



National Vocational & Technical Training Commission (NAVTTC)

Curriculum for Fabricator & Welder

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1. Introduction

The purpose of this training program is to train Fabricator and Welder trade man, who specializes in cutting and joining materials together. The trainee shall be able to perform the selection of materials, marking and cutting the working piece according the drawings and specification, whereas as welder refers to the operator; the machine is referred to as the welding power supply. The materials to be joined can be metals (such as steel, aluminum, brass, stainless steel etc.). Welders typically have to have good dexterity and attention to detail, as well as some technical knowledge about the materials being joined and best practices in the field.

Welding, without the proper precautions appropriate for the process, can be a dangerous and unhealthy practice. However, with the use of new technology and proper protection, the risks of injury and death associated with welding can be greatly reduced. Because many common welding procedures involve an open electric arc or flame, the risk of burns is significant. To prevent them, welders wear personal protective equipment in the form of heavy leather gloves and protective long sleeve jackets to avoid exposure to extreme heat and flames. Additionally, the brightness of the weld area leads to a condition called arc eye in which ultraviolet radiation causes the inflammation of the cornea and can burn the retinas of the eyes. Full face welding helmets with dark face plates are worn to prevent this exposure, and in recent years, new helmet models have been produced that feature a face plate that self-darkens upon exposure to high amounts of UV radiation. To protect bystanders, opaque welding curtains often surround the welding area. These curtains, made of a polyvinyl chloride plastic film, shield nearby workers from exposure to the UV radiation from the electric arc, but should not be used to replace the filter glass used in helmets.

Welders are also often exposed to dangerous gases and particulate matter. Processes like flux-cored arc welding and shielded metal arc welding produce smoke containing particles of various types of oxides, which in some cases can lead

to medical conditions like metal fume fever. The size of the particles in question tends to influence the toxicity of the fumes, with smaller particles presenting greater danger. Additionally, many processes produce fumes and various gases, most commonly carbon dioxide and ozone, that can prove to be dangerous if ventilation is inadequate. Furthermore, because the use of compressed gases and flames in many welding processes pose an explosion and fire risk, some common precautions include limiting the amount of oxygen in the air and keeping combustible materials away from the workplace. The Fabrication and Welding expertise in welding pressure vessels, including submarine hulls, industrial boilers, and power plant heat exchangers, columns, storage structures and boilers.

1.1- NAME OF COURSE:

Fabricator & Welding

24 Months (3200 hours)

1.2- OVERALL OBJECTIVE OF COURSE

1. The prime objective of this course of 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 students.
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 24 months (12 months in Institute and 12 months on the job training in a company) 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.

1.3- COMPETENCIES GAINED AFTER COMPLETION OF COURSE

a- Knowledge Competencies:

1. Safety precautions applicable to Welding machines, hand tools, equipment, tools and during welding operations.
2. The common types of materials and their uses for fabrication purpose.
3. Express the knowledge of welding, fabrication, 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. Knowledge of Assembling, Brazing and soldering
6. Describe the knowledge of material, cutting methodologies, tools and safety.
7. Describe the knowledge of Arc (SMAW) welding tools, equipment, their use and safety.
8. Express knowledge of (MIG/MAG) welding tools, equipment, their use and safety.
9. Describe the knowledge of welding joints, positions, their use and selection.
10. Express the knowledge of inspecting and testing welded joints to ensure weld quality.
11. Understand application of work Permit & WPS.
12. Understand welding defects & their recognition and rectification process.
13. Express the knowledge of fabrication equipment, their use and safety.

b- **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 / plate 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. Execute the major welding techniques being used in Pakistan, for common welding joints in all positions.
10. Inspect and test welding joints.
11. Distinguish different metals & electrodes.
12. Understand electricity & control of welding machines.
13. Making bevel & cuts by grinders.
14. Able to prepare his job according to WPS

1.4- 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.

1.5- TRAINEE ENTRY LEVEL

The trainee selected should be minimum Middle in qualification.

1.6- MINIMUM QUALIFICATION OF TRAINER

1. D.A.E (Mech) / B. Tech with 2-Years' experience in Industry and 1 year teaching
2. CSWIP or Other welding qualification would be added advantage
3. Computer Proficiency
4. G-II level certificate with 5 years industrial field experience in relevant field

1.7- 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.

1.8- Sequence of Module:

Training in Training Center-12 Months;	On the Job Training (OJT) in a company-12 months			Revision in Training Centre 2-3 Weeks
Phase-I; Basic Institutional Learning	Phase-III: Advanced Institutional Learning	Phase-II: Basic OJT	Phase-IV: advanced OJT	
<p>Module 1-Follow Safety Rules at Workplace Module 2-Perform Bench work at workplace Module 3-Perform Cutting of Material Module 4-Perform Assembling of Job Module 5-Perform Soldering of Job Module 6-Perform Brazing of Job Module 7-Perform Oxy-Acetylene Welding</p> <p>Module 10-Computer Skills Module 11-English Language Skills-I Module 12- Life Skills I</p> <p>Module 13: Secondary Skills Activities I</p>	<p>Module 8-Perform Welding [SMAW (MMA) /GTAW (TIG) /GMAW (MIG/MAG)/SAW] Module 9- Develop Professionalism</p> <p>Module 11- English Language Skills-II Module 12- Life Skills-II</p> <p>Module 13- Secondary Skills Activities II</p>	<p>Module 14: OJT – I</p> <p>Company orientation, HSE procedures & Regulations, Material Used & their selection, PPE, Health Safety & Environment, Overview of workplace as well as Equipment, Performing bench Work, Cutting of Material and Assembling of Job, Perform Soldering & Brazing of the job, Perform Ox-Acetylene Welding and Report writing Weekly and month end.</p>	<p>Module 15: OJT – I</p> <p>Review of OJT – I, procedures and regulations of the company, Material use and their selection, Perform SMAW (MMA) Welding, Perform GTAW(TIG) Welding, Perform GMAW(MIG/MAG) Welding, Perform SAW Welding, Repair of Welding Defects, Skills & Concept, Report writing weekly and final report.</p>	<p>Review & Preparation for final Examination</p>

SEQUENCE OF THE MODULES

Sequence of the modules:

Module 1: Follow Safety Rules at Workplace

Aim: This is designed to follow safety rules at workplace by Fabricator & Welder in accordance with the organization's approved guidelines and procedures. Trainee will be expected to follow personal safety measures, Apply workplace safety measures, Apply tools & equipment safety measures and Apply job/work piece safety measures at all times.

Module 2: Perform Bench Work

Aim: This is designed to perform bench work in accordance with the organization's approved guidelines and procedures. Trainee will be expected to take measurements, marking, cutting and filling. Apply tools & equipment safety measures and Apply job/work piece safety measures at all times.

Module 3: Perform Cutting of Material

Aim: This module is designed to perform cutting of the materials at workplace by Fabricator & Welder in accordance with the organization's approved guidelines and procedures. Trainee is expected to organize the workplace for fabrication & welding, prepare the base metal for cutting, perform operations related to cutting job.

Module 4: Perform Assembling of Job

Aim: This module is designed to perform Assembling operations at workplace by Fabricator & Welder in accordance with the organization's approved guidelines and procedures. Trainee is expected to organize the workplace for fabrication & welding, prepare the base metal for assembling, perform operations related to assembling job.

Module 5: Perform Soldering of Job

Aim: This module is designed to perform Soldering operations at workplace by welder in accordance with the organization's approved guidelines and procedures. Trainee is expected to organize the workplace for welding, prepare the base metal for soldering, perform operations related to soldering job.

Module 6: Perform Brazing of Job

Aim: This module is designed to perform Brazing operations at workplace by welder in accordance with the organization's approved guidelines and procedures. Trainee is expected to organize the workplace for welding, prepare the base metal for brazing, perform operations related to brazing job.

Module 7: Perform Ox-Acetylene Welding

Aim: This module is designed to perform Oxy-Acetylene Welding operations at workplace by welder in accordance with the organization's approved guidelines and procedures. Trainee is expected to organize the workplace for welding, prepare the base metal for welding, perform operations related to Oxy-Acetylene Welding and perform post welding operations at the workplace.

Module 8: Perform Welding (SMAW/GTAW(TIG)/GMAW(MIG/MAG)/SAW)

Aim: This module is designed to perform (SMAW/GTAW(TIG)/GMAW(MIG/MAG)/SAW) operations at workplace by welder in accordance with the organization's approved guidelines and procedures. Trainee is expected to organize the workplace for welding, prepare the base metal for welding, perform operations related to (SMAW/GTAW(TIG)/GMAW(MIG/MAG)/SAW) and perform post welding operations at the workplace

Module 09: Develop Professionalism

Aim: This module is designed to develop Professionalism by welder in accordance with the organization's approved guidelines and procedures. Trainee is expected to perform communication with others, upgrade professional skills and work in a team.

Module 10: Computer Skills

Aim: This module is designed to use the computer efficiently with Introduction to Computer, MS-Word (Basic to intermediate), MS-Excel (Basic to intermediate), MS-PowerPoint (Basic to intermediate) to do the reporting efficiently.

Module 11: English Language Skills I & II

Aim: These two module is designed to enhance students' listening comprehension of English language and enrich them with a passion of reading and to speak English language with fewer errors.

Module 12: Life Skills I & II

Aim: This module is designed to add value to vocational skills through self-exploration and self-presentation and to add value to vocational skills through teamwork, goal-setting and other essential life skills.

Module 13: Secondary Skills Activities I & II

Aim: This module is designed to add values in assessment and extra curriculum activities to give the trainee physical and other secondary skills.

Module 14: On the Job Training-I

Aim: This module is designed to gain real work place understanding, skills and experience. Practicing the techniques learnt so far and to perform as a semi-skilled worker on the job floor. Understanding and demonstrating the best practices of the companies by following the company rules, guidance provided by the immediate supervisor and working in a team.

Module 15: On the Job Training-II

Aim: This module is designed to give trainee the advance level of workplace environment with real time case scenario's, work on the job floor with exercising all the techniques and skills learnt throughout the program/course. Trainee had to demonstrate the full level of skills and to become a resourceful part for the organization.

2. Overview about the program –Curriculum for Fabricator & Welder

Module Title	Learning Units	Theoryhours	Workshop hours	Timeframe of modules
Module 1 Follow Safety Rules at Workplace	<ol style="list-style-type: none"> 1. Apply personal safety measures 2. Apply workplace safety measures 3. Follow Work Permit 4. Apply tools and equipment safety measures 5. Apply job/work piece safety measures 	25hrs	40hr	65 hrs
Module 2 Perform Bench Work	<ol style="list-style-type: none"> 1. Take measurement of job 2. Perform Saw cutting on the job 3. Perform grinding / filing of job 4. Perform Drilling / Threading on work piece 	20hrs	80hrs	100 hrs
Module 3 Perform Cutting of Material	<ol style="list-style-type: none"> 1. Arrange the required material for cutting 2. Perform gas cutting method on job 3. Perform disc cutting method on job 4. Perform Saw cutting method on job 	25hrs	40hrs	65 hrs

	5. Perform Shear cutting method on job			
Module 4 Perform Assembling of Job	<ol style="list-style-type: none"> 1. Perform Grinding filling of job 2. Take measurement of job parts of assembling 3. Perform alignment of job pieces 4. Perform tacking of job 	20hrs	40hrs	60 hrs
Module 5 Perform Soldering of Job	<ol style="list-style-type: none"> 1. Prepare job for soldering 2. Perform soldering on job 3. Perform post soldering inspection 	35hrs	95hrs	130 hrs
Module 6 Perform brazing of job	<ol style="list-style-type: none"> 1. Prepare job for brazing 2. Perform brazing operation on job 3. Perform post brazing inspection 	35hrs	95hrs	130 hrs
Module 7 H- Perform Oxy-Acetylene Welding	<ol style="list-style-type: none"> 1. Prepare job for Oxy-Acetylene welding 2. Perform operations related to Oxy-Acetylene welding 3. Perform post Oxy- 	35hrs	100hrs	135 hrs

	Acetylene welding inspection			
Module 8 Perform Welding (SMAW/GTAW (TIG) /GMAW (MIG/MAG)/SAW)	<ol style="list-style-type: none"> 1. Prepare job for welding 2. Prepare workplace for SMAW (MMA) Welding 3. Perform operations related to SMAW (MMA) Welding 4. Prepare workplace for GTAW (TIG) Welding 5. Perform operations related to GTAW (TIG) Welding 6. Prepare workplace for GMAW (MIG/MAG) welding 7. Perform operations related to GMAW (MIG/MAG) Welding 8. Prepare workplace for Submerged Arc Welding (SAW) welding 9. Perform operations related to Submerged Arc Welding (SAW) welding 10. Perform post welding operations 11. Repair defected area 	50hrs	250hrs	300 hrs

	of job / work piece			
Module 09 Developing Professionalism	<ol style="list-style-type: none"> 1. Perform communications with others 2. Upgrade professional skills 3. Work in a team 	15hrs	40hrs	55 hrs
Module 10 Computer Skills	<ol style="list-style-type: none"> 1. Introduction to Computer 2. MS-Word (Basic to Intermediate) 3. MS-Excel (Basic to Intermediate) 4. MS-PowerPoint (Basic to Intermediate) 5. 	0hrs	40hrs	40 hrs
Module 11 English Language Skills I	<ol style="list-style-type: none"> 1. Introduction to Listening Part I -Listening to Match Information 2. Introduction to Listening Part II -Listening to Respond 3. Introduction to Listening Part III -Following Conversations 4. Introduction to 	40hrs	00hrs	40 hrs

	<p>Listening Part IV -Listening for Key Information</p> <p>5. Introduction to Reading Part I -Reading to Understand the Sequence of a Text</p> <p>6. Introduction to Reading Part II -Understanding the Text Structures</p> <p>7. Introduction to Reading Part III -Understanding the Purpose of Text</p> <p>8. Introduction to Reading Part IV -Reading for Key information</p>			
Module 11: English Language Skills II	<p>1. Introduction to Writing Part I -Completing a form</p> <p>2. Introduction to Writing Part II -Correcting errors</p> <p>3. Introduction to Writing Part III -Communicating ideas and information</p> <p>4. Introduction to Writing Part IV -Writing a text</p>	40hrs	0hrs	40 hrs

	<ul style="list-style-type: none"> 5. Introduction to Speaking Part I -Introduction to language 6. Introduction to Speaking Part II -Social situations 7. Introduction to Speaking Part III exchanging information and opinion 8. Introduction to Speaking Part IV -Presenting a topic 			
Module 12 Life Skills I	<ul style="list-style-type: none"> 1. Exploring and Understanding Self 2. Effective Communication 3. Personal Grooming 	30hrs	0hrs	30 hrs
Module 12 Life Skills II	<ul style="list-style-type: none"> 1. Working with Teams 2. Vision and Goal Setting 3. Professional Development 4. Personal and Social Responsibility 	30hrs	0hrs	30 hrs
Module 13 Secondary Skills	<ul style="list-style-type: none"> 1. Monthly test. 2. Library 	0hrs	190hrs	190hrs

Activities I	3. Sports 4. Events			
Module 13 Secondary Skills Activities II	1. Monthly test. 2. Library 3. Sports 4. Events 5. Student Projects 6. Industrial Visits 7. Student Profiling	0hrs	190hrs	190hrs
Module 14 OJT-I	Company orientation, HSE procedures & Regulations, Material Used & their selection, PPE, Health Safety & Environment, Overview of workplace as well as Equipment, Performing bench Work, Cutting of Material and Assembling of Job, Perform Soldering & Brazing of the job, Perform Ox- Acetylene Welding and Report writing Weekly and month end.	0hrs	800hrs	800hrs
Module 15 OJT-II	Review of OJT – I, procedures and regulations of the company, Material use and their selection, Perform SMAW (MMA)	0hrs	800hrs	800hrs

	Welding, Perform GTAW(TIG) Welding, Perform GMAW(MIG/MAG) Welding, Perform SAW Welding, Repair of Welding Defects, Skills & Concept, Report writing weekly and final report.			
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3. Fabricator & Welder Curriculum Contents (Teaching and Learning Guide)

Module: 1 : Follow Safety Rules at Workplace

Objective: To understand the safety requirements and standards to follow safety rules at workplace by Fabrication, welding and pipe worker in accordance with the organization’s approved guidelines and procedures. You will be expected to apply personal safety measures, Apply workplace safety measures, Apply tools & equipment safety measures and Apply job/work piece safety measures at all times. Your underpinning knowledge regarding safety rules will be sufficient to provide you the basis for your work.

Duration: 65 hours Theory: 25hours Practice: 40 hours

Module Title and Aim	Learning Outcome	Learning Elements	Tools and Equipment	Learning Place
LU1. Apply personal safety measures	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Select personal protective equipment (PPE) in terms of type as per needs • Pick the appropriate quantity according to work permit. • Wear and adjust suitable PPE as required. • Maintain PPE to ensure correct fit and optimum protection in compliance with company procedures. 	<ul style="list-style-type: none"> • Explain Importance of using Personal Protective Equipment (PPE) • Define Types of PPE, eyes, hands and feet protection. • Familiarize with protective clothing and equipment to be worn. • Locate from where it can be obtained. • Explain safe maintenance of PPE, cleaning and placement of the tools in proper place after completion of 	Leather apron, safety gloves, safety goggles, welding helmet, safety shoes, ear plugs, safety belt, fume mask, dungaree	Class Room / Workshop

Module Title and Aim	Learning Outcome	Learning Elements	Tools and Equipment	Learning Place
	<ul style="list-style-type: none"> Ensure PPE is cleaned and stored at proper place. 	<p>work.</p>		
<p>LU2.Apply workplace safety measures</p>	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> Describe workplace safety guidelines. Explain specific company procedures regarding workplace safety. Explain procedure for cleaning and storing of tools and equipment at workplace. Develop the importance of clean workplace and exhaust arrangement. 	<ul style="list-style-type: none"> Explain importance of safety at workplace: <ul style="list-style-type: none"> Ensure ventilation No inflammable material nearby Secure gas cylinders Availability of fire extinguishers Secure electrical connections Ensure earthing No light reflection Ensure availability of welding booths Emergency exit Exhibit housekeeping at workplace according to organizational guidelines Ensure the availability of first aid box at the workplace Display a list of emergency contact numbers at workplace Place tools and equipment in proper place after completion of task. Arrange proper light at 	<p>Fire extinguisher, Tool box/bins, Safety covers, First aid box, welding table, fume extractor, lighting system, PPE</p>	<p>Class Room / Workshop</p>

Module Title and Aim	Learning Outcome	Learning Elements	Tools and Equipment	Learning Place
		workplace.		
LU3-Follow work permit	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Able to understand the commencement of the job • Able to know about the working conditions • Is able to know the and describe the work permits • Knowledge about the issuer and responsible personnel involved. • Process & procedure to get the work Permit 	<ul style="list-style-type: none"> • Delivery of Tool Box Talk • Explain prerequisites for start of the job • Explain Importance of Work Permit • Know about the permission and authorities and responsibilities of the job • Analyze the work place conditions and hazards • Take precautions • Work Permit System • Hot work permits • Cold work permits • Work Permit Issuer • Process and procedure to get the work permit 	<p>Work Permit Document Relevant forms / documents information sheets Exercise sheet</p>	<p>S t a t i o n e r r Class Room / Workshop</p>
LU4.Apply tools and equipment safety measures	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Apply safety measures for selected tools and equipment at workplace: <ul style="list-style-type: none"> o Arc Welding machine/plant and equipment o Gas welding and cutting 	<ul style="list-style-type: none"> • Establish importance of tools and equipment safety and its implications. • Display the use of cleaning tools and equipment • Explain welding machine and 	<p>Safety manuals, safety instruction sheets, cleaning tools and equipment</p>	<p>Class Room / Workshop</p>

Module Title and Aim	Learning Outcome	Learning Elements	Tools and Equipment	Learning Place
	<p>equipment</p> <ul style="list-style-type: none"> o Mechanical cutting and beveling equipment o Grinding machines o Hand tools (e.g: scrappers, files, measuring tape, hammers, stacks, Hatches, Anvils etc) <ul style="list-style-type: none"> • Demonstrate use of fire blankets • Demonstrate use of first aid box • Demonstrate use of Fire extinguisher. • Perform cleaning of tools and equipment before and after the job • Ensure safe placement of measuring and cutting tools • Follow tools and equipment safety instruction manuals 	<p>equipment</p> <ul style="list-style-type: none"> • Demonstrate gas cutting, mechanical cutting and beveling equipment • Describe the importance of safe handling and placement of measuring and cutting tools • Explain the safety manual instructions • Explain specific company procedures regarding tools and equipment safety. • Illustrate procedure for cleaning and storing of tools and equipment at workplace. • Demonstrate installation / placement of welding machines 		
LU5.Apply	Trainee will be able to:		Safety instructions,	

Module Title and Aim	Learning Outcome	Learning Elements	Tools and Equipment	Learning Place
job/workpiece safety measures	<ul style="list-style-type: none"> • Follow the instruction sheet / work permit for the workpiece safety • Apply the following safety measures for the work piece safety <ul style="list-style-type: none"> - Workpiece / job is free from dust, oil, grease, paint and moisture - Safely cover the job/work piece after the duty - Safely place the job/work piece after the duty • Apply safe handling of job/work piece during <ul style="list-style-type: none"> - Fabrication - Welding - Loading/unloading - Transportation • Follow specific job/work piece safety instructions 	<ul style="list-style-type: none"> • Explain instruction sheet / work permit • Describe the importance of job / workpiece safety • Demonstrate safe handling and transportation of job/ work piece • Explain specific job/ work piece safety instructions 	cleaning tools and equipment, cranes, lifters, hand trolleys	Class Room / Workshop

Module 2: Perform Bench Work

Objective: To understand the tools and equipment which are required to perform the job, take the measurements, marking and performing cutting of the working piece. Use of grinders and scrapers and the identify the welding jobs to be performed.

Duration: 100 hours Theory: 20hours Practice: 80 hours

Module Title and Aim	Learning Outcome	Learning Elements	Time Duration (Th/Pr)	Tools and Equipment	Learning Place
LU 1 Take Measurement of the job	<p>Trainee would be able to:</p> <ul style="list-style-type: none"> • Arrange measuring tools required for cutting • Check measurements of parts of job as per drawing • Follow safety precautions at workplace • Explain the usage of different measuring tools for assembling 	<p>Train the students to have knowledge of:</p> <ul style="list-style-type: none"> • Measuring Tools: Steel foot rules, Steel Tape, Vernier Caliper, Calipers (Internal & external), Micrometer, Gauges, Solid Steel Square, Protectors. • Marking Tools: Steel scribes, Divider, Centre Punch, Surface Gauge. • Cutting tools: Shears, Saws, Chisels, Punches, Drills /Counter sinks, Thread cutting Tapes & Dies. • Files Scraper and Grinders; Files-Single cut, Cross cut, Rasp and their shapes. Scrapers- Flat and Triangle. Grinders- Grades, Wheels, Discs and Pencils. • Hammers: Kinds, Shapes and Weights. • Describe different conversion 	5 / 15 hrs	<ul style="list-style-type: none"> - Original Tools - White/Chalk board - OHP - Transparencies - Information sheets - Exercise sheets - Work sheets <p>MS Channel</p>	Class Room Workshop

		<p>systems used for measurement</p> <ul style="list-style-type: none"> • Explain the usage of different measuring tools for assembling • Explain specific safety measures associated with the workplace 		<p>100x75x38x6 MS Flat 100x62.5x15 - do – - do – - do – - do – - do – MS Flat 173x25x2.5 MS Sheet 132x162 x1 MS Pipe 62x500 114x500</p>	
<p>LU2 Perform Saw cutting on the job</p>	<p>Trainee would be able to:</p> <ul style="list-style-type: none"> • Select tools required for saw cutting method as per material • Prepare workplace for saw cutting as per requirement • Perform clamping of job for saw cutting • Perform saw cutting 	<ul style="list-style-type: none"> • Demonstrate the usage of saw cutting tools • Describe the types of saw blades according to material and teeth • Explain and demonstrate the saw cutting process • Explain and demonstrate the usage of finishing tools • Explain specific safety precautions 	<p>5 / 20 hrs</p>	<ul style="list-style-type: none"> - Trainees tool kit - Working Clothes - Duster for placing tools on bench - Bench 	<p>Class room Workshop</p>

	<p>operations as per specifications</p> <ul style="list-style-type: none"> • Perform finishing (remove burr/ sharp edges etc) as per SOPs • Inspect the job, as per specifications, after completion of saw cutting • Follow safety precautions at workplace 	related to saw cutting method		<p>cleaning brush</p> <p>MS Channel 100x75x38x6</p> <p>MS Flat 100x62.5x15</p> <p>- do -</p> <p>- do -</p> <p>- do -</p> <p>- do -</p> <p>- do -</p> <p>MS Flat 173x25x2.5</p> <p>MS Sheet 132x162x1</p> <p>MS Pipe 62x500</p> <p>114x500</p>	
LU3 Perform Grinding / filling of job	<p>Trainee would be able to:</p> <ul style="list-style-type: none"> • Select grinding / filing process as per material/requirement • Arrange grinding machines and different types of 	<ul style="list-style-type: none"> • Demonstrate different types of grinding and filing processes • Explain the usage of grinding machines and files • Describe the types of bevels 	5 / 20 hrs i.i. Hrs	<ul style="list-style-type: none"> - Original Tools - White/ Chalk board - OHP - Transparencie 	Class room Workshop

	<p>files as per requirement</p> <ul style="list-style-type: none"> • Select machines required for grinding/filing method • Prepare workplace for grinding/filing as per requirement • Perform grinding/filing operations as per SOPs • Perform finishing (remove burr/ sharp edges etc) as per SOPs • Inspect the job after completion of grinding/filing as per specifications • Follow safety precautions at workplace 	<ul style="list-style-type: none"> • Explain and demonstrate the grinding/filing process • Explain the usage of finishing tools • Explain specific safety precautions related to grinding/filing process 		<p>s</p> <ul style="list-style-type: none"> - Information sheets - Exercise sheets - Work sheets <p>MS Channel 100x75x38x6</p> <p>MS Flat 100x62.5x15</p> <ul style="list-style-type: none"> - do – - do – - do – - do – - do – <p>MS Flat 173x25x2.5</p> <p>MS Sheet 132x162x1</p> <p>MS Pipe 62x500 114x500</p>	
LU 4 Perform Drilling / threading on	Trainee would be able to:	<ul style="list-style-type: none"> • Explain types of drilling machines. 	5 / 25 hrs	MS Flat 100x62.5	Workplace

work piece	<ul style="list-style-type: none"> • Set up drilling machine for producing holes according to job requirement. • Manipulate the machine tool controls safely and correctly in line with operational procedures. • Carry out drilling as per job requirement • Select tap and die for threading according to job requirement. • Clamp work-piece in the vice properly. • Ensure alignment of tap and die. • Use lubricants during threading for smooth cutting. • Ensure the threads are accurate and dimensionally correct • Observe personal and workplace safety at all times 	<ul style="list-style-type: none"> • Demonstrate procedure of setting up of drilling machine with safe procedure. • Describe selecting and adjusting speed and feed of drilling machine. • Define types of taps and dies. • Describe use of tap set according to safe process. • Explain importance of using lubricants and coolants during threading • Describe application of lubricants. • Safety precautions. 		x15 h - do – - do – - do – - do – - do – MS Flat 173x25x 2.5 MS Sheet 132x162 x1 MS Pipe 32x500	Workplace Workplace Workplace Workplace Workplace Workplace Workplace
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Module 3: Perform Cutting of Material

Objective: To perform cutting of material at workplace, to arrange the required material for cutting, perform gas cutting method, perform disc cutting method, perform Saw cutting method and perform shear cutting method on job

Duration: 65 hours Theory: 25hours Practice: 40 hours

Module Title and Aim	Learning Outcome	Learning Elements	Time Duration (Th/Pr)	Tools and Equipment	Learning Place
LU 1. Arrange the required material for cutting	<p>Trainee would be able to:</p> <ul style="list-style-type: none"> ❖ Interpret the following types of drawings <ul style="list-style-type: none"> • 2D drawing • 3D drawing • Isometric • Diametric • Oblique • Piping and 	<ul style="list-style-type: none"> ❖ Basic problems of arithmetic ❖ I-Addition & Subtractions ❖ II-Multiplication & Divisions ❖ III-Metric system ❖ Area & Circumference finding ❖ Percentage ❖ Inter-conversion of measuring units <p>2- Explain the lines Angles Drawing Radius</p>	5 / 0hrs	Drawing instruments, measuring tools, symbol and abbreviation sheets, calculator, stationary items, Standard operating procedures (SOPs), Measuring tape, divider, grinder with power brush, line	Workshop / & Job Floor

	<p>instrument diagram (P&ID)</p> <ul style="list-style-type: none"> ❖ Take measurements and calculations as per drawing ❖ Identify required material as per specifications of drawing ❖ Follow the standard operating procedures (SOPs) for the arrangement of required material ❖ Arrange the marking tools required, as per job 	<p>Corner finding from isometric views Views finding and matching of views</p> <ul style="list-style-type: none"> ❖ Define types of lines ❖ Describe how to read and Interpret symbols, abbreviations ❖ Explain different types of drawing views ❖ Explain types of conversion methods (e.g: imperial and metric system) ❖ Explain the types of measuring tools steel foot rule , steel tape, Vernier caliber (inside-outside), micrometer, 		<p>scriber, hammer, center punch, prick punch, combination set, set square, inside and outside caliper, files and scrappers, wire brush, cotton waste, tong, emery paper, marking stone, straight bar, surface plate/marketing table, anvil, V block, wrap around, bench and pipe vices, chemicals for cleaning, Personal Protective Equipment (PPE).</p> <p>MS Channel 100x75x38x6</p>	
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	<ul style="list-style-type: none"> ❖ Clean the material surface for marking area ❖ Mark the job area as per requirement ❖ Punch the cutting area as per requirement ❖ Apply specific safety precautions associated with the material handling 	<p>gauges</p> <ul style="list-style-type: none"> ❖ Explain the international standards for material selection ASME, ANSI, API, Color coding ❖ Explain the types of fittings ; Reducers, spool, flange, elbows, end cap ❖ Explain the importance of standard operating procedures (SOPs) ❖ Explain the types and usage of marking tools steel scriber, dividers, center punch, tri-square ❖ Demonstrate the various cleaning methods for base metal specifications Chemical & 		<p>MS Flat 100x62.5x15</p> <ul style="list-style-type: none"> - do – - do – - do – - do – - do – <p>MS Flat 173x25x2.5</p> <p>MS Sheet 132x162x1</p>	
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		<p>Mechanical</p> <ul style="list-style-type: none"> ❖ Explain different types of tolerances and allowances; Unilateral & bilateral. ❖ Identify different colors used for highlighting the marking surface ❖ Describe specific safety precautions associated with material handling; SS Material, MS/CS material 			
LU 2. Perform gas cutting method on job	<p>Trainee would be able to:</p> <ul style="list-style-type: none"> ❖ Arrange gas cutting set as per requirement ❖ Inspect the equipment and connectio 	<ul style="list-style-type: none"> ❖ Explain the different type of gases used for cutting; oxygen, acetylene, LPG ❖ Describe usage of torch and nozzles; round, half round of different sizes, tip cleaner ❖ Explain the usage of followings 	5 / 10hrs	Gas cylinders (oxygen, fuel gases), gas cutter, hose pipes, nozzles, regulator, flash back arresters,	Workshop & Job Floor

	<p>ns as per SOPs</p> <ul style="list-style-type: none"> ❖ Place the job for cutting as per requirement ❖ Perform gas cutting operation as per specifications ❖ Follow safety precautions at workplace 	<ul style="list-style-type: none"> • Hose pipes according to their colors • Regulators • Flash back arrester • Gas cylinders with spindle key, & trolley ❖ Explain the startup and shutdown procedure of gas cutter ❖ Demonstrate the proper pressure setting as per material thickness and nozzle sizes (e.g.: nozzle selection chart) ❖ Explain the safety hazards related to gas cutting process (e.g.: flashback, back fire etc. 		<p>spark lighter, tip cleaner, cylinder/s pindle key, cylinder trolley with chain, adjustable spanner set, gas working table, hose protector, SOPs, gas pressure setting chart as per nozzle, PPE</p> <p>MS Channel 100x75x38x6</p> <p>MS Flat 100x62.5x15 - do -</p>	
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				<ul style="list-style-type: none"> - do – - do – - do – - do – <p>MS Flat 173x25x2.5</p> <p>MS Sheet 132x162 x1</p>	
LU3. Perform disc cutting method on job	<p>Trainee would be able to:</p> <ul style="list-style-type: none"> ❖ Select tools required for disc cutting method ❖ Prepare workplace for disc cutting as per requirement ❖ Perform disc cutting operations as per 	<ul style="list-style-type: none"> ❖ Demonstrate the usage of disc cutting tools of different sizes ❖ Describe the types of grinders & cutting discs and their sizes pencil grinder, pedestal grinder, bench grinder, angle grinder ❖ Demonstrate the disc cutting process ❖ Explain the usage of finishing tools; files, emery paper, 	5 / 10hrs	<p>Grinder, cutting discs, grinding discs, files, emery paper, conical- stone, straight stone, emery flower, grinder key, power supply, extension board, PPE</p> <p>MS Channel 100x75x38x6</p> <p>MS Flat 100x62.5x15</p> <ul style="list-style-type: none"> - do – - do – - do – - do – - do – 	

	<p>specifications</p> <ul style="list-style-type: none"> ❖ Perform finishing (remove burr/ sharp edges etc) as per SOPs ❖ Inspect the job, as per specifications, after completion of cutting ❖ Follow safety precautions at workplace 	<p>wire brush, stones</p> <ul style="list-style-type: none"> ❖ Explain specific safety precautions related to disc cutting method; use of face shield and ear plugs, cotton gloves 		<p>MS Flat 173x25x2.5</p> <p>MS Sheet 132x162x1</p>	
LU4. Perform Saw cutting method on job	<p>Trainee would be able to:</p> <ul style="list-style-type: none"> ❖ Select tools required for saw 	<ul style="list-style-type: none"> ❖ Demonstrate the usage of saw cutting tools; Hacksaw, power hacksaw, blades, vices 	5 / 10hrs	Hacksaw, power hacksaw, blades, vices, coolants, measuring	Class Room Workshop / & Job Floor

	<p>cutting method as per material</p> <ul style="list-style-type: none"> ❖ Prepare workplace for saw cutting as per requirement ❖ Perform clamping of job for saw cutting ❖ Perform saw cutting operations as per specifications ❖ Perform finishing (remove burr/ sharp edges etc) as 	<ul style="list-style-type: none"> ❖ Describe the types of saw blades according to material and teeth ❖ Demonstrate the saw cutting process ❖ Explain the usage of finishing tools ❖ Explain specific safety precautions related to saw cutting method; goggles, cotton gloves 		<p>tape, right angle, PPE</p> <p>MS Channel 100x75x38x6</p> <p>MS Flat 100x62.5x15</p> <ul style="list-style-type: none"> - do – - do – - do – - do – - do – <p>MS Flat 173x25x2.5</p> <p>MS Sheet 132x162x1</p>	
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	<p>per SOPs</p> <ul style="list-style-type: none"> ❖ Inspect the job, as per specifications, after completion of saw cutting ❖ Follow safety precautions at workplace 				
LU5. Perform shear cutting method on job	<p>Trainee would be able to:</p> <ul style="list-style-type: none"> ❖ Select machine and tools required for shear cutting method ❖ Prepare workplace 	<ul style="list-style-type: none"> ❖ Explain the usage of shear cutting machine and tools; lever shearing, power shearing, profile shearing and hand shearing ❖ Demonstrate the shear cutting process 	5 / 10hrs	<p>Shearing machines, lever shear, hand shear, measuring tape, right angle, files, emery paper, waste cotton, lubricants, PPE</p> <p>MS Channel</p>	Class Room Workshop / & Job Floor

	<p>e for shear cutting as per requirement</p> <ul style="list-style-type: none"> ❖ Perform holding of job for shear cutting ❖ Perform shear cutting operations as per specifications ❖ Perform finishing (remove burr/ sharp edges etc) as per SOPs ❖ Inspect the job, as per specifications 	<ul style="list-style-type: none"> ❖ Explain the usage of finishing tools; files, emery paper, waste cotton, ❖ Explain specific safety precautions related to shear cutting method; to safe body parts 		<p>100x75x38x6</p> <p>MS Flat 100x62.5x15</p> <ul style="list-style-type: none"> - do – - do – - do – - do – - do – <p>MS Flat 173x25x2.5</p> <p>MS Sheet 132x162x1</p>	
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	ons, after completio n of shear cutting ❖ Follow safety precautio ns at workplac e				
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Module 4: Perform Assembling of Job

Objective of the Module: To perform Assembling of Job at workplace.

Duration: 60 hours Theory: 20 hours Practice: 40 hours

Module Title and Aim	Learning Outcome	Learning Elements	Time Duration (Th/Pr)	Tools and Equipment	Learning Place
LU1. Perform grinding/ filing of job	Trainee would be able to: ❖ Select grinding / filing process as per material/requirement ❖ Arrange grinding	❖ Explain different types of grinder and file processes; angle, pencil, pedestal grinder & flat file, round file, half round file, square file, triangle file, knife file, smooth cut file, needle file etc. ❖ Describe the types	5 / 10hrs	Angle grinder, pedestal grinder, pencil grinder, grinding discs, grinding stones, grinder key, power cable, flat file, round file, half round file, square file, triangle file, knife file,	Workshop / & Job Floor

	<p>machines and different types of files as per selected process</p> <ul style="list-style-type: none"> ❖ Select machines required for grinding/filing method ❖ Prepare workplace for grinding/filing as per requirement ❖ Perform grinding/filing operations as per SOPs ❖ Perform 	<p>of bevels; V bevel, J bevel and U bevel</p> <ul style="list-style-type: none"> ❖ Demonstrate the grinding/filing process; single cut, double cut, smooth, bastered cut, rast cut ❖ Explain specific safety precautions related to grinding/filing process 		<p>smooth cut file, needle file set, PPE</p> <p>MS Channel 100x75x38x6</p> <p>MS Flat 100x62.5x15</p> <ul style="list-style-type: none"> - do – - do – - do – - do – - do – <p>MS Flat 173x25x2.5</p> <p>MS Sheet 132x162x1</p>	
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	<p>finishing (remove burr/ sharp edges etc) as per SOPs</p> <ul style="list-style-type: none"> ❖ Inspect the job, as per specifications, after completion of grinding/filing <p>Follow safety precautions at workplace</p>				
LU2. Take measurement of job parts for assembling	<p>Trainee would be able to:</p> <ul style="list-style-type: none"> ❖ Arrange measuring tools required for assembling ❖ Check measurements of 	<ul style="list-style-type: none"> ❖ Explain the usage of different measuring tools for assembling; to mark and cut the job ❖ Explain conversion system used for measurement ; explain methods for inter- 	5 / 10hrs	<p>Measuring tape, steel rule, tri square, vernier caliper, outside inside caliper, vernier height gauge, radius gauge, filler gauge, bevel gauge, PPE</p> <p>MS Channel</p>	Workshop / & Job Floor

	<p>parts as per drawing</p> <ul style="list-style-type: none"> ❖ Follow safety precautions at workplace 	<p>conversion of various measuring systems for length</p> <ul style="list-style-type: none"> ❖ Explain specific safety measures associated with the workplace 		<p>100x75x38x6</p> <p>MS Flat 100x62.5x15</p> <ul style="list-style-type: none"> - do – - do – - do – - do – - do – <p>MS Flat 173x25x2.5</p> <p>MS Sheet 132x162x1</p>	
<p>LU3. Perform alignment of job pieces</p>	<p>Trainee would be able to:</p> <ul style="list-style-type: none"> ❖ Arrange alignment tools required for alignment of job ❖ Arrange workplace according to the job requirement (temporary support) 	<ul style="list-style-type: none"> ❖ Explain the usage of different tools for alignment ; ;Measuring tape, steel rule, tri square, vernier caliper, outside inside caliper, bevel gauge, combination set, water level, spirit level, plumb bob, fishing line, hammer, straight bar ❖ Explain the usage of different tools for measurement; 	<p>5 / 10hrs</p>	<p>Measuring tape, steel rule, tri square, vernier caliper, outside inside caliper, vernier height gauge, radius gauge, filler gauge, bevel gauge, combination set, water level, spirit level, plumbob, fishing line, hammer, straight bar, PPE</p>	<p>Workshop / & Job Floor</p>

	<ul style="list-style-type: none"> ❖ Check alignment of parts as per drawing ❖ Follow safety precautions at workplace. 	<p>vernier height gauge, radius gauge, filler gauge</p> <ul style="list-style-type: none"> ❖ Read and interpret drawing for alignment ❖ Knowledge of basic arithmetic and trigonometry ❖ Explain specific safety measures associated with the workplace 		<p>MS Channel 100x75x38x6</p> <p>MS Flat 100x62.5x15</p> <ul style="list-style-type: none"> - do – - do – - do – - do – - do – <p>MS Flat 173x25x2.5</p> <p>MS Sheet 132x162x1</p>	
LU4. Perform tacking of job	<p>Trainee would be able to:</p> <ul style="list-style-type: none"> ❖ Arrange tacking tools and equipment required for tacking of job ❖ verify alignment of parts before tacking, as per drawing 	<ul style="list-style-type: none"> ❖ Select & use tools and equipment for tacking; welding equipment with accessories, aligning tools and fixture ❖ Read and interpret drawing/WPS (Welding Procedure Specification) for tacking requirement ❖ Describe the 	5 / 10hrs	<p>Welding machine set, hammer, tri square, filler gauge, chipping hammer, taper gauge, high-low gauge, tacking cleeds, gap rod, temporary support, tacking clamp, jigs and fixtures, chain block, hydraulic jack, come along, lifting and shifting</p>	Workshop / & Job Floor

	<ul style="list-style-type: none"> ❖ Check the gaps between two parts as per welding procedure specifications (WPS) ❖ Perform tacking of job as per requirement ❖ Verify alignment of parts after tacking as per drawing ❖ Cover the job, as per requirement, after tacking ❖ Follow 	<p>effects of temperature on tacking of job (i.e. expansion and contraction); ; thermal expansion and contraction of metal and its control</p> <ul style="list-style-type: none"> ❖ Explain the process of tacking as per WPS; alignment, joint gaps, angle, no. of tacks ❖ Explain the methods of protection of job; bevel protection and end caps ❖ Explain specific safety precautions associated with tacking of job 		<p>equipment, C-clamp, adjustable wrench, screw driver, pre heating torch, grinder, cutting disc, PPE</p> <ul style="list-style-type: none"> - MS 200x100x5 mm 1pcs - MS 200x100x5 mm 1pcs - MS 200x100x5 mm 1pcs - MS 200x100x5 mm 1pcs - MS 200x100x5 mm 1pcs - MS 200x100x3 mm 1pcs - MS 200x100x5 	
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	safety precautions at workplace			mm 1pcs - MS 200x100x3 mm 1pcs - MS 200x100x3 mm 1pcs - MS 200x100x5 mm 1pcs - MS 200x100x8 mm 1pcs - MS 200x100x8 mm 1pcs - MS 200x100x8 mm 1pcs	
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Module 5 : Perform Soldering of job

Objective: To perform soldering of Job at workplace & to perform grinding/ filing and soldering of job , take measurement use of tools

used in performing the soldering job at workplace

Duration: 130 hours Theory: 35 hours Practice: 95 hours

Module Title and Aim	Learning Outcome	Learning Elements	Time Duration (Th/Pr)	Tools and Equipment	Learning Place
LU1. Prepare job for soldering	<p>Trainee would be able to:</p> <ul style="list-style-type: none"> ❖ Select the soldering method as per job requirement (i.e. electronic and gas) ❖ Arrange the workplace according the soldering requirement ❖ Arrange tools required for soldering method 	<ul style="list-style-type: none"> ❖ Illustrate different soldering methods; ; Iron Soldering, blow lamp soldering ❖ Explain the physical properties of metals; GI sheet, Brass, Tin, copper, MS, stainless steel sheets ❖ Demonstrate the usage of soldering tools; ; soldering iron, blow lamp, wire brush, file, emery paper, cotton waste, solder sucker, cleaning chemicals, fluxes ❖ Explain the usage 	10 / 25hrs	<p>Different soldering irons, sucker, wire brush, , soldering tips, filler materials, flux, holding clamp, copper tube, emery paper, cotton waste, cleaning agents, PPE</p> <ul style="list-style-type: none"> - MS 200x100x2 mm 1pcs - MS 200x100x2 mm 1pcs - MS 200x100x3 	Workshop / & Job Floor

	<ul style="list-style-type: none"> ❖ Arrange filler material and flux as per requirement ❖ Clean the soldering area as per requirement i.e. <ul style="list-style-type: none"> • Chemically • Mechanically ❖ Follow safety precautions at workplace 	<p>of filler material and flux; hydrochloric acid, ammonium chloride, resin.</p>		<ul style="list-style-type: none"> mm 1pcs - MS 200x100x3 mm 1pcs - MS 200x100x3 mm 1pcs - MS 200x100x3 mm 1pcs - MS 200x100x2 mm 1pcs 	
LU2. Perform soldering operation on job	<p>Trainee would be able to:</p> <ul style="list-style-type: none"> ❖ Prepare soldering by: <ul style="list-style-type: none"> • Connecting 	<ul style="list-style-type: none"> ❖ Explain the usage of consumables for soldering; types of solder ❖ Demonstrate the 	15 /50hrs	Different soldering irons, sucker, wire brush, gas welding set, soldering tips,	Workshop / & Job Floor

	e	<ul style="list-style-type: none"> ❖ Double lap joint ❖ butt joint, ❖ lap joint ❖ Double lap joint ❖ butt joint, ❖ lap joint <p>Double lap joint</p> <ul style="list-style-type: none"> ❖ butt joint, ❖ lap joint <p>Double lap joint</p> <ul style="list-style-type: none"> ❖ butt joint, 		<p>GI Sheet 26 SWG, 100 x 50 x 3 pieces</p> <p>MS Sheet 20 SWG, 100 x 50 x 2 pieces</p> <p>MS Sheet 20 SWG, 100 x 50 x2 pieces</p> <p>MS Sheet 20 SWG, 100 x 50 x 3 pieces</p> <p>Brass 20 SWG, 100 x 50 x 2 pieces</p> <p>Brass 20 SWG, 100 x 50 x 2 pieces</p> <p>Brass 20 SWG, 100 x 50 x 3 pieces</p> <p>Copper 24 SWG, 100 x 50 x 2 pieces</p> <p>Copper 24 SWG, 100 x 50</p>	
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		❖ lap joint Double lap joint Open box Funnel with handle ❖ Mug		x 2 pieces Copper 24 SWG, 100 x 50 x 3 pieces SS 30 SWG, 100 x 50 x 2 pieces SS 30 SWG, 100 x 50 x 2 pieces SS 30 SWG, 100 x 50 x 3 pieces 120 x 60 x 20 mm – GI 26 SWG Part 1-D1: 80 mm, D2: 20 mm, h: 70 GI Sheet 26 SWG	
LU3. Perform post	Trainee would		10 / 20hrs		

soldering inspection	<p>be able to:</p> <ul style="list-style-type: none"> ❖ Perform visual inspection for locating soldering defects ❖ Perform following tests for inspection of quality: <ul style="list-style-type: none"> • Pneumatic test • Hydro pressure test ❖ Remove defects of soldering as per requirement ❖ Follow safety precautions at workplace 	<ul style="list-style-type: none"> ❖ Illustrate different type of soldering defects; lack of penetration, blow hole, porosity, crack ❖ Demonstrate different types of testing applied on soldered job; bend test ❖ Describe the method of removal of soldering defects; re-soldering ❖ Explain specific safety measures associated with workplace (e.g. hazards related to removal of flux, shutdown of heating source) 		<p>Magnifying glass, different soldering irons, sucker, wire brush, gas welding set, soldering tips, filler materials, flux, holding clamp, copper tube, emery paper, cotton waste, cleaning agents, soap testing material, PPE</p>	<p>Workshop / & Job Floor</p>
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Module 6: Perform Brazing of Job

Objective: To perform brazing of Job at workplace & to prepare job for brazing , Perform brazing operation on job , Perform postbrazing inspection, at workplace

Duration: 130 hours Theory: 35 hours Practice: 95 hours

Module Title and Aim	Learning Outcome	Learning Elements	Time Duration (Th/Pr)	Tools and Equipment	Learning Place
LU1. Prepare job for Brazing	<p>Trainee would be able to:</p> <ul style="list-style-type: none"> ❖ Select the brazing technique as per job requirement ❖ Arrange 	<ul style="list-style-type: none"> ❖ Demonstrate different brazing techniques; blow lamp brazing, flame brazing, torch brazing, furnace brazing ❖ Explain the physical properties 	10 / 25hrs	Steel wire brush, gas welding set, welding tips, filler materials, holding clamp, flux, emery paper, cotton waste, cleaning	Workshop / & Job Floor

	<p>the workplace according to the brazing requirement</p> <ul style="list-style-type: none"> ❖ Arrange tools required for brazing method ❖ Explain metal properties ❖ Arrange filler material and flux as per requirement ❖ Clean the brazing area as per requirement i.e. 	<p>of metals; GI sheet, Brass, Tin, copper, MS, stainless steel sheets</p> <ul style="list-style-type: none"> ❖ Demonstrate the usage of brazing tools; ; oxy acetylene equipment with accessories, furnace, files, emery paper, wire brush and chemicals ❖ Demonstrate the usage of filler materials spelters (brass or bronze), silver solder, copper brazing rod and flux; ammonium chloride ❖ Explain different types of cleaning materials; ; file, emery paper, wire brush, chemical (thinner and acetone)and 	<p>agents, spark lighter, tip cleaner, spanners, cylinder keys, SOPs, PPE</p> <p>GI Sheet 26 SWG, 100 x 50 x 2 pieces</p> <p>GI Sheet 26 SWG, 100 x 50 x2 pieces</p> <p>GI Sheet 26 SWG, 100 x 50 x 3 pieces</p> <p>MS Sheet 20 SWG, 100 x 50 x 2 pieces</p> <p>MS Sheet 20 SWG, 100 x 50 x2 pieces</p> <p>MS Sheet 20 SWG, 100 x 50 x 3 pieces</p> <p>Brass 20 SWG, 100 x 50 x 2</p>	
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	<ul style="list-style-type: none"> • Chemically • Mechanically ❖ Follow safety precautions at workplace 	<p>related techniques</p> <ul style="list-style-type: none"> ❖ Explain the hazards related to brazing; flame burning, metal burning, spatter burning <p>Practical Exercises:</p> <ul style="list-style-type: none"> ❖ Lap Joint, ❖ Butt Joint, ❖ Tee Joint ❖ Double Lap 		<p>pieces</p> <p>Brass 20 SWG, 100 x 50 x 2 pieces</p> <p>Brass 20 SWG, 100 x 50 x 3 pieces</p> <p>Copper 24 SWG, 100 x 50 x 2 pieces</p> <p>Copper 24 SWG, 100 x 50 x 2 pieces</p> <p>Copper 24 SWG, 100 x 50 x 3 pieces</p> <p>SS 30 SWG, 100 x 50 x 2 pieces</p> <p>SS 30 SWG, 100 x 50 x 2 pieces</p>	
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				SS 30 SWG, 100 x 50 x 3 pieces 120 x 60 x 20 mm – GI 26 SWG Part 1-D1: 80 mm, D2: 20 mm, h: 70 GI Sheet 26 SWG	
LU2. Perform brazing operation on job	Trainee would be able to: <ul style="list-style-type: none"> ❖ Lit up the gas torch and make flame as per requirement ❖ Apply flux to job surface as per SOPs ❖ Perform brazing of job as per 	<ul style="list-style-type: none"> ❖ Perform usage of tools for brazing; ; file, emery paper, wire brush ❖ Explain the usage of consumables for brazing; ; spelter, chemicals and fluxes ❖ Describe the post cleaning methods of brazing area; ; water cleaning, wire brush, emery paper, files ❖ Perform brazing 	15 / 50hrs	Steel wire brush, gas welding set, welding tips, filler materials, holding clamp, emery paper, flux, cotton waste, cleaning agents, spark lighter, tip cleaner, spanners, cylinder keys, SOPs, PPE GI Sheet 26 SWG, 100 x 50	Workshop / & Job Floor

	<p>SOPs</p> <ul style="list-style-type: none"> ❖ Perform post cleaning of brazing area as per requirement ❖ P5. Follow safety precautions at workplace 	<p>on Lap Joint, Butt Joint, Double Lap Joint on MS Sheet, SS, copper with MS, cast iron, carbon steel with mild steel</p> <p>Practical Exercises:</p> <ul style="list-style-type: none"> ❖ Lap Joint, ❖ Butt Joint, ❖ Tee Joint ❖ Double Lap 		<p>x 2 pieces</p> <p>GI Sheet 26 SWG, 100 x 50 x2 pieces</p> <p>GI Sheet 26 SWG, 100 x 50 x 3 pieces</p> <p>MS Sheet 20 SWG, 100 x 50 x 2 pieces</p> <p>MS Sheet 20 SWG, 100 x 50 x2 pieces</p> <p>MS Sheet 20 SWG, 100 x 50 x 3 pieces</p> <p>Brass 20 SWG, 100 x 50 x 2 pieces</p> <p>Brass 20 SWG, 100 x 50 x 2 pieces</p> <p>Brass 20 SWG, 100 x 50 x 3 pieces</p>	
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				<p>Copper 24 SWG, 100 x 50 x 2 pieces</p> <p>Copper 24 SWG, 100 x 50 x 2 pieces</p> <p>Copper 24 SWG, 100 x 50 x 3 pieces</p> <p>SS 30 SWG, 100 x 50 x 2 pieces</p> <p>SS 30 SWG, 100 x 50 x 2 pieces</p> <p>SS 30 SWG, 100 x 50 x 3 pieces</p> <p>120 x 60 x 20 mm – GI 26 SWG</p> <p>Part 1-D1: 80 mm, D2: 20</p>	
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				mm, h: 70 GI Sheet 26 SWG	
LU3. Perform post brazing inspection	<p>Trainee would be able to:</p> <ul style="list-style-type: none"> ❖ Perform visual inspection for locating brazing defects ❖ Perform following tests for inspection of quality: <ul style="list-style-type: none"> • Pneumatic test • Hydro pressure test ❖ Remove defects of brazing as per requirement 	<ul style="list-style-type: none"> ❖ Explain different type of brazing defects; ; lack of penetration, crack, overheat, porosity, blow holes ❖ Demonstrate different types of testing applied on brazing job; breaking, bending, tensile strength, pneumatic test, hydro pressure test ❖ Demonstrate the method of removal of brazing defects; re-brazing 	10 / 20hrs	Magnifying glass, Steel wire brush, gas welding set, welding tips, flux, filler materials, holding clamp, emery paper, cotton waste, cleaning agents, spark lighter, tip cleaner, spanners, cylinder keys, SOPs, PPE	Workshop / & Job Floor

	❖ Follow safety precautions at workplace				
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Module 7: Perform Oxy-Acetylene Welding

Objective: To perform Oxy-Acetylene Welding at workplace, and expected to prepare job for oxy-acetylene welding , perform operations related to oxy-acetylene welding, perform post oxy-acetylene welding inspection , at workplace

Duration: 135 hours Theory: 35 hours Practice: 100 hours

Module Title and Aim	Learning Outcome	Learning Elements	Time Duration (Th/Pr)	Tools and Equipment	Learning Place
LU1. Prepare job for oxy-acetylene welding	<p>Trainee would be able to:</p> <ul style="list-style-type: none"> ❖ Select the oxy-acetylene welding technique as per job requirement ❖ Arrange the 	<ul style="list-style-type: none"> ❖ Demonstrate oxy-acetylene gas welding techniques; left-right ward ❖ Explain the physical properties of metals ❖ Demonstrate the usage of tools for 	10 / 30hrs	Steel wire brush, gas welding set, welding tips, filler materials, holding clamp, emery paper, cotton waste, cleaning agents, spark lighter, tip cleaner,	Workshop / & Job Floor

	<p>workplace according to the oxy-acetylene welding requirement</p> <ul style="list-style-type: none"> ❖ Arrange tools required for oxy-acetylene welding method ❖ Arrange filler material as per requirement ❖ Clean the oxy-acetylene welding area as per requirement i.e. ❖ Chemically 	<p>oxy-acetylene welding ; oxy-acetylene equipment with all accessories, torch (injector & non injector), regulators, rubber hoses and their colors, flash back arresters, back fire arresters, oxygen and acetylene cylinders, Steel wire brush, gas welding set, welding tips, filler materials, holding clamp, emery paper, cotton waste, cleaning agents, spark lighter, tip cleaner, spanners, cylinder keys</p> <ul style="list-style-type: none"> ❖ Explain the usage of filler material same as base metal ❖ Explain different types of cleaning agents; ; steel wire 		<p>spanners, cylinder keys, SOPs, PPE;</p> <p>-</p> <p>MS200x100x4 ...5mm 2pcs</p> <p>-MS 200x100x4... 5mm 2pc</p> <p>-MS dia. 2"x50xwall thickness 2mm 2pcs</p> <p>-Filler Wire</p>	
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	<ul style="list-style-type: none"> ❖ Mechanically ❖ Follow safety precautions at workplace 	<p>bush, file, emery paper and related and techniques</p> <ul style="list-style-type: none"> ❖ Illustrate the hazards related to oxy-acetylene welding; back fire, flash back ❖ Lighting of flame, adjusting of different flames, flange weld, blind weld, butt joint flat, corner joint flat, corner joint horizontal, butt joint vertical, butt joint horizontal, T-joint horizontal, T joint vertical, T joint overhead, corner joint pipe, t joint pipe, saddle, lateral, miter elbow three piece., Neck weld flange, slip on flange, socket weld flange, orifice flange, integral flange, (pipe spool), stool making, 			
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<p>LU2. Perform operations related to oxy-acetylene welding</p>	<p>Trainee would be able to:</p> <ul style="list-style-type: none"> ❖ Lit up the gas torch and make flame as per requirement ❖ Perform cleaning of job surface before welding as per requirement ❖ Perform oxy-acetylene welding of job as per SOPs ❖ Perform cleaning of welded area after welding, as per 	<ul style="list-style-type: none"> ❖ List the usage of tools for oxy-acetylene welding ❖ Demonstrate oxy-acetylene welding process and illustrate the usage of consumables for oxy-acetylene welding; gases (oxygen, acetylene, filler metal ❖ Describe the post cleaning methods of oxy-acetylene welded area; steel wire brush, chisel, emery paper, cotton waste ❖ Explain the specific safety precautions associated with oxy-acetylene welding; back fire, flash back 	<p>15 / 50hrs</p>	<p>Steel wire brush, gas welding set, welding tips, filler materials, holding clamp, emery paper, cotton waste, cleaning agents, spark lighter, tip cleaner, spanners, cylinder keys, SOPs, PPE</p> <p>- MS200x100x4...5mm 2pcs -MS 200x100x4...5mm 2pc -MS dia. 2"x50xwall thickness 2mm 2pcs -Filler Wire</p>	<p>Workshop / & Job Floor</p>
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	<p>requirement</p> <ul style="list-style-type: none"> ❖ Follow safety precautions at workplace 				
<p>LU3. Perform post oxy-acetylene welding inspection</p>	<p>Trainee would be able to:</p> <ul style="list-style-type: none"> ❖ Perform visual inspection for locating oxy-acetylene welding defects ❖ Remove defects of oxy-acetylene welding as per requirement ❖ Perform Pneumatic and hydro 	<ul style="list-style-type: none"> ❖ Explain different type of oxy-acetylene welding defects; under cut, gas pocket, porosity, lack of penetration, blow holes, lack of fusion etc. ❖ Demonstrate different types of testing applied on oxy-acetylene welded job; Non-destructive & destructive tests; tensile test, bend test, hardness test, impact test, nick break test, ❖ Describe the method of removal of oxy-acetylene 	<p>10 / 20hrs</p>	<p>Magnifying glass, wire brush, gas welding set, welding tips, filler materials, flux, holding clamp, jigs and fixtures, emery paper, cotton waste, cleaning agents, instructions manuals, SOPs, PPE</p>	<p>Workshop / & Job Floor</p>

	pressure tests on job for inspection ❖ Follow safety precautions at workplace	defects ; remove defect area with disc grinder and re-weld			
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Module 8: Perform Welding (SMAW/GTAW (TIG) /GMAW (MIG/MAG)/SAW)

Objective : To prepare workplace for SMAW welding, Prepare workplace for SMAW /GTAW (TIG) welding, prepare workplace for GMAW (MIG/MAG) welding, . prepare workplace for SAW welding, Prepare job for welding, Perform operations related to SMAW welding, Perform operations related to GTAW (TIG) welding, and GMAW (MIG/MAG) and SAW welding operations.

Duration: 300 hours Theory: 50 hours Practice: 250 hours

Module Title and Aim	Learning Outcome	Learning Elements	Time Duration (Th/Pr)	Tools and Equipment	Learning Place
LU1. Prepare job for welding	Trainee would be able to: ❖ Arrange	❖ Describe the usage of tools required for	4 / 20hrs	Grinders, cutters, beveling	Workshop / &

	<p>tools and cleaning chemicals required for the job</p> <ul style="list-style-type: none"> ❖ Prepare joint as per drawing • Joint preparation • Joint cleaning ❖ Follow the welding procedure specification (WPS) / instruction sheet for welding ❖ Follow specific safety precautions associated with welding job 	<p>the job; Grinders, cutters, beveling machine, file, measuring tools</p> <ul style="list-style-type: none"> ❖ Demonstrate joint preparation, cleaning and tacking ❖ Explain welding procedure specification (WPS) / instruction sheet ❖ Apply specific safety precautions associated with welding job 		<p>machine, file, measuring tools, WPS/ instruction sheet, PPE</p>	<p>Job Floor</p>
<p>LU2. Prepare workplace for</p>	<p>Trainee would be able to:</p>	<ul style="list-style-type: none"> ❖ Describe the 	<p>4 / 20hrs</p>	<p>Welding</p>	<p>Workshop</p>

SMAW welding	<ul style="list-style-type: none"> ❖ Arrange the workplace according to the requirement of the job <ul style="list-style-type: none"> •Welding booth/fire blanket •Welding machine and accessories •Electric supply •Scaffolding •Jigs and fixtures •Lighting ❖ Apply the safety measures as per work permit <ul style="list-style-type: none"> •Ventilation •Fire extinguishers •First Aid box •Emergency alarm/light •Ambulance •Personal protective 	<p>requirements of a workplace for welding the specific job ; welding booth, table, welding machines ; transformer, rectifier and generator, electrodes, electro dryer, welding cables, electrode holders, earth clamp, chipping hammer, wire brush, helmet, leather apron, leather gloves, fire blanket</p> <ul style="list-style-type: none"> ❖ Describe the organizational safety rules and guidelines; PPE's ❖ Demonstrate the preparation of SMAW welding machine including <ul style="list-style-type: none"> •Type of current (AC/DC) • polarity (straight and reverse) ❖ Explain Lower 		<p>machine, grinder, chipping hammer, wire brush, electrode oven, desiccators, jigs and fixtures, lights, exhaust fans, fire blankets, fire extinguishers, first aid box, PPE</p> <ul style="list-style-type: none"> - MS 200x100x5m m 1pcs - MS 200x100x5m m 1pcs - MS 200x100x5m m 1pcs - MS 200x100x5m m 1pcs - MS 200x100x5m m 1pcs - MS 200x100x3m 	/ & Job Floor
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	<p>equipment</p> <ul style="list-style-type: none"> ❖ Prepare the required welding machine as per job requirement <ul style="list-style-type: none"> •Type of current (AC/DC) •Current polarity 	<p>explosive limits (LEL)</p>		<p>m 1pcs</p> <ul style="list-style-type: none"> - MS 200x100x5m m 1pcs - MS 200x100x3m m 1pcs - MS 200x100x3m m 1pcs - MS 200x100x5m m 1pcs - MS 200x100x8m m 1pcs - MS 200x100x8m m 1pcs - MS 200x100x8m m 1pcs 	
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<p>LU3. Perform operations related to SMAW welding</p>	<p>Trainee would be able to:</p> <ul style="list-style-type: none"> ❖ Arrange the electrode as per welding procedure specification (WPS) / instruction sheet ❖ Arrange pre-heating equipment as per welding procedure specification (WPS) / instruction sheet ❖ Adjust electrical parameters as per welding procedure specification (WPS) / instruction sheet 	<ul style="list-style-type: none"> ❖ Determine the specifications/ classification of electrode required for the job ❖ Read and interpret instructions of WPS ❖ State the importance of pre heating if necessary ❖ Demonstrate how to adjust welding current parameters and their effects on weld ❖ Demonstrate the process of SMAW welding Explain types of Welding positions; flat, horizontal, vertical, over head ❖ Explain kinds of basic welding joints; butt joint, lap 	<p>5 / 25hrs</p>	<p>Welding machine, electrodes, pre-heating equipment, grinders, wire brush, chipping hammer, temperature gun, temple sticks, desiccators, PPE, WPS/ instruction sheet:</p> <ul style="list-style-type: none"> - MS 200x100x5m m 1pcs - MS 200x100x5m m 1pcs - MS 200x100x5m m 1pcs - MS 200x100x5m m 1pcs - MS 200x100x5m m 1pcs 	<p>Workshop / & Job Floor</p>
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	<ul style="list-style-type: none"> ❖ Perform welding as per welding procedure specification (WPS) / instruction sheet • Pre heat the job, if required • Perform welding operation • Inter-pass cleaning • Inter-pass inspection • Maintain inter-pass temperature ❖ Apply specific safety precautions associated with welding job/process 	<p>joint, edge joint, t-joint, corner joint</p> <ul style="list-style-type: none"> ❖ Apply specific safety precautions associated with welding job/process ❖ Practical exercises; Starting an arc, breaking an arc, making a small beads, restarting the arc, blind welding, outside corner joint, square but joint flat, outside corner joint vertical up, square but joint horizontal, t-joint horizontal, t joint vertical up, t-joint vertical down, t-joint flat, t-joint over head, V joint flat, V joint vertical up, V joint horizontal, V joint overhead, lap joint, pipe butt welding rotation, pipe butt weld fixed position, pipe corner joint, 		<ul style="list-style-type: none"> - MS 200x100x3m m 1pcs - MS 200x100x5m m 1pcs - MS 200x100x3m m 1pcs - MS 200x100x3m m 1pcs - MS 200x100x5m m 1pcs - MS 200x100x8m m 1pcs - MS 200x100x8m 	
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		pipe t-joint, proto type overhead bridge/Model Trolley		m 1pcs - MS 200x100x8m m 1pcs	
LU4. Prepare workplace for GTAW (TIG) welding	<p>Trainee would be able to:</p> <ul style="list-style-type: none"> ❖ Arrange the workplace according to the requirement of the job • Welding booth/fire blanket • Welding machine and accessories • Gas cylinders (Argon) with accessories • Electric supply • Scaffolding • Jigs and fixtures • Lighting ❖ Apply the safety measures as 	<ul style="list-style-type: none"> • Describe the requirements of a workplace for welding the specific job ;welding booth, table, welding machines ; transformer, rectifier and generator, electrodes, welding cables, earth clamp, welding torch, tungsten electrode chipping hammer, wire brush, helmet, apron, inert gases (argon), gas flow meter, leather gloves & apron, fire blanket • Describe the organizational safety rules and guidelines 	5 / 20hrs	<p>Welding machine and gas cylinders (Argon) with accessories, tungsten electrode, filler rod/ wire, grinder, wire brush, jigs and fixtures, lights, exhaust fans, fire blankets, fire extinguishers, first aid box, welding helmet, PPE</p> <ul style="list-style-type: none"> - MS 200x100x5m m 1pcs - MS 200x100x5m m 1pcs - MS 200x100x5m m 1pcs - MS 	Workshop / & Job Floor

	<p>per work permit</p> <ul style="list-style-type: none"> • Ventilation • Fire extinguishers • First Aid box • Emergency alarm/light • Ambulance • Personal protective equipment <p>❖ Prepare the required welding machine as per job requirement</p> <ul style="list-style-type: none"> • Type of current (AC/DC) • Current polarity • Gas flow rate <p>❖ Explain uses of Lower Explosive Limits (LEL) Tester, Oxygen</p>	<ul style="list-style-type: none"> • Demonstrate the preparation of welding machine including • Type of current (AC/DC) • polarity (straight – reverse) • Explain Lower explosive limits (LEL) 		<p>200x100x5m m 1pcs</p> <p>- MS 200x100x5m m 1pcs</p> <p>- MS 200x100x3m m 1pcs</p> <p>- MS 200x100x5m m 1pcs</p> <p>- MS 200x100x3m m 1pcs</p> <p>- MS 200x100x3m m 1pcs</p> <p>- MS 200x100x5m m 1pcs</p>	
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	Analyzer			<ul style="list-style-type: none"> - MS 200x100x8m m 1pcs - MS 200x100x8m m 1pcs - MS 200x100x8m m 1pcs 	
LU5. Perform operations related to GTAW (TIG) welding	<p>Trainee would be able to:</p> <ul style="list-style-type: none"> ❖ Arrange the filler wire/rod as per welding procedure specification (WPS) / instruction sheet ❖ Arrange pre-heating equipment as per welding procedure specification (WPS) / instruction sheet ❖ Adjust 	<ul style="list-style-type: none"> ❖ Determine the specifications/ classification of filler wire/rod required for the job ❖ Read and interpret instructions of WPS/ instruction sheet ❖ State the importance of pre heating if necessary ❖ Describe how to adjust welding parameters and their effects on weld ❖ Demonstrate the 	5 / 25hrs	<p>Welding machine and gas cylinders (Argon) with accessories, tungsten electrode, grinder, wire brush, filler wire/rod, jigs and fixtures, temperature gun, dissolving paper (as required), temple stick, masking tape (as required), lights, exhaust fans, fire blankets, fire extinguishers, first aid box, welding helmet, PPE, WPS/ instruction sheet</p>	Workshop / & Job Floor

	<p>welding parameters as per welding procedure specification (WPS) / instruction sheet</p> <ul style="list-style-type: none"> • Amperes • Gas flow rate • Back purging, if required <p>❖ Perform welding as per welding procedure specification (WPS) / instruction sheet</p> <ul style="list-style-type: none"> • Pre heat the job, if required • Perform welding operation • Inter-pass cleaning • Inter-pass 	<p>process of GTAW (TIG) welding</p> <ul style="list-style-type: none"> ❖ Explain the lower explosive limits ❖ Apply specific safety precautions associated with welding job/process ❖ Practical exercises; starting an arc, maintaining the arc, running short bead, breaking and restarting the arc, outside corner horizontal, outside corner flat, butt joint flat, outside corner vertical up, square butt vertical up, square butt horizontal, square butt overhead, t— joint/lap joint horizontal, t-joint vertical up, V joint flat, V joint vertical up, V joint horizontal, square 		<ul style="list-style-type: none"> - MS 200x100x5m m 1pcs - MS 200x100x5m m 1pcs - MS 200x100x5m m 1pcs - MS 200x100x5m m 1pcs - MS 200x100x5m m 1pcs - MS 200x100x3m m 1pcs - MS 200x100x5m m 1pcs - MS 200x100x3m m 1pcs 	
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	<ul style="list-style-type: none"> inspection • Maintain inter-pass temperature ❖ Apply specific safety precautions associated with welding job/process 	<p>butt joint on pipe rolling, square butt joint pipe in fix position, corner joint pipe, t-joint pipe, pipe on support.</p>		<ul style="list-style-type: none"> - MS 200x100x3m m 1pcs - MS 200x100x5m m 1pcs - MS 200x100x8m m 1pcs - MS 200x100x8m m 1pcs - MS 200x100x8m m 1pcs 	
LU6. Prepare workplace for GMAW (MIG/MAG) welding	<p>Trainee would be able to:</p> <ul style="list-style-type: none"> ❖ Arrange the workplace according to the requirement of the job • Welding booth/fire blanket 	<ul style="list-style-type: none"> ❖ Describe the requirements of a workplace for welding the specific job; ; welding booth, table, welding machines ; transformer, rectifier and generator, 	4 / 20hrs	Welding machine and gas cylinders (CO ₂ , Argon) with accessories, grinder, chipping hammer, wire brush, wire cutter, anti spatter spray,	Workshop / & Job Floor

	<ul style="list-style-type: none"> • Welding machine and accessories • Gas cylinders (CO₂, Argon) with accessories • Electric supply • Scaffolding • Jigs and fixtures • Lighting <p>❖ Apply the safety measures as per work permit</p> <ul style="list-style-type: none"> • Ventilation • Fire extinguishers • First Aid box • Emergency alarm/light • Ambulance • Personal protective equipment <p>❖ Prepare the</p>	<p>electrodes, welding cables, earth clamp, welding torch, wire spool, wire feeding unit, chipping hammer, wire brush, helmet, apron, inert gases (argon, CO₂), gas flow meter, leather gloves & apron, fire blanket,</p> <p>❖ Describe the organizational safety rules and guidelines</p> <p>❖ Demonstrate the preparation of welding machine including</p> <ul style="list-style-type: none"> • Type of current • Polarity (straight-reverse) • Gas flow rate <p>❖ Explain Lower explosive limit</p>		<p>wire spool, jigs and fixtures, lights, exhaust fans, fire blankets, fire extinguishers, first aid box, PPE</p> <ul style="list-style-type: none"> - MS 200x100x5m m 1pcs - MS 200x100x5m m 1pcs - MS 200x100x5m m 1pcs - MS 200x100x5m m 1pcs - MS 200x100x5m m 1pcs - MS 200x100x3m m 1pcs - MS 200x100x5m m 1pcs 	
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	<p>required welding machine as per job requirement</p> <ul style="list-style-type: none"> • Type of current (AC/DC) • Current polarity • Gas flow rate 			<ul style="list-style-type: none"> - MS 200x100x3m m 1pcs - MS 200x100x3m m 1pcs - MS 200x100x5m m 1pcs - MS 200x100x8m m 1pcs - MS 200x100x8m m 1pcs - MS 200x100x8m m 1pcs 	
LU7. Perform operations related to GMAW (MIG/MAG) welding	<p>Trainee would be able to:</p> <ul style="list-style-type: none"> ❖ Arrange the wire spool as per welding 	<ul style="list-style-type: none"> ❖ Determine the specifications/ classification of filler wire required for the job 	5 / 25hrs	Welding machine and gas cylinders (CO ₂ , Argon) with	Workshop / & Job Floor

	<p>procedure specification (WPS) / instruction sheet</p> <ul style="list-style-type: none"> ❖ Arrange pre-heating equipment as per welding procedure specification (WPS) / instruction sheet ❖ Adjust welding parameters as per welding procedure specification (WPS) / instruction sheet <ul style="list-style-type: none"> • Voltage • Amperes • Wire feed speed • Gas flow rate 	<ul style="list-style-type: none"> ❖ Read and interpret instructions of WPS/ instruction sheet ❖ State the importance of pre heating if necessary ❖ Describe how to adjust welding parameters and their effects on weld ❖ Demonstrate the process of GMAW (MIG/MAG) welding ❖ Apply specific safety precautions associated with welding job/process ❖ Practical exercises; MAG/MIG welding exercises; striking an arc and maintaining arc, 		<p>accessories, grinder, chipping hammer, wire brush, wire cutter, anti spatter spray, wire spool, jigs and fixtures, lights, exhaust fans, fire blankets, fire extinguishers, first aid box, PPE, WPS/ instruction sheet</p> <ul style="list-style-type: none"> - MS 200x100x5m m 1pcs - MS 200x100x5m m 1pcs - MS 200x100x5m m 1pcs - MS 200x100x5m m 1pcs - MS 200x100x5m m 1pcs 	
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	<ul style="list-style-type: none"> • Stick out ❖ Perform welding as per welding procedure specification (WPS) / instruction sheet • Pre heat the job, if required • Perform welding operation • Inter-pass cleaning • Inter-pass inspection • Maintain inter-pass temperature ❖ Apply specific safety precautions associated with welding job/process 	<p>running short bead, breaking and restarting the arc, trade bead/ blind welding, fillet weld horizontal, fillet weld vertical down, fillet weld overhead, fillet weld vertical up, square butt joint flat, square butt joint vertical down, V-joint flat, V-joint vertical up, pipe on plate, pipe corner joint, fillet straight bead/ blind welding on Aluminum, fillet weld horizontal Aluminum, square butt joint flat Aluminum, V joint flat Aluminum, square butt flat stainless steel, t-joint horizontal stainless steel.</p>		<ul style="list-style-type: none"> - MS 200x100x3m m 1pcs - MS 200x100x5m m 1pcs - MS 200x100x3m m 1pcs - MS 200x100x3m m 1pcs - MS 200x100x5m m 1pcs - MS 200x100x8m m 1pcs - MS 200x100x8m 	
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				m 1pcs - MS 200x100x8m m 1pcs	
LU8. Prepare workplace for SAW welding	<p>Trainee would be able to:</p> <ul style="list-style-type: none"> ❖ Arrange the workplace according to the requirement of the job • Welding machine and accessories • Electric supply • Jigs and fixtures • Lighting ❖ Apply the safety measures as per work permit • Ventilation • Fire extinguishers • First Aid box • Emergency 	<ul style="list-style-type: none"> ❖ Describe the requirements of a workplace for welding the specific job; ; welding booth, welding machines, wire feeding unit, flux, welding cables, earth clamp, wire spool, flux hopper, weld backing plate, chipping hammer, wire brush,, leather gloves & apron, fire blanket ❖ Describe the organizational safety rules and guidelines ❖ Demonstrate the preparation of welding machine including • Type of current 	4 / 20hrs	<p>Welding machine with accessories, flux drying oven, grinder, chipping hammer, wire brush, jigs and fixtures, lights, exhaust fans, fire extinguishers, first aid box, PPE;</p> <ul style="list-style-type: none"> - MS 200x100x5m m 1pcs - MS 200x100x5m m 1pcs - MS 200x100x5m m 1pcs - MS 200x100x5m m 1pcs - MS 200x100x5m 	Workshop / & Job Floor

	<p>alarm/light</p> <ul style="list-style-type: none"> • Ambulance • Personal protective equipment <p>❖ Prepare the required welding machine as per job requirement</p> <ul style="list-style-type: none"> • Type of current (AC/DC) • Current polarity • Travel speed 	<p>(AC/DC)</p> <ul style="list-style-type: none"> • Polarity (straight-reverse) • Travel speed 		<p>m 1pcs</p> <ul style="list-style-type: none"> - MS 200x100x3m m 1pcs - MS 200x100x5m m 1pcs - MS 200x100x3m m 1pcs - MS 200x100x3m m 1pcs - MS 200x100x5m m 1pcs - MS 200x100x8m m 1pcs - MS 	
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				200x100x8m m 1pcs - MS 200x100x8m m 1pcs	
LU9. Perform operations related to SAW welding	<p>Trainee would be able to:</p> <ul style="list-style-type: none"> ❖ Arrange the wire spool and flux as per welding procedure specification (WPS) / instruction sheet ❖ Arrange pre-heating equipment as per welding procedure specification (WPS) / instruction sheet ❖ Adjust welding parameters as per welding 	<ul style="list-style-type: none"> ❖ Determine the specifications/ classification of wire-flux combination required for the job ❖ Read and interpret instructions of WPS/ instruction sheet ❖ State the importance of pre heating if necessary ❖ Describe how to adjust welding parameters and their effects on weld ❖ Demonstrate the process of SAW welding operation 	5 / 25hrs	Welding equipment with accessories, wire spool, flux, pre-heating equipment, grinders, wire brush, wire cutter, chipping hammer, temple sticks, flux drying oven, PPE, WPS/ instruction sheet	Workshop / & Job Floor

	<p>procedure specification (WPS) / instruction sheet</p> <ul style="list-style-type: none"> • Voltage • Amperes • Travel speed • Type of Polarity • Stick out • Wire speed <p>❖ Perform welding as per welding procedure specification (WPS) / instruction sheet</p> <ul style="list-style-type: none"> • Pre heat the job, if required • Perform welding operation • Inter-pass cleaning • Inter-pass inspection • Maintain inter-pass 	<p>❖ Apply specific safety precautions associated with welding job/process</p> <p>❖ Practical exercises, normally welding is performed in vertical positions in automatic process, pipes and vessels with higher thick material is welded, mostly the part is rotated.</p>			
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	<p>temperature</p> <ul style="list-style-type: none"> ❖ Apply specific safety precautions associated with welding job/process 				
LU10. Perform post welding operations	<p>Trainee would be able to:</p> <ul style="list-style-type: none"> ❖ Apply post weld cleaning of the job following the processes; • Removal/collection of un-fused flux (for SAW process) • Removal of slag • Removal of jigs and fixtures ❖ Perform visual inspection of 	<ul style="list-style-type: none"> ❖ State the importance of post weld cleaning of the job ; remove and store the flux, remove slag, clean the weld bead ❖ Perform post weld cleaning of the job following the processes; • Removal/collection of un-fused flux (for SAW process) • Removal of slag • Removal of jigs and fixtures ❖ Identify visually, imperfections of 	5 / 25hrs	<p>post-heating equipment, welding machine, consumables, grinders, wire brush, chipping hammer, PPE, WPS/ instruction sheet</p>	<p>Workshop / & Job Floor</p>

	<p>weld area and rectify defected area as per requirement</p> <ul style="list-style-type: none"> ❖ Perform post-heating of the job as per WPS/ instruction sheet, if required ❖ Apply specific safety precautions associated with welding job/process 	<p>weld</p> <ul style="list-style-type: none"> ❖ Demonstrate the purpose of post-heating if necessary ❖ Explain specific safety precautions associated with welding job/process 			
LU11. Repair defected areas of job/work piece	<ul style="list-style-type: none"> ❖ Follow the instructions of supervisor and inspector's report to identify defected point (s) ❖ Arrange the tools and equipment required for repairing defected 	<ul style="list-style-type: none"> ❖ Explain reading and interpreting inspection report regarding defects ❖ Enlist the non-destructive tests (NDT) for welding inspection <ul style="list-style-type: none"> • Visual testing (VT) • Magnetic particle test (MT) • Radiographic test (RT) • Ultrasonic test (UT) 	5 / 25 hours	Grinder, cutter, gouging equipment, welding equipment with accessories, electrodes/filler wires, gas cylinder, desiccators, electrode drying oven, (argon),WPS/ instruction sheet, PPE	Workshop / & Job Floor

	<p>area(s)</p> <ul style="list-style-type: none"> ❖ Apply the following repair procedure as per inspection report • Grinding • Cutting • Gouging ❖ Apply repair welding to specific defected area(s) as per WPS/ instruction sheet ❖ Apply specific safety precautions associated with welding equipment 	<ul style="list-style-type: none"> • Dye penetration test (PT) • Positive Material Identification (PMI) ❖ Demonstrate the usage of tools and equipment required for the job ❖ Describe the process and selection of defect removal methods ❖ State the need for repair welding ❖ Describe specific safety precautions associated with welding equipment usage 			
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Module 09: Develop Professionalism

Objective of the Module: This module would develop professionalism in the Fabricator and welder to improve the skills regarding communication, work ethics and to look into the latest research and developments.

Duration: 55 hours Theory: 15 hours Practice: 40 hours

Module Title and Aim	Learning Outcome	Learning Elements	Time Duration (Th/Pr)	Tools and Equipment	Learning Place
LU1. Communicate with others	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Communicate with supervisor following appropriate communication procedure • Communicate with colleagues following communication 	<ul style="list-style-type: none"> • Describe the channels required to communicate effectively and precisely within organisation. e.g. chain of command • Train how to appropriately use electronic and relevant media as per need • Provide knowledge of 	5 / 10 hrs	Computer/ laptop, internet, telephone	Class Room / Workshop

	<p>procedure</p> <ul style="list-style-type: none"> • Use media to communicate effectively (e.g.: email, telephone, laptop etc.) 	basic technical english			
LU2. Upgrade professional skills	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Participate in Skill test for professional development • Attend seminars/ training workshops for professional development • Adopt upcoming market trends in welding field • follow organizational policies (SOPs) for professional development 	<ul style="list-style-type: none"> • Describe the importance of latest trends and market research. • Identify the need of skill sets by getting involved in seminars, workshops and competitions. 	5 / 15hrs	Computer, internet facility, magazines, books, codes and standards	Classroom /Workshop & Job floor
LU3. Work in a team	Trainee will be able to:		5 / 15hrs	Computer, internet facility, multi-	Class Room / Workshop

	<ul style="list-style-type: none"> • Demonstrate good team work: <ul style="list-style-type: none"> • Cooperation/coordination • Work ethics • Etiquettes/manners • Carry an appropriate appearance. • Extend tolerance and ease. 	<ul style="list-style-type: none"> • Establish importance of being a good team player: <ul style="list-style-type: none"> • Cooperation / coordination • Work ethics • Etiquettes/manners • Specialized knowledge, competency, punctuality, honesty and integrity, emotional stability, accountability, self regulation, image, emotional stable 		media, printer, Over Head Projector	
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Module: 10: Computer Skills

Objective of the Module: Learn to use computer effectively.

Duration: 40 hrs Theory 0 hrs Practical 40 hrs

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials/ learning	Learning Place
LU1. Introduction to Computer	After completion of this unit the student will be able to understand about Computer Hardware and software	10.1.1 Computer (Definition) 10.1.2 Information Processing Cycle 10.1.3 Components of the Computer 10.1.4 Data Representation 10.1.5. Software 10.1.6. Some Abbreviations	4HRS	1.D C o m p u t	Computer Lab
LU2. MS-W ord (Basic to intermediate)	After completion of this unit the student will be able to use the word processing application (MS- W ord) of MS- Office	10.2.1. Introduction 10.2.3 Editing and Formatting Text 10.2.4 Formatting Paragraph 10.2.5 Printing Documents 10.2.6 Formatting Pages 10.2.7 Checking Spelling and Grammar 10.2.8 Generating Report	10HRS	1. D S o C o m	Computer Lab

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials/ learni	Learning Place
LU3. MS-Excel (Basic to intermediate)	After completion of this unit the student will be able to use the spreadsheet application (MS-Excel) of MS- Office	10.3.1 Introduction 10.3.2 Typing Data 10.3.3 Basic Formatting 10.3.4 Modifying Worksheets 10.3.5 Working with Formulas 10.3.6 Working with Basic Functions 10.3.7. AutoFilter 10.3.8. Charts 10.3.9. Printing Workbooks	12HRS	1 . D e s k t o p	Computer Lab
LU4. MS-PowerPoint (Basic to intermediate)	After completion of this unit the student will be able to use the PowerPoint application (MS-PowerPoint) of MS- Office	10.4.1. Introduction 10.4.2 Creating and Saving Presentations 10.4.3 Proofing Your Content 10.4.4 Working with Pictures and Multimedia 10.4.5Running Slide Show	14HRS	1.D C o m p u t e	Computer Lab

Module 11: English Language Skills I

Objective of the Module: To improve trainees' listening comprehension and capacity to read English language with understanding.

Duration	Theory	Practical
40 hours	40 hrs	0 hrs

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials	Learning Place
LU.1. Introduction to Listening Part I - Listening to Match Information	Able to listen and match information and practice effective and active listening.	11.1 Listening to Match Information 11.1.1 Body parts 11.1.2 Daily routine 11.1.3 How do I spend my day? 11.1.4 People and profession 11.1.5 Riddles 11.1.6 All over the world 11.1.7 My visits 11.1.8 Colours all around	5	H a n d - o	Class Room
LU2. Introduction to Listening Part II - Listening to Respond	Achieve an elementary level of listening skills to respond accordingly.	11.2 Listening to Respond 11.2.1 Introduction and meeting 11.2.2 A day at school 11.2.3 At a hotel 11.2.4 My stay 11.2.5 Inquiry 11.2.6 Uncle Fester 11.2.7 At a railway station	5	H a n d -	Class Room
Learning Unit	Learning Outcomes	Learning Elements	Materials Required		Learning

<p>LU.3. Introduction Listening Part III - Following Conversations</p>	<p>Improve English language listening comprehension skills to participate more effectively in communicative skills to follow conversations.</p>	<p>11.3 Following Conversations 11.3.1 At a 11.3.2 Birthday 11.3.3 Birthday party 11.3.4 At the 11.3.5 At a party 11.3.6 At a bank 11.3.7 Movie 11.3.8 UFO</p>	<p>5</p>	<p>Handbook and Audio CD</p>	<p>Class Room</p>
<p>LU 4. Introduction to Listening Part IV - Information</p>	<p>Expand English language listening comprehension skills to focus on particular key information.</p>	<p>11.4. Listening for Key 11.4.1 Being busy 11.4.2 H 11.4.3 e 11.4.4 ll 11.4.5 n 11.4.6 A trip to 11.4.7 Job 11.4.8 A medical advice</p>	<p>5</p>	<p>Handbook and Audio CD</p>	<p>Class Room</p>

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning
LU 5. Introduction to Reading Part I - Reading to Understand the Sequence of a Text	Achieve an acceptable level of reading skills and follow meaning sequences as well.	11.5 Reading to Understand the Sequence of a Text 11.5.1 ABC 11.5.2 Words in my life 11.5.3 My puzzled world of words 11.5.4 Senseless! 11.5.5 Let's give sentences a sense 11.5.6 Let's make a story 11.5.7 Read and be a writer	5	Handbook	Class Room
LU.6. Introduction to Reading Part II - Understanding the Text Structures	Acquire an adequate level of reading skills and be able to understand different types of reading structures.	11.6 Understanding the Text Structures 11.6.1 Turn on the meaning 11.6.2 Be a reading detective 11.6.3 Making a decision on opinions 11.6.4 Read a picture 11.6.5 Read a map 11.6.6 Reading between	5	Handbook	Class Room

Learning Unit	Learning Outcomes	Learning Elements	Materials Required	Learning
LU 7. Introduction to Reading Part III - Understanding the Purpose of Text	Enable students to read and fully comprehend the purpose of written materials.	11.7 Understanding the 11.7.1 Purpose of 11.7.2 Text Finding 11.7.3 essence 11.7.4 Facts and 11.7.5 opinions 11.7.6 11.7.7 11.7.8	5 Handbook	Class Room
LU 8. Introduction to Reading Part IV - Reading for Key Information	Enable students confident to read independently to look for the key information.	11.8. Reading for 11.8.1 Key 11.8.2 Inform 11.8.3 ation 11.8.4 PMI 11.8.5 11.8.6 11.8.7 11.8.8	5 Handbook	Class Room

Module 11 Title: English Language Skills II

Objective of the Module: To improve overall English language writing skills of students and graduate them to the level of a good speaker.

	Duration	Theory	
	40 hours	40 hrs	
Learning Unit	Learning Outcomes	Learning Elements	Duration
LU1. Introduction to Writing Part I - Completing a form	Improve students' basic English Language writing skills.	11.1 Completing a form 11.1.1 All about you 11.1.2 What do I look like? 11.1.3 Where am I from? 11.1.4 Likes and dislikes 11.1.5 What about you?	
LU 2. Introduction to Writing Part II - Correcting errors	Improve students' English language writing skills focusing on basic writing errors.	11.2 Correcting errors 11.2.1 Capital Letters 11.2.2 Full stops 11.2.3 Other	

<p>LU 3. Introduction to Writing Part III - Communicating ideas and information</p>	<p>Improve students' English language writing skills concerning their immediate surroundings</p>	<p>11.3. Communicating ideas and information</p> <p>11.3.1 Where do you live? 11.3.2 My family 11.3.3 What's his job? 11.3.4 What can</p>	
<p>LU 4. Introduction to Writing Part IV - Writing a text</p>	<p>Improve students' English language formal and informal writing skills</p>	<p>11.3 Writing a text</p> <p>11.3.2 Writing informally in response to a text</p> <p>11.3.2.1 Replying to a letter</p> <p>11.3.2.2 Suggestions in a letter</p> <p>11.3.2.3 Having a great time</p> <p>11.3.2.4 Café life</p> <p>11.3.3 Writing a formal response</p>	

<p>LU 5. Introduction to Speaking Part I - Introduction to language</p>	<p>Improve students' English language speaking skills by discussing basic and general information.</p>	<p>11.5 Introduction to language 11.5.1 Sounds interesting 11.5.2 Patterns and shapes 11.5.3 Numbers and dates 11.5.4 Family 11.5.5 Home and</p>	<p>5</p>		
<p>LU.6. Introduction to Speaking Part II - Social situations</p>	<p>Improve students' English language speaking skills by sharing information on higher level.</p>	<p>11.6 Social situations 11.6.1 Greeting, exclaiming and saying goodbye 11.6.2 Asking and answering questions 11.6.3 Describing people, things, and places 11.6.4 Expressing likes, dislikes and preferences 11.6.5 Complaining 11.6.6 Apologising and forgiving 11.6.7 Accepting and refusing offers 11.6.8 Suggesting and</p>	<p>5</p>	<p>Handbook and Audio CD</p>	<p>Class Room</p>

<p>LU.7.</p> <p>Introduction to Speaking Part III - Exchanging information and opinion</p>	<p>Improve students' English language speaking skills by sharing information on higher level.</p>	<p>11.7 Exchanging information and opinion</p> <p>11.7.1 Same and different people and things</p> <p>11.7.2 Same and different actions</p> <p>11.7.3 What's in your picture?</p> <p>11.7.4 Plans, maps and routes</p> <p>11.7.5 Asking for and giving</p>	<p>5</p>	<p>Handbook and Audio CD</p>	<p>Class Room</p>
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Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning
		<p>days of your life?</p> <p>11.7.9 How do you commute to work?</p> <p>11.7.10 Are you in a rut?</p> <p>11.7.11 How to report people?</p> <p>11.7.12 How do you spend your leisure time?</p> <p>11.7.13 I have done it!</p> <p>11.7.14 Is tourism appreciated?</p>			
<p>LU8.</p> <p>Introduction to Speaking Part IV - Presenting a topic</p>	<p>Improve students' English language speaking skills by expressing and presenting opinions and experiences.</p>	<p>11.8. Presenting a topic</p> <p>11.8.1 People</p> <p>11.8.2 Personalities</p> <p>11.8.3 Clothes</p> <p>11.8.4 Books, music and film</p> <p>11.8.5 Places</p> <p>11.8.6 Food and drink</p> <p>11.8.7 How was your dinner?</p> <p>11.8.8 Machines and technology</p> <p>11.8.9 Sports and games</p> <p>11.8.10 Travelling</p> <p>11.8.11 Where would you</p>	5	<p>Handbook and Audio CD</p>	<p>Class Room</p>

Module 12 Title: Life Skills I

Aim of the Module: Add value to vocational skills through self-exploration and self-presentation

Duration: 30	Theory: 30	Practice: 00
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Learning Unit	Learning Outcomes	1. Learning Elements	Duration	Mat	Learning Place
LU1. Exploring and Understanding Self	Understand the importance and acquire skills for self-awareness and emotional intelligence for a solid foundation in personal effectiveness	12.1.1 Self Awareness <ul style="list-style-type: none"> •Self-Discovery •Self-Knowing •Self Esteem •Self-Concept •Developing Self 12.1.2 Emotions Management <ul style="list-style-type: none"> •Knowing emotions •Exploring intense emotions 12.1.3 Emotional Intelligence <ul style="list-style-type: none"> •Dealing with own emotions •Dealing with others emotions 12.1.4 Leading via emotional intelligence	10 hrs	a) Multimedia	Training Room
LU2. Effective Communication	Understand the importance of communication in life and learn about different elements of effective	12.2.1 Communication Skills <ul style="list-style-type: none"> •Persuasive Communication 	10 hrs	a) Multimedia	Training Room

Learning Unit	Learning Outcomes	1. Learning Elements	Duration	M a t e r i a l	Learning Place
		<ul style="list-style-type: none"> •Communication styles •Listening skills 12.2.2 Presentati on Skills •Body Language •Voice •Managing Information •Presentation skills 		d) S p e a k e r s e) I n t e r n e t f) T L P	
LU3. Personal Grooming	Learn various factors which makes a well groomed person who is also socially effective	12.3.1 Etiquette s and Self Presentation <ul style="list-style-type: none"> •Dressing •Dealing with others •Self-Presentation •Managing hygiene 	10 hrs	a) M u l t i m e d i a b) V i d e o	Training Room

Module 12 Title: Life Skills II

Aim of the Module: Add value to vocational skills through teamwork, goal-setting and other essential life skills

Duration: 30		Theory: 30		Practice: 00 hours	
Learning Unit	Learning Outcomes	Learning Elements	Duration	Material	Learning Place
LU1. Working with Teams	Comprehend how to work with people / groups	12.1.1 Team building <ul style="list-style-type: none"> • Knowing diversity • Team building techniques 12.1.2 Team work Managing diversity	4 hrs.	a) Multimedia b) Whiteboard	Training Room
LU2. Vision and Goal Setting	Develop personal vision and goals for fulfilling one's dreams for a successful life	12.2.1 Personal Vision and Goal Setting <ul style="list-style-type: none"> • Personal Development Plan 	8 hrs	a) Multimedia b) Whiteboard	Training Room

LU3. Professional Development	Know how to make an effective CV and learn interviewing techniques for better chances of getting a job	12.3.1 Twenty First Century workplace •Job Searching	8 hrs.	a) Multimedia b) Whiteboard	Training Room
		Techniques •Effective Use of Social Media 12.3.2 CV Writing and giving Interviews 12,3.3 Continuous Professional Development		c) Markers d) Speakers e)	
LU4. Personal and Social Responsibility	Understanding & responding impact of gender disparity and gender in culture on individuals / groups	12.4.1 Gender Sensitivity •Difference between sex & gender •Division of labor •Power & decision making •Practical gender need •Rights & Responsibility	10 hrs	a) Videos b) Stories c) Case	Training Room

Module 13: **Secondary Skills - I**

Aim of the Module: Add values in assessment and extra curriculum activities

Duration: 190 Hours

Learning Unit	Learning Outcomes	1. Learning Elements	Duration	Materials Required	Learning Place
1. Monthly Test	<ul style="list-style-type: none"> a. Check if the Learning Objectives have been achieved. b. Identify the learning gaps. c. Monitor the trainees' progress. d. Preparation for final examination. 	<ul style="list-style-type: none"> • Module 1 • Module 2 • Module 3 • Module 4 	80 Hours	<ul style="list-style-type: none"> • Multimedia Projector 	Class rooms
2. Library	<ul style="list-style-type: none"> a. Develop reading habits b. Study reference books and machine manuals. c. Providing opportunity to get more details on computers 	<ul style="list-style-type: none"> • Module 1 • Module 2 • Module 5 • Module 6 	30 Hours	<ul style="list-style-type: none"> • Fully equipped library 	Library
3. Sports	<ul style="list-style-type: none"> a. Providing an opportunity of healthy and physical activities. b. Improve team work and 	<ul style="list-style-type: none"> • Module 7 • Module 8 	50 Hours	<ul style="list-style-type: none"> • Sports goods 	Play Area
4. Events	<ul style="list-style-type: none"> a. Getting extra curricula knowledge and information. b. Broadening the vision and thinking. 	<ul style="list-style-type: none"> • Module 1 • Module 9 • Module 10 • Module 11 	30 Hours	<ul style="list-style-type: none"> • Multimedia Project 	Company / outside

Module 13: Secondary Skills - II

Aim of the Module: Add values in assessment and extra curriculum activities

Duration: 190 hours

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
1. Monthly Test	<ul style="list-style-type: none"> a. Check if the Learning Objectives have been achieved. b. Identify the learning gaps. c. Monitor the trainees' progress. d. Preparation for final examination. 	<ul style="list-style-type: none"> • Module 1 • Module 2 • Module 3 • Module 4 	80 Hours	<ul style="list-style-type: none"> • Multimedia Projector 	Classrooms
2. Library	<ul style="list-style-type: none"> a. Develop reading habits b. Study reference books and machine manuals. c. Providing opportunity to get more details on any topics. 	<ul style="list-style-type: none"> • Module 1 • Module 2 • Module 5 • Module 6 • Module 7 	10 Hours	<ul style="list-style-type: none"> • Fully equipped 	Library
3. Sports	<ul style="list-style-type: none"> a. Providing an opportunity of healthy and physical activities. b. Improve team work and fitness by playing indoor and 	<ul style="list-style-type: none"> • Module 8 • Module 9 	10 Hours	<ul style="list-style-type: none"> • Sports goods 	Play Area
4. Events	<ul style="list-style-type: none"> a. Getting extra curricula knowledge and information. b. Broadening the vision and thinking. 	<ul style="list-style-type: none"> • Module 1 • Module 2 • Module 3 • Module 6 • Module 7 	10 Hours	<ul style="list-style-type: none"> • Multimedia Projector 	Company / outside
5. Students Projects	<ul style="list-style-type: none"> a. Enhancement of technical skills and knowledge. b. Understanding technical drawings (Detail Drawings and 	<ul style="list-style-type: none"> • Module 1 • Module 5 • Module 8 • Module 9 	60 Hours	<ul style="list-style-type: none"> • Machines • Hand Tools 	Workshop

Learning Unit	Learning Outcomes	Learning Elements	Duration	Materials Required	Learning Place
	d. Improving problem-solving skills, creative thinking, and team work.				
6. Industrial visit	a. Giving exposure to local industries b. Observing industrial procedures and operations. c. Getting awareness of industrial		16 Hours	N/A	Industry
7. Students profiling	a. Compiling of trainees' data/profile b. Register the trainees as a alumni	<ul style="list-style-type: none"> • Module 10 • Module 11 • Module 12 	4 Hours	<ul style="list-style-type: none"> • M ulti me 	comput er lab

Module 14 Title: On-the-Job Training - I

Objective of the Module: Gain real work place understanding, skills and experience.

Duration		Theory		Practical	
800 Hrs		0 hrs		800 Hrs	
Month	Week	Recommended rotation plan		Applied Knowledg	

1	1	11.1: Company Orientation (Department wise)	Awareness of chain of command on the plant site, process unit wise orientation and
	2	HSE Procedures and regulations of local authority and the company	Health, Safety and Environment manuals and policies; Equipment
	3	Materials use and their selection	Importance and use of warehouse; Supply and demand concept,
	4	Monthly report writing	MS- Office or computerized logging or reporting system
2	5	11.2: Personnel protective equipment	Use and importance of PPE; Maintain the best and safe working
	6	Health, Safety and Environment overview of work place as well as equipment	Safety at Work, Understanding Emergency procedures, Fire Fighting, Disposal of waste
	7		product managements, Identifying
	8	Monthly report Writing	MS- Office or computerized logging or reporting system
	9	11.3: Performing Bench Work	material identification, Surface Protection Methods, Identification of Material., Scrapping, Marking, Center Punching,
	10		Filling, Surfacing, Squaring
	11		Beveling, Drilling, Threading, Chamfering
	12		Monthly report Writing
	13		Sawing with Hacksaw and Power Saw, Sheering, Disc Cutting Gas Cutting, Plasma cutting

	14		
	15	11.4: Cutting of Material & Assembling of Job	Prepare the place for performing alignment to assemble the job, Use of fixture, Hydraulic jack for alignment, use of computerized
	16	Monthly report Writing	MS-Office or computerized
	17	11.5: Performing soldering of	piece
	18		Bevel and surface cleaning, making Butt Joint, Lap joint, and
	19		Bevel and surface cleaning, making Butt joint, Lap joint,
	20	Monthly report Writing	MS-Office or computerized
	21	11.6: Perform Oxy-Acetylene	Use of Oxy-acetylene welding equipment, Flame adjustments, performing Flange weld, Blind weld, Butt joint flat, Corner joint flat, Horizontal Butt joint, vertical Butt joint, Horizontal Tee Joint, Tee Joint Vertical, Tee Joint
	22		Overhead, Corner joint Pipe, Tee Joint Pipe, Saddle, Lateral, Miter
	23		Elbow three piece, Neck weld
	24	Final report writing	Preparing final report with complete observations, learning and presentation.

Module 15 Title: On-the-Job Training - II

Objective of the Module: Deepen the understanding and skills for the concepts taught in the modules and building Skills for self-learning.

Duration	Theory	Practical
800 Hrs	0 hrs	800 Hrs

Month	Week	Recommended rotation plan	Applied Knowledge and skills Related to
1	1	12.1: Review of OJT of phase I	Assessment and examine the previous OJT with better understanding of working techniques, process unit wise understanding
	2	Procedures and regulations of local and the company	Communication Skills, computerized skills of plant machinery, study of manuals
	3	Materials use and their selection	Importance and use of warehouse; Supply and demand concept, international codes and standards of materials

	4	Monthly report writing	MS- Office or computerized logging or reporting system
2	5	12.2: Perform SMAW (MMA) Welding	Adjust welding current / polarity, Welding position (Flat / Horizontal / Vertical / Overhead), Preheating (if required), perform Butt Joint, Lap Joint, Edge Joint, Corner joint on each position, Post Weld Heat Treatment (PWHT) as and if required
	6		
	7		
	8	Monthly report Writing	MS- Office or computerized logging or reporting system
3	9	12.3: Perform GTAW (TIG) Welding	Adjust Gas Flow Rate and welding current / polarity, Welding position (Flat / Horizontal / Vertical / Overhead), preheating (if required), perform Butt Joint, Lap Joint, Edge Joint, Corner joint on each position, Post Weld Het Treatment (PWHT) as and if required
	10		
	11		
	12	Monthly report Writing	MS- Office or computerized logging or reporting system
4	13	12.4: Perform GMAW (MIG/MAG) Welding	Adjust Gas Flow Rate and welding current / polarity, Welding position (Flat / Horizontal / Vertical / Overhead), preheating (if required), perform Butt Joint, Lap Joint, Edge Joint, Corner joint on each position, Post Weld Het Treatment (PWHT) as and if required
	14		
	15		
	16	Monthly report Writing	MS- Office or computerized logging or reporting system
5	17	12.5: Perform SAW Welding	Classification of Wire Flux combination, Preheating process (if required), Adjust welding current / polarity, Welding position (Vertical), Adjust of auto-weld machine and the job piece for the required rotation, Post Weld Heat Treatment (PWHT) as and if required
	18		
	19		
	20	Monthly report Writing	MS- Office or computerized logging or reporting system

6	21	12.6: Repair of Welding Defects	Analysis and identification of the defects (Lack of penetration, Slag, infusion, Incomplete Fusion, Under cut, Pin hole, Crack, Porosity etc. adopting method of cleaning (Chemical etc.) and re-welding the job to remove the defect.
	22		
	23	Skills and concepts	Communication, Measuring & Marking Out skills, Math's & Drawing related to the process plant / manufacturing unit. Respect the existing rules in the company premises traffic,
	24	Final report writing	Preparing final report with complete observations, knowledge and presentation. Recommendation with the relevant supervisors or staff for bright and better performance

7. ASSESSMENT OF TRAINEES ACHIEVEMENT

ASSESSMENT GUIDANCE:

Assessment is the process of collecting evidence and making judgments on whether competence has been achieved. This confirms that an individual can perform to the standard expected in the workplace as expressed in the nationally endorsed competency standards (where they exist), Good assessment practices should be adopted for sessional and final assessments. Such practices by vocational training providers during sessional and final assessments will form the basis of qualifying the trainees.

Differences between sessional and final assessments

Sessional assessment shall be on an all-time basis. Its purpose is to provide feedback on what students are learning:

To the student: It will identify achievement and areas for further teaching and its level.

To the teacher: It will evaluate the effectiveness of teaching, and guide to determine the future plan.

Assessors need to advise sessional assessments for both theoretical and practical work. Guidance is provided in the assessment strategy.

Final assessment is the assessment, usually carried out on completion of a course or module. This determines whether or not the student has "passed". It is - or should be - undertaken with reference to all the objectives or outcomes of the course, and is often fairly formal. Considerations of security - ensuring that the student who gets the credit is the person who did the work - assume considerable importance in final assessment.

Methods of assessment

For lessons with a high quantity of theory, written or oral tests related to learning outcomes and/ or learning content can be conducted. For work place lessons, assessment will focus on the quality of planning and executing the related process along with the quality of the product and/or evaluation of the process.

Direct assessment:

Direct assessment is the most desirable form of assessment. For this, evidence shall be obtained by directly observing the student's performance.

Examples for direct assessment of a Fabrication, Welding & Pipework Technician will include:

Work performances, for example the application of grinding & filling techniques

Demonstrations, for example demonstrating the appropriate method of cutting on gas cutter or Auto cutters.

Direct questioning, where the assessor will ask the student how to select the tool for step turning before any performance

Paper-based tests, such as multiple choice or short answer questions at entrepreneurship, hygienic and safety issues, communicating and working with others and types of Welding Machine etc.

Portfolio of evidence, such as compilation of all work done during the course

Indirect assessment:

Indirect assessment shall be used where the performance could not be watched and evidence is gained indirectly.

Examples for indirect assessment of a Machinist will include:

Selection of accurate products on the basis of market survey

Taking all health and safety measures in workplace.

Maintenance of machine: the methods adopted to maintain the machine & tools and housekeeping.

Indirect assessment should only be a second choice. (In some cases, it may not even be guaranteed that the work produced by the person being assessed).

Principles of assessment

All assessments should be valid, reliable, fair and flexible:

Fairness means that there should be no advantages or disadvantages for any assessed person. For example, it should not happen that one student gets prior information about the type of work performance that will be assessed, while another candidate does not get any prior information. Provide all learners with an equal opportunity for and access to assessment

Validity means that a valid assessment assesses what it claims to assess. For example, if the ability to do a specific gear cutting, the assessment should involve performance criteria that are directly related to gear cutting techniques. An interview about setting of milling machine would not meet the performance criteria.

Reliability means that the assessment is consistent and reproducible. For example, if the preparation procedure of workplace/services area has been assessed, another assessor (e.g. the future employer) should be able to see the same work performance and witness the same level of achievement.

Flexibility means that the assessor has to be flexible concerning the assessment approach. For example, if there is a power failure during the assessment, the assessor should modify the arrangements to accommodate the students' needs.

Assessment strategy for Fabrication, Welding & Pipe Work Curriculum

This curriculum consists of 14 modules:

- **Module 1: Follow Safety Rules at Workplace**
- **Module 2: Perform Bench Work**
- **Module 3: Perform Cutting of Material**
- **Module 4: Perform Assembling of job**
- **Module 5: Perform Soldering of Job**
- **Module 6: Perform Brazing of Job**
- **Module 7: Perform Oxy-Acetylene Welding**
- **Module 8: Perform Welding (SMAW/GTAW (TIG) /GMAW (MIG/MAG)/SAW)**
- **Module 09: Developing Professionalism**
- **Module 10: Computer Skills**

- **Module 11: English language Skills I & II**
- **Module 12: Life Skills I & II**
- **Module 13: Secondary Skills Activities I & II**
- **Module 14: OJT Part I**
- **Module 15: OJT Part II**

SUGGESTIONS FOR SESSIONAL ASSESSMENT

The sessional assessment for all modules shall be in two parts: theoretical assessment and practical assessment. The sessional marks shall contribute to the final qualification.

Theoretical assessment for all learning modules must consist of a written paper lasting at least one hour per module. This can be a combination of multiple choice and short answer questions.

For practical assessment, all procedures and methods for the modules must be assessed on a sessional basis. Guidance is provided under the title “Planning for assessment”.

Suggestions of final assessment

Final assessment shall be in two parts:

THEORETICAL ASSESSMENT

The final theoretical assessment shall consist of multiple choice and short answer questions, covering all modules.

PRACTICAL ASSESSMENT

For practical assessment, proper procedures of services, management of stock, health & safety shall be selected to assess the competencies of student expected to be gained after this training course.

(The final assessment marks shall contribute to the final qualification)

It is also proposed that the assessment may take place in such a way that covers each of the modules. Time and markings may be distributed according to the importance of module that is reflected from the time invested during teaching. The distribution of time and markings for assessment are given below:

MODULES	PRACTICAL	THEORY
Module 1	Apply Safety Rules at Workplace	

<p>LU 1 Apply personal Safety Measures</p>	<p>Trainee should be able to do:</p> <ul style="list-style-type: none"> • Identify drawing and interpret work processes and procedures correctly. • Identify risk of hazards at workplace. • Recognize engineering processes, tools, equipment and consumable • Materials that have the potential to cause harm. • Identify any potential hazards and take appropriate action to minimize the risk. • Health and safety precautions of the company. • Techniques and methods to identify the risks of hazards at workplace. • Dealing with hazards to avoid any accident or injury. • Safety reporting procedures and documentation. 	<p>Trainee will be asked for:</p> <p>Explain drawing and interpret work processes and procedures.</p> <ul style="list-style-type: none"> • Discussion on risk of hazards at workplace. • Discuss engineering processes, tools, equipment and consumable materials that have the potential to cause harm. • Identify any potential hazards and take appropriate action to minimize the risk. • Discuss on safety precautions of the company. • Demonstrate with hazards to avoid any accident or injury. • Explain of any potential hazards and takes appropriate action to minimize the risk. <p>✓ Adopt health and safety precautions of work shop.(Worksite Hazardous Materials Information Systems (WHMIS),</p> <ul style="list-style-type: none"> • fire regulations.
<p>LU2 Apply Work Place safety measures</p>	<p>Trainee should be able to do:</p> <ul style="list-style-type: none"> • Identify drawing and interpret work processes and procedures correctly. • Identify risk of hazards at workplace. • Recognize engineering processes, tools, equipment and consumable • Materials that have the potential to cause harm. • Techniques and methods at workplace. 	<p>Trainee will be asked for:</p> <ul style="list-style-type: none"> • Explain drawing and interpret work processes and procedures. • Discussion on risk of hazards at workplace. • Discuss engineering processes, tools, equipment and consumable materials that have the potential to cause harm. • Appropriate action to minimize the risk.

	<ul style="list-style-type: none"> • Safety reporting procedures and documentation. 	<ul style="list-style-type: none"> • Discuss on safety precautions of the company. • Explain of any potential hazards and takes
LU 3 Follow Work Permit	<p>Trainee will be able to:</p> <ul style="list-style-type: none"> • Demonstrate commencement of the job • Explain the working conditions • Describe the work permits • Perform as the issuer and responsible personnel involved. • Describe the process & procedure to get the work Permit 	<p>Trainee will be asked for:</p> <ul style="list-style-type: none"> • Delivery of Tool Box Talk • Prerequisites for start of the job • Importance of Work Permit • Precautions at work site • Work Permit System • Hot work permits • Cold work permits • Work Permit Issuer roles & responsibilities • Process and procedure to get the work permit
LU4 Apply Tools & Equipment safety Measures	<p>Trainee should be able to do:</p> <ul style="list-style-type: none"> • Identify drawing and interpret work processes and procedures correctly. • Identify risk of hazards at workplace. • Recognize engineering processes, tools, equipment and consumable • Materials that have the potential to cause harm. • Techniques and methods at workplace. • Safety reporting procedures and documentation. 	<p>Trainee will be asked for:</p> <ul style="list-style-type: none"> • Explain drawing and interpret work processes and procedures. • Discussion on risk of hazards at workplace. • Discuss engineering processes, tools, equipment and consumable materials that have the potential to cause harm. • Appropriate action to minimize the risk. • Discuss on safety precautions of the company. • Explain of any potential hazards and takes
LU 5 Apply Job Work Piece	<p>Trainee should be able to do:</p>	<p>Trainee will be asked for:</p>

Safety Measures	<ul style="list-style-type: none"> • Knowledge to Deal with work hazards, accidents & injuries • Identify the produce to required quality and within the specified • Specify producer. • Adopt safety. 	<ul style="list-style-type: none"> • Discussion of the work hazards, accidents & injuries • Demonstrate work hazards, accidents & injuries. • Explain safety for hazards, accidents & injuries.
Module 2	Perform Bench Work	
LU 1 Take Measurement of Job	<p>Trainee should be able to do:</p> <ul style="list-style-type: none"> • First select the blade according to martial of work piece. • Setting blade in the frame of hacksaw as per procedure. • Perform marking as per drawing. • Perform sawing as per procedure. • Use of measuring tools. • Observe personal and workplace safety. • Understand basic drawings. • use of marking tools • Perform marking as given drawing • Sawing as per procedure. • emphasize the important of clamping of work piece • Adopt safety precaution. 	<p>Trainee will be asked for:</p> <ul style="list-style-type: none"> • Explain the kind of hand hacksaw blade hand • Hacksaw. • Discussion on how to set hacksaw blade. • Importance of selection of blade. • Importance of marking tools and method. • Discussion on reading interprets basic • Drawings. • Discussion about clamping work piece. • Type of tools use for measuring. • Demonstrate The marking and sawing operation • Importance of safety precautions.

<p>LU2 Perform SAW Cutting on the Job</p>	<p>Trainee should be able to do:</p> <ul style="list-style-type: none"> • Identified the workshop tools. • Identified the fastening work piece properly. • Identified the file and their uses. • Perform and select files. • Perform measuring • Observe personal and tool safety. • Perform different filling operation, parallel filling, curved edge, even • Surface and square filling. • Perform filling with key file needle file set. • Perform clamping of workpiece as required. • Understand and use of Saw Cutting on the Job. 	<p>Trainee will be asked for:</p> <ul style="list-style-type: none"> • Perform fastening of work piece as required. • Understand and use of measuring tools. • Explain different filling operation, parallel, curved edge, even surface and square filling. • select files according to dimension and finishing. • Explain the all measuring tools and their use. • Explain the marking and filing operation • Explain the personal and tool safety.
<p>LU3 Perform Grinding / Filing of Job</p>	<p>Trainee should be able to do:</p> <ul style="list-style-type: none"> • Identify the workpiece fastening method. • Application of tap and die alignment. • Adopt proper threading procedure. • Observe personal and workplace safety at all times. • Knowledge of different kind of taps & die according to requirement • Knowledge of calculation for drill size for 	<p>Trainee will be asked for:</p> <ul style="list-style-type: none"> • Explain the kind of taps & die according to requirement. • Discussion the clamping workpiece properly. • Importance of alignment of tap and dies. • Calculate drill size for internal threading. • Demonstrate internal threading and external • as prescribe procedure adopt safety during threading.

	<p>internal threading.</p> <ul style="list-style-type: none"> • Perform clamping of workpiece as required. • Ensure tap and die alignment. • Ensure use of lubricants during threading. • Knowledge of threading procedure for accurate and dimensionally correct. . 	
LU 4 Perform Drilling / Threading on Work piece	<p>Trainee should be able to do:</p> <ul style="list-style-type: none"> • Identify different kind of Arithmetic's / Geometrical terminologies. • Apply all alignment • Knowledge of different kind of Arithmetic's standard according to Requirement. • Importance use of Geometrical. 	<p>Trainee will be asked for:</p> <ul style="list-style-type: none"> • Explain different kind of standard according to requirement. • Importance of alignment. • Calculate drill size for reaming. • Demonstrate procedure for accurate and dimensionally correct.
Module 3	Perform Cutting of Material	
LU 1 Arrange the required material for cutting	<p>Trainee should be able to do:</p> <ul style="list-style-type: none"> • Perform basic mathematical calculation for Cutting operations.(cutting speed, feed and RPM) Identify machine controls. • Perform proper clamping the workpiece. • Identify the produce to required quality and within the specified dimensional 	<p>Trainee will be asked for:</p> <ul style="list-style-type: none"> • Explain the construction of different type of Cutting machine and their use. • Calculate basic mathematical calculation for cutting operations. (cutting speed, feed and RPM) • Discussion the clamping workpiece properly.

	<p>accuracy.</p> <ul style="list-style-type: none"> • Perform on cutting machine • Perform measuring • Identify the marking as per drawing • Perform cutting on marked point. 	<ul style="list-style-type: none"> • Discussion marking as per drawing and perform marking. • Demonstrate Cutting on cutting machine mind the marked point.
LU2 Perform Gas Cutting Method on Job	<p>Trainee should be able to do:</p> <ul style="list-style-type: none"> • Knowledge of replacement of cutting tools. • Perform proper clamping the workpiece. • Identify the produce to required quality and within the specified • Dimensional accuracy. • Understand marking tools and perform as per drawing. • Understand measuring tools and perform measuring • Understand Gas cutting. • Apply safety on cutting machine • Adopt machine tool. & personal safety. 	<p>Trainee will be asked for:</p> <ul style="list-style-type: none"> • Calculate basic mathematical calculation for cutting. • machine.(cutting speed, feed and RPM) • Discussion the clamping workpiece properly. • Discussion marking as per drawing and perform marking. • Demonstrate on cutting tools. • Explain cutting machine mind the marked point. • Discuss measuring tools and perform measuring. • Discuss Importance of cutting tools. • Explain safety on cutting machine.
LU3 Perform Disc Cutting Method on Job	<p>Trainee should be able to do:</p> <ul style="list-style-type: none"> • Knowledge of cleaning of welding tip nozzle. 	<p>Trainee will be asked for:</p> <ul style="list-style-type: none"> • Discussion the clamping workpiece properly. • Discussion marking as per procedure.

	<ul style="list-style-type: none"> • Perform proper clamping the workpiece. • Identify the produce to required quality and within the specified. • Understand Disc cutting. • Perform cleaning specify producer. • Adopt machine tool & personal safety. 	<ul style="list-style-type: none"> • Demonstrate clean of welding nozzle.. • Discuss Importance of welding. • Explain safety on welding machine.
LU4 Perform SAW Cutting on the Job	<p>Trainee should be able to do:</p> <ul style="list-style-type: none"> • Knowledge of change the holder welding pilers. • Perform proper clamping the workpiece. • Identify the produce to required quality and within the specified • Perform specify producer. • Adopt machine tool & personal safety. 	<p>Trainee will be asked for:</p> <ul style="list-style-type: none"> • Discussion the clamping workpiece properly. • Discussion marking as per procedure. • Demonstrate on holding welding pilers. • Discuss Importance of welding. • Explain safety on welding machine.
LU5 Perform Shear Cutting on the Job	<p>Trainee should be able to do:</p> <ul style="list-style-type: none"> • Knowledge of clean welding guns. • Perform proper clamping the workpiece. • Identify the produce to required quality and within the specified • Perform specify producer. • Adopt machine tool & personal safety. 	<p>Trainee will be asked for:</p> <ul style="list-style-type: none"> • Discussion the clamping workpiece properly. • Discussion marking as per procedure. • Demonstrate on clean welding guns. • Discuss Importance of welding. • Explain safety on welding machine.
Module 4	Perform Assembling of Job	
LU 1 Perform Grinding / Filling of Job	<p>Trainee should be able to do:</p> <ul style="list-style-type: none"> • Identify drawing and interpret work processes and procedures correctly. 	<p>Trainee will be asked for:</p> <ul style="list-style-type: none"> • Explain drawing and interpret work processes

	<ul style="list-style-type: none"> • Identify risk of hazards at workplace. • Recognize engineering processes, tools, equipment and consumable • Materials that have the potential to cause harm. • Techniques and methods at workplace. • Safety reporting procedures and documentation. 	<ul style="list-style-type: none"> • and procedures. • Discussion on risk of hazards at workplace. • Discuss engineering processes, tools, equipment and consumable materials that • have the potential to cause harm. • Appropriate action to minimize the risk. • Discuss on safety precautions of the company. • Explain of any potential hazards and takes
LU2 Take measurement of job part for assembling	<p>Trainee should be able to do:</p> <ul style="list-style-type: none"> • First Select the material according to work of work piece. • Setting work as per procedure. • Perform marking as per drawing. • Perform as per procedure. • Observe personal and workplace safety. • Understand basic drawings. • use of marking tools • arrange as per procedure. • emphasize the important of clamping of work piece • Adopt safety precaution. 	<p>Trainee will be asked for:</p> <ul style="list-style-type: none"> • Explain the Preparation of the required work. • Discussion on how to set all.. • Importance of selection of work. • Discussion on reading interprets basic Drawings. • Discussion about clamping work piece. • Type of tools use for measuring. • Importance of safety precautions.
LU3 Perform Alignment of Job Pieces	<p>Trainee should be able to do:</p> <ul style="list-style-type: none"> • Perform basic Alignment work. • Identify the produce to required quality and within the specified dimensional accuracy. • Perform Alignments • Identify the marking as per drawing 	<p>Trainee will be asked for:</p> <ul style="list-style-type: none"> • Explain Alignments. • Discussion Alignments as per drawing and • perform Alignments with tools. • Demonstrate on Alignments.

	<ul style="list-style-type: none"> • Perform Alignments with tools. 	
LU4 Perform Tacking of Job	<p>Trainee should be able to do:</p> <ul style="list-style-type: none"> • Perform basic Tacking of the Job. • Identify the produce to required quality and within the specified dimensional accuracy. • Perform Tacking of the Job. • Identify the Tacking as per drawing • Perform tacking with tacking tools. 	<p>Trainee will be asked for:</p> <ul style="list-style-type: none"> • Explain the Tacking of the Job. • Explain the Basic procedure of Tacking of job. • Discussion marking as per drawing and perform tacking. • Demonstrate on tacking of job.
Module 5	Perform Soldering of Job	
LU 1 Prepare Job for Soldering	<p>Trainee should be able to do:</p> <ul style="list-style-type: none"> • Identify drawing and interpret work processes and procedures correctly. • Identify risk of hazards at workplace. • Recognize engineering processes, tools, equipment and consumable • Materials that have the potential to cause harm. • Techniques and methods at workplace. • Safety reporting procedures and documentation. 	<p>Trainee will be asked for:</p> <ul style="list-style-type: none"> • Explain drawing and interpret work processes and procedures. • Discussion on risk of hazards at workplace. • Discuss engineering processes, tools, equipment and consumable materials that have the potential to cause harm. • Appropriate action to minimize the risk. • Discuss on safety precautions of the company. • Explain of any potential hazards and takes
LU2 Perform Soldering operation on Job	<p>Trainee should be able to do:</p> <ul style="list-style-type: none"> • First Select the machine according to work of work piece. • Setting work as per procedure. • Perform marking as per drawing. • Perform as per procedure. • Observe personal and workplace safety. • Understand basic drawings. 	<p>Trainee will be asked for:</p> <ul style="list-style-type: none"> • Explain the Preparation of the required work. • Discussion on how to set all.. • Importance of selection of work. • Discussion on reading interprets basic Drawings. • Discussion about clamping work piece. • Type of tools use for measuring.

	<ul style="list-style-type: none"> • use of marking tools • arrange as per procedure. • emphasize the important of clamping of work piece • Adopt safety precaution. 	<ul style="list-style-type: none"> • Importance of safety precautions.
LU3 Perform Post Soldering Inspection	<p>Trainee should be able to do:</p> <ul style="list-style-type: none"> • Knowledge Remove surface base metal defects. • Identify the produce to required quality and within the specified • Perform specify producer. • Adopt machine tool & personal safety. 	<p>Trainee will be asked for:</p> <ul style="list-style-type: none"> • Discussion how to Remove surface base metal defects. • Discussion as per procedure. • Discuss Importance • Explain safety.
Module 6	Perform Brazing of Job	
LU 1 Prepare Job for Brazing	<p>Trainee should be able to do:</p> <ul style="list-style-type: none"> • Identify drawing and interpret work processes and procedures correctly. • Identify risk of hazards at workplace. • Recognize engineering processes, tools, equipment and consumable • Materials that have the potential to cause harm. • Techniques and methods at workplace. • Safety reporting procedures and documentation. 	<p>Trainee will be asked for:</p> <ul style="list-style-type: none"> • Explain drawing and interpret work processes and procedures. • Discussion on risk of hazards at workplace. • Discuss engineering processes, tools, equipment and consumable materials that have the potential to cause harm. • Appropriate action to minimize the risk. • Discuss on safety precautions of the company. • Explain of any potential hazards and takes
LU2 Perform Brazing	<p>Trainee should be able to do:</p>	<p>Trainee will be asked for:</p>

Operation on Job	<ul style="list-style-type: none"> • First Select the machine according to work of work piece. • Setting work as per procedure. • Perform marking as per drawing. • Perform as per procedure. • Observe personal and workplace safety. • Understand basic drawings. • use of marking tools • arrange as per procedure. • emphasize the important of clamping of work piece • Adopt safety precaution. 	<ul style="list-style-type: none"> • Explain the Preparation of the required work. • Discussion on how to set all.. • Importance of selection of work. • Discussion on reading interprets basic Drawings. • Discussion about clamping work piece. • Type of tools use for measuring. • Importance of safety precautions.
LU3 Perform Post Brazing Inspection	<p>Trainee should be able to do:</p> <ul style="list-style-type: none"> • Knowledge Remove surface base metal defects. • Identify the produce to required quality and within the specified • Perform specify producer. • Adopt machine tool & personal safety. 	<p>Trainee will be asked for:</p> <ul style="list-style-type: none"> • Discussion how to Remove surface base metal defects. • Discussion as per procedure. • Discuss Importance • Explain safety.
Module 7	Perform OXY-Acetylene of Job	
LU 1 Prepare Job for Oxy-Acetylene Welding	<p>Trainee should be able to do:</p> <ul style="list-style-type: none"> • Identify drawing and interpret work processes and procedures correctly. • Identify risk of hazards at workplace. • Recognize engineering processes, tools, equipment and consumable 	<p>Trainee will be asked for:</p> <ul style="list-style-type: none"> • Explain drawing and interpret work processes and procedures. • Discussion on risk of hazards at workplace. • Discuss engineering processes, tools,

	<ul style="list-style-type: none"> • Materials that have the potential to cause harm. • Techniques and methods at workplace. • Safety reporting procedures and documentation. 	<ul style="list-style-type: none"> • equipment and consumable materials that have the potential to cause harm. • Appropriate action to minimize the risk. • Discuss on safety precautions of the company. • Explain of any potential hazards and takes
LU2 Perform operations related to Oxy-Acetylene Welding	<p>Trainee should be able to do:</p> <ul style="list-style-type: none"> • First Select the machine according to work of work piece. • Setting work as per procedure. • Perform marking as per drawing. • Perform as per procedure. • Observe personal and workplace safety. • Understand basic drawings. • use of marking tools • arrange as per procedure. • emphasize the important of clamping of work piece • Adopt safety precaution. 	<p>Trainee will be asked for:</p> <ul style="list-style-type: none"> • Explain the Preparation of the required work. • Discussion on how to set all.. • Importance of selection of work. • Discussion on reading interprets basic Drawings. • Discussion about clamping work piece. • Type of tools use for measuring. • Importance of safety precautions.
LU3 Perform Post Oxy-Acetylene welding Inspection	<p>Trainee should be able to do:</p> <ul style="list-style-type: none"> • Knowledge Remove surface base metal defects. • Identify the produce to required quality and within the specified • Perform specify producer. • Adopt machine tool & personal safety. 	<p>Trainee will be asked for:</p> <ul style="list-style-type: none"> • Discussion how to Remove surface base metal defects. • Discussion as per procedure. • Discuss Importance • Explain safety.
Module 8	Perform Welding (SMAW/GTAW (TIG) GMAW (MIG/MAG) / SAW)	

<p>LU 1 Prepare Job for Welding</p>	<p>Trainee should be able to do:</p> <ul style="list-style-type: none"> • Identify drawing and interpret work processes and procedures correctly. • Identify risk of hazards at workplace. • Recognize engineering processes, tools, equipment and consumable • Materials that have the potential to cause harm. • Techniques and methods at workplace. • Safety reporting procedures and documentation. 	<p>Trainee will be asked for:</p> <ul style="list-style-type: none"> • Explain drawing and interpret work processes and procedures. • Discussion on risk of hazards at workplace. • Discuss engineering processes, tools, equipment and consumable materials that have the potential to cause harm. • Appropriate action to minimize the risk. • Discuss on safety precautions of the company. • Explain of any potential hazards and takes
<p>LU2 Prepare workplace for SMAW (MMA) Welding</p>	<p>Trainee should be able to do:</p> <ul style="list-style-type: none"> • First Select the machine according to work of work piece. • Setting work as per procedure. • Perform marking as per drawing. • Perform as per procedure. • Observe personal and workplace safety. • Understand basic drawings. • use of marking tools • arrange as per procedure. • emphasize the important of clamping of work piece • Adopt safety precaution. 	<p>Trainee will be asked for:</p> <ul style="list-style-type: none"> • Explain the Preparation of the required work. • Discussion on how to set all.. • Importance of selection of work. • Discussion on reading interprets basic Drawings. • Discussion about clamping work piece. • Type of tools use for measuring. • Importance of safety precautions.
<p>LU3 Perform operations related to SMAW (MMA) Welding</p>	<p>Trainee should be able to do:</p> <ul style="list-style-type: none"> • Knowledge Remove surface base metal 	<p>Trainee will be asked for:</p> <ul style="list-style-type: none"> • Discussion how to Remove surface base

	<p>defects.</p> <ul style="list-style-type: none"> • Identify the produce to required quality and within the specified • Perform specify producer. • Adopt machine tool & personal safety. 	<p>metal defects.</p> <ul style="list-style-type: none"> • Discussion as per procedure. • Discuss Importance • Explain safety.
LU4 Prepare workplace for GTAW (TIG) Welding	<p>Trainee should be able to do:</p> <ul style="list-style-type: none"> • Knowledge Set the pressure of the inert / active gas. • Identify the produce to required quality and within the specified • Perform specify producer. • Adopt safety. 	<p>Trainee will be asked for:</p> <ul style="list-style-type: none"> • Discussion how pressure of the inert / active gas. • Discussion as per procedure. • Discuss Importance Set the suitable current. • Explain safety.
LU5 Perform Operations Related to GTAW (TIG) Welding	<p>Trainee should be able to do:</p> <ul style="list-style-type: none"> • Select Welding Position • Adopt suitable Welding Position • Knowledge of Welding Position • Perform specify producer 	<p>Trainee will be asked for:</p> <ul style="list-style-type: none"> • Explain Welding Position • Demonstrate as prescribe procedure.
LU6 Prepare workplace for GMAW(MIG/MAG) Welding	<p>Trainee should be able to do:</p> <ul style="list-style-type: none"> • Select voltage • Adopt suitable voltage <p>Knowledge of selection of voltage Perform specify producer.</p>	<p>Trainee will be asked for:</p> <ul style="list-style-type: none"> • Explain selection of voltage • Demonstrate as prescribe procedure.
LU7 Perform Operations	<p>Trainee should be able to do:</p>	<p>Trainee will be asked for:</p>

related to GMAW(MIG/MAG) Welding	<ul style="list-style-type: none"> • Knowledge to Set the Wire's feed speed rate • Identify the produce to required quality and within the specified • Perform specify producer. • Adopt safety. 	<ul style="list-style-type: none"> • Discussion how Set the Wire's feed speed rate • Discussion as per procedure. • Discuss Importance Set the Wire's feed speed rate. • Explain safety.
LU8 Prepare workplace for SAW Welding	<p>Trainee should be able to do:</p> <ul style="list-style-type: none"> • Knowledge to Clean Welding joint after Welding • Identify the produce to required quality and within the specified • Perform specify producer. • Adopt safety. 	<p>Trainee will be asked for:</p> <ul style="list-style-type: none"> • Discussion how to Clean Welding joint after Welding • Discussion as per procedure. • Discuss Importance Clean Welding joint after Welding • Explain safety.
LU9 Perform Operations Related to SAW Welding	<p>Trainee should be able to do:</p> <ul style="list-style-type: none"> • Knowledge of Weld the Metal. • Identify the produce to required quality and within the specified • Perform specify producer. • Adopt safety. 	<p>Trainee will be asked for:</p> <ul style="list-style-type: none"> • Discussion of Weld the Metal • Discussion as per procedure. • Discuss Importance • Explain safety.
LU10 Perform Post Welding Operations	<p>Trainee should be able to do:</p> <ul style="list-style-type: none"> • Knowledge to Clean Welding joint after Welding • Identify the produce to required quality and within the specified • Perform specify producer. • Adopt safety. 	<p>Trainee will be asked for:</p> <ul style="list-style-type: none"> • Discussion how to Clean Welding joint after Welding • Discussion as per procedure. • Discuss Importance Clean Welding joint after Welding • Explain safety.

LU11 Repair defected areas of job / work piece	<p>Trainee should be able to do:</p> <ul style="list-style-type: none"> • Knowledge to Remove visual defects. • Identify the produce to required quality and within the specified • Perform specify producer. • Adopt safety. 	<p>Trainee will be asked for:</p> <ul style="list-style-type: none"> • Discussion how to Remove visual defects. • Discussion as per procedure. • Discuss Importance Remove visual defects. • Explain safety.
Module 09	Developing Professionalism	
LU 1 Perform Communications with others	<p>Trainee should be able to do:</p> <ul style="list-style-type: none"> • Describe the benefits of latest techniques and developments. • Identify the need of skill sets by getting involved in seminars, workshops and competitions. 	<p>Trainee will be asked for:</p> <ul style="list-style-type: none"> • Discussion benefits of latest techniques and developments. • Discussion as per procedure.
LU2 Upgrade Professional Skills	<p>Trainee should be able to do:</p> <ul style="list-style-type: none"> • Participate in Skill test for professional development • Adopt upcoming market trends. • follow organizational policies (SOPs) for professional development 	<p>Trainee will be asked for:</p> <ul style="list-style-type: none"> • Explain upcoming market trends.
LU3 Work in Team	<p>Trainee should be able to do:</p> <ul style="list-style-type: none"> • Use media to communicate effectively (e.g: email, telephone, laptop etc.) 	<p>Trainee will be asked for:</p> <ul style="list-style-type: none"> • Explain the importance of relevant subject.

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Module 10: Computer Skills

Learning Units	Theory hours	Workplace hours	Recommended formative assessment	Recommended Methodology	Scheduled Dates
10.1. Introductory	0	4	Awareness of CIT	1. Viva Voce 2. Written MCQs	After completion of Unit
10.2. MS-Word (Basic to intermediate)	0	10	Creating of Word processing sheet	1. Practical Performance 2. Viva Voce 3. Written MCQs	In the middle and at end of the learning unit
10.3. MS-Excel (Basic to intermediate)	0	12	Creating of Spreadsheet	1. Practical Performance 2. Viva Voce 3. Written MCQs	In the middle and at end of the learning unit
10.4. MS-PowerPoint (Basic to intermediate)	0	14	Creating of Presentation with the help of Ms-PowerPoint	1. Practical Performance 2. Viva Voce 3. Written MCQs	After completion of Unit

Module 11: English Language Skills - I

Learning Units	Theory hours	Workplace hours	Recommended formative assessment	Recommended Methodology	Scheduled Dates
11.1. Introduction to Listening Part I - Listening to Match	2	3	Assess students' listening and reading comprehension	Paper based test and verbal and written quiz	After completion of each unit
11.2. Introduction to Listening Part II - Listening to	2	3		Paper based test and verbal and written quiz	After completion of each unit
11.3. Introduction to Listening Part III - Following Conversations	2	3		Paper based test and verbal and written quiz	After completion of each unit
11.4. Introduction to Listening Part IV - Listening for Key Information	2	3		Paper based test and verbal and written quiz	After completion of each unit
11.5. Introduction to Reading Part I - Reading to Understand the Sequence of a Text	2	3		Class based tests and home assignments	After completion of each unit
11.6. Introduction to Reading Part II - Understanding the Text	2	3		Class based tests and home assignments	After completion of each unit
11.7. Introduction to Reading Part III - Understanding the Purpose	2	3		Class based tests and home assignments	After completion of each unit
11.8. Introduction to Reading Part IV - Reading for Key	2	3		Class based tests and home assignments	After completion of each unit

Module 11: English Language Skills – II

Learning Units	Theory hours	Workplace hours	Recommended formative assessment	Recommended Methodology	Scheduled Dates
11.1. Introduction to Writing Part I - Completing a form	2	3	Assess students' English writing and speaking comprehension	Take-home Writing Assignments/in class paper based tests	After completion of each unit
11.2. Introduction to Writing Part II - Correcting errors	2	3		Take-home Writing Assignments/in class paper based tests	After completion of each unit
11.3. Introduction to Writing Part III - Communicating ideas and information	2	3		Take-home Writing Assignments/in class paper based tests	After completion of each unit
11.4. Introduction to Writing Part IV - Writing a text	2	3		Take-home Writing Assignments/in class paper based tests	After completion of each unit
11.5. Introduction to Speaking Part I - Introduction to language	2	3		In class interviews/spoken English test	After completion of each unit
11.6. Introduction to Speaking Part II - Social situations	2	3		In class interviews/spoken English test	After completion of each unit
11.7. Introduction to Speaking Part III - Exchanging information and	2	3		In class interviews/spoken English test	After completion of each unit
11.8. Introduction to Speaking Part IV - Presenting a topic	2	3		In class interviews/spoken English test	After completion of each unit

Module 12: Life Skills – I

Learning Units	Theory hours	Workplace	Recommended formative assessment	Recommended Methodology	Schedule
12.1 Exploring and Understanding	10 hrs.	0	Students' feedback, role plays and group activities	Multiple Choice Questions (MCQs)	After Every Learning Unit
12.2 Effective Communication	10 hrs.	0			
12.3 Personal Grooming	10 hrs.	0			

Module 12: Life Skills – II

Learning Units	Theory hours	Workplace	Recommended formative assessment	Recommended Methodology	Schedule
12.1 Working with Teams	4 hrs.	0	Students' feedback, role plays and group activities	Multiple Choice Questions (MCQs)	After Every Learning Unit
12.2 Vision and Goal Setting	8 hrs.	0			
12.3 Professional Development	8 hrs.	0			
12.4 Personal and Social Responsibility	10 hrs.	0	Self-reflection essays before the training and after the training. Feedback from sisters or female cousins. Feedback from friends, and	Student Teacher Discussion	

4 List of Tools, Machinery & Equipment

Name of Trade	Fabricator & Welder
Duration	12 Months (1600 hrs)

Sr. No.	Name of Item/ Equipment / Tools
1	Calculator
2	Bevel Machine
3	Pedestal Grinder
4	Angle grinder
5	Pencil Grinder
6	Bench vice
7	Electric Hand drill machine
8	Sprit level metallic
9	Pipe vice
10	Pipe cutter
11	Tin cutter
12	Hammer ball pien
13	Hammer Straight
14	Hammer Cross pien
15	Prick Punch
16	Center Punch
17	Ms. Chisel Flat
18	Pipe Wrench
19	Adjustable Wrench

20	Hack Saw Frame
21	Hack saw Blade
22	Tri-square
23	Micrometer
24	Vernier Calipers
25	Tap and Die
26	File (e.g: round, half round, flat, triangle)
27	Jigs and fixtures
28	Combination set
29	Spanners
30	Socket set
31	Screw driver
32	Steel scale
33	Inside calipers
34	Outside calipers
35	Divider
36	Tool Box
37	Anvil steel
38	Clamp
39	Letter punch
40	Number punch
41	Chipping hammer
42	Gas cutting torch set
43	Argon cylinders
44	Welding rectifier for electric welding
45	Welding machine for Argon welding
46	Welding machine for CO2 welding
47	Welding Machine for SAW
48	Electrode holder
49	Welding cable

50	Hose pipe
51	Welding torch for GTAW
52	Welding torch for Brazing
53	Torch Head
54	Baking oven
55	Power cutter
56	flash back Arrestor
57	Welding booth
58	Exhaust fans
59	Welding Procedure Specification (WPS)
60	Standard Operating Procedures (SOPs)

5 List of Consumable Supplies

Name of Trade	Fabricator and Welder
Duration	12 Months (1600 hrs)

Sr. No.	Name of Consumable Supplies
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 Goggles
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

6 - 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

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 equipment 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 after every three years.