

SYLLABUS FOR SHEET METAL WORKER TRADE			
DURATION: ONE YEAR			
Duration	Reference Learning Outcome	Professional Skills (Trade Practical) With Indicative Hours	Professional Knowledge (Trade Theory)
Professional Skill 75 Hrs; Professional Knowledge 21 Hrs	Select sheet of required type, thickness (gauge) and size and mark it with scribe, square, divider, steel rule etc., according to drawing or sample following safety precautions.	<ol style="list-style-type: none"> 1. Induction of training Familiarisation with the Institute, Importance of trade in Training Machines used in the trade. (12 hrs.) 2. Induction to safety devices used in shop floor. (13 hrs.) 3. Identification of Tools and Equipments Induction and use of marking tools. (8 hrs.) 4. Practice in Reading, Steel Rule, Scribing of straight lines, Bisecting of straight lines (on the sheet metal) using marking tools. (17 hrs.) 5. Mark and cut through the straight lines Planishing of Sheet Metal. (6 hrs.) 6. Practice in drawing simple Geometrical shapes. (10 hrs.) 7. Practice in marking and cutting of sheets to various angles. (9 hrs.) 	<p>General discipline in the institute</p> <p>Elementary of First aid Importance of the sheet metal work in the Industry. General safety precautions</p> <p>Safety precaution in sheet metal work. (07 hrs)</p> <p>Metals and Non-Metals and their Characteristics, Types, Sizes and uses of Sheet Metals as per BIS. Use of reference table.</p> <p>Raw material information: CRCA, HRCA & MS Material Terms & definitions in sheet metal work. (07 hrs)</p> <p>Marking and laying out tools and accessories</p> <p>Measuring Tools : steel Rule, calipers, try square, L square , Micrometer, Vernier caliper, Vernier height gauge, Combination set, screw pitch gauge, radius gauge, SWG, Bevel Protractor etc. Marking Tools: Scratch AWL, divider, Trammel point, punches etc. Cutting tools: Snips, shears, hacksaw, chisel, cutting plier, files, drills, tap & die sets etc. (07 hrs)</p>
Professional	Shears or bends the sheet wherever	8. Practice on cutting with different types of snips. (10	Hand tools: mallets, hammer, sheet metal hammers,

<p>Skill 25 Hrs; Professional Knowledge 07 Hrs</p>	<p>necessary by machine or hand shear.</p>	<p>hrs.) 9. Tin snips (Straight cut, Right cut and Left cut) cutting off inside and outside curve, cutting off notches and cutting off profiles. (15 hrs.)</p>	<p>groovers, riveting tools, screw drivers, wrench and spanners etc. Holding tools & accessories: vices, C clamps, stakes, stakes holder, hollow mandrel, wooden former, Jigs & fixtures, soldering bits etc. (07 hrs)</p>
<p>Professional Skill 125 Hrs; Professional Knowledge 35 Hrs)</p>	<p>Form sheet metal to required shape and size by bending, seaming, forming, riveting etc., using mallets, hammers, formers, sets, stakes, etc., or by various operations such as shearing, bending, beading, channelling, circle cutting.</p>	<p>10. Practice on Sheet Metal seams. "Grooved seam, Locked Grooved seam, Pane down seam, Bottom lock seam or Corner Fold (Knocked-up seam), Corner Clip Lock, Double Bottom Lock, Clip Lock (Cap Lock), snap Joint etc. (Folded Joints) and hemming practice. (18 hrs.)</p>	<p>Sheet Metal Folded Joints: Description of Sheet Metal Seam, Grooved seam, Locked Grooved seam, Paned down seam, Knocked up seam inside and outside, capstrip seam, pitsburg seam etc. (06 hrs)</p>
		<p>11. Forming rectangular shapes using stakes. (8 hrs.) 12. Forming Cylindrical job using various stakes such as Hollow Mandrel, Hatchet Stake; Tin Man's' Anvil stake etc. (12 hrs.)</p>	<p>Folding and joining allowances, edge stiffing, wiring allowances and false wiring, types of notches in sheet metal. (06 hrs)</p>
		<p>13. Folding, Bending Sheet Metal to 90 degree using wooden mallet, 'C' clamps etc. (4 hrs.) 14. Making a radius using Wooden blocks using Hairpin Folder. (4 hrs.) 15. Making a cylindrical container with knocked- up, bottom (Bottom Locked), Grooved Joint and hemmed Top. (5 hrs.) 16. Forming frustum of Cone. (4 hrs.) 17. Making of Mug, scoop, measuring can. (4 hrs.)</p>	<p>Definitions of pattern, Development, stretched out pattern, Master pattern (gross pattern) and templates Development of by parallel line method, radial line method. (06 hrs)</p>

		18. Hemming (single, Double) wire edge by hand process. (4 hrs.)	
		19. Make a taper chute square to rectangle transition. (08 hrs.) 20. Make a taper chute square to round. (10 hrs.)	Development of surfaces: Triangulation method and geometrical construction methods. (06 hrs)
		21. Making holes with solid punches, round punches as per BIS. (08 hrs.) 22. Use of hollow punches making hole in sheet metal with help of wood block. (11 hrs.)	Solid and Hollow Punches. Description of hand punches as per BIS. Sizes of solid and hollow Punches and their uses. (06 hrs)
		23. Riveting practice using various types of rivet heads. (4 hrs.) 24. Single chain riveted joint. Double chain and Zig- zag, Lap & butt riveted joints Making a dust pan (Corner and handle riveted) (8 hrs.) 25. Making a fire bucket with lap riveted joint on one side and Locked Grooved Seam on the other side. (7 hrs.) 26. Bottom Hollowing and Bottom Lock Seam. (6 hrs.)	Rivets and its parts, Selection of Rivet heads. Types of Rivet and their uses. Standard sizes of Rivets and Riveting Tools. Calculation for Riveting allowances (pitch and Lap) (05 hrs)
Professional Skill 150 Hrs; Professional Knowledge 42 Hrs	Perform different type of MS pipe joints by Gas welding (OAW).	27. Solder Lap joint. (12 hrs.) 28. Single plated solder butt joint.(13 hrs.)	Fastening of Sheet Metal: Self tapping screws, Clips and Connectors; Their uses, Types and Allowance of 'S' Clips, Government Clips, Drive Clips, Mailing Clips etc. (07 hrs)
		29. Making oil Can by hand process by soldering. (12 hrs.) 30. Making funnel by soldering process.(13 hrs.)	Solder, Different types of solder and their composition. Types and uses of fluxes, their effect on different metal. (07 hrs)
		31. Make by soldering:- • Elbow 90° equal dia pipe.	Process of soft soldering, hard soldering (brazing).

		<p>(7 hrs.)</p> <ul style="list-style-type: none"> • T joint 90° equal dia pipe. (9 hrs.) • T joint 90° unequal dia pipe by soldering. (9 hrs.) 	<p>Heating appliances (Hand Forge, Blow Lamp, L.P.G.) (07 hrs)</p>
		<p>32. Make by soldering:- T Pipe 60° branch joint unequal dia pipe Offset T joint equal dia. (25 hrs.)</p>	<p>Development & laying out pattern of elbow pipe, T pipe and offset pipe in equal diameter. (07 hrs)</p>
		<p>33. Make a taper lobster back bend 90 degree from oblique cone by soldering. (25 hrs.)</p>	<p>Development of T pipe, round equal and unequal. Introduction to tubes and pipes. (07 hrs)</p>
		<p>34. Forming square section segmental quarter bend pipe with suitable lock and forming round section segmental quarter bend pipe. (25 hrs.)</p>	<p>Laying out pattern of 600 offset 'T' pipe. Pattern Development of 'Y' pipe. Preparation of pickling solution. Protection-Coating, Cleaning and preparing of Sheet Metals Corrosion and anti corrosion treatment of sheet metal. (07 hrs)</p>
Professional Skill 50 Hrs;	Perform soldering, brazing operations on sheet metal.	<p>35. Making a square duct elbow with snap block. (25 hrs.)</p>	<p>Method of galvanizing, tinning, anodising, sheradising and Electroplating. (07 hrs)</p>
Professional Knowledge 14 Hrs		<p>36. Make a conical hopper by soldering. (25 hrs.)</p>	<p>Development and laying out of pattern of segmental quarter bend pipe. (07 hrs)</p>
Professional Skill 100 Hrs;	Perform Arc welding, Gas welding, TIG welding & MIG welding and Spot welding on sheet metals	<p>37. Setting up of Oxy-acetylene plant and types of flames. (25 hrs.)</p>	<p>Need for ducting. Places where ducting is employed and the working principle of a dust cyclone, Gutter and its use. False ceiling. (07 hrs)</p>
Professional Knowledge 28 Hrs		<p>38. Setting up of Arc welding plant and striking & maintaining the arc & laying short beads. (25 hrs.)</p>	<p>Safety precaution in gas & arc welding Description of Oxyacetylene plant and the equipments, accessories & tools. (07 hrs)</p>
		<p>39. Fusion run with/without filler rod in flat position. (12 hrs.)</p>	<p>Types of oxy-acetylene flames & its uses. Types and description of flux. Types of</p>

		40. Square butt joint in flat position by gas. (13 hrs.)	welding blow pipes & its functions. (07 hrs)
		41. Brazing copper sheet in lap joint in flat position. (25 hrs.)	Various types of pipe joints. Method of metal preparation & cleaning them base metal before welding. Gas welding defects causes & remedies. Arc welding defects causes & remedies. (07 hrs)
Professional Skill 175 Hrs; Professional Knowledge 49 Hrs	Make sheet metal articles according to drawing or sample following safety precaution.	42. Importance of machinery used in the trade. (5 hrs.)	Importance of the trade in the development of Industrial Economy of the Country. Review of Types of sheet metal Fabrication. Methods of developments. (05 hrs)
		43. Types of job made by the trainees in trade. (8 hrs.)	
		44. Introduction to machinery safety including fire fighting equipment and their uses etc. (12 hrs.)	Introduction to Aluminum fabrication, and its applications. Ferrous and Non-Ferrous metals. Use of Copper and Alloys. Laying out pattern of conical elbows. Pattern development of lobster back bend. Chemical and Physical properties of Aluminium. Use of Aluminium and its Alloys. (07 hrs)
		45. Locked groove joint by aluminum sheet. (8 hrs.)	
		46. Single riveted lap joint by aluminum sheet. (8 hrs.)	
47. Double strap single row riveted butt joint by aluminum sheet. (9 hrs.)	Brief Description of hand punch machine. Hand and Power operated drilling Machines. Drill Bits, parts and effects of cutting angles. Angles for Drilling Sheet Metals, effect of speed, Feed Cutting Fluids, etc., on metals. Difference between drilled and punched holes. (07 hrs)		
48. Exercise involving practical work on Aluminium Sheet, and using Pop Rivet. (6 hrs.)			
		49. Aluminium Windows with different extruded sections, Aluminium Soldering. (10 hrs.)	Description of swaging and beading machine, its parts, operating principles etc. Description of Fly Ball press.
		50. Making holes in sheet metal using Punching Machine. (4 hrs.)	
		51. Making holes in sheets with	

		<p>a twist drill. (5 hrs.)</p> <p>52. Tri-paning with use of hand and electric drilling machine. Grinding a drill bit. (5 hrs.)</p> <p>53. Practice in Drilling Holes in walls and Ceilings as applied to ducting work. (6 hrs.)</p> <p>54. Use of rawl bits and rawl plug. (5 hrs.)</p>	<p>Operating Principles of Power Press and press brakes. Method to calculate the pressure adjustment. Clearance between Die and Punch. Introduction to "C" and "H" frame presses. (07 hrs)</p>
		<p>55. Practice on hollowing and rising on non-ferrous sheet as well as ferrous sheet. (08 hrs.)</p> <p>56. Practice on removing dents of spherical or hemi-spherical articles using wheeling and raising machine. (Repairing mud guards etc.) (10 hrs.)</p>	<p>Properties of stainless steel and its uses. Properties and uses of tin, lead, zinc and silver. Description and Physical properties of Muntz Metal, Gun Metal, White Metal etc. (05 hrs)</p>
		<p>57. Practice on pipe bending by hand. (5 hrs.)</p> <p>58. Pipe bending using Hydraulic Pipe bending' machine. (5 hrs.)</p> <p>59. Development of a cone: Cylinder fitted to a cone. (8 hrs.)</p> <p>60. Equal dia pipe joint with crimping and Ogee beading. (5 hrs.)</p>	<p>Introduction to pipe/tube bending. Brief description of Hydraulic pipe bending machine. Operating Principles etc. Description of roll forming machine types and operating principles, description of slip roll forming machine and its function. (05 hrs)</p>
		<p>61. Practice on external threading using "Die stock". (5 hrs.)</p> <p>62. Practice on internal threading using taps. (5 hrs.)</p> <p>63. Typical folding, Bending Practice, Making Steel-Racks, Reinforcement with angle iron. (10 hrs.)</p> <p>64. Use of self tapping screws and other fasteners. (5 hrs.)</p>	<p>Use of Die and Die Holder, Description of taps and tap wrench. (06 hrs)</p>

		<p>65. Project work such as Steel Stool, Aluminium Ladder etc. (08 hrs)</p> <p>66. Metal Spinning: Making a cylindrical medicine container of Aluminium Sheet. (10 hrs.)</p>	<p>Method to operate folding/brake folder for typical folding.</p> <p>Description and use of jigs and fixtures. (07 hrs)</p>
Professional Skill 100 Hrs; Professional Knowledge 28 Hrs	Plan & work in different sheet metals such as tin, copper, brass.	<p>67. Making a Copper article by use of power press and also making brass and stainless steel articles. (13 hrs.)</p> <p>68. Practice of Buffing and polishing. (12 hrs.)</p> <p>69. Angle iron bending in different angles and different radii. (13 hrs.)</p> <p>70. Twisting the M.S. square rod and flats. (12 hrs.)</p> <p>71. Gas welding Square butt joint on M.S. sheet in down hand position Fillet Tee & Lap joint on M.S sheet in down hand position. (25 hrs.)</p> <p>72. Pipe butt joint in down hand position. (8 hrs.)</p> <p>73. Butt joint on MS flat in down hand position by arc. (8 hrs.)</p> <p>74. Fillet lap and T joint on MS flat in down hand position. (9 hrs.)</p>	<p>Definition of Planishing and its application. Brief description of polishing machine. Various types of bobs and polishing compounds. (07 hrs)</p> <p>Operating principles of spinning lathe. Description of spinning. (07 hrs)</p> <p>Different process of metal joining types of weld joint & weld positions. Oxy-acetylene welding equipments & application, Types of flame & their uses. (07 hrs)</p> <p>Principle of arc welding. Types of welding machines and their uses. Advantages and disadvantages of AC/DC welding machines. Arc length and its importance Welding defects. (07 hrs)</p>
Professional Skill 125 Hrs; Professional Knowledge 35 Hrs	Perform Arc welding, Gas welding, TIG welding & MIG welding and Spot welding on sheet metals	<p>75. Resistance welding. Spot welding, seam welding. (25 hrs)</p> <p>76. Co2 welding. Deposit bead on MS sheet in flat position. (12 hrs)</p> <p>77. Lap joint T joint and butt joint in down hand position. (13 hrs)</p>	<p>Principle of resistance welding. Types and applications. Welding symbols. (07 hrs)</p> <p>Introduction to CO2 welding process. Welding equipments and accessories. Advantages and application of CO2 process. (07 hrs)</p>

		78. TIG welding. Deposit bead on SS sheet in flat position. Making butt, Tee and corner joint. (25 hrs.)	TIG welding process. Advantages. Description of equipments. Types of polarity and application. (07 hrs)
		79. TIG welding. Deposit bead on Aluminium sheet in flat position. (12 hrs.)	Types of Tungsten Electrodes, Filler rods, Shielding Gases. Defects, causes and remedy in TIG welding process. (07 hrs)
		80. Making butt, Tee and corner joint. (13 hrs.)	
		81. MS/SS pipe butt and Y joint by TIG welding process. (25 hrs.)	Latest sheet metal cutting techniques: Plasma cutting, Laser cutting, water jet cutting and punching etc. (07 hrs)
Professional Skill 25 Hrs; Professional Knowledge 07 Hrs	Undertakes Aluminium frame works. Makes ducts, cabins & panels.	82. Make models of Aluminium sliding windows and doors. (13 hrs.) 83. Partitions of mini model rooms by using aluminum channels beadings etc (8 hrs.) 84. Electrical Panel, trunk boxes & ducts fabrication and Painting. (4 hrs.)	Specification of aluminium channels angles, strips, tubes beadings, packing rubber, cardboard, glasses etc. Tools and equipments used in aluminium fabrication. Assembly & Sub assembly: Gaurding assembly, Door assembly, Chassis assembly, Cabinet assembly, Power pack assembly etc. Process of painting. Spray painting. Etch primer painting, Powder coating, buffing, grinding, and sanding. Selection of different grit sizes. (07 hrs)
Professional Skill 50 Hrs; Professional Knowledge 14 Hrs	Undertake repair work of mudguard, Radiators etc.	85. Special Exercises: Repairing Mudguard and Radiators and testing of Sheet metal containers. (25 hrs.) 86. Any Special Exercises: Repairing Blocked Silencer and fuel tank. (25 hrs.)	Types of Radiators and construction of Radiators, Mufflers, Estimation of work. (07 hrs) Material handling: handling of light, medium and heavy materials. Use of cranes and types. Estimation and costing. (07 hrs)
Industrial training / Project work			