

**Curriculum**

**For**

**Welder**

**(SMAW/MAG/MIG/SAW)**

Six Months Duration Course

Code: VI82S004

## **1. Introduction Template**

### **NAME OF COURSE:**

Welder Technician SMAW, MAG, MIG, SAW

6 Months (800 hrs)

### **OVERALL OBJECTIVE OF COURSE**

1. The prime objective of this course of Welder Technician is to develop and enhance the skill level of the incumbent in the industry.
2. Semi-skilled and skilled worker produced by this training would help to reduce unemployment and poverty in the society.
3. To impart the training and provide the industry with workforce whose scope with job knowledge and skills are identified.
4. This curriculum is designed to train the Middle / Matric pass persons who are facing a lot of shortage of Welders in the field of industry.
5. This training program will provide opportunity to those who want to equip themselves with such knowledge and skills which will be helpful for their employment after completing this training of 06 months and would enable them to start their own business with professional approach.
6. Further, this Curriculum is developed by considering the requirements of local and international market and need of the trade enabling the pass-outs to meet the job market to reduce the shortage of Semi Skilled and Skilled workers in the area.
7. To establish coordination among employer's, workers and government relating to human resource development programs.
8. Provide technical and vocational training basis which reflects the requirements of the industry.

## **COMPETENCIES GAINED AFTER COMPLETION OF COURSE**

### **Knowledge Competencies:**

1. Safety precautions applicable to Welding machines, hand tools, equipments, tools and during welding operations.
2. The common types of materials and their uses.
3. Express the knowledge of welding, marking, identifying of material, cutting tools & instruments, their uses and safety.
4. Define basic principles of welding symbols, read & interpretation of drawings, bevel preparation and tacking.
5. Describe the knowledge of Arc (SMAW) welding tools, equipment, their use and safety.
6. Express knowledge of (MIG/MAG) welding tools, equipment, their use and safety.
7. Describe the knowledge of welding joints, positions, their use and selection.
8. Express the knowledge of inspecting and testing welded joints to ensure weld quality.
9. Understand application of work Permit & WPS.
10. Understand welding defects & their recognition and rectification process.

### **Skill Competencies:**

1. Observe all safety precautions about tools and equipment.
2. Common working hand tools (measuring, grinding, cutting tools, welding tools), their use and maintenance.
3. Preparation of working piece.
4. Grinding on working piece.
5. Use pencil grinders and cutting discs for the preparation of pipe piece.
6. Measure, cut and place / stack MS Pipe to the given size.
7. Making bevel of the pipe to make it ready for welding.
8. Tacking the two welding pieces for joint.
9. Arc (SMAW) welding of common welding joints in all positions.
10. Perform the SAW welding of common welding joints in all positions on pipes.
11. Execute the (MIG / MAG) welding of common welding joints in all positions.
12. Inspect and test welding joints.

13. Distinguish different metals & electrodes.
14. Understand electricity & control of welding machines.
15. Able to make bevel & cuts by grinders.
16. Able to prepare his job according to WPS

### **JOB OPPORTUNITIES AVAILABLE IMMEDIATELY AND IN THE FUTURE**

- Steel manufacturing industry.
- Construction industry.
- Fertilizer industry
- Chemical industry
- Sugar industry
- Industrial projects.
- Shipyards.
- Railway.
- Pakistan Ordinance Factory Wah.
- Heavy Mechanical Complex Taxila.
- Heavy Forge and Foundry Taxila.
- Tractor and Agricultural Equipment Industry.
- Automobile industry.
- Local industry.
- Local metal fabrication shops.
- Self employment.

### **TRAINEE ENTRY LEVEL**

The trainee selected should be minimum Matric in qualification, whereas Middle pass may also be considered, who have earned practical experience of welding prior to the admission.

### **MINIMUM QUALIFICATION OF TRAINER**

1. D.A.E / B. Tech experience in the field of welding
2. 5-Years experience in Industry / teaching
3. CSWIP or Other welding qualification would be added advantage
4. Computer Proficiency

## **MEDIUM OF INSTRUCTION I.E. LANGUAGE OF INSTRUCTION**

Medium of instruction would be Urdu, but the English would also be there, as the jargons, terminologies, standards, tools and equipment name are in English and they have to be learnt in the same language.

## SEQUENCE OF THE MODULES

### 2. Overview about the program –Curriculum for Welder Technician –

Module Title and Aim	Learning Units	Theory <sup>1</sup> Days/hours	Workplace <sup>2</sup> Days/hours	Timeframe of modules / sequence
Module 1 A- Follow Safety Rules	<ol style="list-style-type: none"> <li>1. Wear work clothes</li> <li>2. Wear safety gears</li> <li>3. Prepare the workplace</li> <li>4. Deal with work hazards, accidents &amp; injuries</li> <li>5. Inspect connections and regulators</li> <li>6. Use of extinguishers</li> <li>7. Place gas cylinders in appropriate location</li> <li>8. Ensure proper ventilation systems</li> </ol>	15 hrs	35 hr	# 1 Independent
Module 2 B- Work permit System	<ol style="list-style-type: none"> <li>1. Understanding Work permit system</li> <li>2. Knowledge about types of work permits</li> <li>3. Acquisition of work permit</li> </ol>	05 hrs	25 hrs	# 2
Module 3 C- Bench Work	<ol style="list-style-type: none"> <li>1. Metal Working tools basic</li> <li>2. Practical Exercise</li> <li>3. Jobs, Tools and Personal Safety</li> <li>4. Arithmetic's / Geometrical terminologies and problem solving</li> <li>5. Kinds of welding, their principles and use</li> </ol>	10 hrs	90 hrs	# 3, can be offered independent subject to Module "A" is completed

<sup>1</sup> Learning hours in training provider premises

<sup>2</sup> Training workshop, laboratory and on-the-job workplace

<p>Module 3 D- Perform Maintenance Operation</p>	<ol style="list-style-type: none"> <li>1. Replace damaged welding cables</li> <li>2. Replace cutting tools</li> <li>3. Clean the tip of the welding nozzle</li> <li>4. Change the holder and welding pliers</li> <li>5. Clean welding guns</li> <li>6. Clean machines and equipment</li> <li>7. Replace hoses of the Gas Cylinders</li> <li>8. Replace timer of the Gas regulators</li> </ol>	<p>10 hrs</p>	<p>25 hrs</p>	<p># 4</p>
<p>Module E- Communicate to Others</p>	<ol style="list-style-type: none"> <li>1. Communicate with supervisor</li> <li>2. Communicate with Engineer</li> <li>3. Communicate with peers</li> <li>4. Communicate with helpers</li> <li>5. Communicate with client / customer</li> </ol>	<p>10 hrs</p>	<p>15 hrs</p>	<p># 5, can be offered independent</p>
<p>Module F- Perform Electric Arc Welding</p>	<ol style="list-style-type: none"> <li>1. Organize the work place</li> <li>2. Prepare the required welding machine</li> <li>3. Remove surface base metal defects</li> <li>4. Set the suitable current</li> <li>5. Determine the suitable electrode size</li> <li>6. Connect the terminals of the welding machine</li> <li>7. Select the welding positions</li> <li>8. Bake the electrode</li> <li>9. Select the suitable grinder (cutting, grinding)</li> <li>10. Weld the Metal</li> <li>11. Remove Slag</li> <li>12. Remove visual</li> </ol>	<p>15 hrs</p>	<p>80 hrs</p>	<p># 6, Can also be offered independently subject to the module "C" is completed</p>

	defects			
Module G- Perform MAG Welding Operation	<ol style="list-style-type: none"> <li>1. Organize workplace</li> <li>2. Prepare the required welding machine</li> <li>3. Remove surface base metal defects</li> <li>4. Set pressure of the inert / active gas</li> <li>5. Select welding position</li> <li>6. Set voltage</li> <li>7. Set the wire's feed speed rate</li> <li>8. Clean welding joint after welding</li> <li>9. Weld the Metal</li> <li>10. Clean Welding joint after Welding</li> <li>11. Remove visual defects</li> </ol>	15 hrs	85 hrs	# 7, Can also be offered independently subject to the module "F" is completed
Module H- Perform MIG Welding Operation – Aluminum & Stainless Steel Welding Operation	<ol style="list-style-type: none"> <li>1. Organize workplace</li> <li>2. Prepare the required welding machine</li> <li>3. Remove surface base metal defects</li> <li>4. Set pressure of the inert / active gas</li> <li>5. Select welding position</li> <li>6. Set voltage</li> <li>7. Set the wire's feed speed rate</li> <li>8. Clean welding joint after welding</li> <li>9. Weld the Metal</li> <li>10. Clean welding joint after welding</li> <li>11. Remove visual defects</li> </ol>	20 hrs	108 hrs	# 8, Can also be offered independently subject to the module "G" is completed
Module I- Perform SAW Welding Operations	<ol style="list-style-type: none"> <li>1. Organize workplace</li> <li>2. Prepare the required welding machine</li> </ol>	20 hrs	108 hrs	# 9, Can also be offered independently subject to



	<ol style="list-style-type: none"> <li>3. Remove surface base metal defects</li> <li>4. Prepare the welding machine</li> <li>5. Prepare work part</li> <li>6. Use suitable powder flux type</li> <li>7. Follow operations supporting welding</li> <li>8. Reuse unconsumed flux</li> <li>9. Remove slag</li> <li>10. Remove visual defects</li> </ol>			the module "H" is completed
Module J- Repair Welding Defects	<ol style="list-style-type: none"> <li>1. Receive instruction from supervisor</li> <li>2. Trace the defected location</li> <li>3. Remove defected area</li> <li>4. Re-weld defected area</li> </ol>	6 hrs	16 hrs	# 10
Module K- Upgrade work skills	<ol style="list-style-type: none"> <li>1. Benefit from experienced people</li> <li>2. Read books in the field</li> <li>3. Watch videos on the subject</li> <li>4. Continue practicing welding operations</li> <li>5. Make visits to exhibitions and factories</li> </ol>	8 hrs	17 hrs	# 11
Module L- Prepare Equipment, tools & appliances	<ol style="list-style-type: none"> <li>1. Prepare welding machines</li> <li>2. Keep electrode in suitable place</li> <li>3. Prepare measure tools &amp; equipment</li> <li>4. Prepare welding power connectors</li> <li>5. Clean tools</li> <li>6. Prepare production fixtures</li> </ol>	8 hrs	12 hrs	# 12

Module M- Clear Work place at the time of completion of Work	<ol style="list-style-type: none"> <li>1. Place tools in proper place</li> <li>2. Shut down power supplies / gas cylinder</li> <li>3. Dispose waste material</li> <li>4. Return leftover consumables</li> </ol>	10 hrs	12 hrs	# 13
Module N- Welding Procedure Specification	<ol style="list-style-type: none"> <li>1. Reading WPS</li> <li>2. Understanding WPS</li> <li>3. Abbreviations and terminologies</li> <li>4. Standards</li> </ol>	8 hrs	12 hrs	# 14

### 3. Welding Technician Curriculum Contents ( Teaching and Learning Guide)

Module: A: Follow Safety Rules

Objective of the Module: To understand the safety requirements and standards

Duration: 50 hours Theory: 15 hours Practice: 35 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
1. Wear work clothes	1.1. Is able to understand the personal Safety 1.2. is able to working while wearing the coverall & welding aprons etc 1.3. Is able to explain the advantages of the safe clothing	Knowledge of: 1.1.1. Work safety and environment 1.1.2. Type of safety clothing 1.1.3. Use of safety clothing  Ability to: 1.1.4 Perform while wearing safety clothing whole working 1.1.5 Indentify the work environment and selecting proper clothing	2+1 hrs	<ul style="list-style-type: none"> <li>- Coverall</li> <li>- Welding Apron</li> <li>- Face Shield</li> <li>- Welding Gloves</li> <li>- Safety Shoes</li> <li>- Ear Plugs</li> <li>- Ear Muffs</li> <li>- Breathing Apparatus</li> <li>- Safety Belt</li> </ul>	Workshop
2. Wear Safety Gears	2.1 Is able to know the safety equipment used 2.2 Is able to understand and purpose of each	Knowledge of: 2.1.1 Safety gears i.e; Face Shield, Safety Shoes, Welding Helmets, Goggles, Ear Plugs, Ear Muffs, Welding	1+4 hrs	<ul style="list-style-type: none"> <li>- White/ Black board</li> <li>- OHP</li> <li>- Transparences</li> <li>- Information sheets</li> <li>- Exercise sheets</li> <li>- Work sheets</li> <li>- Coverall</li> <li>- Welding Apron</li> </ul>	Class Room Workshop

	equipment	<p>2.2.1 Gloves, etc Safety at work and its importance</p> <p>Ability to:</p> <ol style="list-style-type: none"> <li>1. Use safety gears and equipments</li> <li>2. Identify safety requirements</li> <li>3. Perform in safe environment</li> </ol>		<ul style="list-style-type: none"> <li>- Face Shield</li> <li>- Welding Gloves</li> <li>- Safety Shoes</li> <li>- Ear Plugs/muffs</li> <li>- Helmets</li> </ul>	
3 Prepare the Work place	<p>3.1 Able to know about Housekeeping and its advantages</p> <p>3.2 Gathering to tools and equipment required to perform the job</p>	<p>Knowledge of:</p> <ol style="list-style-type: none"> <li>3.1.1 Housekeeping and work place preparation to start the activity</li> <li>3.1.2 Safe working environment and its advantages</li> <li>3.1.3 Effects on Performance because of workplace</li> </ol> <p>Ability to:</p> <ol style="list-style-type: none"> <li>1. Selection and identify the tools required</li> <li>2. Place and handle the tools and equipment to be used</li> </ol>	2+4 hrs	<ul style="list-style-type: none"> <li>- White/ Black board</li> <li>- OHP</li> <li>- Transparences</li> <li>- Information sheets</li> <li>- Exercise sheets</li> <li>- Work sheets</li> <li>- Cleaning Equipment</li> <li>- Mobbing Brush</li> <li>- Dust bins</li> </ul>	Class room Workshop
4. Deal with work hazards, accidents & Injuries	<p>4.1 Able to know the work hazards</p> <p>4.2 Able to know about the injuries</p>	<p>Knowledge of:</p> <ol style="list-style-type: none"> <li>4.1.1 Health hazards occurring due to welding</li> <li>4.1.2 Possible injuries that can occur</li> </ol>	2+4 hrs	<ul style="list-style-type: none"> <li>- White/ Black board</li> <li>- OHP</li> <li>- Transparences</li> <li>- Information sheets</li> <li>- Exercise sheets</li> </ul>	Class room Workshop

	<p>happening during welding</p> <p>4.3 Able to know about the first aid</p>	<p>4.1.3 First Aid provision and Emergency response</p> <p>Ability to:</p> <ol style="list-style-type: none"> <li>1. Remain conscious and provide first aid to the fellow who is suffering</li> <li>2. To assembly area in case of emergency</li> <li>3. Respond and call in the first aid</li> </ol>		<ul style="list-style-type: none"> <li>- Work sheets</li> <li>- First aid box with Medicines</li> </ul>	
5. Inspect connections and regulators	<p>5.1 Is able to know about the connection.</p> <p>5.2 Is able to identify the proper connections</p> <p>5.3 Able to understand the function of regulators and gas cylinders</p>	<p>Knowledge of:</p> <ol style="list-style-type: none"> <li>5.1.1 Electrical connection, receptacles</li> <li>5.1.2 Earthing and proper safety requirements</li> <li>5.1.3 Gas Cylinders, their types and usage</li> <li>5.1.4 Current flow</li> </ol> <p>Ability of:</p> <ol style="list-style-type: none"> <li>1. Insulating, connectors, and thimbles installations</li> <li>2. Regulators installations.</li> <li>3. Type of regulators.</li> <li>4. Back fire arresters function and their installation before start of work</li> </ol>	2+7 hrs	<ul style="list-style-type: none"> <li>- White/ Black board</li> <li>- OHP</li> <li>- Transparencs</li> <li>- Information sheets</li> <li>- Exercise sheets</li> <li>- Work sheets</li> <li>- Regulator</li> <li>- Backfire Arresters</li> <li>- Thimble</li> <li>- Lugs</li> <li>- Female Connector</li> <li>- Male Connector</li> <li>- Receptacles</li> </ul>	Classroom Workshop

<p>6. Use of Extinguishers</p>	<p>6.1 Is able to respond in case of fire 6.2 Using of fire extinguishers and other techniques 6.3 Fire safety and hazards</p>	<p>Knowledge of: 6.1.1 Causes of Fire 6.1.2 Fire Hazards 6.1.3 Fire Safety 6.1.4 Process and respond in case of emergency 6.1.5 Types of fire extinguishers 6.1.6 Welding fires 6.1.7 Sparks and spatters</p> <p>Ability to: 1. Use the fire extinguishers 2. Use of fire blankets 3. Use of Water and Sand 4. Remain safe and keep others safe as well 5. Making precautionary measures 6. Respond correctly in case of emergency</p>	<p>2+6 hrs</p>	<ul style="list-style-type: none"> <li>- White/ Black board</li> <li>- OHP</li> <li>- Transparencens</li> <li>- Information sheets</li> <li>- Exercise sheets</li> <li>- Work sheets</li> <li>- Fire Extinguishers of all types</li> <li>- Fire Blankets</li> <li>- Water Buckets</li> <li>- Sand Buckets</li> </ul>	<p>Class Room Workshop</p>
<p>7. Place gas cylinders in appropriate location</p>	<p>7.1 Is able to place the cylinders properly 7.2 is able to handle the shifting of the cylinders 7.3 Is able to keep safe working conditions</p>	<p>Knowledge of: 7.1.1 Cylinders and their types 7.1.2 Use of cylinders 7.1.3 Shifting / mobilizing the cylinders 7.1.4 Keeping the full and empty cylinders in proper place 7.1.5 Hazards of</p>	<p>2+5 hrs</p>	<ul style="list-style-type: none"> <li>- White/ Black board</li> <li>- OHP</li> <li>- Transparencens</li> <li>- Information sheets</li> <li>- Exercise sheets</li> <li>- Work sheets</li> </ul>	<p>Class Room Workshop</p>

		<p>mishandling with cylinder</p> <p>7.1.6 Cylinder trolleys and their functions</p> <p>Ability to:</p> <ol style="list-style-type: none"> <li>1. Place and shift cylinders</li> <li>2. Keep the work place safe</li> </ol>			
8. Ensure proper ventilation systems	<p>8.1 Is able to understand the ventilation system</p> <p>8.2. Able to keep the smoke free zone of his work place</p>	<p>Knowledge of:</p> <ol style="list-style-type: none"> <li>8.1.1 Ventilations systems</li> <li>8.1.2 Ducting an its types</li> <li>8.1.3 Exhaust Fans</li> <li>8.1.4 Smoke Catchers</li> </ol> <p>Ability to:</p> <ol style="list-style-type: none"> <li>1. Place the welding plant where there is proper ventilation</li> <li>2. Keep the environment smoke free</li> </ol>	2+4 Hrs	<ul style="list-style-type: none"> <li>- White/ Black board</li> <li>- OHP</li> <li>- Transparencs</li> <li>- Information sheets</li> <li>- Exercise sheets</li> <li>- Work sheets</li> <li>- Exhaust Fans</li> <li>- Ducts</li> </ul>	Classroom Workshop

Module – B : Title.....Work Permit Systems

Objective of the Module: .....To Control the completion time and Manage Material.

Duration: 30 hours      Theory: 05 hours      Practice: 25 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
1. Follow Work permit system	1.1 Able to understand the commencement of the job 1.2 Able to know about the working conditions	Knowledge of: 1.1.1 Prerequisites for start of the job 1.2.1 Importance of Work Permit  Ability to: 1. Know about the permission and authorities and responsibilities of the job 2. Analyze the work place conditions and hazards 3. Take precautions 4. Plan the job for proper execution	3+10 hrs	1. Stationery 2. Work Permit Document	Class Room
2. Assess requirement of work permits	2.1 Is able to know the and describe the work permits	Knowledge of: 2.1.1 Work Permit System 2.1.2 Hot work permits 2.1.3 Cold work permits  Ability to: 1. Assess the job and generate required work permit	1+10 hrs	- White/Chalk board - OHP - Transparencies - Relevant forms / documents - Information sheets - Exercise sheet - Work sheet	Classroom



<p>3. Acquisition of work permit</p>	<p>3.1 Knowledge about the issuer and responsible personnel involved.</p> <p>3.2 Process &amp; procedure to get the work Permit</p>	<p>Knowledge of:</p> <p>3.2.1 Work Permit type</p> <p>3.2.2 Work Permit Issuer</p> <p>3.2.3 Process and procedure to get the work permit</p> <p>Ability to:</p> <ol style="list-style-type: none"> <li>1. Coordinate with the supervisor</li> <li>2. Coordinate with the safety personnel</li> <li>3. Know the safety requirement and the work permit acquisition</li> </ol>	<p>1+5 hrs</p>	<ul style="list-style-type: none"> <li>- White/Chalk board</li> <li>- OHP</li> <li>- Transparencies</li> <li>- Relevant forms / documents</li> <li>- Information sheets</li> <li>- Case history</li> <li>- Exercise sheet</li> <li>- Work sheet</li> </ul>	<p>Classroom Workshop</p>

Module – C : Title..... Basic Bench Work

Objective of the Module: .... To Identify, Select and perform Operations with basic metal working Tools

Duration: 100 hours Theory: 10 hours Practice: 90 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
1. Organize the Bench work Tools.	1.1 Is able to Identify the suitable tools for the job.	<p>Knowledge of:</p> <p>1.1.1 <b>Measuring Tools:</b> Steel foot rules, Steel Tape, Vernier Caliper, Calipers (Internal &amp; external), Micrometer, Gauges, Solid Steel Square, Protectors.</p> <p>1.1.2 <b>Marking Tools:</b> Steel scribes, Divider, Centre Punch, Surface Gauge.</p> <p>1.1.3 <b>Cutting tools:</b> Shears, Saws, Chisels, Punches, Drills /Counter sinks, Thread cutting Tapes &amp; Dies.</p> <p>1.1.4 <b>Files Scraper and Grinders; Files-</b>Single cut, Cross cut, Rasp and their shapes. <b>Scrapers-</b> Flat and Triangle. <b>Grinders-</b> Grades, Wheels, Discs and Pencils.</p> <p>1.1.5 Hammers: Kinds, Shapes and Weights.</p> <p>Ability : The trainee is able to</p>	2+6 hrs	<ul style="list-style-type: none"> <li>- Original Tools</li> <li>- White/Chalk board</li> <li>- OHP</li> <li>- Transparencies</li> <li>- Information sheets</li> <li>- Exercise sheets</li> <li>- Work sheets</li> </ul>	Class Room Workshop

		select the basic tools for metal work			
2. Organize the Bench work Place.	2.1 Is able to select basic metal working tools.	<p>Knowledge of:</p> <p>2.1.1 Select the tools for jobs.</p> <p>2.1.2 Place the tools in proper manners</p> <p>2.1.3 Place Exercise sheet/drawing on bench</p> <p>2.1.4 Care the respective tools</p> <p>2.1.5 Care the job</p> <p>2.1.6 Self safety</p> <p>Ability to: The trainee is able to manage his workplace in good presenting condition</p>	2+3 hrs	<ul style="list-style-type: none"> <li>- Trainees tool kit</li> <li>- Working Clothes</li> <li>- Duster for placing tools on bench</li> <li>- Bench cleaning brush</li> </ul>	Class room Workshop
3. Observe Tools, Job and personal safety.	3.1 Observe safety for tools, work and personal to complete the Job.	<p>Knowledge of:</p> <p>3.1.1. Measuring tool safety</p> <p>3.1.2. Marking tools safety</p> <p>3.1.3. Cutting tools safety</p> <p>3.1.4. Files, Scraper and Grinder safety</p> <p>3.1.5. Jobs safety</p> <p>3.1.6. Personal safety</p> <p>Ability to: The trainee is able to perform his work safely with quality.</p>	2+4 hrs	<ul style="list-style-type: none"> <li>- Original Tools</li> <li>- White/Chalk board</li> <li>- OHP</li> <li>- Transparencies</li> <li>- Information sheets</li> <li>- Exercise sheets</li> <li>- Work sheets</li> </ul>	Class room Workshop
4. Prepare the jobs according to the drawings.	4.1 Practical work	<p>Skill of:</p> <p>i. Filing Exercise (channel)</p> <p>ii. Squaring</p> <p>iii. Marking</p> <p>iv. Sawing</p>	<p>16 hrs</p> <p>08 hrs</p>	<p>MS Channel 100x75x38x6</p> <p>MS Flat 100x62.5x15</p> <ul style="list-style-type: none"> <li>- do –</li> <li>- do –</li> </ul>	<p>Workplace</p> <p>Workplace</p>

		v. Drilling vi. Countersinking vii. Counterboring viii. Threading ix. Stretching x. Sheet metal box  Ability to: The trainee is able to make the jobs in size as per given drawings.	04 hrs 08 hrs 08 hrs 04 hrs 07 hrs 10 hrs	- do – - do – - do – MS Flat 173x25x2.5 MS Sheet 132x162x1	Workplace Workplace Workplace Workplace Workplace  Workplace
5. Arithmetic's / Geometrical terminologies and problem solving.	5.1 Solve the Simple Math Questions 5.2 Understand and Read the Drawing	Knowledge of: i. Addition and Subtractions ii. Multiplications and Divisions iii. Diameter and Circumference finding iv. Percentage finding v. Conversion of Inches to Metric to Inches  5.2.1 Kinds of Lines 5.2.2 Kinds of Angles 5.2.3 Drawing the Radius 5.2.4 Corner finding from Isometric views 5.2.5 Views finding 5.2.6 Matching of views  Ability to: The trainee is able to solve the mathematical problems and read the	2+12 hrs	- White/Chalk board - Transparencies - OHP - Information sheets - Exercise Sheets - Work Sheets	Class room

		Drawings for the completion of job.			
6. Define kinds of welding, their principles and use.	6.1 Explain the different kinds of Welding:	<p>Knowledge of:</p> <p>6.1.1 Kinds of Pressure Welding, their principles and Uses</p> <p>6.1.2 Kinds of Fusion Welding, their Principles and Uses</p> <p>Ability to:</p> <p>1. Differentiate pressure and Fusion welding machines and equipments</p>	2 hrs	<ul style="list-style-type: none"> <li>- White/Chalk board</li> <li>- Transparencies</li> <li>- OHP</li> <li>- Information sheets</li> <li>- Exercise Sheets</li> <li>- Work Sheets</li> </ul>	Class room

Module – D : Title.....Perform Maintenance Operation

Objective of the Module: .....To keep the Machines, Equipments and Tools ready for Operation

Duration: 35 hours Theory: 10 hours Practice: 25 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
1. Replace damaged welding cables	1.1 Keep the cables in good condition for execution of the assigned job	<p>Knowledge of:</p> <p>1.1.1 Welding Cables</p> <p>1.1.2 Thimbles and Lugs</p> <p>1.1.3 Knowledge of causes which damages the cable</p> <p>Ability to:</p> <p>1. Repair the joints</p> <p>2. Remove defective cables</p> <p>3. Install thimbles and lugs</p>	1+3 hrs	<ul style="list-style-type: none"> <li>- Relevant tools and material</li> <li>- White/Chalk board</li> <li>- OHP</li> <li>- Transparencies</li> <li>- Information sheets</li> <li>- Exercise sheet</li> <li>- Work sheet</li> </ul>	Classroom Workplace
2. Replace cutting tools	2.1 Handling of the grinder and cutting tools	<p>Knowledge of:</p> <p>2.1.1 Grinders and their safe use</p> <p>2.1.2 Type of cutting Discs</p> <p>2.1.3 Sizes of cutting Discs</p> <p>2.1.4 Hand and electrical saws</p> <p>2.1.5 Filling tools</p> <p>Ability to:</p> <p>1. Handle and cut with power saw</p> <p>2. Cutting using grinders</p>	1+3 hrs	<ul style="list-style-type: none"> <li>- Relevant tools and material</li> <li>- White/Chalk board</li> <li>- OHP</li> <li>- Transparencies</li> <li>- Information sheets</li> <li>- Exercise sheet</li> <li>- Work sheet</li> </ul>	Classroom Workplace

		<p>and cutting discs</p> <ol style="list-style-type: none"> <li>i. Smoothing of the edges</li> <li>ii. Filling techniques</li> </ol>			
3. Clean the tip of the welding nozzle	<p>3.1 Kinds and sizes of the welding nozzles</p> <p>3.2 cleaning techniques and tools</p>	<p>Knowledge of:</p> <ol style="list-style-type: none"> <li>3.1.1 Welding Nozzles and their types</li> <li>3.1.2 Sizes of the welding nozzles</li> <li>3.2.1 Cleaning tools</li> <li>3.2.2 Efficiency due to clean nozzles</li> </ol> <p>Ability to:</p> <ol style="list-style-type: none"> <li>1. Clean the nozzle</li> <li>2. Adjust the flames</li> <li>3. Perform welding using gases</li> </ol>	1+3 hrs	<ul style="list-style-type: none"> <li>- Relevant tools and material</li> <li>- White/Chalk board</li> <li>- OHP</li> <li>- Transparencies</li> <li>- Information sheets</li> <li>- Exercise sheet</li> <li>- Work sheet</li> </ul>	Classroom Workplace
4. Change the holder and welding pliers	4.1 Able to know the types and size of the welding holder	<p>Knowledge of:</p> <ol style="list-style-type: none"> <li>4.1.1 Welding holders types and their sizes</li> <li>4.1.2 Current capacity of the welding holder</li> </ol> <p>Ability to:</p> <ol style="list-style-type: none"> <li>1. Change the welding holder</li> <li>2. Plug the holder to the cable and welding rectifiers</li> </ol>	1+3 hrs	<ul style="list-style-type: none"> <li>- Relevant tools and material</li> <li>- White/Chalk board</li> <li>- OHP</li> <li>- Transparencies</li> <li>- Information sheets</li> <li>- Exercise sheet</li> <li>- Work sheet</li> </ul>	Classroom Workplace
5. Clean welding guns	5.1 Is able to use and clean the welding guns	<p>Knowledge of:</p> <ol style="list-style-type: none"> <li>5.1.1 Gas cutting sets</li> <li>5.1.2 Welding guns types and their sizes</li> </ol>	1+3 hrs	<ul style="list-style-type: none"> <li>- Relevant tools and material</li> <li>- White/Chalk board</li> <li>- OHP</li> </ul>	Classroom Workplace

		<p>5.1.3 Hose pipes and their maintenance</p> <p>Ability to:</p> <ol style="list-style-type: none"> <li>1. Change the welding gun / gas cutter and cleaning procedure</li> <li>2. Nozzle installations and replacement</li> </ol>		<ul style="list-style-type: none"> <li>- Transparencies</li> <li>- Information sheets</li> <li>- Exercise sheet</li> <li>- Work sheet</li> </ul>	
6. Clean machines and equipment	6.1 Cleaning and maintenance of welding machines / rectifiers	<p>Knowledge of:</p> <ol style="list-style-type: none"> <li>6.1.1 Types of welding machines / rectifiers</li> <li>6.1.2 Welding current settings and flow</li> <li>6.1.3 Earthing and safe operations</li> <li>6.1.4 Slag and carbon removal from the thimbles / connectors / receptacles</li> </ol> <p>Ability to:</p> <ol style="list-style-type: none"> <li>1. Change the welding machine</li> <li>2. Clean the welding machines</li> <li>3. Plugging the machine to the receptacles</li> <li>4. Changing of the receptacles</li> <li>5. Male and Female connectors and their cleaning</li> </ol>	2+4 hrs	<ul style="list-style-type: none"> <li>- Relevant tools and material</li> <li>- White/Chalk board</li> <li>- OHP</li> <li>- Transparencies</li> <li>- Information sheets</li> <li>- Exercise sheet</li> <li>- Work sheet</li> </ul>	Classroom Workplace



<p>7. Replace hoses of the Gas Cylinders</p>	<p>7.1 Able to change and maintain the hose pipes used with gas cylinders</p>	<p>Knowledge of:</p> <p>7.1.1 Types of Hose pipe and their sizes</p> <p>7.1.2 Clapping and installation of the hose pipe with the cylinders and welding guns</p> <p>7.1.3 Types of gases and their uses</p> <p>7.1.4 LPG / Acetylene / Oxygen hose pipes</p> <p>Ability to:</p> <ol style="list-style-type: none"> <li>1. Change the hose pipes</li> <li>2. Removal of the damaged pipes</li> <li>3. Making joints in the pipe for repair and length increasing</li> </ol>	<p>2+3 hrs</p>	<ul style="list-style-type: none"> <li>- Relevant tools and material</li> <li>- White/Chalk board</li> <li>- OHP</li> <li>- Transparencies</li> <li>- Information sheets</li> <li>- Exercise sheet</li> <li>- Work sheet</li> </ul>	<p>Classroom Workplace</p>
<p>8. Replace timer of the Gas regulators</p>	<p>8.1 Changing and maintenance of the gas welding equipment</p>	<p>Knowledge of:</p> <p>8.1.1 Gas regulators</p> <p>8.1.2 Calibration and testing of the regulators</p> <p>8.1.3 Making connections with the regulators and timers</p>	<p>1+3 hrs</p>	<ul style="list-style-type: none"> <li>- Relevant tools and material</li> <li>- White/Chalk board</li> <li>- OHP</li> <li>- Transparencies</li> <li>- Information sheets</li> <li>- Exercise sheet</li> <li>- Work sheet</li> </ul>	<p>Classroom Workplace</p>

		<p>Ability to:</p> <ol style="list-style-type: none"><li>1. Install the regulators properly and test it before starting of the job.</li><li>2. Use of timers and regulators</li><li>3. Installation of backfire arresters and safe operations</li><li>4. Change the timer and regulators</li><li>5. Oxygen and Gas mixing hosing and regulators</li></ol>			
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Module – E : Title.....Communication to others

Objective of the Module: ..... To perform work with controlled time and quality Assurance

Duration: 25 hours      Theory: 10 hours      Practice: 15 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
1. Communicate with Supervisor	1.1 Understanding the direct orders and responding to them	Knowledge of: 1.1.1 Understanding commands 1.1.2 Understanding Instructions of the supervisor 1.1.3 Knowing and understanding the assigned task details  Ability to: 1. Understand the task 2. Identify problems and taking guideline from the supervisor 3. Keep the supervisor update about the progress of the work completed 4. Time management and work performance 5. Achieve the targets 6. Team building	2+2 hrs	- One case study - White/Chalk board - OHP - Transparencies - Information sheets - Exercise sheets - Work sheets	Classroom Workshop
2. Communicate with Engineer	2.1 Is able the follow the instructions and order of the	Knowledge of: 2.1.1 Assigned task details understanding 2.1.2 Taking guideline	2+2 hrs	- One case study - White/Chalk board - OHP - Transparencies	Classroom Workshop

	superiors	<p>from the engineers on particular task</p> <p>2.1.3 Time management and work performance</p> <p>Ability to:</p> <ol style="list-style-type: none"> <li>1. Update the work in progress</li> <li>2. Achieve targeted milestone of the job / task</li> <li>3. Play his role as a team member</li> <li>4. Taking guideline on the drawing and job specifications</li> </ol>		<ul style="list-style-type: none"> <li>- Information sheets</li> <li>- Exercise sheets</li> <li>- Work sheets</li> </ul>	
3. Communicate with peers	3.1 Able to sharing knowledge and problem solving abilities	<p>Knowledge of:</p> <ol style="list-style-type: none"> <li>3.1.1 Team building</li> <li>3.1.2 Performance abilities</li> <li>3.1.3 Knowledge sharing and learning</li> <li>3.1.4 Understand the inter-related tasks with fellows</li> <li>3.1.5 Better understanding of job</li> </ol> <p>Ability to:</p> <ol style="list-style-type: none"> <li>1. Perform and compete with fellow</li> <li>2. Taking and giving guidelines to each</li> </ol>	2+4 hrs	<ul style="list-style-type: none"> <li>- One case study</li> <li>- White/Chalk board</li> <li>- OHP</li> <li>- Transparencies</li> <li>- Information sheets</li> <li>- Exercise sheets</li> <li>- Work sheets</li> </ul>	Classroom Workshop

		<p>other</p> <p>3. Solve the problem on job and off the job as well</p> <p>4. Better safe working environment</p>			
4. Communicate with helpers	4.1 Able to give commands to the subordinates	<p>Knowledge of:</p> <p>4.1.1 Giving the orders to juniors</p> <p>4.1.2 Making helpers learn about tools and equipments</p> <p>4.1.3 Completing the task with the assistance of helpers</p> <p>Ability to:</p> <p>1. Perform the job</p> <p>2. Keeping the working environment</p> <p>3. Follow Safety requirements</p> <p>4. Making knowledge and learning sharing a habit</p> <p>5. Problem sharing and solutions</p>	2+3 hrs	<ul style="list-style-type: none"> <li>- One case study</li> <li>- White/Chalk board</li> <li>- OHP</li> <li>- Transparencies</li> <li>- Information sheets</li> <li>- Exercise sheets</li> <li>- Work sheets</li> </ul>	Classroom Workshop
5. Communicate with client / customer	5.1 Is able to understand the requirement of the client / customer	<p>Knowledge of:</p> <p>5.1.1 Client information</p> <p>5.1.2 Job requirements and their details</p> <p>5.1.3 Building company image</p> <p>Ability to:</p>	2+4 hrs	<ul style="list-style-type: none"> <li>- White/Chalk board</li> <li>- OHP</li> <li>- Transparencies</li> <li>- Information sheets</li> <li>- Exercise sheets</li> <li>- Work sheets</li> </ul>	Classroom

		<ol style="list-style-type: none"><li>1. Understand the requirement of the job</li><li>2. Execute the job according to the client requirements</li><li>3. Better work methodology</li></ol>			
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Module – F : Title..... Perform Electric Arc Welding

Objective of the Module: .....To Weld with Electric Arc welding process on different Joints and welding Positions

Duration: 95 hours      Theory: 15 hours      Practice: 80 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
1. Organize the work place	1.1 Able to arrange the tools and equipment required to perform the job	<p>Knowledge of:</p> <ul style="list-style-type: none"> <li>1.1.1 Tools required</li> <li>1.1.2 Welding Machines</li> <li>1.1.3 Grinders</li> <li>1.1.4 Fire Safety precautions</li> </ul> <p>Ability to:</p> <ul style="list-style-type: none"> <li>1. Organize the job to execute</li> <li>2. Perform job on time and safely</li> <li>3. Plan the activity to perform</li> </ul>	4 hrs	<ul style="list-style-type: none"> <li>- Relevant Equipment</li> <li>- White/Chalk board</li> <li>- Transparencies</li> <li>- OHP</li> <li>- Information sheets</li> <li>- Exercise Sheets</li> <li>- Work Sheets</li> </ul>	Classroom
2. Prepare the required welding machine	1.1 Is able to identify the welding machine / rectifier required to execute the job according to the WPS	<p>Knowledge of:</p> <ul style="list-style-type: none"> <li>1.1.1 Types of the Welding Machines</li> <li>1.1.2 Current / polarity settings</li> <li>1.1.3 Welding machines accessories and their safe working conditions</li> </ul> <p>Ability to:</p> <ul style="list-style-type: none"> <li>1. Select the machine required with AC / DC current</li> <li>2. Gas cutting set</li> </ul>	3+2hrs	<ul style="list-style-type: none"> <li>- Relevant Equipment</li> <li>- White/Chalk board</li> <li>- Transparencies</li> <li>- OHP</li> <li>- Information sheets</li> <li>- Exercise Sheets</li> <li>- Work Sheets</li> </ul>	Classroom Workplace

		<p>installation</p> <p>3. Regulators and holders selection and installation</p>			
3. Remove surface base metal defects	3.1 Able to prepare the welding piece	<p>Knowledge of:</p> <p>3.1.1 Base metal i.e. Carbon Steel / Mild Steel / Stainless Steel etc.</p> <p>3.1.2 Grinding the pieces to remove the slag / defects</p> <p>3.1.3 Cutting angles</p> <p>3.1.4 Making bevel (as required)</p> <p>3.1.5 Cleaning the surface of the welding piece</p> <p>Ability to:</p> <ol style="list-style-type: none"> <li>1. Grind and buff</li> <li>2. Use of the power brush</li> <li>3. Marking the piece</li> <li>4. Preparing for the joint</li> </ol>	2 hrs	<ul style="list-style-type: none"> <li>- Relevant tools and equipment</li> <li>- Metal pieces</li> </ul>	Workplace
4. Set Suitable current	4.1 Able to select the current required according to the WPS / job order	<p>Knowledge of:</p> <p>4.1.1 Welding Machine current ratio</p> <p>4.1.2 Setting the current / polarity</p> <p>4.1.3 Operating the wheel / dial of the machine to set the desired current</p> <p>4.1.4 Electrical current and its flow</p>	3+2 hrs	<ul style="list-style-type: none"> <li>- Relevant tools and equipment</li> <li>- Metal pieces</li> </ul>	Classroom Workplace



		<p>Ability to:</p> <ol style="list-style-type: none"> <li>1. Set the current</li> <li>2. Test the current</li> <li>3. Identify the electrode and its current handling capacities</li> <li>4. Perform the job according to the desired results as specified in the WPS / job order</li> </ol>			
5. Determine the suitable electrode size	5.1 Able to understand the size of the welding piece and required electrode	<p>Knowledge of:</p> <ol style="list-style-type: none"> <li>5.1.1 Welding electrode types and their sizes</li> <li>5.1.2 Classification</li> <li>5.1.3 Base material</li> <li>5.1.4 Selection of electrode according to WPS / job order</li> <li>5.1.5 Identify the material and select the electrode by himself</li> </ol> <p>Ability to:</p> <ol style="list-style-type: none"> <li>1. Understand the electrode types</li> <li>2. Electrode materials</li> <li>3. Coding of electrodes</li> <li>4. Classifications of the electrodes</li> </ol>	3+2 hrs	<ul style="list-style-type: none"> <li>- Relevant tools and equipment</li> <li>- Metal pieces</li> <li>- Worksheet</li> <li>-</li> </ul>	Classroom Workplace
6. Connect the terminals of the welding	6.1 Is able to select the machine	<p>Knowledge of:</p> <ol style="list-style-type: none"> <li>6.1.1 Thimbles, lugs and terminals</li> </ol>	2 hrs	<ul style="list-style-type: none"> <li>- Relevant tools and equipment</li> </ul>	Workplace

machine	and connect its terminals	6.1.2 Male and Female Connectors 6.1.3 Welding Machines types 6.1.4 Selection of the proper welding cables 6.1.5 Use of pliers to connect terminals  Ability to: 1. Connect the terminals 2. Select the male and female connectors		- Metal pieces	
7. Select the welding positions	7.1 Able to set the welding positions required	Knowledge of: 7.1.1 Welding Positions (Vertical, Horizontal, Flat, Overhead,) 7.1.2 Understand the terminologies (IG, 2G, 3G, 4G, 5G & 6G)  Ability to: 1. Perform and execute the job according to the WPS / job order 2. Describe the position 3. Set the welding piece at the required position	2+2 hrs	- Relevant tools and equipment - Metal pieces	Classroom Workplace
8 Bake the electrode	8.1 Baking of electrode to achieve	Knowledge of: 8.1.1 Electrodes 8.1.2 Baking oven	2 hrs	- Relevant tools and equipment	Workplace

	the required temperature	<p>and its capacity</p> <p>8.1.3 Setting the temperature</p> <p>8.1.4 Placing the electrode in the decicators</p> <p>8.1.5 Temperature and moisture control</p> <p>Ability to:</p> <ol style="list-style-type: none"> <li>1. Bake the electrode in the electrode baking oven</li> <li>2. Shift the baked electrode in the decicator at the place where job is being performed</li> </ol>		- Metal pieces	
9 Select the Suitable grinder (cutting, grinding)	9.1 Able to select the grinder for execution of the job	<p>Knowledge of:</p> <p>9.1.1 Grinder types (Bench Power grinder, Hand grinder, pencil grinder)</p> <p>9.1.2 Grinder sizes (4", 5", 7" and 9")</p> <p>9.1.3 Cutting Discs</p> <p>9.1.4 Grinding Discs</p> <p>9.1.5 Techniques of grinding</p> <p>Ability to:</p> <ol style="list-style-type: none"> <li>1. To do the grinding activity</li> </ol>	2 hrs	- Relevant tools and equipment - Metal pieces	Workplace

		2. To perform the cutting on the welding piece			
10 Weld the Metal	10.1 Able to perform welding according to the Metal, different Joint and positions	<p>Practical Exercises:</p> <ul style="list-style-type: none"> <li>- <i>Striking of electrode and maintaining the Arc</i></li> <li>- <i>Running short beads</i></li> <li>- <i>Breaking and re-starting the Arc</i></li> <li>- <i>Straight Bead / Blind welding</i></li> <li>- <i>Outside Corner joint Horizontal.</i></li> <li>- <i>Square Butt joint flat</i></li> <li>- <i>Outside Corner Joint Vertical up</i></li> <li>- <i>Square Butt Joint Vertical up</i></li> <li>- <i>Square Butt joint Horizontal</i></li> <li>- <i>T-Joint and Overlap Horizontal</i></li> <li>- <i>V Joint Flat</i></li> <li>- <i>V Joint Verticals up</i></li> <li>- <i>V Joint Overhead</i></li> <li>- <i>Lap joint</i></li> </ul>	<p>2 hrs</p> <p>2 hrs</p> <p>2 hrs</p> <p>2 hrs</p> <p>2 hrs</p> <p>4 hrs</p> <p>4 hrs</p> <p>6 hrs</p> <p>6 hrs</p> <p>6 hrs</p> <p>6 hrs</p> <p>6 hrs</p> <p>8 hrs</p> <p>10 hrs</p>	<ul style="list-style-type: none"> <li>- MS 200x100x5mm 1pcs</li> <li>- MS 200x100x5mm 1pcs</li> <li>- MS 200x100x5mm 1pcs</li> <li>- MS 200x100x5mm 1pcs</li> <li>- MS 200x100x5mm 1pcs</li> <li>- MS 200x100x3mm 1pcs</li> <li>- MS 200x100x5mm 1pcs</li> <li>- MS 200x100x3mm 1pcs</li> <li>- MS 200x100x3mm 1pcs</li> <li>- MS 200x100x5mm 1pcs</li> <li>- MS 200x100x5mm 1pcs</li> <li>- MS 200x100x8mm 1pcs</li> <li>- MS 200x100x8mm 1pcs</li> <li>- MS 200x100x8mm 1pcs</li> </ul>	Workplace
11 Remove Slag	11.1 Able to remove slag on the welding piece	<p>Knowledge of:</p> <ul style="list-style-type: none"> <li>11.1.1 Welding Slag</li> <li>11.1.2 Use of power brush</li> <li>11.1.3 Hand tools to remove slag</li> <li>11.1.4 Filing and grinding</li> </ul>	2 hrs	<ul style="list-style-type: none"> <li>- Relevant tools and equipment</li> <li>- Metal pieces with defects / slags</li> </ul>	Workplace

		<p>Ability to:</p> <ol style="list-style-type: none"> <li>1. Clean the slag of the welded piece</li> <li>2. Clear the joint</li> </ol>			
12 Remove visual defects	<p>12.1</p> <p>Able to identify the visual defects and remove them</p>	<p>Knowledge of:</p> <ol style="list-style-type: none"> <li>12.1.1 Welding defects</li> <li>12.1.2 Identify the tools to remove the defect</li> <li>12.1.3 Visual inspection of the welded joint / piece</li> </ol> <p>Ability to:</p> <ol style="list-style-type: none"> <li>1. Identify the defect and remove the defect by using the grinding / polishing / filing techniques</li> </ol>	2 hrs	<ul style="list-style-type: none"> <li>- Relevant tools and equipment</li> <li>- Welding pieces</li> </ul>	Workplace

Module – G : Title.....Perform MAG welding Operations

Objective of the Module: .... To Weld MS metal with MAG welding process on different Joints and Welding Positions

Duration: 100 hours Theory: 15 hours Practice: 85 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
1. Organize workplace	1.1 Able to arrange the tools and equipment required to perform the job	<p>Knowledge of:</p> <ul style="list-style-type: none"> <li>1.1.1 Tools required</li> <li>1.1.2 Welding Machines / rectifiers</li> <li>1.1.3 Grinders</li> <li>1.1.4 Fire Safety precautions</li> </ul> <p>Ability to:</p> <ul style="list-style-type: none"> <li>1. Organize the job to execute</li> <li>2. Perform job on time and safely</li> <li>3. Plan the activity to perform</li> </ul>	2 hrs	<ul style="list-style-type: none"> <li>- Relevant Equipment</li> <li>- White/Chalk board</li> <li>- Transparencies</li> <li>- OHP</li> <li>- Information sheets</li> <li>- Exercise Sheets</li> <li>- Work Sheets</li> </ul>	Classroom
2. Prepare the required welding machine	2.1 Is able to identify the welding machine / rectifier required to execute the job according to the WPS	<p>Knowledge of:</p> <ul style="list-style-type: none"> <li>2.1.1 Types of the Welding Machines</li> <li>2.1.2 Current settings</li> <li>2.1.3 Welding machines accessories and their safe working conditions</li> </ul> <p>Ability to:</p> <ul style="list-style-type: none"> <li>1. Select the machine required with AC / DC current</li> </ul>	4+2 hrs	<ul style="list-style-type: none"> <li>- Relevant Equipment</li> <li>- White/Chalk board</li> <li>- Transparencies</li> <li>- OHP</li> <li>- Information sheets</li> <li>- Exercise Sheets</li> <li>- Work Sheets</li> </ul>	Classroom Workshop

		<p>2. Gas cutting set installation</p> <p>3. Regulators and holders selection and installation</p>			
<p>3. Remove surface base metal defects</p>	<p>3.1 Able to prepare the welding piece</p>	<p>Knowledge of:</p> <p>3.1.1 Base metal i.e. Carbon Steel / Mild Steel / Stainless Steel etc.</p> <p>3.1.2 Grinding the pieces to remove the slag / defects</p> <p>3.1.3 Cutting angles</p> <p>3.1.4 Making bevel (as required)</p> <p>3.1.5 Cleaning the surface of the welding piece</p> <p>Ability to:</p> <ol style="list-style-type: none"> <li>1. Grind and buff</li> <li>2. Use of the power brush</li> <li>3. Marking the piece</li> <li>4. Preparing for the joint</li> </ol>	<p>2 hrs</p>	<ul style="list-style-type: none"> <li>- Relevant Equipment</li> <li>- White/Chalk board</li> <li>- Transparencies</li> <li>- OHP</li> <li>- Information sheets</li> <li>- Exercise Sheets</li> <li>- Work Sheets</li> </ul>	<p>Classroom</p>
<p>4. Set pressure of the inert / active gas</p>	<p>4.1 Understand the gases their types and safe working of accessories</p>	<p>Knowledge of:</p> <p>4.1.1 Gases and their types</p> <p>4.1.2 Installation of gas regulators and backfire arrester</p> <p>4.1.3 Hose pipes</p> <p>4.1.4 Gas regulators and dial indicators / Flow Meter</p>	<p>2 hrs</p>	<ul style="list-style-type: none"> <li>- Relevant Equipment</li> <li>- White/Chalk board</li> <li>- Transparencies</li> <li>- OHP</li> <li>- Information sheets</li> <li>- Exercise Sheets</li> <li>- Work Sheets</li> </ul>	<p>Classroom</p>

		<p>4.1.5 Operating the valves to control the gas pressure rate</p> <p>4.1.6 Control the gas flow rate at welding gun</p> <p>4.1.7 Active and Inert gases (CO<sub>2</sub>, Argon)</p> <p>Ability to:</p> <ol style="list-style-type: none"> <li>1. Install the gas regulator and welding gun.</li> <li>2. Control the pressure of the gas with welding gun nozzle and valve</li> <li>3. Cleaning of Tips and nozzles</li> </ol>			
5. Select welding position	5.1 Able to set the welding positions required	<p>Knowledge of:</p> <p>5.1.1 Welding Positions (Vertical, Horizontal, Flat, Overhead,)</p> <p>5.1.2 Understand the terminologies (IG, 2G, 3G, 4G, 5G &amp; 6G)</p> <p>Ability to:</p> <ol style="list-style-type: none"> <li>1. Perform and execute the job according to the WPS / job order</li> <li>2. Describe the position</li> <li>3. Set the welding piece at the required position</li> </ol>	2 hrs	<ul style="list-style-type: none"> <li>- Relevant Equipment</li> <li>- White/Chalk board</li> <li>- Transparencies</li> <li>- OHP</li> <li>- Information sheets</li> <li>- Exercise Sheets</li> <li>- Work Sheets</li> </ul>	Classroom



6. Set voltage	6.1 Able to understand the electric current	<p>Knowledge of:</p> <p>6.1.1 Electric Current</p> <p>6.1.2 Flow of Current</p> <p>6.1.3 Dial of the welding machine</p> <p>6.1.4 Setting the current</p> <p>Ability to:</p> <ol style="list-style-type: none"> <li>1. Set the desired current of the welding plant</li> <li>2. Check the proper connection of the welding machine to the receptacles and terminals</li> <li>3. Understand and install male / female connectors</li> </ol>	2+1 hrs	<ul style="list-style-type: none"> <li>- Relevant Equipment</li> <li>- White/Chalk board</li> <li>- Information sheets</li> <li>- Exercise Sheets</li> <li>- Work Sheets</li> </ul>	Classroom Workshop
7 Set the wire's feed speed rate	7.1 Able to feed the wire	<p>Knowledge of:</p> <p>7.1.1 Welding Wire types</p> <p>7.1.2 Materials</p> <p>7.1.3 Welding wire sizes</p> <p>7.1.4 Welding joint making</p> <p>7.1.5 Feeding techniques according to the welding position</p> <p>7.1.6 Gas/ current flow rate</p> <p>7.1.7 Hand feed skill</p> <ol style="list-style-type: none"> <li>I. Arc length</li> <li>II. Current and amperage</li> <li>III. Speed of travel</li> <li>IV. Electrode angle</li> <li>V. Crater formation</li> <li>VI. Maintaining crater</li> <li>VII. Breaking the arc</li> <li>VIII. Restarting the arc</li> </ol>	12 hrs	<ul style="list-style-type: none"> <li>- Complete MAG welding equipment with Ac/DC</li> <li>- MS200x100x4...5mm 2pcs</li> <li>- MS 200x100x4...5mm 2pc</li> <li>- MS dia. 2"x50xwall thickness 2mm 2pcs</li> <li>- Filler Wire</li> <li>- Relevant tools &amp; Equipment</li> </ul>	Workplace  Workplace



<p>9. Clean welding joint after welding</p>	<p>9.1 Able to remove slag on the welding piece</p>	<p>Knowledge of:            9.1.1 Welding Slag            9.1.2 Use of power brush            9.1.3 Hand tools to remove slag            9.1.4 Filling and grinding</p> <p>Ability to:            1. Clean the slag of the welded piece            2. Clear the joint</p>	<p>1+2 hrs</p>	<ul style="list-style-type: none"> <li>- Relevant Equipment</li> <li>- White/Chalk board</li> <li>- Information sheets</li> <li>- Exercise Sheets</li> <li>- Work Sheets</li> </ul>	<p>Workshop Classroom</p>
<p>10 Remove visual defects</p>	<p>10.1 Able to identify the visual defects and remove them</p>	<p>Knowledge of:            10.1.1 Welding defects            10.1.2 Identify the tools to remove the defect            10.1.3 Visual inspection of the welded joint / piece</p> <p>Ability to:            1. Identify the defect and remove the defect by using the grinding / polishing / filling techniques</p>	<p>2 hrs</p>	<ul style="list-style-type: none"> <li>- Relevant Equipment</li> <li>- White/Chalk board</li> <li>- Transparencies</li> <li>- OHP</li> <li>- Information sheets</li> <li>- Exercise Sheets</li> <li>- Work Sheets</li> </ul>	<p>Classroom</p>

Module – H : Title..... Perform MIG – Aluminum and Stainless steel welding Operations

Objective of the Module: .. To Weld Aluminum and Stainless steelmet with MIG welding process on different Joints and Welding Positions

Duration: 128 hours Theory: 20 hours Practice: 108 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
1. Organize workplace	1.1 Able to arrange the tools and equipment required to perfume the job	<p>Knowledge of:</p> <ul style="list-style-type: none"> <li>1.1.1 Tools required</li> <li>1.1.2 Machines / rectifiers</li> <li>1.1.3 Grinders</li> <li>1.1.4 Fire Safety precautions</li> </ul> <p>Ability to:</p> <ul style="list-style-type: none"> <li>1. Organize the job to execute</li> <li>2. Perform job on time and safely</li> <li>3. Plan the activity to perform</li> </ul>	2+2 hrs	<ul style="list-style-type: none"> <li>- Relevant Equipment</li> <li>- White/Chalk board</li> <li>- Transparencies</li> <li>- OHP</li> <li>- Information sheets</li> <li>- Exercise Sheets</li> <li>- Work Sheets</li> </ul>	Workshop Classroom
2. Prepare the required welding machine	2.1 Is able to identify the welding machine / rectifier required to execute the job according to the WPS	<p>Knowledge of:</p> <ul style="list-style-type: none"> <li>2.1.1 Types of the Welding Machines</li> <li>2.1.2 Current settings</li> <li>2.1.3 Welding machines accessories and their safe working conditions</li> </ul> <p>Ability to:</p> <ul style="list-style-type: none"> <li>1. Select the machine required with AC / DC</li> </ul>	2+2 hrs	<ul style="list-style-type: none"> <li>- Relevant Equipment</li> <li>- White/Chalk board</li> <li>- Transparencies</li> <li>- OHP</li> <li>- Information sheets</li> <li>- Exercise Sheets</li> <li>- Work Sheets</li> </ul>	Workshop Classroom

		<p>current</p> <p>2. Gas cutting set installation</p> <p>3. Regulators and holders selection and installation</p>			
3. Remove surface base metal defects	3.1 Able to prepare the welding piece	<p>Knowledge of:</p> <p>3.1.1 Base metal i.e. Carbon Steel / Mild Steel / Stainless Steel etc.</p> <p>3.1.2 Grinding the pieces to remove the slag / defects</p> <p>3.1.3 Cutting angles</p> <p>3.1.4 Making bevel (as required)</p> <p>3.1.5 Cleaning the surface of the welding piece</p> <p>Ability to:</p> <p>1. Grind and buff</p> <p>2. Use of the power brush</p> <p>3. Marking the piece</p> <p>4. Preparing for the joint</p>	4+2 hrs	<ul style="list-style-type: none"> <li>- Relevant Equipment</li> <li>- White/Chalk board</li> <li>- Working piece</li> <li>- Information sheets</li> <li>- Exercise Sheets</li> <li>- Work Sheets</li> </ul>	Classroom Workshop
4. Set pressure of the inert / active gas	4.1 Understand the gases their types and safe working of accessories	<p>Knowledge of:</p> <p>4.1.1 Gases and their types</p> <p>4.1.2 Installation of gas regulators and backfire arrester</p> <p>4.1.3 Hose pipes</p> <p>4.1.4 Gas regulators and dial indicators /</p>	2+2 hrs	<ul style="list-style-type: none"> <li>- Relevant Equipment</li> <li>- White/Chalk board</li> <li>- Transparencies</li> <li>- OHP</li> <li>- Information sheets</li> <li>- Exercise Sheets</li> <li>- Work Sheets</li> </ul>	Workshop Classroom

		<p>Flow Meter</p> <p>4.1.5 Operating the valves to control the gas pressure rate</p> <p>4.1.6 Control the gas flow rate at welding gun</p> <p>4.1.7 Active and Inert gases (CO<sub>2</sub>, Argon)</p> <p>Ability to:</p> <ol style="list-style-type: none"> <li>1. Install the gas regulator and welding gun.</li> <li>2. Control the pressure of the gas with welding gun nozzle and valve</li> <li>3. Cleaning of Tips and nozzles</li> </ol>			
5. Select welding position	5.1 Able to set the welding positions required	<p>Knowledge of:</p> <p>5.1.1 Welding Positions (Vertical, Horizontal, Flat, Overhead,)</p> <p>5.1.2 Understand the terminologies (IG, 2G, 3G, 4G, 5G &amp; 6G)</p> <p>Ability to:</p> <ol style="list-style-type: none"> <li>1. Perform and execute the job according to the WPS / job order</li> <li>2. Describe the position</li> <li>3. Set the welding piece at the required position</li> </ol>	2+2 hrs	<ul style="list-style-type: none"> <li>- Relevant Equipment</li> <li>- White/Chalk board</li> <li>- Transparencies</li> <li>- OHP</li> <li>- Information sheets</li> <li>- Exercise Sheets</li> <li>- Work Sheets</li> </ul>	Workshop Classroom

6. Set voltage	6.1 Able to understand the electric current	<p>Knowledge of:</p> <p>6.1.1 Electric Current 6.1.2 Flow of Current 6.1.3 Dial of the welding machine 6.1.4 Setting the current</p> <p>Ability to:</p> <ol style="list-style-type: none"> <li>1. Set the desired current of the welding plant</li> <li>2. Check the proper connection of the welding machine to the recepticals and terminals</li> <li>3. Understand and install male / female connectors</li> </ol>	2+2 hrs	<ul style="list-style-type: none"> <li>- Relevant Equipment</li> <li>- White/Chalk board</li> <li>- Information sheets</li> <li>- Exercise Sheets</li> <li>- Work Sheets</li> </ul>	Classroom Workshop
7. Set the wire's feed speed rate	7.1 Able to feed the wire	<p>Knowledge of:</p> <p>7.1.1 Welding Wire types 7.1.2 Materials 7.1.3 Welding wire sizes 7.1.4 Welding joint making 7.1.5 Feeding techniques according to the welding position 7.1.6 Gas/ current flow rate 7.1.7 Hand feed skill</p> <ol style="list-style-type: none"> <li>i. Arc length</li> <li>ii. Current and amperage</li> <li>iii. Speed of travel</li> <li>iv. Electrode angle</li> <li>v. Crater formation</li> <li>vi. Maintaining crater</li> </ol>	2+16 hrs	<ul style="list-style-type: none"> <li>- Relevant Equipment</li> <li>- White/Chalk board</li> <li>- Transparencies</li> <li>- OHP</li> <li>- Information sheets</li> <li>- Exercise Sheets</li> <li>- Work Sheets</li> </ul>	Workshop Classroom

		vii. Breaking the arc viii. Restarting the arc ix. Running continuous bead  Ability to: 1. Perform welding through feeding of the wire. 2. Identify the materials and flow rate 3. Control the feeding of the wire			
8. Weld the metal	8.1 Able to perform welding on MIG process	MIG Welding Exercises - <i>Striking and maintaining the Arc</i> - <i>Running short beads</i> - <i>Breaking and re-starting the Arc</i> - <i>Straight Bead / Blind welding</i> - <i>Fillet Weld Horizontal.</i> - <i>Fillet Weld Vertical Down</i> - <i>Fillet Weld Overhead Horizontal</i> - <i>Fillet Weld Vertical up</i> - <i>Square Butt joint</i> - <i>Square Butt joint vertical down</i> - <i>V-joint flat</i> - <i>V-joint Vertical up</i>	3 hrs  3 hrs 4 hrs  4 hrs  8 hrs 8 hrs  10 hrs  10 hrs 8 hrs 8 hrs  10 hrs 10 hrs	- SS 200x100x3mm 1pcs  - SS / Aluminum 200x100x3mm 1pcs - SS 200x100x3mm 1pcs  - SS / Aluminum 200x100x3mm 1pcs - SS 200x100x3mm 1pcs - SS 200x100x3mm 1pcs - SS / Aluminum 200x100x3mm 1pcs - SS 200x100x3mm 1pcs - SS / Aluminum 200x100x3mm 1pcs - SS / Aluminum 200x100x8mm 1pcs - SS / Aluminum 200x100x8mm 1pcs	



<p>9. Clean welding joint after welding</p>	<p>9.1 Able to remove slag on the welding piece</p>	<p>Knowledge of:            9.1.1 Welding Slag            9.1.2 Use of power brush            9.1.3 Hand tools to remove slag            9.1.4 Filling and grinding</p> <p>Ability to:            1. Clean the slag of the welded piece            2. Clear the joint</p>	<p>2+2 hrs</p>	<ul style="list-style-type: none"> <li>- Relevant Equipment</li> <li>- White/Chalk board</li> <li>- Information sheets</li> <li>- Exercise Sheets</li> <li>- Work Sheets</li> </ul>	<p>Workshop Classroom</p>
<p>10. Remove visual defects</p>	<p>10.1 Able to identify the visual defects and remove them</p>	<p>Knowledge of:            10.1.1 Welding defects            10.1.2 Identify the tools to remove the defect            10.1.3 Visual inspection of the welded joint / piece</p> <p>Ability to:            1. Identify the defect and remove the defect by using the grinding / polishing / filling techniques</p>	<p>2+2 hrs</p>	<ul style="list-style-type: none"> <li>- Relevant Equipment</li> <li>- White/Chalk board</li> <li>- Transparencies</li> <li>- OHP</li> <li>- Information sheets</li> <li>- Exercise Sheets</li> <li>- Work Sheets</li> </ul>	<p>Workshop Classroom</p>

Module – I : Title..... Perform SAW Welding Operation

Objective of the Module: ..... To Inspect and Identify the welding defects and repair them.

Duration: 128 hours Theory: 20 hours Practice: 108 hour

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
1. Organize workplace	1.1 Able to arrange the tools and equipment required to perform the job	<p>Knowledge of:</p> <ul style="list-style-type: none"> <li>1.1.1 Tools required</li> <li>1.1.2 Machines / rectifiers</li> <li>1.1.3 Grinders</li> <li>1.1.4 Fire Safety precautions</li> </ul> <p>Ability to:</p> <ul style="list-style-type: none"> <li>1. Organize the job to execute</li> <li>2. Perform job on time and safely</li> <li>3. Plan the activity to perform</li> </ul>	2+2 hrs	<ul style="list-style-type: none"> <li>- Relevant Equipment</li> <li>- White/Chalk board</li> <li>- Transparencies</li> <li>- OHP</li> <li>- Information sheets</li> <li>- Exercise Sheets</li> <li>- Work Sheets</li> </ul>	Workshop Classroom
2. Prepare the required welding machine	2.1 Is able to identify the welding machine / rectifier required to execute the job according to the WPS	<p>Knowledge of:</p> <ul style="list-style-type: none"> <li>2.1.1 Types of the Welding Machines (Auto)</li> <li>2.1.2 Current settings</li> <li>2.1.3 Welding machines accessories and their safe working conditions</li> </ul> <p>Ability to:</p> <ul style="list-style-type: none"> <li>1. Set the machine required current</li> <li>2. Regulators and holders selection and</li> </ul>	2+2 hrs	<ul style="list-style-type: none"> <li>- Relevant Equipment</li> <li>- White/Chalk board</li> <li>- Transparencies</li> <li>- OHP</li> <li>- Information sheets</li> <li>- Exercise Sheets</li> <li>- Work Sheets</li> </ul>	Workshop Classroom

		installation			
3. Remove surface base metal defects	3.1 Able to prepare the welding piece	<p>Knowledge of:</p> <p>3.1.1 Base metal i.e. Carbon Steel / Mild Steel / etc.</p> <p>3.1.2 Grinding the pieces to remove the slag / defects</p> <p>3.1.3 Cutting angles</p> <p>3.1.4 Making bevel (as required)</p> <p>3.1.5 Cleaning the surface of the welding piece</p> <p>Ability to:</p> <ol style="list-style-type: none"> <li>1. Grind and buff</li> <li>2. Use of the power brush</li> <li>3. Marking the piece</li> <li>4. Preparing for the joint</li> </ol>	2+12 hrs	<ul style="list-style-type: none"> <li>- Relevant Equipment</li> <li>- White/Chalk board</li> <li>- Information sheets</li> <li>- Exercise Sheets</li> <li>- Work Sheets</li> </ul>	Classroom Workshop
4. Prepare the welding machine	4.1 Understand the Automatic welding Machine and safe working	<p>Knowledge of:</p> <p>4.1.1 Installation of gas regulators and backfire arrester</p> <p>4.1.2 Welding cables</p> <p>4.1.3 Current and Polarity</p> <p>Ability to:</p> <ol style="list-style-type: none"> <li>1. Install the welding gun.</li> <li>2. Control the current and flux flow rate</li> </ol>	2+12 hrs	<ul style="list-style-type: none"> <li>- Relevant Equipment</li> <li>- White/Chalk board</li> <li>- Information sheets</li> <li>- Exercise Sheets</li> <li>- Work Sheets</li> </ul>	Classroom Workshop

<p>5. Prepare the work part</p>	<p>5.1 Able to prepare the work part i.e. seam of pipe or straight welding on vessels</p>	<p>Knowledge of:</p> <p>5.1.1 Welding Positions Vertical which is normally used in the automated process</p> <p>5.1.2 Pipes and Vessels</p> <p>5.1.3 Rotations of work part</p> <p>Ability to:</p> <p>1. Perform and execute the job according to the WPS / job order</p>	<p>2+16 hrs</p>	<ul style="list-style-type: none"> <li>- Relevant Equipment</li> <li>- White/Chalk board</li> <li>- Information sheets</li> <li>- Exercise Sheets</li> <li>- Work Sheets</li> </ul>	<p>Classroom Workshop</p>
<p>6 Use suitable powder flux type</p>	<p>6.1 Able to understand the Flux type and its feed</p>	<p>Knowledge of:</p> <p>6.1.1 Flux type</p> <p>6.1.2 Feeding process of the flux</p> <p>Ability to:</p> <p>1. Set the desired current of the welding plant</p> <p>2. Understand and install Automatic welding machine</p>	<p>2+20 hrs</p>	<ul style="list-style-type: none"> <li>- Relevant Equipment</li> <li>- White/Chalk board</li> <li>- Information sheets</li> <li>- Exercise Sheets</li> <li>- Work Sheets</li> </ul>	<p>Classroom Workshop</p>
<p>7. Follow operations supporting welding</p>	<p>7.1 Able to understand operating factors in mechanized applications</p>	<p>Knowledge of:</p> <p>7.1.1 Welding Materials</p> <p>7.1.2 Welding Flux</p> <p>7.1.3 Welding joint making</p> <p>7.1.4 Feeding techniques - Hand feed skill and automated function</p>	<p>2+20 hrs</p>	<ul style="list-style-type: none"> <li>- Relevant Equipment</li> <li>- White/Chalk board</li> <li>- Information sheets</li> <li>- Exercise Sheets</li> <li>- Work Sheets</li> </ul>	<p>Classroom Workshop</p>

		<p>Ability to:</p> <ol style="list-style-type: none"> <li>1. Perform welding through feeding of the flux.</li> <li>2. Identify the materials and flow rate</li> <li>3. Control the feeding of the wire</li> </ol>			
8. Reuse unconsumed flux	8.1 Able to perform welding on by use the unconsumed flux	<p>Knowledge of:</p> <ol style="list-style-type: none"> <li>8.1.1 Welding flux</li> <li>8.1.2 Electrode Stick out (ESO)</li> </ol> <p>Ability to:</p> <ol style="list-style-type: none"> <li>1. Reuse the flux</li> </ol>	2+20 hrs	<ul style="list-style-type: none"> <li>- Relevant Equipment</li> <li>- White/Chalk board</li> <li>- Information sheets</li> <li>- Exercise Sheets</li> <li>- Work Sheets</li> </ul>	Classroom Workshop
9. Remove Slag	9.1 Able to remove slag on the welding piece	<p>Knowledge of:</p> <ol style="list-style-type: none"> <li>9.1.1 Welding Slag</li> <li>9.1.2 Use of power brush</li> <li>9.1.3 Hand tools to remove slag</li> <li>9.1.4 Filling and grinding</li> </ol> <p>Ability to:</p> <ol style="list-style-type: none"> <li>1. Clean the slag of the welded piece</li> <li>2. Clear the joint</li> </ol>	2+2 hrs	<ul style="list-style-type: none"> <li>- Relevant Equipment</li> <li>- White/Chalk board</li> <li>- Information sheets</li> <li>- Exercise Sheets</li> <li>- Work Sheets</li> </ul>	Workshop Classroom
10 Remove visual defects	10.1 Able to identify the visual defects and remove them	<p>Knowledge of:</p> <ol style="list-style-type: none"> <li>10.1.1 Welding defects</li> <li>10.1.2 Identify the tools to remove the defect</li> <li>10.1.3 Visual inspection of the welded joint / piece</li> </ol>	2+2 hrs	<ul style="list-style-type: none"> <li>- Relevant Equipment</li> <li>- White/Chalk board</li> <li>- Transparencies</li> <li>- OHP</li> <li>- Information sheets</li> </ul>	Workshop Classroom

		Ability to: 1. Identify the defect and remove the defect by using the grinding / polishing / filling techniques		<ul style="list-style-type: none"><li>- Exercise Sheets</li><li>- Work Sheets</li></ul>	
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Module – J : Title..... Repair Welding Defects

Objective of the Module: ..... To Inspect and Identify the welding defects and repair them.

Duration: 22 hours      Theory: 06 hours      Practice: 16 hour

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
1. Receive instruction from supervisor	1.1 Perform according the order / guideline of the superior	<p>Knowledge of:</p> <p>1.1.1 Inspection of the welded piece</p> <p>1.1.2 Analysis of the defects</p> <p>1.1.3 Directions of the supervisor</p> <p>1.1.4 Plan the possible remedies</p> <p>Ability to:</p> <p>1. Take orders and perform the corrective action plan</p> <p>2. Understand and execute the job order</p>	2+4 hrs	<ul style="list-style-type: none"> <li>- Relevant Equipment</li> <li>- White/Chalk board</li> <li>- Transparencies</li> <li>- OHP</li> <li>- Information sheets</li> <li>- Exercise Sheets</li> <li>- Work Sheets</li> </ul>	Classroom Workplace
2. Trace the defected location	2.1 Perform inspection of the welding job	<p>Knowledge of:</p> <p>2.1.1 Visual inspection</p> <p>2.1.2 Welding defects i.e. slack of fusion, cracks, lack of penetration, solid / slag inclusions</p> <p>Ability to:</p> <p>1. Inspect the welding job and trace the possible defect through visual inspection</p>	2 hrs	<ul style="list-style-type: none"> <li>- Relevant Equipment</li> <li>- White/Chalk board</li> <li>- Transparencies</li> <li>- OHP</li> <li>- Information sheets</li> <li>- Exercise Sheets</li> <li>- Work Sheets</li> <li>- Defective welded pieces</li> </ul>	Classroom

<p>3. Remove defected area</p>	<p>3.1 Able to treat and remove the defected welding area</p>	<p>Knowledge of:</p> <p>3.1.1 Defects of the welding job</p> <p>3.1.2 Techniques of removing the defect</p> <p>3.1.3 Grinding and cutting</p> <p>3.1.4 Surface cleaning and preparing the defective part for re-welding</p> <p>Ability to:</p> <p>1. Inspect the welding piece and remove the defective part / defect fusions etc.</p>	<p>2+6 hrs</p>	<ul style="list-style-type: none"> <li>- Relevant Equipment</li> <li>- White/Chalk board</li> <li>- Transparencies</li> <li>- OHP</li> <li>- Information sheets</li> <li>- Exercise Sheets</li> <li>- Work Sheets</li> <li>- Defective welded pieces</li> </ul>	<p>Classroom Workplace</p>
<p>4. Re-weld defected area</p>	<p>4.1 Able to re-prepare the defective piece for re-welding</p>	<p>Knowledge of:</p> <p>4.1.1 Remove the slag</p> <p>4.1.2 Grind / cut the defect</p> <p>4.1.3 Filing and starting the re-welding job</p> <p>4.1.4 Filling and capping</p> <p>Ability to:</p> <p>1. Re-weld the joint according to the specification</p> <p>2. Inspect the joint to see the defect has been removed and proper welding is done</p>	<p>6 hrs</p>	<ul style="list-style-type: none"> <li>- Relevant Equipment</li> <li>- White/Chalk board</li> <li>- Transparencies</li> <li>- OHP</li> <li>- Information sheets</li> <li>- Exercise Sheets</li> <li>- Work Sheets</li> </ul>	<p>Workplace</p>



Module – K : Title.....Up Grade Workskill

Objective of the Module: ..... To improve Knowledge and Skill required with the development of Technology

Duration: 25 hours      Theory: 08 hours      Practice: 17 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
1. Benefits from experienced people	1.1 Is able to get knowledge and enhance skill with the help of others	<p>Knowledge of:</p> <p>1.1.1 New Welding skills and techniques</p> <p>1.1.2 Enhance knowledge about contemporary changes</p> <p>1.1.3 Experience people guidance through practical activities preformed</p> <p>Ability to:</p> <p>1. Increase the knowledge and improve the skill by making learning out of other's experiences</p>	2+1 hrs	<ul style="list-style-type: none"> <li>- Relevant Equipment</li> <li>- White/Chalk board</li> <li>- Transparencies</li> <li>- OHP</li> <li>- Information sheets</li> <li>- Exercise Sheets</li> <li>- Work Sheets</li> </ul>	Classroom Workshop
2. Read books in the field	2.1 Developing the habit of reading books to gain knowledge about technology	<p>Knowledge of:</p> <p>2.1.1 New techniques and methodologies</p> <p>2.1.2 Prior learning's and correction in pervious learning</p> <p>2.1.3 Enhance the subject information</p> <p>Ability to:</p> <p>1. Learn new</p>	2+4 hrs	<ul style="list-style-type: none"> <li>- Relevant Equipment</li> <li>- White/Chalk board</li> <li>- Transparencies</li> <li>- OHP</li> <li>- Information sheets</li> <li>- Exercise Sheets</li> <li>- Work Sheets</li> </ul>	Classroom Workshop

		<p>advancements and adopting the same in one's own practices</p> <p>2. Sharing the information with others and taking guidelines</p>			
3. Watch videos on the subject	3.1 Use of Audio Visual Aids to enhance learning	<p>Knowledge of:</p> <p>3.1.1 Practical aspect of performing the new technique in executing the job</p> <p>3.1.2 Observe and learning of correct welding</p> <p>Ability to:</p> <p>1. Enhance the skill and techniques of proper welding under safe operation</p>	1+6 hrs	<ul style="list-style-type: none"> <li>- Relevant Equipment</li> <li>- White/Chalk board</li> <li>- Transparencies</li> <li>- OHP</li> <li>- Information sheets</li> <li>- Exercise Sheets</li> <li>- Work Sheets</li> </ul>	Classroom Workplace
4. Continue practicing welding operations	4.1 Able to adapt new learning and perform those in perform and executing the job	<p>Knowledge to:</p> <p>4.1.1 Keep abreast himself with new techniques</p> <p>4.1.2 Correct the prior learning</p> <p>4.1.3 Practice the learning in executing the job</p> <p>Ability to:</p> <p>1. Perform the job in more effective and efficient manner</p> <p>2. Keep safety standards in observation and follow them</p>	2+6 hrs	<ul style="list-style-type: none"> <li>- Relevant Equipment</li> <li>- White/Chalk board</li> <li>- Transparencies</li> <li>- OHP</li> <li>- Information sheets</li> <li>- Exercise Sheets</li> <li>- Work Sheets</li> </ul>	

<p>5. Make visits to exhibitions and factories</p>	<p>5.1 Able to learning the practical implication of the technology changes and adaptability</p>	<p>Knowledge of:</p> <p>5.1.1 Modern skills used in the industry</p> <p>5.1.2 Modern machinery being inducted in the industry</p> <p>5.1.3 Contemporary knowledge about welding techniques and materials introduced</p> <p>Ability to:</p> <ol style="list-style-type: none"> <li>1. Enhance his learning by observation and exclusive practical aspect.</li> <li>2. Abreast the knowledge of the welding field</li> <li>3. Plan better execution of the job</li> </ol>	<p>1 hrs</p>	<ul style="list-style-type: none"> <li>- Relevant Equipment</li> <li>- White/Chalk board</li> <li>- Transparencies</li> <li>- OHP</li> <li>- Information sheets</li> <li>- Exercise Sheets</li> <li>- Work Sheets</li> </ul>	<p>Classroom</p>
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Module – L : Title..... Prepare Equipment, Tools and Appliances

Objective of the Module: .... Keep the Equipment, Tools and Appliances ready for use in Operation

Duration: 20 hours Theory: 08 hours Practice: 12 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
1. Prepare welding machines	1.1 Able to make the welding machines ready for job execution and keep them running	<p>Knowledge of:</p> <p>1.1.1 Welding machines maintenance</p> <p>1.1.2 Welding Machines cleaning process</p> <p>1.1.3 Replace parts of the machines</p> <p>Ability to:</p> <p>1. Keep the welding machines in running condition</p> <p>2. Replace few part and make minor repairs</p>	1+2 hrs	<ul style="list-style-type: none"> <li>- Relevant Equipment</li> <li>- White/Chalk board</li> <li>- Transparencies</li> <li>- OHP</li> <li>- Information sheets</li> <li>- Exercise Sheets</li> <li>- Work Sheets</li> </ul>	Classroom Workshop
2. Keep electrode in suitable place	2.1 Able to properly store the electrode for best results	<p>Knowledge of:</p> <p>2.1.1 Types of electrodes</p> <p>2.1.2 Temperature effect on electrode</p> <p>2.1.3 Moisture effect on electrode</p> <p>2.1.4 Proper Storage place</p> <p>2.1.5 Packaging of electrodes</p> <p>Ability to:</p> <p>1. Properly store the electrodes in moisture</p>	1+2 hrs	<ul style="list-style-type: none"> <li>- Relevant Equipment</li> <li>- White/Chalk board</li> <li>- Transparencies</li> <li>- OHP</li> <li>- Information sheets</li> <li>- Exercise Sheets</li> <li>- Work Sheets</li> </ul>	Workshop Classroom

		<p>free environment.</p> <ol style="list-style-type: none"> <li>Place the electrode while executing the job</li> <li>Use the baking ovens and decicators</li> </ol>			
3. Prepare measuring tools and equipment	3.1 Able to understand and gather the tools & equipment required to perform a job	<p>Knowledge of:</p> <ol style="list-style-type: none"> <li>3.1.1 Measuring tools i.e. meter tape, scale, Right angle, varnier, Micro Meter etc.</li> <li>3.1.2 Gather other tools i.e. chipping hammer, files, grinders, cutting and grinding discs etc.</li> <li>3.1.3 Safe operation</li> </ol> <p>Ability to:</p> <ol style="list-style-type: none"> <li>Perform and execute the job properly and safely.</li> <li>Taking exact measurements and markings</li> <li>Plan and execute the job according to WPS / job order</li> </ol>	1+2 hrs	<ul style="list-style-type: none"> <li>- Relevant Equipment</li> <li>- White/Chalk board</li> <li>- Transparencies</li> <li>- OHP</li> <li>- Information sheets</li> <li>- Exercise Sheets</li> <li>- Work Sheets</li> </ul>	Classroom Workshop
4. Prepare welding power connectors	4.1 Able to understand the power connection of all welding and other equipment	<p>Knowledge of:</p> <ol style="list-style-type: none"> <li>4.1.1 Power connections</li> <li>4.1.2 Current and its flow</li> <li>4.1.3 Receptacles and their installation</li> <li>4.1.4 Thimbles and lugs</li> <li>4.1.5 Power switches</li> </ol> <p>Able to:</p>	2+2 hrs	<ul style="list-style-type: none"> <li>- Relevant Equipment</li> <li>- White/Chalk board</li> <li>- Transparencies</li> <li>- OHP</li> <li>- Information sheets</li> <li>- Exercise Sheets</li> <li>- Work Sheets</li> </ul>	Classroom Workshop

	s	<ol style="list-style-type: none"> <li>1. Properly connect the welding power supply</li> <li>2. Remove and repair defective parts</li> </ol>			
5. Clean tools	5.1 Able to maintain and arrange the tools required	<p>Knowledge of:</p> <ol style="list-style-type: none"> <li>5.1.1 Gathering the required tools</li> <li>5.1.2 Clean and arrange them after proper working</li> <li>5.1.3 Place the tools in tool box / working area</li> <li>5.1.4 Hazards of unclean tools</li> </ol> <p>Ability to:</p> <ol style="list-style-type: none"> <li>1. Plan and execute the job with proper clean tools</li> <li>2. Clean the tools after use</li> </ol>	1 + 2 hrs	<ul style="list-style-type: none"> <li>- Relevant Equipment</li> <li>- White/Chalk board</li> <li>- Transparencies</li> <li>- OHP</li> <li>- Information sheets</li> <li>- Exercise Sheets</li> <li>- Work Sheets</li> </ul>	Workshop Classroom
6 Prepare production fixtures	6.1 Able to understand the production fixture requirements	<p>Knowledge of:</p> <ol style="list-style-type: none"> <li>6.1.1 Lifting and handling tools and equipments</li> <li>6.1.2 Planning of the job.</li> <li>6.1.3 Efficient and progressive production</li> <li>6.1.4 Rigging activities</li> <li>6.1.5 Working area cleaning, housekeeping and safety measures</li> </ol> <p>Ability to:</p> <ol style="list-style-type: none"> <li>1. Plan the production and know the requirement</li> </ol>	2+2 hrs	<ul style="list-style-type: none"> <li>- Relevant Equipment</li> <li>- White/Chalk board</li> <li>- Transparencies</li> <li>- OHP</li> <li>- Information sheets</li> <li>- Exercise Sheets</li> <li>- Work Sheets</li> </ul>	Workshop Classroom

		<ol style="list-style-type: none"><li>2. Execute the job properly</li><li>3. Understand the mass production</li><li>4. Lift the heavy jobs through rigging assistance</li></ol>			
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Module – M : Title..... Clear Work Place on the Completion of work

Objective of the Module: ...To Take all Measures to make the workplace ready available for next job operation

Duration: 22 hours Theory: 10 hours Practice: 12 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
1. Place tools in proper place	1.1 Able to gather the tools and place them proper before and after completion of job	<p>Knowledge of:</p> <ul style="list-style-type: none"> <li>1.1.1 Tools requirement</li> <li>1.1.2 Tools safety</li> <li>1.1.3 Tools placement</li> <li>1.1.4 Tools handling</li> <li>1.1.5 Efficient working with help of hand and power tools</li> <li>1.1.6 Ensure proper cabling and connections of all power tools</li> <li>1.1.7 Place in the tool properly in working area</li> </ul> <p>Ability to:</p> <ul style="list-style-type: none"> <li>1. Use the tools effectively</li> <li>2. Safety of tools and working safety</li> <li>3. Return of tools after use</li> </ul>	3+3 hrs	<ul style="list-style-type: none"> <li>- Relevant Equipment</li> <li>- White/Chalk board</li> <li>- Transparencies</li> <li>- OHP</li> <li>- Information sheets</li> <li>- Exercise Sheets</li> <li>- Work Sheets</li> </ul>	Classroom workplace
2. Shut down power supplies / gas cylinder	2.1 Able to complete and make the working area /	<p>Knowledge of:</p> <ul style="list-style-type: none"> <li>2.1.1 Disconnection of equipment</li> <li>2.1.2 Power supply cut off</li> <li>2.1.3 Gas regulators</li> </ul>	2 hrs	<ul style="list-style-type: none"> <li>- Relevant Equipment</li> <li>- White/Chalk board</li> <li>- Transparencies</li> <li>- OHP</li> <li>- Information sheets</li> </ul>	Classroom



	equipment safe	turning off Ability to: 1. Turn off all the equipment in use		- Exercise Sheets - Work Sheets	
3. Dispose waste material	3.1 Able to do the housekeeping	Knowledge of: 3.1.1 Housekeeping 3.1.2 Safety hazards due to waste materials 3.1.3 Segregation of waste material 3.1.4 Disposal procedure and precautions of different types of waste Ability to: 1. Complete the job and clean the area making it ready for the next job 2. Make environment and working safe for himself as well as others	2+4 hrs	- Relevant Equipment - White/Chalk board - Transparencies - OHP - Information sheets - Exercise Sheets - Work Sheets	Classroom workplace
4. Return leftover consumables	4.1 Able to collect and return the leftover materials / consumables	Knowledge of: 4.1.1 Issuance and return procedures 4.1.2 Gate passes etc 4.1.3 Using materials and consumables efficiently Ability to: 1. Execute the job and making the leftover safe for the next working day or for the next job	3+5 hrs	- Relevant Equipment - White/Chalk board - Transparencies - OHP - Information sheets - Exercise Sheets - Work Sheets	Classroom

Module – N : Title..... Welding Procedure Specifications

Objective of the Module: .... Understand the terms and standards followed for welding in the industry

Duration: 20 hours      Theory: 08 hours      Practice: 12 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
1. Reading WPS	1.1 Able to get the information of job to be executed	<p>Knowledge of:</p> <p>1.1.1 Materials required for a job</p> <p>1.1.2 Consumables required for a job</p> <p>1.1.3 Procedures to be adopted</p> <p>Ability to:</p> <p>1. Understand the job details and work accordingly</p>	2 hrs	<ul style="list-style-type: none"> <li>- Relevant Equipment</li> <li>- White/Chalk board</li> <li>- Transparencies</li> <li>- OHP</li> <li>- Information sheets</li> <li>- Exercise Sheets</li> <li>- Work Sheets</li> </ul>	Classroom
2. Understanding WPS	2.1 Able to translate and understand the job requirements	<p>Knowledge of:</p> <p>2.1.1 Material detailed specifications</p> <p>2.1.2 Positions to be used</p> <p>2.1.3 Current and other standards to be followed</p> <p>Ability to:</p> <p>1. Perform the job according to the details provided.</p> <p>2. Understand the drawing and supervisor detail directions</p>	2 hrs	<ul style="list-style-type: none"> <li>- Relevant Equipment</li> <li>- White/Chalk board</li> <li>- Transparencies</li> <li>- OHP</li> <li>- Information sheets</li> <li>- Exercise Sheets</li> <li>- Work Sheets</li> </ul>	Classroom

3. Abbreviations & terminologies	3.1 Able to understand the abbreviations	<p>Knowledge of:</p> <p>3.1.1 All welding terms and abbreviations / terminologies</p> <p>Ability to:</p> <p>1. Execute the job according to the specification required</p>	2+6 hrs	<ul style="list-style-type: none"> <li>- Relevant Equipment</li> <li>- White/Chalk board</li> <li>- Transparencies</li> <li>- OHP</li> <li>- Information sheets</li> <li>- Exercise Sheets</li> <li>- Work Sheets</li> </ul>	Classroom
4. Standards	4.1 Able to understand the required standard which is to be followed	<p>Knowledge of:</p> <p>4.1.1 American Society of Mechanical Engineers (ASME) Codes</p> <p>4.1.2 American Welding Society (AWS) Codes</p> <p>4.1.3 Safety Standards of ISO and IIW</p> <p>Ability to:</p> <p>1. Understand the terminologies and standard to be followed as per WPS</p>	2+6 hrs	<ul style="list-style-type: none"> <li>- Relevant Equipment</li> <li>- White/Chalk board</li> <li>- Transparencies</li> <li>- OHP</li> <li>- Information sheets</li> <li>- Exercise Sheets</li> <li>- Work Sheets</li> </ul>	Classroom and Net working place

## 4 Assessment Template

Module – A.....Follow Safety Rules

Learning Units	Theory Days/hours	Workplace Days/hours	Recommended formative assessment	Recommended Methodology	Scheduled Dates
1. Wear work clothes	15 hrs	35 hrs	a. Select and use the Safety Clothes according to the Work and Environment	Objective / Short answer / Oral	Test of Module at the end of 7 <sup>th</sup> day of training
2. Wear safety gears			a. Identify and select the Safety Gears work operations	Objective / Short answer / Oral	
3. Prepare the workplace			a. Determine the Housekeeping advantages and Select the Tools and Equipment required to perform the job	Objective / Short answer / Oral	
4. Deal with work hazards, accidents & injuries			4.1 Know work hazards, injuries and required first aid during welding job performance	Objective / Short answer / Oral	
5. Inspect connections and regulators			1.1 Know about the current hazards and proper connections	Objective / Short answer / Oral	
6. Use of extinguishers			1.2 Able to understand the function of regulators and gas cylinders	Objective / Short answer / Oral	
			6.1 Fire safety, Hazards and Respond in case of fire	Objective / Short answer / Oral	
7. Place gas cylinders in appropriate location			6.2 Fire extinguishers and other technique	Objective / Short answer / Oral	
8. Ensure proper ventilation systems	7.1 Place and Handle the cylinders properly to Keep safe working conditions	Objective / Short answer / Oral			
	8.1 Understand the ventilation system keep the smoke free zone of work place	Objective / Short answer / Oral			

Module – B .....Work Permit System

Learning Units	Theory Days/hours	Workplace Days/hours	Recommended formative assessment	Recommended Methodology	Scheduled Dates
1. Understanding Work permit system	05 hrs	25 hrs	a. Understand execution of the job and working conditions	Objective / Short answer / Oral	Test of Module at the end of 10 <sup>th</sup> day of training
2. Knowledge about types of work permits			a. Know and describe the work permits	Objective / Short answer / Oral	
3. Acquisition of work permit			3.1 Accomplish the work permit	Objective / Short answer / Oral	

Module – C... .. Basic Bench Work

Learning Units	Theory Days/hours	Workplace Days/hours	Recommended formative assessment	Recommended Methodology	Scheduled Dates
1. Organize the Bench work place.	10 hrs	90 hrs	1.1 Identify the suitable tools for the job.	Objective / Short answer / Oral	Test of Module at the end of 14 <sup>th</sup> day of training
2. Organize the Bench work tools.			a. Select basic metal working tools.	Objective / Short answer / Oral	
3. Observe Tools, Job and personal safety.			a. Observe safety for tools, work and personal to complete the Job.	Objective / Short answer / Oral	
4. Prepare the jobs following the drawing.			4.1 Accomplish the job with its requirement and quality	Practical Skill Test	
5. Arithmetic's / Geometrical terminologies			5.1 Solve the Simple Math Questions 5.2 Understand and Read the Drawing	Objective / Short answer / Oral	

and problem solving. 6. Define kinds of welding, their principles and use.			6.1 Explain the different kinds of Welding:	Objective / Short answer / Oral	
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Module – D .....Performance Maintenance Operation

Learning Units	Theory Days/hours	Workplace Days/hours	Recommended formative assessment	Recommended Methodology	Scheduled Dates
1. Replace damaged welding cables 2. Replace cutting tools 3. Clean the tip of the welding nozzle 4. Change the holder and welding pliers 5. Clean welding guns 6. Clean machines and equipment 7. Replace hoses of the Gas Cylinders	10 hrs	25 hrs	a. Keep the cables in good condition for execution of the assigned job  2.1 Handling of the grinder and cutting tools b. Kinds and sizes of the welding nozzles c. Cleaning tools and techniques  4.1 Know the types and size of the welding holder  5.1 Use and clean the welding guns  6.1 Clean & keep maintenance of welding machines / rectifiers  7.1 Change and maintain the hose pipes used with gas cylinders	Objective / Short answer / Oral  Objective / Short answer / Oral Objective / Short answer / Oral Objective / Short answer / Oral Objective / Short answer / Oral Objective / Short answer / Oral Objective / Short answer / Oral	Test of Module at the end of 14 <sup>th</sup> day of training

8. Replace timer of the Gas regulators			8.1 Changing and maintenance of the gas welding equipment	Objective / Short answer / Oral	
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Module – E ..... Communication to Others

Learning Units	Theory Days/hours	Workplace Days/hours	Recommended formative assessment	Recommended Methodology	Scheduled Dates
1. Communicate with supervisor 2. Communicate with Engineer 3. Communicate with peers 4. Communicate with helpers 5. Communicate with client / customer	10 hrs	15	a. Understand the direct orders and respond to them a. Follow the instructions and order of the engineer 1.1 Able to sharing knowledge and problem solving abilities 4.1 Command and provide guideline to subordinates 5.1 Understand requirement of the client / customer	Objective / Short answer / Oral Objective / Short answer / Oral Objective / Short answer / Oral Objective / Short answer / Oral Objective / Short answer / Oral	Test of Module at the end of 20 <sup>th</sup> day of training

Module – F ..... Perform Electric (SMAW) Arc Welding

Learning Units	Theory Days/hours	Workplace Days/hours	Recommended formative assessment	Recommended Methodology	Scheduled Dates
1. Organize the work place 2. Prepare the required welding equipment 3. Remove surface base metal defects 4. Set the suitable	15 hrs	80 hrs	a. Identify and Select the Gas Welding Equipment and accessories 1.1 Assemble the Gas welding Equipment. 3.1 Clean and size the metals before welding 4.1 Explain the kinds of Regulators	Objective / Short answer / Oral Objective / Short answer / Oral Objective / Short answer / Oral Objective / Short	Test of Module at the end of 50 <sup>th</sup> day of training

Gas Pressure			4.2 Adjust the Oxy-Acetylene Pressure	answer / Oral	
5. Determine the suitable Tip / Nozzle size			5.1 Explain Kinds of welding Torches	Objective / Short answer / Oral	
6. Connect the Tip / Nozzle to the torch.			6.1 Select welding Tip / Nozzle	Objective / Short answer / Oral	
7. Select the welding Joints			7.1 Determine the different welding Joints	Objective / Short answer / Oral	
8. Select Welding positions			8.1 Explain the different welding Positions	Objective / Short answer / Oral	
9. Kinds of filler metals			9.1 Determine the filler metal / rod considering kinds of base metal and its thickness	Objective / Short answer / Oral	
10. Acquire Skill			1.1 Weld the metals with Oxy-Acetylene process on different Joints and Positions	Practical Skill Test	
11. Remove Slag			a. Clean the welded surfaces to find the visual defects	Objective / Short answer / Oral	
12. Remove visual defects			12.1 Prepare and repair the welding defect	Objective / Short answer / Oral	
13. Oxy-Acetylene Cutting			13.1 Select and use the Oxy-Acetylene Cutting equipment and technique	Objective / Short answer / Oral	

Module – G ..... Perform MAG – CS & MS Welding Operation

Learning Units	Theory Days/hours	Workplace Days/hours	Recommended formative assessment	Recommended Methodology	Scheduled Dates
1. Organize workplace	15 hrs	85 hrs	a. Arrange the tools and equipment required to perform the job	Objective / Short answer / Oral	Test of Module at the end of 66 <sup>th</sup> day of training
2. Prepare the required welding			1.1 Identify the welding machine / rectifier required to execute the job	Objective / Short answer / Oral	









Module – J ..... Inspect and Identify Welding Defects and Repair

Learning Units	Theory Days/hours	Workplace Days/hours	Recommended formative assessment	Recommended Methodology	Scheduled Dates
1. Receive instruction from supervisor 2. Trace the defected location 3. Remove defected area 4. Re-weld defected area	06 hrs	16 hrs	1.1 Perform according the order / guideline of the superior 1.2 Perform inspection of the welding job 1.3 Treat and remove the defected welding area 1.4 Able to re-prepare the defective piece for re-welding	Objective / Short answer / Oral Objective / Short answer / Oral Objective / Short answer / Oral Objective / Short answer / Oral	Test of Module at the end of 90 <sup>th</sup> day of training

Module – K ..... Up Grade Work Skill

Learning Units	Theory Days/hours	Workplace Days/hours	Recommended formative assessment	Recommended Methodology	Scheduled Dates
1. Benefit from experienced people 2. Read books in the field 3. Watch videos on the subject 4. Continue practicing welding operations 5. Make visits to exhibitions and factories	08 hrs	17 hrs	a. Enhance the Knowledge and Skill with the help of others 1.1 Developing the habit of reading books to gain knowledge about technology 3.1 Use of Audio Visual Aids to enhance learning 4.1 Adopt new learning and perform those in executing the job 5.1 Learn the practical implication of the technology changes and adoptability	Objective / Short answer / Oral Objective / Short answer / Oral Objective / Short answer / Oral Objective / Short answer / Oral Objective / Short answer / Oral	Test of Module at the end of 93 <sup>rd</sup> day of training

Module – L ..... Prepare Equipment, Tools and Appliances

Learning Units	Theory Days/hours	Workplace Days/hours	Recommended formative assessment	Recommended Methodology	Scheduled Dates
1. Prepare welding machines	08 hrs	12 hrs	a. Make the welding machines ready for job execution and keep them running	Objective / Short answer / Oral	Test of Module at the end of 96 <sup>th</sup> day of training
2. Prepare welding power connectors			b. Understand the power connection of all welding and other equipments	Objective / Short answer / Oral	
3. Clean tools			c. Maintain and arrange the tools required	Objective / Short answer / Oral	
4. Prepare production fixtures			d. Understand production fixture requirements	Objective / Short answer / Oral	

Module – M..... Clear Workplace on the Completion of Work

Learning Units	Theory Days/hours	Workplace Days/hours	Recommended formative assessment	Recommended Methodology	Scheduled Dates
1. Place tools in proper place	10 hrs	12 hrs	1.1 Gather the tools and place them proper before and after completion of job	Objective / Short answer / Oral	Test of Module at the end of 98 <sup>th</sup> day of training
2. Shut down power supplies / gas cylinder			1.1 Complete and make the working area / equipment safe	Objective / Short answer / Oral	
3. Dispose waste material			3.1 Do neat and clean housekeeping	Objective / Short answer / Oral	
4. Return leftover consumables			4.1 Collect and return the leftover materials / consumables	Objective / Short answer / Oral	

Module – N .....Welding Procedure Specification

Learning Units	Theory Days/hours	Workplace Days/hours	Recommended formative assessment	Recommended Methodology	Scheduled Dates
1. Reading WPS 2. Understanding WPS 3. Abbreviations and terminologies 4. Standards	08 hrs	12 hrs	a. Get the information of job to be executed b. Translate and understand the job requirements c. Understand the abbreviations d. Understand the required standard which is to be followed		

**Supportive notes**

- Assessment context
- Critical aspects
- Assessment condition
- Resources required for assessment

## 5 List of Tools, Machinery & Equipment

<b>Name of Trade</b>	<b>Welding Technician (SMAW, MIG, MAG, SAW)</b>
<b>Duration</b>	<b>6 Months (800 hrs)</b>

<b>Sr. No.</b>	<b>Name of Item/ Equipment / Tools</b>
1.	WELDING MACHINE
2.	WELDING HELMET / FACE SHIELD
3.	CHIPPING HAMMER
4.	ARGON TROCH SET
5.	ANGLE GRINDERS 4", 5", 7" & 9"
6.	PENCIL GRINDER
7.	HEATING BURNER TROCH
8.	DECICATOR
9.	ELECTRODE OVEN
10.	DRILL MACHINE
11.	SPIRIT LEVELS
12.	PIPE BEVEL MACHINE
13.	PLIER COMBINATION
14.	GAS REGULATORS
15.	FACE SHIELDS
16.	BACKFIRE ARRSTERS
17.	FIRE EXTINGUSHERS
18.	GAS CUTTING SETS

## 6 List of Consumable Supplies

<b>Name of Trade</b>	<b>Welding Technician (SMAW, MIG, MAG, SAW)</b>
<b>Duration</b>	<b>6 Months (800 hrs)</b>

<b>Sr. No.</b>	<b>Name of Consumable Supplies</b>
1	Argon Cylinder
2	Argon Gloves
3	Argon Helmet
4	Ceramic Cup 1 ~ 9 no.
5	Chipping Hammer
6	Collet 125&250
7	Collet Body
8	Cutting Disc 4", 7", 9"
9	Grinding Disc 4", 7" – 9"
10	Electrode E 6010 2.4mm
11	Electrode E 6010 3.2mm
12	Electrode E 7018 2.4mm
13	Electrode E 7018 3.2mm
14	Electrode E 7018 4mm
15	Filler Wire 2.4 mm
16	Glass Black
17	Glass White
18	Wire Brush
19	Electrode Holder
20	Hose Pipe



21	Long Cap
22	Pencil Grinding Stone
23	Short Cap
24	Thimble
25	Tungsten Rod 1.5, 2.4, 3.2 & 4 mm
26	Welding Lead Copper
27	MS Pipe 4" 40 sch.
28	MS Pipe 2" 40 sch.
29	Welding Gloves
30	Coverall
31	Safety Shoes
32	Safety Helmet / Welding Helmets
33	Safety Google
34	Welding Aprons
35	Ear Plugs
36	MS Sheet 200x250x2mm
37	MS Sheet 200x250x4mm
38	MS Plate 200x250x5mm
39	MS Plate 200x250x10mm
40	SS Plate 200x250x3mm
41	SS Plate 200x250x10mm
42	SS pipe 2" 40 sch
43	Aluminum filler rod 2mm
44	Aluminum filler rod 2.5mm
45	Aluminum filler rod 3.2mm
46	Stainless steel rod 1mm

47	Stainless steel rod 1.5mm
48	Oxygen Gas
49	Acetylene Gas
50	Carbon dioxide (Co2)Gas
51	Argon Gas
52	Gas Cutting Sets
53	Power Brush

## REFERENCE BOOKS FOR TEACHER

1. Modern Welding  
By Althouse - Turnquist - Bowditch.
2. Welding Skills and Practices  
By Giachino - Weeks.
3. Welding Skills  
By Giachino - Weeks.
4. Welding Principles & Practices  
By Sacks.
5. Practical Welding Technology  
By Rudy Mohler.
6. Principles of Welding Technology  
By L. M. Gourd.
7. Oxy-Acetylene Welding basic fundamentals  
By Ronald J. Baird.
8. Brazing and soldering of Metals  
N. Lashko - S. Lashko
9. Technology of the Metal Trade (GTZ)  
Appold - Feiler - Reinhard - Schmith.
10. Oxy-Acetylene handbook,  
By LINDE

## ASSESSMENT OF TRAINEES ACHIEVEMENT

- Monthly Theory test (Objective / short answer type) should be conducted.
- Each practical exercise should be marked on the provided marking criteria.
- Final theory test should be Objective / Short answer type, not more than 30minutes.
- Final practical test should be from the skill, the trainees have performed during training.

Passing Marks in Theory each Test 40 %

Passing Marks in Practical each exercise 60 %

### RESULT:

Sessional marks obtained in Theory (A) 20%

Final Marks obtained in Theory (B) 80%

**Total (A + B) = "C"**

Sessional Marks obtained in Practical (D) 30%

Final Marks obtained in Practical (E) 70%

**Total (D + E) = "F"**

**Certification Marks will be in percentage = 20 % of "C" + 80% of "F"**

## GENERAL RECOMMENDATIONS

### TEXT BOOKS:

The text book should be based on approved national curriculum with:

1. Fully illustrated.
2. Simple and easy Urdu/English.
3. Examples from everyday life.
4. Uniformity in terminology.
5. Technical terms / terminologies should not be translated.
6. Objective type and short answer test items should be at the end of each chapter.

### PRACTICAL MANUAL

For uniform standard throughout the country, the Manual should be prepared. This manual should contain:

1. Practical drawings with sizes and title.
2. Material.
3. Tools and instruments required.
4. Sequence of Operations.
5. Marking criteria sheet for each practical test, in which marks may be distributed as Dimensions and sizes 20%, Trade skill 70%, Tidiness of workplace and safety 10%. This may also be applied for Final Trade Test marking sheet.

### LESSON PLAN

The teacher should prepare lesson plans for Classroom of each topic. This will provide guideline to the teacher regarding;

- a. Topic.
- b. Objectives.
- c. Teaching aids required.
- d. Motivation.
- e. Sequence of knowledge transfer.
- f. Chalkboard / Whiteboard layout to be developed during lesson delivery.
- g. Revision of important points.
- h. Test the Achievement of trainees.

## WORKSHOP

In order to facilitate the Trainees to develop the desired skills and competencies, it is recommended that:

- a. Practical activities by the trainees should be carried out individually.
- b. Workshop should be fully equipped as stipulated in the curriculum.
- c. Budget provision should be made to replace/purchase the latest tools and equipments to update the equipment.
- d. Recommended consumables should be provided for practical in reasonable quantity.
- e. The teacher should himself be able to make / demonstrate the practical exercises to the desired skill level.

## EVALUATION OF CURRICULUM

The curriculum development is continuous process; a follow-up committee should be formed to check its proper implementation and evaluation. It is recommended that National and Provincial evaluation committees should be formulated on permanent basis.

The committee may comprise on following:

- a. Curriculum experts.
- b. Teacher Trainers.
- c. Subject specialists.
- d. Curriculum designer.
- e. Industrial experts.

The Committees will be expected to:

- a. Evaluate the shortcomings and achievements of the curriculum.
- b. Remain in contact with the teacher to obtain feedback.
- c. Suggest proposals for the amendment / revision of course.

## **SCHEME OF STUDIES**

**Name of Trade: SMAW, MAG, MIG, & SAW**

<b>Sr #</b>	<b>Modules</b>	<b>Theory Hours</b>	<b>Practical Hours</b>	<b>Total Hours</b>
1	Module A Follow Safety Rules	15	35	50
2	Module B Work Permit system	5	25	30
3	Module C Bench Work	10	90	100
4	Module D Perform Maintenance Operation	10	25	35
5	Module E Communication to Others	10	15	25
6	Module F Perform Electric Arc Welding	15	80	95
7	Module G Perform MAG Welding Operation	15	85	100
8	Module H Perform MIG Welding Operation- Aluminum & Stainless Steel Welding Operation	20	108	128
9	Module I Perform SAW Welding	20	108	128

	Operation			
10	Module J Repair Welding Defects	6	16	22
11	Module K Upgrade Work Skills	8	17	25
12	Module L Prepare Equipment , tools & appliances	8	12	20
13	Module M Clear Work place at the of completion of work	10	12	22
14	Module N Welding Procedure Specification	8	12	20
<b>TOTAL HOURS</b>		<b>160</b>	<b>640</b>	<b>800</b>