

**Plumbing and Pipe Fitting - National Technical
Certificate (NTC) and Advanced National Technical
Certificate (ANTC)**

Fabrication, Welding and Brazing (ANTC)

PROGRAMME:	ADVANCED NATIONAL TECHNICAL CERTIFICATE IN PLUMBING AND PIPE FITTING
COURSE:	FABRICATION, WELDING AND BRAZING, COURSE CODE: CFW 23
CONTACT HOURS:	7HRS/WEEK
GOAL:	This course is designed to provide the trainee with further knowledge and skills which will enable him to carry out fabrication, welding and brazing of both ferrous and non-ferrous metals using arc and gas welding equipment.

GENERAL OBJECTIVES: On completion of this course, the trainee should be able to:-

1. Understand the principles of manufacture of acetylene gas, the storage and installation of gas welding equipment, fabricate and weld plumbing models, thick mild steel plates and steel pipes.
2. Carry out bronze welding on non-ferrous metals.
3. Understand the principles of gas cutting of metals and carry out metal cutting using oxy-acetylene equipment.
4. Understand the principles and functions of electric arc welding transformer and carry out electric arc welding operation with facility.

PRACTICAL COMPETENCE On completion of this course, the trainee should be able to:-

1. Carry out different techniques in gas welding.
2. Carry out fabrication and welding of plumbing models.
3. Fabricate and carry out bronze welding of waste pipe models on copper pipes e.g stack and branches, loop venting, etc.
4. Select equipment, prepare template for and apply these in intricate cuttings.
5. Carry out electric arc welding and observing necessary safety precautions while welding.

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Course Specification: Theoretical/Practical Contents

General Objective 1.0: Understand the principles of manufacture of acetylene gas, the storage and installation of gas welding equipment, fabricate and weld plumbing models, thick m.s. plates and steel, pipes.

Week	Specific Learning Outcome	Teachers Activities	Resources
1-9	1.1 State the principles of manufacture of acetylene gas and the storage and installation of gas welding equipment. 1.2 Carry out different techniques in gas welding 1.3 Weld bigger sizes of steel pipe and thicker sizes of m.s. plates. 1.4 Carry out fabrication and welding of plumbing models. EVALUATION: Group work Assessment and Marking of individual assignments.	<ul style="list-style-type: none"> • Ask students to review the principles of manufacture of acetylene gas, storage, assembly and Testing of gas welding equipment. • Ask students prepare bigger sizes of steel pipes and thicker sizes of M.s plates for welding. • Explain and prepare notes. 	<ul style="list-style-type: none"> • Welding equipment • M.S. pipe of various sizes • M.S. plates of various thickness • Marking tools.

General Objective 2.0: Carry out bronze welding on non ferrous metals

Week	Specific Learning Outcome	Teachers Activities	Resources
9-18	2.1 Adjust flame for bronze welding of different metals 2.2 Fabricate and carry out bronze welding of waste pipe models on copper pipes e.g. stack and branches, loop venting, etc. 2.3 Explain the need for and carry out bronze welding of castings, brasses and galvanised metals.	<ul style="list-style-type: none"> • Ask students to review the proper methods of setting welding flame for bronze of different metals. • Ask students to carryout fabrication and bronze welding of waste pipe models on copper pipes. • Ask students to carry out successful bronze welding of brass castings and galvanise metals. • Explain and prepare notes. • Assess the students. 	<ul style="list-style-type: none"> • Gas Welding equipment • Suitable fluxes for brazing • Rods, copper pipes and Galvanise pipes

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Course Specification: Theoretical/Practical Contents			
General Objective: 3.0 Understand the principles of gas cutting of metals and carry out metal cutting using oxy-acetylene equipment			
Week	Specific Learning Outcome	Teachers Activities	Resources
19-27	3.1 State the principles of gas cutting. 3.2 Select suitable equipment used for gas cutting 3.3 Mark and prepare m.s. plate ready for gas cutting 3.4 Light and adjust flame correctly 3.5 Carry out straight cutting observing necessary precautions 3.6 Prepare template for and apply these to carry out intricate cuttings.	<ul style="list-style-type: none"> • Ask students to explain the principles of gas cutting and analyse the function of the equipment used for gas cutting. • Ask students prepare and mark m.s. steel plate ready for gas cutting operations. • Ask students to mark out and cut specific template for intricate cuttings. • Explain and prepare notes. • Assess the students. • EVALUATION: Project assignment. (Group) • Assessment of individual work. 	<ul style="list-style-type: none"> • Cutting blow • Pipe • Metals • Metal support • Charts • Aprons • Gloves

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Course Specification: Theoretical/Practical Contents

General Objective 4.0: Understand the principles and functions of electric arc welding transformer and carry out electric arc welding operations with facility

Week	Specific Learning Outcome	Teachers Activities	Resources
28-36	<p>4.1 Differentiate between electric arc welding machine and gas welding equipment.</p> <p>4.2 Identify parts of the transformer and their functions</p> <p>4.3 Relate arc welding to gas welding process</p> <p>4.4 Select the current rating suitable for the thickness of metals.</p> <p>4.5 Apply necessary safety precautions while using the equipment to carry out electric arc welding.</p> <p>4.6 State the reason for a complete circuit with regards to the electrode holder and the job.</p>	<ul style="list-style-type: none"> • Ask students to explain the difference between electric arc welding and gas welding. • Ask students to enumerate the equipment needed for each class of welding and explain their differences. • Ask students to identify parts of electric welding transformer and explain their functions. • Ask students to set or obtain current rating suitable for thickness of metals. • Ask students to demonstrate in the striking of Arc • Ask students to carry out arc welding on m.s. plates. • Ask students to emphasise the necessary safety precautions to be observed while carryout arc welding. • Ask students to explain the reasons for a complete circuit with regards to electrode holder and the job. • Explain and prepare notes. • Asses the students. • EVALUATION: assessment of the assigned project. 	<ul style="list-style-type: none"> • Complete Arc striking equipment • Electrodes (different gauges) • Rubber boot • Gloves • Protecting clothing • Welding shield