - Difference between plate and pipe welding. - Types of pipes and pipe schedule - Preparation work before welding
17	<ul style="list-style-type: none"> - Pipe welding 45 ° angle joint on MS pipe Ø 50 and 3mm WT. by SMAW - Single “V” butt joint on M.S pipe in (schedule 40) in 1G position by SMAW - Inspection and clearance using LPI testing during Root pass and cover pass 	<ul style="list-style-type: none"> - Basic pipe welding procedure - uphill welding, downhill welding and horizontal welding - Pipe welding position 1G, 2G, 5G & 6G
18	<ul style="list-style-type: none"> - Single “V” butt joint on M.S pipe (schedule 60) in 2G position by SMAW - Inspection and clearance using LPI testing during Root pass and cover pass 	<ul style="list-style-type: none"> - Procedure for welding heavy wall pipes in 5G & 6G position welding

19	<ul style="list-style-type: none"> - Welding of pipes (schedule 80) in 5G position by SMAW - Inspection and clearance using LPI testing during Root pass and cover pass 	<ul style="list-style-type: none"> - Importance of pre heating, post heating and maintenance of inter pass temperature. - Use of temperature indicating crayons
20	<ul style="list-style-type: none"> - Welding of pipes (schedule 80) in 6G position by SMAW Inspection and clearance using LPI testing during Root pass and cover pass 	<ul style="list-style-type: none"> - Welding symbols as per BIS & AWS. - Reading of assembly drawings
21	<ul style="list-style-type: none"> - Fusion welding Single 'V' butt joint on cast iron (6 mm. thick) in flat position by OAW - Bronze welding Single 'V' butt joint on cast iron (6 mm. thick) in flat position by OAW 	<ul style="list-style-type: none"> - Cast iron –types- properties and uses. - Welding methods of cast iron.
22	<ul style="list-style-type: none"> - Weld joint preparation for pipe fillet welding - Pipe to pipe fillet weld on MS pipes by SMAW, position - Study of Welding drawings - Study of welding codes & standards 	<ul style="list-style-type: none"> - Requirement for qualification in different codes - Qualification procedure under various codes - Different tests and inspection involved in qualification - Pressure welding codes and standards (IBR, ASME etc.) - Writing procedure for WPS and PQR
23	Industrial visit and project work	
24	Industrial visit and project work	
25	Revision and mock test	
26	Examination	

D. Details of Syllabus
Syllabus for Trade Practical and Trade Theory (CITS)
SEMESTER - II

Sl. 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 	<ul style="list-style-type: none"> - Outline of the subjects to be Covered - Safety precautions pertaining to GTAW & GMAW.
2	<ul style="list-style-type: none"> - Setting up of GMAW welding machine & accessories - Lap, Tee and Corner joints on M.S. plate (10 mm. thick plate) in flat position by GMAW. - Single 'V' butt joint on M.S. (10 mm. thick plate) in flat position by GMAW 	<ul style="list-style-type: none"> - Introduction to CO2 welding – equipment – accessories. - Description of CO2 welding set with diagram - Constant Voltage Power source for CO2 welding –working principle - Advantages & Limitations of GMAW over other welding processes
3	<ul style="list-style-type: none"> - Lap, Tee and Corner joints on M.S. sheet (3 mm. thick plate) in Horizontal position by GMAW. - Single 'V' butt joint on M.S. (10 mm. thick plate) in Horizontal position by GMAW 	<ul style="list-style-type: none"> - Power source & accessories - Wire feed units – types – applications, limitations care and maintenance.
4	<ul style="list-style-type: none"> - Lap, Tee and Corner joints on M.S. plate (sheet 6 mm. thick plate) in Vertical downward progression by GMAW. - Single 'V' butt joint on M.S. (10 mm. thick plate) in Vertical position by GMAW. 	<ul style="list-style-type: none"> - Welding Gun-types, description of parts functions and maintenance. - Modes of metal transfer – Dip or Short circuiting transfer, Spray transfer (free flight transfer) and Globular transfer (intermittent transfer) and applications. - Welding parameters for GMAW M.S and Alloy steels-related Tables / data
5	<ul style="list-style-type: none"> - Tee joint on M.S plate 10 mm thick plate by Vertical upward progression - Lap, Tee and Corner joints on M.S. plate (10 mm. thick plate) in Overhead position by GMAW. - Single 'V' butt joint on M.S. (10 mm. thick plate) in Over head position by GMAW 	<ul style="list-style-type: none"> - Welding wires used in CO2 welding – diameter – specification as per AWS and applications. - Shielding gases & Gas mixtures, and its applications in GMAW - Edge preparation and fit up of various thicknesses of metals for GMAW. - Types of weld defects, causes and remedy in GMAW process
6	<ul style="list-style-type: none"> - Single "V" joint by Flux cored Arc welding (on 12 mm thick plate) - Lap & Square butt and T joint on S.S 	<ul style="list-style-type: none"> - Flux cored arc welding – description, advantage - Welding wire for Flux cored Arc Welding,

	sheet. 2 mm thick by GMAW	types coding as per AWS and specification - Trouble shooting in MIG welding
7	- Single "V" and fillet Tee joint on Aluminium plate (thickness 6 mm) by GMAW	- Introduction to GTAW (TIG welding) equipment – advantages over SMAW and oxy-acetylene welding. GTAW : Power sources - high frequency unit, D.C. suppressor unit and uses.
8	- Tee Joints on MS Pipe Ø 60 mm OD x 3 mm WT in flat position – Arc constant (Rolling) by GMAW	- Effect of polarity in DC TIG Welding and application of straight and reversed polarity. - GTAW torches, types, parts and functions - Edge preparation and fit up for TIG welding sheets, plates and pipes
9	- Setting up of GTAW welding machine & accessories - Lap, Tee and Corner joint on MS sheet in down hand position by GTAW - Square butt joint on MS in down hand position by GTAW	Welding parameters and Tables & data relating to TIG welding. - Tungsten electrode, Types, sizes, and uses. coding as per AWS
10	- Lap, Tee and Corner joint on MS sheet 1.6 mm in Vertical position by GTAW - Square butt joint on MS sheet 2 mm in Vertical position by GTAW	- Filler metals for GTAW Types & Specifications as per BIS & AWS and applications - Argon / Helium gas properties and application.
11	- Square butt joint on Aluminium sheet 3 mm thick in Flat position by GTAW - Lap, "T" and Corner joint on Aluminium sheet 2 mm thick in down hand position by GTAW	- Pulsed TIG welding and application - Different type of weld joints- plates & pipes
12	- Square butt joint on Aluminium sheet 2 mm thick in Horizontal & vertical positions by GTAW - Lap, Tee and Corner joint on Aluminium sheet 2 mm thick in down Horizontal & vertical positions by GTAW	- Advantages of root pass welding of pipes by TIG welding - Square wave concept and Wave balancing. -
13	- Square butt joint on S.S sheet 1.6 mm thick in Flat position by GTAW - Lap, Tee and Corner joint on S.S sheet 1.6 mm thick in Flat position by GTAW	- Types of weld defects, causes and remedy in GTAW process - Purging : Importance, Method of purging
14	- Square butt joint on S.S sheet 1.6 mm thick in Vertical position by GTAW - Lap, Tee and Corner joint on S.S sheet 1.6 mm thick in Vertical position by GTAW	- Submerged Arc welding - Principles, application-Types of fluxes, welding head, power source and Parameter setting

15	<ul style="list-style-type: none"> - Single V butt joint on Aluminum sheet 6 mm thick by GTAW in down hand position - Square butt joint on Tube welding on M.S. & S.S tube metals in rolled position by GTAW 	<ul style="list-style-type: none"> - Micro plasma welding principles, Equipment, power source, parameter settings, Advantages & limitations - Plasma cutting principles and advantages
16	<ul style="list-style-type: none"> - Root pass welding of M.S schedule 40 pipes by GTA Welding up to 6G positions 	<ul style="list-style-type: none"> - Friction welding process: principles, application, advantages, - Principles and applications of Friction Stir welding
17	<ul style="list-style-type: none"> - Plasma cutting of SS sheets & Aluminum plates - CNC profile cutting practice using air plasma torch 	<ul style="list-style-type: none"> - Principles and applications of Laser welding, Electron beam welding, Electro slag welding, Electro gas welding, Thermit welding etc. - Principles and application of Water jet cutting & laser cutting
18	<ul style="list-style-type: none"> - Lap joint on Stainless steel sheet by Resistance Spot welding - MS sheets joining by Resistance Spot welding - Practice on Seam welding machine 	<ul style="list-style-type: none"> - Resistance welding processes: Principles, application, advantages, Elements, Control parameters, Various types viz. Spot, seam projection , Flash butt etc,
19	<ul style="list-style-type: none"> - Practice on Automatic Submerged Arc Welding machine – butt joint - Robot Welding demonstration 	<ul style="list-style-type: none"> - Robot Welding - principles, applications and advantages. Programming concept. - Mechanical Testing of Metals. - Principles, Applications of - Hardness testing (Rockwell and Brinell) - Impact testing (Izod and Charpy) - Tensile testing and Bend Test
20	<ul style="list-style-type: none"> - Hardness Testing - Bend Testing of Weldments - Tensile testing - Impact Testing 	<ul style="list-style-type: none"> - Non destructive Testing of Metals. - Visual inspection - Dye penetrant test - Principles - Advantages - Limitations - Types of Penetrants - Cleaners - Dwelling time etc. - Magnetic Particle Test (MPT)- Principles - Advantages - Limitations - - Types of Magnetation - Current requirements - Testing equipments - Indication and Interpretations - Eddy current testing - Principles, advantages & limitations
21	<ul style="list-style-type: none"> - Dimensional inspection of weldments using weld gauge - Weld test specimen preparation - Visual inspection of weldments - Evaluation of welding defects using Dye 	<ul style="list-style-type: none"> - Ultrasonic Testing (UT)- Principles - Advantage – Limitations - Measuring Techniques - Standard reference blocks - Contact Testing procedure - Indications and interpretations

	<ul style="list-style-type: none"> penetrant - Evaluation of welding defects using and Magnetic Particle Testing - Evaluation of defects Eddy current testing 	<ul style="list-style-type: none"> - Radiographic testing (RT) - Principles - Advantages - Limitations - Basic Radiation Physics - X-Rays - Gama Rays - Radiographic Techniques - Radiographic Interpretation and Evaluation
22	<ul style="list-style-type: none"> - Ultrasonic Flaw detector- Setting & calibration - Ultrasonic Flaw detector- application on weldments - Study of IIW / ASTM reference Radiograph - Interpretation of Radiographic films - Preparation of welding inspection reports 	<ul style="list-style-type: none"> - Certification methods for welding inspectors - Codes and standards for welding inspection
23	Industrial visit and Project work	
24	Industrial visit and Project work	
25	Revision and Mock test	
26	Examination	

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

Consumables

SI. No.	Name of the items	Quantity
1	Leather Hand Gloves 14"	21 pairs .
2	Cotton hand Gloves 8"	21 pairs
3	Leather Apron leather	21 nos.
4	S.S Wire brush 5 rows and 3 rows	21 nos.each
5	Leather hand sleeves 16"	21 pairs
6	Safety boots for welders	21 pairs
7	Leg guards leather	21 pairs
8	Rubber hose clips 1/2"	21 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
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 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 with all accessories (300A , OCV 60 – 100 V, 60% duty cycle)	2 sets
42	Inverter based welding Power source (300A)	1 No
43	D.C Arc welding rectifiers set with all accessories (400 A. OCV 60 – 100 V, 60% duty cycle)	2 sets
44	GMAW welding machine 400A capacity with air cooled torch, Regulator, Gas preheater, Gas hose and Standard accessories	3 set
45	AC/DC GTAW welding machine with water cooled torch 300 A, Argon regulator, Gas hose, water circulating system and standard accessories.	3 set
46	Air Plasma cutting equipment with all accessories, capacity to cut 25 mm clear cut	1 set
47	Air compressor suitable for air plasma cutting system	1
48	Auto Darkening Welding Helmet	2

49	Spot welding machine to 15 KVA with all accessories	1 set
50	Portable gas cutting machine capable of cutting Straight & Circular with all accessories	1 set
51	Pedestal grinder fitted with coarse and medium grain size grinding wheels dia. 300 mm	1
52	Bench grinder fitted with fine grain size silicon carbide green grinding wheel dia. 150 mm	1
53	AG 4 Grinder	2
54	Suitable gas welding table with fire bricks	2
55	Suitable Arc welding table with positioner	14
56	Trolley for cylinder (H.P. Unit)	2
57	Hand shearing machine capacity to cut 6 mm sheets and flats	1
58	Power saw machine 18''	1
59	Portable drilling machine (Cap. 6 mm)	1
60	Oven, electrode drying 0 to 350°C, 10 kg capacity	1
61	Work bench 340x120x75 cm with 4 bench vices of 150 mm jaw opening	4 sets
62	Oxy Acetylene Gas cutting blow pipe	2 sets
63	Oxygen, Acetylene Cylinders	2 each
64	CO ₂ cylinder	3 Nos
65	Argon gas cylinder	3 Nos
66	Anvil 12 sq. inches working area with stand	1
67	Swage block	1
68	Die penetrant testing kit	5 set
69	Magnetic particle testing Machine Prode Type with all standard accessories	1 set
70	Fire extinguishers (foam type and CO ₂ type)	1
71	Fire buckets with stand	4
72	Portable abrasive cut-off machine	1
73	Suitable Gas cutting table	1
74	Welding Simulators for SMAW/GTAW/GMAW	1 each*
74	Seam welding Machine(longitudinal) 75 KVA with accessories	1*
75	Portable CNC profile cutting system with all standard accessories	1*
76	Ultrasonic flaw detector with accessories	1
77	Submerged arc welding machine with accessories (1000 amps)	1
78	Radiographic reference standard	1
79	Eddy current tester	1*
80	Friction welding machine	
81	Welding motor generator (300 Amps)	1 No
82	X-ray film illuminator	1
83	Electric pipe cutting and beveling machine, cutting capacity 15 mm wall thickness M.S. pipes	1
84	Fume extractor system connecting all the Welding booths	1 set
85	Pressure vessel codes (Book or CD) IBR & ASME sec IX	1
86	Structural welding codes D1.1 (Book or CD)	1
87	Universal Testing Machine 20T	1 set*
88	Rockwell hardness Testing machine	1
89	Impact testing Machine (Charpy & Izod Combined)	1

90	MAG welding Robot with all standard accessories	1 set*
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* Marked Items may be treated as optional and in the case of non-availability of the same in the institute the relevant practical demonstrations may be covered in the industrial visits.

**F. LIST OF FURNITURE, ACCESSORIES AND AUDIO VISUAL AIDS
(COMMON FOR ALL ENGINEERING TRADES)**

S.No	Description of Furnitures/Accessories	Quantity
01	Class Room Chairs (armless) / Dual desk may also be allowed	30 /15
02	Class Room Tables (3ft X 2ft) / Dual desk may also be allowed	30 /15
03	Chair for Trainer (armed) movable	01
04	Table for Trainer (4 ½ ft X 2 ½ ft) with Drawer and cupboard	01
05	LCD Projector	01
06	Multimedia Computer System with all accessories with UPS (.5 KVA)	01 set
07	Computer Table	01
08	White Board (6ft X 4 ft.)	01 no.
09	LCD Projector Screen	01
10	Air Conditioner 1.5Ton (OPTIONAL)	02
11	Wall Clock	01 no.
12	Wall charts, Transparencies and DVDs related to the trade	As required
13	Document Camera / Visualizer	01
14	Smart Board / Inter Active Board	01
15	Over Head Projector	01
16	Video Camera with stand	01
17	Printer cum Scanner	01
18	Laptop with all latest OS	01

.LIST OF TRADE COMMITTEE MEMBERS

Sl. No	Names & Designation	Organisation	Remarks
Members of Sector Mentor council			
1	Dr.G.Buvanashakaran	AGM, WRI, Trichy	Chairman
2	Dr.K.Ashokkumar	AGM, BHEL, Trichy	Member
3	Prof. JyothiMukhopadhyaya	IIT, Ahmedabad	Member
4	B.Pattabhiraman	MD, GB Engineering, Trichy	Member
5	Dr.Rajeevkumar	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.DeepankarMallick	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.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