

Loy Loy

**SYLLABUS**

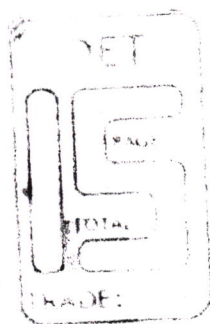
FOR

**WELDING TECHNICIAN**

*Duration. - 1 year.*

**UNDER CODE OF REGULATIONS FOR  
INDUSTRIAL SCHOOL**

**AS APPROVED BY  
DEPT OF EMPLOYMENT AND TRAINING  
CHEPAUK, CHENNAI-600 005.**



## LIST OF COMMITTEE MEMBERS FOR WELDING TECHNICIAN

Members and Experts

: THIRU. S. SUBBIAH. M.E., M.B.A.,  
Regional Joint Director of Trg  
Trichy.

THIRU. T. JOHN BOSCO., B.E.,  
Principal  
Govt. I.T.I, Tanjore.

THIRU. A. MARIAPPAN., D.M.E.,  
Deputy Director/Principal (I/C)  
Govt, I. T.I Trichy.

THIRU. K. SELVARAJ., D.M.E.,  
Asst. Trg. Officer  
Govt. I.T.I, Tanjore.

THIRU. G. NAGARETHINAM., B.E.,  
Asst. Trg. Officer,  
Govt, I. T.I Trichy.

THIRU. M. SELVAM., B.E.,  
Asst. Trg. Officer,  
Govt, I. T.I Trichy.

THIRU. T. SUBRAMANIAN., B.E.,  
Junior. Trg. Officer,  
Govt, I. T.I Trichy.

**COURSE DETAILS**

<b>Name of Trade</b>	<b>: WELDING TECHNICIAN</b>
<b>Qualification</b>	<b>: VIII Pass</b>
<b>Age</b>	<b>: 14-40 Years</b>
<b>Duration</b>	<b>: 1 Year</b>
<b>Number of Trainees</b>	<b>: 20</b>
<b>Number of Practical hours</b>	<b>: 32 hrs. per week</b>
<b>Number of Theory Hours</b>	<b>: 8 hrs. per week</b>
<b>Number of Workshop Calculation hours</b>	<b>: 2 hrs. per week.</b>
<b>Number of Engineering Drawing hours</b>	<b>: 2 hrs. per week</b>
<b>Space Required</b>	
<b>Workshop</b>	<b>: 600sq. feet</b>
<b>ClassRoom</b>	<b>: 200 sq. feet</b>
<b>Power Required in KW</b>	<b>: 6 k.w.</b>



# WELDING TECHNICIAN



EK NO	THEORY
1	General discipline in the institute - elementary knowledge of First Aid - Importance of welding in industry.
2	Safety precautions in gas and arc welding.
3	Discription and use of tools and equipment used in the trade. Marking and measuring tools. Materials preparation method.
4	welding terms and definition (Arc and Gas)
5	Welding methods and group of welding and their application.
6	Arc and gas welding hand tools- uses care and maintenance.
7	Different process of metal joining - bolting - riveting - soldering brazing ,etc.
8	Oxy -Acetylene cutting equipment - principle and application - their care and maintenance.
9	Regulators - Types - Construction uses, care and maintenance.
10	Simple electrical terms and their definitions - uses of electricity as applied to welding .
11	Electricity - AC-DC - Types of electric welding and application.
12	Common gases used for welding oxygen ,Hydrogen,Oxy- Acetylene coal gas,etc., - Types of Oxy - Acetylene flames - Their setting - uses - various gas combination - flame temperatures and their uses - states for matter .
13	Principles of arc welding - necessity of welding machines - Types of machine - construction - advantage and dis advantage of each machine care and maintenance.



14	Electrodes - Types - Objects of flux coating - characteristics of flux - I.S. B.S. - A.W.S. - specification , criteria for choice of electrodes.
15	Safety precaution in fitter shop. Steel rule types and its uses - punches - types and its uses try square - Scriber - its functions.
16	Chisel - Types- Hacksaw - frame - Hacksaw Blade - Its type-Users.
17	Chemistry and structure of oxy - acetylene flame. Manufacture of calcium carbide quality control - properties - Its Impurities. Effect of each element on metal.
18	Types of joints - kinds and their application. Nomenclature of welding joints - Terms applied to each joint - Explanations with simple sketches.
19	Acetylene - Its properties-Acetylene generators carbide to water type - working principle - care and maintenance
20	Water to carbide type - working principle - care and maintenance. Comparison of two types of generators. Acetylene purifier - Hydraulic back pressure valve.
21	welding symbols description and uses - edge preparation - application.
22	Arc and its characteristics -Arc length - Types - uses - Advantage and Disadvantages
23	Polarity types - Method of identification - uses of each type - importance and indication of wrong polarity.
24	Oxygen - Its properties - manufacturing methods oxygen cylinder .
25	D.A.cylinder - Description - method of charging - care and maintenance

26	sheet metal shop safety rules-measuring tools- marking tools-sheet metal hammers -pullers, mallets, punches, and groovers. Rivet set and uses -types of sheet and uses-of soft solder and soldering process.
27	Development of parallel line method-examples taper tray and different elbow and Tee pipes-hand lever shears.
28	Welding position-flat-horizontal-vertical-and overhead-slope and rotation.
29	Steel classification - carbon percentages and effect of carbon - Iron in its impurities effects of each element of metal, ferrous and non - ferrous.
30	Heat treatment metal - Different heat treatment process.
31	Welding blow pipes - types - description - operation- construction - uses care and maintenance.- different between H.P & L.P system.
32	Effect of moisture on electrodes necessity and importance of backing the electrodes before use - storage conditions and handling of electrodes for better welding quality.
33	Faults in gas welding - definition of faults . Their effects - causes - corrections.
34	Mainfold system - necessity - operation - lamination - care and maintenance.
35	Faults in Arc welding - definition -effects , causes and correction of fault.
36	Arc blow - definitions - Its causes and effects - method to overcome in practice.
37	Welding technique - Right hand - Left hand explanation - method - application - linde welding - application.



38	Distortion in arc welding - causes and effects. Methods employed to minimized its effect.
39	Method employed to control distortion in gas welding -stress relieving outdoor method.
40	Welding of M.S pipe- Difference between pipe and plate welding.
41	Pipe devolpment 90 degree and 45 degree branch pipe. pipewelding-positions 1G,2G,5G,6G.
42	Specification of filler rod and its uses in different arc welding methods. Effect of atmosphere on metals.
43	Specification of wires in gas welding, uses of gas welding flux Effects of alloying element on weldability.
44	Principle of gas -cutting, blow pipes - types and maintenance - flame cutting factors - quality of cut.
45	Flame adjustments - free hand flame cuttings - guided flame cutting & mechanical flame cutting.
46	Cast iron determination of weldability - preheating methods - choice of methods of welding- methods of welding(Arc)
47	soft and silver solder, Their composition. Fluxes - and its uses. Methods and application .
48	Hard facing - necessity of types methods - applications.



49	<p>Introduction to TIG welding -TIG welding equipments - advantages of TIG welding process over manual metal arc welding and oxy-acetylene welding process.</p> <p>Power sources for TIG welding - Types - Applications - care and maintenance -High frequency unit - parts, consruction and uses - D.C suppressor unit contruction application - care and maintenanace.</p> <p>Tungsten eletrodes types.Sizes,Uses.</p>
50	<p>Introduction to CO<sub>2</sub> welding ,CO<sub>2</sub> welding equipment and accessories description of CO<sub>2</sub> welding set with diagram.Mode of metal transfer in CO<sub>2</sub> welding .welding wires used in CO<sub>2</sub> welding.Variou gas Mixture and its applications in CO<sub>2</sub> welding wire feed system.</p>
51	<p>Inspection and testing of weld - destructive and non destructive test - semi - destructive test explanation of each method.</p>
52	TEST.

## WELDING TECHNICIAN

WEEK NO	TRADE PRACTICAL
1	Familiarization with the institute. Importance of trade training, machinery used in the trade. Introduction to safety equipment and their uses.
2	Setting - up of an arc, and striking of an arc.
3	E Straight line beads on M.S. Plate 10mm Position. F
4	E Weaved bead on M.S. plate M.S. 10mm position F
5	Setting up an gas apparatus, Lighting and adjustment of flame.
6	G Fusion run with and without filler rod M.S. plate 3mm position F.
7	G Butt weld square butt joint on M.S. sheet 3mm position F
8	E Fillet weld open corner joint on M.S. plate 10mm position F
	G Fillet weld Lap joint on M.S. sheet 3mm position F.
9	E Fillet weld Lap joint on M.S. plate 10mm position F.
10	G Fillet weld Lap joint M.S. sheet M.S. sheet 3mm position F
	E Fillet Tee joint on M.S. plate 10mm position F.
11	G Fillet weld outside corner joint M.S. sheet 3mm position F.
12	G Edge joint on M.S. sheet 3.15mm in flat position.
13	E Butt weld in open square butt joint M.S. plate 5mm position F.
14	Revision and Test.
15	FR Marking out and filing square to dimension.
16	FR Edge chipping, cutting and hack sawing.
17	G Fusion run with filler rod on M.S. sheet 3.15mm position F
18	E Straight line beads on M.S. plate 10mm position H.
19	E Butt weld - single vee butt joint M.S. plate 10mm position H.
20	G Butt weld single butt joint M.S. sheet 3.15mm right hand welding technique position H.
21	Oxy-Acetylene hand cutting on M.S. plate straight.
22	Oxy-Acetylene Bevel cutting practice on M.S. plate.
23	E Fillet weld Tee joint MS plate 10mm position H.
24	G Butt weld square butt joint on M.S. sheet 2mm position H.



25	E	Butt weld single vee butt joint on M.S. plate 10mm position H.
26	SMW	Making different sheet metal joints.
27	SMW	Pipe joint - Tee pipes and soldering practice.
28		Revision and Test.
29	G	Fusion run with filler rod on M.S. sheet 3mm position V
30	E	Straight line bead vertical upward M.S. plate 10mm
31	G	Fillet weld lap joint M.S. sheet 3mm position V
32	E	Fillet weld lap joint M.S. plate 10 mm position V upward
33	G	Fillet weld Tee joint M.S. sheet 3mm position V
34	E	Fillet weld outside corner joint M.S. plate 10mm position V upward.
35	G	Fillet weld outside corner joint M.S. sheet 2mm position V.
36	E	Butt weld / Single vee butt joint on M.S. plate 10mm position V upward.
37	G	Butt weld - square butt joint M.S. sheet 2mm position V.
38	E	Straight line bead in M.S. plate 6mm OH position.
39	G	Fusion run filler rod M.S. sheet 2mm OH position.
40	E	Laying weaved beads vertical upward on M.S. plate 10mm position V.
41	G	Fillet weld Tee joint M.S. sheet 2mm position OH
42	E	Fillet weld Tee joint M.S. plate 10mm position V
43	G	Butt weld square butt joint M.S. sheet 2mm position OH.
44	E	Fillet lap joint M.S. plate 10mm position OH
45		Revision and Test.
46		Brazing practice with carbide tipped tool on M.S. square shank.
47	G	Pipe butt joint on M.S. pipe 50mm dia 3mm WT position IG (Rolling)
48	E	Fillet Tee joint M.S. plate 10mm position OH.
49	E	Fillet weld pipe flange joint (circular cutting) on M.S. plate 6mm, M.S. pipe 50mm dia, WT 3mm position IG (Rolling).
50	G	Pipe joint on M.S. pipe 50mm dia 3mm WT position F.
51		Production of jobs as per drawing with involving all positions welding
52		REVISION & TEST



## WELDING TECHNICIAN

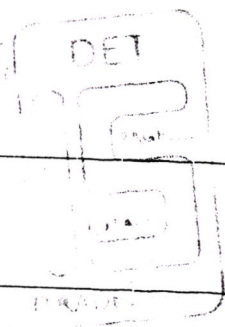


MONTH No	WORKSHOP CALCULATION & SCIENCE
1	Importance of Science and calculation to the trade skill and fundamental arithmetical operations. Addition, Subtraction, Multiplication and Division . Fraction-Addition-Subtraction, Multiplication and Division Problems.
2	Decimal-Addition, Subtraction, Multiplication and Division Problems. Fraction and Decimal Conversion, Fraction to Decimal and vice versa. System of Units-British, Metric and S.I Units for Length, Mass, Area, Volume, Capacity, Time.
3	The Square root – The Square and Square root of whole number and Decimal. The Square root shop problems. Units of heat – Calorie, B.Thu, C.Hu, Specific heat, Latent heat, heat loss, heat gain. REVISION.
4	Percentage-Changing percent decimal to fraction and vice versa- Problems on percentage related to the trade. Newton's law of motion – Definition of force . Units of force in M.K.S System and S.I Units.
5	Ratio-simple problem in ratios Proportion-Direct and Inverse proportion shop problems. Work-Definition and Units of work in M.K.S System and S.I. Units. Power-Definition and Units of power.
6	Algebraic Symbols and fundamentals- Addition, Subtraction, Multiplication, Division Problems. Algebra-Simple equation Problems. REVISION.
7	Algebra-Simultaneous equation Problems Lever-Types of Levers with examples.

8	Mensuration-Area and volume of Square, Rectangle problems.
9	Mensuration-Area of Equilateral triangle, Isosceles triangle, Right angle triangle, scalene triangle problems. REVISION.
10	Area- circle, circular ring problems, Mensuration-volume and weight of cube.
11	Find the Area and volume of cone, and cylinder shaped Solids and vessels.
12	Find the capacity in liters of square, rectangle, hexagon, cone, and cylinder shaped vessels. REVISION AND TEST.



# WELDING TECHNICIAN



MONTH NO	ENGINEERING DRAWING
1	Importance of engineering drawing and its knowledge. Use of drawing instruments ,T-square,drawing board etc. Letters,Numbers and Alphabets as per IS 696/1972
2	Free hand sketching of straight lines,rectangles,circles,polygons,etc. Use of different types of lines and symbols for drawing.
3	Importance of putting dimension on the drawing as per IS 696/1972 Free hand sketching with dimension ,scale and proportionate sketching Revision & Test .
4	Isometric views and oblique views with dimensions of such as cube , rectangular block,cylinder etc.
5	Explanation of orthographic projection. Free hand sketching of plan and elevation of simple objects like hexagonal bar ,square bar,circular bar ,tapered bar and hollow bar etc.
6	Sketching the views of solid bodies when viewed perpendicular to their surfaces and axes . Views of Simple Hollow and Solid bodies with dimensions. Revision & Test .
7	Construct a orthographic projection from the given Iso metric view of shaped blocks in third angle method.
8	Construct a orthographic projection from the given Iso metric view of shaped blocks in third angle method.



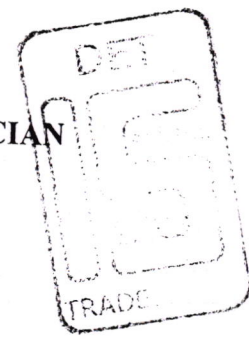
9	Free hand sketching of hand tools of the trade. Free hand sketching of simple objects related to the trade Revision & Test .
10	Reading of simple blue print Exercise on blue print reading related to missing lines and missing views.
11	Simple isometric drawing from given orthographic views of objects.
12	Welding symbols as per I.S.I employed on drawings. Free hand sketching of screw threads with their dimensions. Revision & Test .

**INDUSTRIAL SCHOOLS**  
**TRADE SYLLABUS – REVISED**

Name of the Trade : **WELDING TECHNICIAN**

**SPACE REQUIRED:**

- (1) Workshop/Lab : 600 sq. ft.
- (2) Class Room : 200 sq. ft.



**LIST OF TOOLS & EQUIPMENT**

**For the trade of WELDING TECHNICIAN**  
(For a batch of 20 trainees)

**TOOL KIT**

Sl.No.	Name of the item	QUANTITY REVISED
1	Gloves pair leather	5
2	Apron leather	5
3	Screen welding helmet type	5
4	Screen welding hand type	20
5	Goggles pair welder	10
6	Hammer scaling 0.25 kg. with handle	5
7	Chisel cold flat 19 mm	5
8	Center punch 9 mm + 127 mm	5
9	Dividers 20 cm	5
10	Caliper outside 15 cm	5
11	Rule 60 cm two fold, brass tipped to read inches and mm	5
12	Wire brush 15 cm + 3.7 cm	5
13	Spark lighter	5
14	Chipping screen hand	5
15	Safety boots for welders	20
16	Safety goggles	5
17	Square blade 15 cm	10
18	Scriber 15 cm	5
19	Tongs holding 30 cm	5

**SHOP OUTFIT**

20	Brass rule 30cm or nickel chrome steel rule 30	4
21	Hammer ball pien 1 kg. With handle	4
22	Chisel cold cross 9 mm	8
23	Screw driver 25 cm blade	5
24	Number punch 6 mm and letter punch 6 mm	1 set
25	Hacksaw frame adjustable 30 cm	4
26	Hammering blocks 5cm thick 60 sq.mm	2
27	Magnifying glass 15 cm	4
28	Weld measuring gauge fillet and butt	1



29	File half round bastard 30 cm	6
30	File flat 35 cm rough	6
31	Spanner 12 x 15 mm double ended	4
32	Spanner D.E. 6mm to 15mm by 1.5mm set of nos	1 set
33	Clamps 10 cm, 15cm, 20cm, 30cm.	1 each
34	Pipe wrench 25 cm and 35 cm	1
35	Steel tape 182 cm flexible in case	3
36	Welding torches with 10 nozzles 2 to 45	4 sets
37	Earth clamps	12
38	Electrode holder 400 amps	6
39	Rubber hose clip	10
40	Spindle key (for opening cylinder valve )	2
41	Pressure regulator oxygen double stage	2
42	Pressure regulator acetylene Regulators	2
43	Tip cleaner	2
44	Glasses coloured 108 mm x 82 mm x 3mm DIN 11A 13A	2
45	Glass white 108 mm x 82 mm	4
46	Outfit spanners	2
47	Rubber hose pipe black and red 5 mm	5 mts.
48	Leather sleeves	5 pairs

### GENERAL INSTALLATION

49	Transformer welding, continuous welding, current with all accessories 300A	1set
50	Transformer welding, continuous welding, current with all accessories 400A	1 set
51	Welding generator D.C rotary set 200-300 all accessories	1 set
52	Welding cables to carry 350 Amps with flexible rubber	20 mts.
53	Lugs for cables	10
54	Gas welding table 822 cm X 92 cm X 60 cm fire bricks on stand with positioner	2
55	Arc welding table all metal with positioner 122 cm X 92cm X 60 cm	2
56	D.E Grinder 30 cm wheel motorized pedestal type	1
57	AG 7 Grinder	1
58	Fire extinguishers (foam type and CO <sub>2</sub> type)	2
59	Metal rack 182 cm x 152 cm x 45 cm	1
60	Instructor table (steel)	1
61	Block board with easel	1
62	Instructor chair (steel)	1
63	First Aid box	1
64	Welding helmets	4
65	Fire buckets with stand	3
66	Steel lockers with 8 pigeon holes	1



## ACHIEVEMENT

After completion of one year training, the trainee should be able to:-

Identify and use the measuring instruments, hand tools related to the trade.

Manipulate welding machines and accessories such as Transformer welding set, Welding Generator, H.P & L.P welding set, Oxygen cutting machine, Welding torch with nozzle, Cutting torch, Pressure regulator D.E. Grinder, AG-7 Grinder, etc.

Perform shop operations – Uniform beading, Setting of Welding set, Welding in various position both by gas and arc, Pipe welding and Gas cutting.

Perform basic Fitting work and Sheet Metal work.

Carry out the production jobs such as Furniture, Windows and Grills etc.

\*\*\*\*\*