

## 7. TRADE SYLLABUS

SYLLABUS - WELDER				
DURATION: ONE YEAR				
Duration	Reference Learning Outcome	Process code	Professional Skills (Trade Practical) With Indicative Hrs.	Professional Knowledge (Trade Theory)
Professional Skill 50 Hrs;  Professional Knowledge 14 Hrs	Set the gas welding plant and join MS sheet in different position following safety precautions. <i>[Different position: - 1F, 2F, 3F, 1G, 2G, 3G.]</i>		<ol style="list-style-type: none"> <li>Demonstration of Machinery used in the trade. (6 hrs.)</li> <li>Identification to safety equipment and their use etc. (4 hrs.)</li> <li>Hack sawing, filing square to dimensions. (7 hrs.)</li> <li>Marking out on MS plate and punching. (8 hrs.)</li> </ol>	<ul style="list-style-type: none"> <li>Importance of trade Training.</li> <li>General discipline in the Institute</li> <li>Elementary First Aid.</li> <li>Importance of Welding in Industry</li> <li>Safety precautions in Shielded Metal Arc Welding, and Oxy-Acetylene Welding and Cutting. (07 hrs)</li> </ul>
	Set the SMAW machine and perform different type of joints on MS in different position observing standard procedure. <i>[different types of joints- Fillet (T-joint, lap &amp; Corner), Butt (Square &amp; V); different position - 1F, 2F, 3F, 4F, 1G, 2G, 3G, 4G]</i>	<p>OAW-01</p> <p>SMAW-01</p>	<ol style="list-style-type: none"> <li>Setting of oxy-acetylene welding equipment, Lighting and setting of flame. (5 hrs.)</li> <li>Perform fusion run without filler rod on MS sheet 2mm thick in flat position. (5 hrs.)</li> <li>Setting up of Arc welding machine &amp; accessories and striking an arc. (5 hrs.)</li> <li>Deposit straight line bead on MS plate in flat position. (10 hrs.)</li> </ol>	<ul style="list-style-type: none"> <li>Introduction and definition of welding.</li> <li>Arc and Gas Welding Equipments, tools and accessories.</li> <li>Various Welding Processes and its applications.</li> <li>Arc and Gas Welding terms and definitions. (07 hrs)</li> </ul>

Professional Skill 25 Hrs;  Professional Knowledge 07 Hrs	Set the gas welding plant and join MS sheet in different position following safety precautions. <i>[Different position: - 1F, 2F, 3F, 1G, 2G, 3G.]</i>	OAW-02  OAW-03	9. Depositing bead with filler rod on M.S. sheet 2 mm thick in flat position. (10 hrs.)  10. Edge joint on MS sheet 2 mm thick in flat position without filler rod. (15 hrs.)	<ul style="list-style-type: none"> <li>- Different process of metal joining methods: Bolting, riveting, soldering, brazing, seaming etc.</li> <li>- Types of welding joints and its applications. Edge preparation and fit up for different thickness.</li> <li>- Surface Cleaning (07 hrs)</li> </ul>
Professional Skill 25 Hrs;  Professional Knowledge 07 Hrs	Set the SMAW machine and perform different type of joints on MS in different position observing standard procedure. <i>[different types of joints- Fillet ( T-joint, lap &amp; Corner), Butt (Square &amp; V); different position - 1F, 2F, 3F,4F, 1G, 2G, 3G, 4G]</i>	SMAW-02  SMAW-03	11. Straight line beads on M.S. plate 10 mm thick in flat position. (10 hrs.)  12. Weaved bead on M. S plate 10mm thick in flat position. (15 hrs.)	<ul style="list-style-type: none"> <li>- Basic electricity applicable to arc welding and related electrical terms &amp; definitions.</li> <li>- Heat and temperature and its terms related to welding</li> <li>- Principle of arc welding. And characteristics of arc. (07 hrs)</li> </ul>
Professional Skill 25 Hrs;  Professional Knowledge 07 Hrs	Set the oxy- acetylene cutting plant and perform different cutting operations on MS plate. <i>[Different cutting operation – Straight, Bevel,</i>	OAGC-01  OAGC-02	13. Setting up of oxy-acetylene and make straight cuts (freehand) (2 hrs.)  14. Perform marking and straight line cutting of MS plate 10 mm thick	<ul style="list-style-type: none"> <li>- Common gases used for welding &amp; cutting, flame temperatures and uses.</li> <li>- Chemistry of oxy-acetylene flame.</li> <li>- Types of oxy-acetylene flames and uses.</li> </ul>

	<i>circular]</i>		by gas. Accuracy within $\pm 2$ mm. (4 hrs.)	- Oxy-Acetylene Cutting Equipment principle, parameters and application. (07 hrs)
		OAGC-03	15. Beveling of MS plates 10 mm thick, cutting regular geometrical shapes and irregular shapes, cutting chamfers by gas cutting. (7 hrs.)	
		OAGC-04	16. Circular gas cutting on MS plate 10 mm thick by <i>profile cutting machine</i> . (7 hrs.)	
		OAGC-05	17. Marking and perform radial cuts, cutting out holes using oxy-acetylene gas cutting. (3 hrs.)	
		OAGC-06	18. Identify cutting defects viz., distortion, grooved, fluted or ragged cuts; poor draglines; rounded edges; tightly adhering slag. (2 hrs.)	
Professional Skill 150 Hrs;  Professional Knowledge 42 Hrs	Set the gas welding plant and join MS sheet in different position following safety precautions. [Different position: - 1F, 2F, 3F, 1G, 2G, 3G.]  Set the SMAW machine and perform different type of joints on MS in different position observing	OAW-04	19. Square butt joint on M.S. sheet 2 mm thick in flat Position. <b>(1G)</b> (9 hrs.)	- Arc welding power sources: Transformer, Motor Generator set, Rectifier and Inverter type welding machines and its care & maintenance..
		SMAW-04	20. Fillet "T" joint on M.S. Plate 10 mm thick in flat position. <b>(1F)</b> (7 hrs.)	- Advantages and disadvantages of A.C. and D.C. welding machines
		OAW-05	21. Open corner joint on MS sheet 2 mm thick in flat Position <b>(1F)</b> (9 hrs.)	(06 hrs)
		SMAW-05	22. Fillet lap joint on M.S. plate 10 mm thick in flat position. <b>(1F)</b> (7 hrs.)	- Welding positions as per EN & ASME: flat, horizontal, vertical and over head position.
		OAW-06	23. Fillet "T" joint on MS	

	standard procedure. [different types of joints- Fillet ( T-joint, lap & Corner), Butt (Square & V); different position - 1F, 2F, 3F,4F, 1G, 2G, 3G, 4G]	SMAW-06	sheet 2 mm thick in flat position. <b>(1F)</b> (7 hrs.) 24. Open Corner joint on MS plate 10 mm thick in flat position. <b>(1F)</b> (8 hrs.)	<ul style="list-style-type: none"> <li>- Weld slope and rotation.</li> <li>- Welding symbols as per BIS &amp; AWS. (06 hrs)</li> </ul>
		OAW-07	25. Fillet Lap joint on MS sheet 2 mm thick in flat position. <b>(1F)</b> (08 hrs.)	<ul style="list-style-type: none"> <li>- Arc length – types – effects of arc length.</li> <li>- Polarity: Types and applications.</li> <li>- Weld quality inspection, common welding mistakes and appearance of good and defective welds</li> <li>- Weld gauges &amp; its uses. (06 hrs)</li> </ul>
		SMAW-07	26. Single “V” Butt joint on MS plate 12 mm thick in flat position <b>(1G)</b> . (11 hrs.)	
		I&T-01	27. Testing of weld joints by visual inspection. (1 hr.) 28. Inspection of welds by using weld gauges. (1 hr.)	
		OAW-08	29. Square Butt joint on M.S. sheet. 2 mm thick in Horizontal position. <b>(2G)</b> (8 hrs.)	<ul style="list-style-type: none"> <li>- Calcium carbide properties and uses.</li> <li>- Acetylene gas properties and generating methods.</li> <li>- Acetylene gas Purifier, Hydraulic back pressure valve and Flash back arrestor. (06hrs)</li> </ul>
		SMAW-08	30. Straight line beads and multi layer practice on M.S. Plate 10 mm thick in Horizontal position. (4 hrs.)	
		SMAW-09	31. Fillet “T” joint on M.S. plate 10 mm thick in Horizontal position. <b>(2F)</b> (7 hrs.)	<ul style="list-style-type: none"> <li>- Oxygen gas and its properties</li> <li>- Production of oxygen by Air liquefaction.</li> <li>- Charging process of oxygen and acetylene gases</li> <li>- Oxygen and Dissolved Acetylene gas cylinders</li> </ul>
		OAW-09	32. Fillet Lap joint on M.S. sheet 2 mm thick in horizontal position <b>(2F)</b> (10 hrs.)	
		SMAW-10	33. Fillet Lap joint on M.S. plate 10 mm thick in horizontal position. (11 hrs.) <b>(2F)</b>	

				and Color coding for different gas cylinders. - Gas regulators, types and uses. (06 hrs)
		OAW-10	34. Fusion run with filler rod in vertical position on 2mm thick M.S sheet. (7 hrs.)	- 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. (06 hrs)
		OAW-11	35. Square Butt joint on M.S. sheet. 2 mm thick in vertical position <b>(3G)</b> (7 hrs.)	
		SMAW-11	36. Single Vee Butt joint on M.S. plate 12 mm thick in horizontal position <b>(2G)</b> . (8hrs.)	
		SMAW-12	37. Weaved bead on M.S Plate 10mm in vertical position.(7 hrs.)	- Arc blow – causes and methods of controlling. - Distortion in arc & gas welding and methods employed to minimize distortion - Arc Welding defects, causes and Remedies. (06 hrs)
		OAW-12	38. Fillet “T” joint on M.S sheet 2 mm thick in vertical position. <b>(3F)</b> (7 hrs.)	
		SMAW-13	39. Fillet “T” joint on M.S. plate 10 mm thick in vertical position. <b>(3F)</b> (8 hrs.)	
Professional Skill 100 Hrs; Professional Knowledge 28 Hrs	Set the SMAW machine and perform different type of joints on MS in different position observing standard procedure. <i>[different types of joints- Fillet ( T-joint, lap &amp; Corner), Butt (Square &amp; V); different</i>	OAW-13	40. Structural pipe welding butt joint on MS pipe Ø 50 and 3mm WT in 1G position. (15 hrs.)	- Specification of pipes, various types of pipe joints, pipe welding all positions, and procedure. - Difference between pipe welding and plate welding. (07 hrs)
		SMAW-14	41. Fillet Lap joint on M.S. Plate 10 mm in vertical position. <b>(3G)</b> (10 hrs.)	
		SMAW-15	42. Open Corner joint on MS plate 10 mm thick in	- Pipe development for Elbow joint, “T” joint, Y

	<i>position - 1F, 2F, 3F, 4F, 1G, 2G, 3G, 4G]</i>  Perform welding in different types of MS pipe joints by Gas welding (OAW). <i>[Different types of MS pipe joints – Butt, Elbow, T-joint, angle (45°) joint, flange joint]</i>	OAW-14	vertical position. <b>(2F)</b> (10 hrs.) 43. Pipe welding - Elbow joint on MS pipe Ø 50 and 3mm WT. <b>(1G)</b> (15 hrs.)	joint and branch joint - Manifold system (07 hrs)
		OAW-15	44. Pipe welding “T” joint on MS pipe Ø 50 and 3mm WT. <b>(1G)</b> (10 hrs.)	- 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 (07 hrs)
		SMAW-16	45. Single “V” Butt joint on MS plate 12 mm thick in vertical position (3G). (15 hrs.)	
Professional Skill 75 Hrs;  Professional Knowledge 21 Hrs	Set the SMAW machine and perform different type of joints on MS in different position observing standard procedure. <i>[different types of joints- Fillet ( T-joint, lap &amp; Corner), Butt (Square &amp; V); different position - 1F, 2F,</i>	OAW-16	46. Pipe welding 45 ° angle joint on MS pipe Ø 50 and 3mm WT. <b>(1G)</b> (15 hrs.)	- Electrode : types, functions of flux, coating factor, sizes of electrode Coding of electrode as per BIS, AWS, - Effects of moisture pick up. - Storage and baking of electrodes. - Special purpose electrodes and their applications. (07 hrs)
		SMAW-17	47. Straight line beads on M.S. plate 10mm thick in over head position. (10 hrs.)	
		SMAW-18	48. Pipe Flange joint on M.S plate with MS pipe Ø 50 mm X 3mm WT <b>(1F)</b> (15 hrs.)	- Weldability of metals, importance of pre heating, post heating and maintenance of inter pass temperature. (07 hrs)
		SMAW-19	49. Fillet “T” joint on M.S. plate 10 mm thick in over head position. <b>(4F)</b> (10 hrs.)	
		SMAW-20	50. Pipe welding butt joint on MS pipe Ø 50 and 5 mm WT. in 1G position.	- Classification of steel. - Welding of low, medium and high carbon steel and

	3F,4F, 1G, 2G, 3G, 4G]	SMAW-21	(15 hrs.) 51. Fillet Lap joint on M.S. plate 10 mm thick in over head position. <b>(4G)</b> . (10 hrs.)	alloy steels. (07 hrs)
	Set the SMAW machine and perform welding in different types of MS pipe joints by SMAW. <i>[Different types of MS pipe joints – Butt, Elbow, T-joint, angle (45°) joint, flange joint]</i>	SMAW-22	52. Single “V” Butt joint on MS plate 10mm thick in over head position <b>(4G)</b> (15 hrs.)	- Effects of alloying elements on steel - Stainless steel types- weld decay and weldability. (07 hrs)
		SMAW-23	53. Pipe butt joint on M. S. pipe Ø 50mm WT 6mm <b>(1G)</b> Rolled).(10 hrs.)	
Professional Skill 25 Hrs;  Professional Knowledge 07 Hrs	Choose appropriate welding process and perform joining of different types of metals and check its correctness. <i>[appropriate welding process – OAW, SMAW; Different metal – SS, CI, Brass, Aluminium]</i>	OAW-17  SMAW -24  OAW-18	54. Square Butt joint on S.S. sheet. 2 mm thick in flat position. <b>(1G)</b> (8 hrs.) 55. Square Butt joint on S.S. Sheet 2 mm thick in flat position. <b>(1G)</b> (8 hrs.) 56. Square Butt joint on Brass sheet 2 mm thick in flat position. <b>(1G)</b> (9 hrs.)	- Brass – types – properties and welding methods. - Copper – types – properties and welding methods. (07 hrs)
Professional Skill 25 Hrs;  Professional Knowledge 07 Hrs	Choose appropriate welding process and perform joining of different types of metals and check its correctness. <i>[appropriate welding process – OAW, SMAW; Different metal – SS, CI, Brass, Aluminium]</i>  Demonstrate arc gauging operation to	OAW-19  SMAW-25  AG-01	57. Square Butt & Lap joint on M.S. sheet 2 mm thick by brazing in flat position. (11 hrs.) 58. Single “V” butt joint C.I. plate 6mm thick in flat position. <b>(1G)</b> (11 hrs.) 59. Arc gouging on MS plate 10 mm thick. (3 hrs.)	- Aluminium and its alloys, properties and weldability, Welding methods - Arc cutting & gouging, (07 hrs)





			Dip transfer. <b>(1F)</b> (4 hrs.)	
		GMAW -03	71. Fillet weld – Lap joint on M.S. sheet 3mm thick in flat position by Dip transfer. <b>(1F)</b> (5 hrs.)	<ul style="list-style-type: none"> <li>- Advantages of GMAW welding over SMAW , limitations and applications</li> <li>- Process variables of GMAW.</li> <li>- Modes of metal transfer – dip or short circuiting transfer, spray transfer (free flight transfer) and globular transfer (intermittent transfer) and Pulsed metal transfer. (05 hrs)</li> </ul>
		GMAW -04	72. Fillet weld – “T” joint on M.S. sheet 3mm thick in flat position by Dip transfer. <b>(1F)</b> (5hrs.)	
		GMAW -05	73. Fillet weld – corner joint on M.S. sheet 3mm thick in flat position by Dip transfer. <b>(1F)</b> (5 hrs.)	
		GMAW -06	74. Butt weld – Square butt joint on M.S sheet 3mm thick in flat position <b>(1G)</b> (07 hrs.)	<ul style="list-style-type: none"> <li>- Wire feed system – types – care and maintenance.</li> <li>- Welding wires used in GMAW, standard diameter and codification as per AWS. (05 hrs)</li> </ul>
		GMAW -07	75. Butt weld – Single “V” butt joint on M.S plate 10 mm thick by Dip transfer in flat position. <b>(1G)</b> (8 hrs.)	
		GMAW -08	76. Fillet weld – “T” joint on M.S plate 10mm thick in Horizontal position by Dip transfer. <b>(2F)</b> (10 hrs.)	<ul style="list-style-type: none"> <li>- Types of shielding gases and gas mixtures used in GMAW and its applications.</li> <li>- Flux cored arc welding – description, advantage, welding wires, coding as per AWS. (06 hrs)</li> </ul>
		GMAW -09	77. Fillet weld – corner joint on M.S plate 10mm thick in Horizontal position by	

			Dip transfer. <b>(2F)</b> (15 hrs.)	
		GMAW -10	78. Fillet weld – “T” joint on M.S. sheet 3mm thick in Horizontal position by Dip transfer. <b>(2F)</b> (10 hrs.)	<ul style="list-style-type: none"> <li>- Edge preparation of various thicknesses of metals for GMAW.</li> <li>- GMAW defects, causes and remedies</li> </ul> (07 hrs)
		GMAW -11	79. Fillet weld – corner joint on M.S. sheet 3mm thick in Horizontal position by Dip transfer. <b>(2F)</b> (15 hrs.)	
		GMAW -12	80. Fillet weld – “T” joint on M.S plate 10mm thick in vertical position by Dip transfer. <b>(3F)</b> (10 hrs.)	<ul style="list-style-type: none"> <li>- Heat input and techniques of controlling heat input during welding.</li> <li>- Heat distribution and effect of faster cooling</li> </ul> (07 hrs)
		GMAW -13	81. Fillet weld – corner joint on M.S plate 10mm thick in vertical position by dip transfer. <b>(3F)</b> (15 hrs.)	
		GMAW -14	82. Fillet weld – Lap joint on M.S. sheet 3mm thick in vertical position by Dip transfer. <b>(3F)</b> (10 hrs.)	<ul style="list-style-type: none"> <li>- Pre heating &amp; Post Weld Heat Treatment</li> <li>- Use of temperature indicating crayons.</li> </ul> (07 hrs)
		GMAW -15	83. Fillet weld – corner joint on M.S. sheet 3mm thick in vertical position by Dip transfer. <b>(3F)</b> (15 hrs.)	

		GMAW -16	84. Fillet weld – Lap and “T” joint on M.S sheet 3mm thick in over head position by Dip transfer. <b>(4F)</b> (15 hrs.)	<ul style="list-style-type: none"> <li>- Submerged arc welding process –principles, equipment, advantages and limitations</li> <li>- Electro slag and Electro gas welding processes– principles, equipments, advantages and limitations.</li> </ul>
		GMAW -17	85. Tee Joints on MS Pipe Ø 60 mm OD x 3 mm WT 1G position – Arc constant (Rolling) (10 hrs.)	
		GMAW -18	86. Depositing bead on S.S sheet in flat position. (10 hrs.)	<ul style="list-style-type: none"> <li>- Thermit welding process- types, principles, equipments, Thermit mixture types and applications.</li> <li>- Use of backing strips and backing bars</li> </ul>
		GMAW -19	87. Butt joint on Stainless steel 2 mm thick sheet in flat position by Dip transfer. (15 hrs.)	
Professional Skill 100 Hrs;  Professional Knowledge 28 Hrs	Set the GTAW machine and perform welding by GTAW in different types of joints on different metals in different position and check correctness of the weld. <i>[different types of joints- Fillet ( T-joint, lap, Corner), Butt (Square &amp; V) ; different metals- Aluminium, Stainless Steel; different position- 1F &amp; 1G]</i>	GTAW -01	88. Depositing bead on Aluminium sheet 2 mm thick in flat position. (10 hrs.)	<ul style="list-style-type: none"> <li>- GTAW process - brief description. Difference between AC and DC welding, equipments, polarities and applications.</li> <li>- Various other names of the process (TIG, Argonarc)</li> <li>- Power sources for GTAW - AC &amp; DC</li> </ul>
		GTAW -02	89. Square butt joint on Aluminium sheet 1.6mm thick in flat position. (15 hrs.)	
		GTAW -03	90. Fillet weld – “T” joint on Aluminium sheet 1.6 mm thick in flat position. <b>(1F)</b> (10 hrs.)	<ul style="list-style-type: none"> <li>- Tungsten electrodes – types &amp; uses, sizes and preparation</li> <li>- GTAW Torches- types, parts and their functions</li> <li>- GTAW filler rods and selection criteria.</li> </ul>
		GTAW -04	91. Fillet weld – Outside corner joint on Aluminium sheet 2 mm thick in flat position. <b>(1F)</b> (15 hrs.)	

		GTAW -05	92. Butt weld - Square butt joint on Stainless steel sheet 1.6 mm thick in flat position with purging gas <b>(1G)</b> (25 hrs.)	<ul style="list-style-type: none"> <li>- Edge preparation and fit up.</li> <li>- GTAW parameters for welding of different thickness of metals</li> <li>- Pulsed TIG welding - brief description, pulse parameters slope up and slope down.</li> </ul> (07 hrs)
		GTAW -06	93. Fillet weld – “T” joint on Stainless steel sheet 1.6 mm thick in flat position. <b>(1F)</b> (25 hrs.)	<ul style="list-style-type: none"> <li>- Argon / Helium gas properties – uses.</li> <li>- GTAW Defects, causes and remedy.</li> </ul> (07 hrs)
Professional Skill 25 Hrs; Professional Knowledge 07 Hrs	Perform Aluminium & MS pipe joint by GTAW in flat position.	GTAW -07	94. Pipe butt joint on Aluminium pipe Ø 50 mm x 3 mm WT in Flat position. <b>(1G)</b> (25 hrs.)	<ul style="list-style-type: none"> <li>- Friction welding process-equipment and application</li> <li>- Laser beam welding (LBW) and Electron beam welding (EBW)</li> </ul> (07 hrs)
Professional Skill 25 Hrs; Professional Knowledge 07 Hrs	Perform Aluminium & MS pipe joint by GTAW in flat position.  Set the Plasma Arc cutting machine and cut ferrous & non-ferrous metals.	GTAW -08  PAC-01	95. “T” Joints on MS Pipe Ø 50 mm OD x 3 mm WT, position – Flat <b>(1F)</b> (15 hrs.)  96. Straight cutting on ferrous and non ferrous (10 hrs.)	<ul style="list-style-type: none"> <li>- Plasma Arc Welding (PAW) and cutting (PAC) process – equipments and principles of operation.</li> <li>- Types of Plasma arc, advantages and applications.</li> </ul> (07 hrs)
Professional Skill 25 Hrs; Professional Knowledge 07 Hrs	Set the resistance spot welding machine and join MS & SS sheet.	RW-01  RW-02	97. Lap joint on Stainless steel sheet by Resistance Spot welding. (10 hrs.)  98. MS sheets joining by Resistance Spot welding (15 hrs.)	<ul style="list-style-type: none"> <li>- Resistance welding process -types, principles, power sources and welding parameters.</li> <li>- Applications and limitations.</li> </ul> (07 hrs)
Professional	Perform joining of different similar and	OAW-01	99. Square butt joint on Copper sheet 2mm	<ul style="list-style-type: none"> <li>- Metalizing – types of metalizing principles,</li> </ul>

Skill 50 Hrs; Professional Knowledge 14 Hrs	dissimilar metals by brazing operation as per standard procedure. <i>[different similar and dissimilar metals- Copper, MS, SS]</i>	OAW-02	thick in flat position. <b>(1G)</b> (15 hrs.) 100. "T" joint on Copper to MS sheet 2mm thick in flat position by Brazing <b>(1F)</b> (10 hrs.)	equipments, advantages and applications - Manual Oxy – acetylene powder coating process-principles of operation and applications (07 hrs)
		OAW-03	101. Silver brazing on S.S Sheet with copper sheet "T" joint. (10 hrs.)	- Welding codes and standards
		OAW-04	102. Silver brazing on copper tube to tube. (15 hrs.)	- Reading of assembly drawing - Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) (07 hrs)
Professional Skill 25 Hrs; Professional Knowledge 07 Hrs	Repair Cast Iron machine parts by selecting appropriate welding process. <i>[Appropriate welding process- OAW, SMAW]</i>  Hard facing of alloy steel components / MS rod by using hard facing electrode.	OAW - 05	103. Repair welding of broken C.I. machine parts by oxy-acetylene welding with C.I and bronze filler rod. (10 hrs.)	- Hard facing/ surfacing necessity, surface preparation, various hard facing alloys and advantages of hard facing. (06 hrs)
		SMAW-01	104. Repair welding of broken C.I machine parts by C.I. electrode. (8 hrs.)	
		SMAW-02	105. Hard surfacing practice on M.S round rod Ø 25 mm by using Hard facing electrode in flat position. (7 hrs.)	

#### In-plant training / Project work

##### Broad area:

- Universal welding manipulator
- Metal rack
- Cylinder trolley with chain provision for locking
- Welding fixture for TIG- butt/ corner joint with purging facility