NATIONAL VOCATIONALTRAINING INSTITUTE

TESTING DIVISION

TRADE TESTING REGULATIONS AND SYLLABUS

TRADE : WELDING AND FABRICATION

LEVEL : CERTIFICATE ONE

CERTIFICATE ONE

A. INTRODUCTION

i. The review of this syllabus has been generally influenced by the demands of industries due to its continuous change as a result of technological advancement and the changing needs of society. It was also influenced by the TVET reforms under the directions of the new educational reforms with the view to opening up further education and training opportunities to TVET graduates.

The certificate ONE syllabus is designed to respond to the following level descriptors:

QUALIFICATION	KNOWLEDGE LEVEL	SKILLS AND ATTITUDE:
Certificate 1	1. To demonstrate a broad knowledge base incorporating some technical concepts. 2. To demonstrate knowledge of the theoretical basis of practical skills. 3. To demonstrate knowledge in numeracy, literally, IT and Entrepreneurial skills	1. Require a wide range of technical skills 2. Are applied in a variety of familiar and complex contexts with minimum supervision. 3. Require collaboration with others in a team

ii. Knowledge in the safe use of welding tools, equipment, materials, pipes, sheet metals, thick metals, fabrication of basic structures. Heat source (Chemical and Electrical) arc and gas welding, trade drawing, trade science and calculation.

B. THE GENERAL OBJECTIVES

Upon completion of this course, the trainee should be able to;

i) understand and apply the composition and properties of metals (Ferrous and non-ferrous).
ii) understand and apply the correct usage and handling of Welding Tools and equipment.
iii) understand and apply the basic safety regulations to be observed in the Welding environment.
iv) understand the step by step assembling of the oxy-acetylene welding equipment and test for leakages.
v) identify and remedy of basic faults after testing for leakages.
vi) identify and use of workshop tools and equipment.
vii) understand and apply the safety precautions to be observed when using welding equipment and machines.
viii) understand and apply the principles of the Arc Welding set-up (From the mains to the work piece).
ix) understand and apply the basic principles of Arc Welding operations.
x) understand and apply the basic principles of lighting the Welding blow pipe and adjusting the various welding flames. That is (Oxidizing, Carburizing, Neutral).
xi) understand and apply the basic principles of iron and steel production.
xii) understand and apply the symbols, atomic weight and melting point of basic elements. Eg. aluminum, Iron, Brass, Steel, etc.
xiii) understand and apply the principles of edge preparation (Arc and Gas).
xiv) understand and perform basic arc welding operation.
xv) understand and perform basic oxy-acetylene welding operation.
xvi) understand and apply trade drawing, trade science and calculation relevant to welding trades/profession.

C. THE COURSE COMPONENTS

a) Trade Theory
b) Trade Science and Calculation
c) Trade Drawing
d) General Paper`
e) Trade Practical

EXAMINATION: The candidates would be examined in the FIVE components listed in 'C' above.

Practical work must be carefully planned to illustrate application of the theory and to provide maximum opportunity for workshop practice, laboratory work and demonstration.

D. KNOWLEDGE AND SKILLS REQUIREMENT

The prime objective of the program is to provide knowledge and skills of the trade in manner that will best meet the needs of the trade as well as the industries using Welding Equipment.

E. ELIGIBILITY FOR ENTRY TO EXAMINATION

Candidates may enter for examination only as internal candidate; that is those who at the time of entry to the examination are undertaking (or) have already completed the course at an approved establishment.

F. EXTERNAL EXAMINERS

The practical work of candidates will be assessed by an external examiner appointed by the Trade Testing Commissioner.

G. EXAMINATION RESULTS AND CERTIFICATES

Each candidate will receive record of performance given the grade of performance for the components Taken. These are:

i) Distinction
ii) Credit
iii) Pass
iv) Referred/Failure
v)

Certificates would be issued to candidates who pass in all the components.

H. NOTE:

All Technical and Vocational trainees who aspire to take advantage of the opportunities opened to them

in the educational reforms should NOTE that, for a trainee to progress to certificate Two (2) a pass in Certificate One (1) compulsory.

I. APPROVAL OF COURSE

Institutions or other establishments intending to prepare trainees for the Examination must apply to:

THE COMMISSIONER
TESTING DIVISION
NVTI HEAD OFFICE
P. O. BOX MB 21, ACCRA

J. ACKNOWLEDGEMENT

NVTI wishes to acknowledge the preparatory material done by the team of experts, which have been incorporated into this syllabus. They are;

MR NAPOLEON ACQUAAH (C.Ed)
MR THOMAS KOFI AHIABLE (D.Ed)
MR IBRAHIM ABAARI (LICENTIATESHIP, Dip)

Government's desire to improve the lot of Technical/Vocational training, which led to the preparation of this syllabus, is hereby acknowledged.

RECOMMENDED BOOKS:

1. The Science and Practice of Welding, 14th Edition A.C. Davis,
2. Gibson S.W., (1994), Practical Welding Motivate Macmillan Text for Industrial Vocational and Technical Education published by Macmillan Education Limited London
3. Welding and Fabrication Technology by W. Kenyon, Pitman Books Limited.

OXY-FUEL GAS WELDING – TOOLS AND EQUIPMENT

1. Oxygen and fuel gas cylinders
2. Welding blowpipes
3. Nozzles
4. Hoses
5. Tip cleaners
6. Safety glasses
7. Friction lighter
8. Chipping hammer
9. Wire brush
10. Pliers
11. High top boots
12. Leather aprons and jackets

METAL ARC WELDING

1. A.C. and D.C. welding transformers
2. Welding helmet with filter lens and clear lens
3. Safety boots
4. Cables
5. Leather gloves and aprons
6. Chipping hammers

WELDING CERTIFICATE ONE - TRADE THEORY

TASK		CRITICAL POINTS	SUB-POINTS	INSTRUCTIONAL TECHNIQUE
1.0	SAFETY PRECAUTION (ARC PRACTICE)	1.1 General and Personal safety in accordance to the health and safety Act 1974	1.2.1 General safety in the workshop and on site. Arrangement of equipment at their appropriate places. 1.2.2 Cleaning the work area before and after work. Selection of the right tools for the right job, etc. Personal safety in the workshop and on site. The approved protective clothing (gloves, leather aprons, goggles, shield etc.	1.3.1 Demonstrate to trainee how to observe safe practice at the work shop and on site. 1.3.2 Demonstrate to trainees how to observe personal safety in the workshop and on site.

WELDING CERTIFICATE ONE TRADE THEORY

TASK		CRITICAL POINTS	SUB-POINTS	INSTRUCTIONAL TECHNIQUE
2.0	SAFETY PRECAUTION (GAS PRACTICE)	2.1 Safety precautions on: • Storage of gases • Transporting gases • Handling of gas cylinders and other gas welding equipment.	2.2 Safety precaution in relation to the following ; 1) STORAGE OF GAS WELDING CYLINDERS. • Separation of empty cylinders from full ones • Storage of Acetylene cylinder in an upright position. • Storage of cylinder in a well ventilated room with flame proof electrical fittings, etc. 2) TRANSPORTING: Make sure the wheels under the trolley are in good condition. • Making sure the cylinder valves are close when transporting the cylinders. 3) HANDLING: Never expose the cylinders to the direct rays of the sun. Oil or grease should not be applied on any part of the cylinders.	2.3 Demonstrate to the trainees on how to observe safety when storing, transporting and handling of gas welding cylinders.

WELDING CERTIFICATE ONE TRADE THEORY

TASK		CRITICAL POINTS	SUB-POINTS	INSTRUCTIONAL TECHNIQUE
3.0	INSTALLATION OF A.C AND D.C. POWER SOURCE	3.1 Procedure for installing A.C and D. C. welding transformer.	3.2 The flow of current from the mains by the transformer via (AC/DC) the welding cables to the work piece. Example AC/DC welding circuit	3.3 Discuss with trainees using any suitable teaching aid. Example chart O.H.P, projector, etc.
4.0	ASSEMBLING OF HIGH AND LOW PRESSURE OXY-ACETYLENE WELDING EQUIPMENT	4.1 Procedure for assembling high pressure and low pressure oxy-acetylene welding equipment.	4.2 Step by step for assembling the high pressure and low pressure oxy-acetylene welding equipment. Using carbide to generate acetylene.	4.3 Discuss with trainees using any suitable teaching aid. Example chart, OHP, Projector, etc.
5.0	FUNCTIONS OF THE LOW AND HIGH PRESSURE ACETYLENE SYSTEM	5.1 The process of producing the acetylene (high and low pressure) used in welding.	5.2.1 The functions of the high pressure (acetylene) system and its accessories . 5.2.2 The functions of the low pressure acetylene generator i.e. generation of acetylene.	5.3 Discuss with trainees using any suitable teaching aid. Example, chart, projector, etc.

WELDING CERTIFICATE ONE - TRADE THEORY

TASK		CRITICAL POINTS	SUB-POINTS	INSTRUCTIONAL TECHNIQUE
6.0	ARC WELDING TRANSFORMERS AND THEIR ACCESSORIES	6.1 Types of AC/DC welding transformers. Arc welding accessories.	6.2.1 Types of AC transformer (single phase and three phase). 6.2.2 Types of DC transformer (engine driven generator and the rectifier). <u>Accessories</u> a) Weld lead b) Return weld lead c) Electrode holder d) Chipping hammer e) Welding shield f) Wire brush, etc	6.3 Discuss with trainees using any suitable teaching aid. E.g. real objects.
7.0	JIGS AND FIXTURES	7.1 The usage of the jigs and the fixtures in fabrication work and their advantages.	7.2 The difference between jigs and fixtures taking into consideration their application and their advantages.	7.3 Discussion
8.0	ARC WELDING PROCESS	8.1 The manual metal arc welding process using AC/DC transformer.	8.2 The manual metal Arc Welding using the AC transformer	8.3 Discussion/ Description

WELDING CERTIFICATE ONE - TRADE THEORY

TASK		CRITICAL POINTS	SUB-POINTS	INSTRUCTIONAL TECHNIQUE
9.0	ARC WELDING PROCESS	9.1 The Manual metal arc welding process using the AC/DC transformer.	9.2 The Manual Metal Arc welding using the DC transformer.	9.3 Discussion
10.0	FUNCTIONS OF ELECTRODE COATING	10.1 The purpose of the electrode coating.	10.2 The function of the electrode coating during welding; ▪ Starting and controlling the arc easily. ▪ Shield the molten pool from atmospheric contamination. ▪ Formation of slag ▪	10.3 Discussion

WELDING CERTIFICATE ONE - TRADE THEORY

TASK		CRITICAL POINTS	SUB-POINTS	INSTRUCTIONAL TECHNIQUE
11.0	PRINCIPLES OF OXY-ACETYLENE WELDING.	11.1 The working principles of the oxy-acetylene welding process.	11.2 The working principles i. Lighting up the blow pipe. Adjusting the appropriate flame. ii. Heating the base metal to its molten. iii. Application, advantages and disadvantages of the oxy-acetylene welding process.	11.3 Discuss with trainees using the appropriate teaching aids.
12.0	BASIC GAS WELDING EQUIPMENT	12.1 The basic gas welding equipment. i.e. i. types of blowpipes ii. different nozzle sizes and types	12.2 Gas welding equipment • Oxygen and Acetylene cylinders • Pressure regulators • Hoses and hose protector • Blow Pipes Nozzles, etc.	12.3 Identification/Discuss with trainees using the appropriate teaching aid.

WELDING CERTIFICATE ONE - TRADE THEORY

TASK		CRITICAL POINTS	SUB-POINTS	INSTRUCTIONAL TECHNIQUE
13.0	BASIC GAS WELDING TOOLS AND ACCESSORIES	13.1 The basic gas welding tools and accessories.	13.2 Gas welding tools and accessories. • Spanners • Goggles • Wire brush • Spark lighter • Nozzle cleaners • Filler rod • Fluxes, etc.	13.3 Discuss with trainees using the appropriate teaching aid.
14.0	BASIC HAND CUTTING TOOLS AND EQUIPMENT	14.1 The basic hand tools and equipment • Marking out • Measuring • Cutting • Grinding • Hammering, etc.	14.2 Hand tools and equipment: • Types of marking out tools • Types of measuring tools • Types of cutting tools • Types of grinding tools, etc	14.3 Discuss with trainees and demonstrate the use of tools.

WELDING CERTIFICATE ONE - TRADE THEORY

TASK		CRITICAL POINTS	SUB-POINTS	INSTRUCTIONAL TECHNIQUE
15.0	BASIC WELDING TERMS, JOINTS AND SYMBOLS	15.1 Describe the welding terms, welding joints and welding symbols.	15.2 • Welding terms (Arc length, O.C.V., etc). • Welding joints (Lap, edge, etc). • Welding symbols (II, V, etc.)	15.3 Discuss with trainees by using appropriate teaching aid.
16.0	GAS WELDING FLAMES	16.1 Identify types of flames	16.2 Types of flames • Carburizing • Neutral • Oxidizing	16.3 Discuss with trainees using any appropriate teaching aid.
17.0	FLASH BACK AND BACK FIRE	17.1 Explain what flash back and back fire are.	17.2 Definition of the following: • Back fire • Flash back. • Their causes and remedies.	17.3 Discuss with trainees using any appropriate teaching aid.
18.0	MANIFOLD AND GAS ECONOMIZER	18.1 Understanding the working principles of • Gas Economizer • Manifold System	18.2 How the following systems work. • Gas Economizer • Manifold System	18.3 Discuss with trainees using any appropriate teaching aid
19.0	WELDING TECHNIQUES	19.1 The leftward and rightward technique of gas welding.	19.2 The welding techniques. • Leftward technique • Rightward technique	19.3 Discuss with trainees using any appropriate teaching aid

WELDING CERTIFICATE ONE - TRADE THEORY

TASK		CRITICAL POINTS	SUB-POINTS	INSTRUCTIONAL TECHNIQUE
20.0	WELDING DEFECTS	20.1 Various types of weld defects	20.2 The various types of weld defects, their causes, effects and possible remedies. E.g. porosity, slag inclusion, blow holes, etc.	20.3 Discuss with trainees using the appropriate teaching aids.
21.0	EDGE PREPARATION	21.1 Various types of edge preparation.	21.2.1 Types of edge preparation: • Single vee • Double • Square butt etc. 21.2.2 State the importance of edge preparation.	21.3 Discuss using the appropriate teaching aid.

TRADE SCIENCE AND CALCULATIONS

TASK		CRITICAL POINTS	SUB-POINTS	INSTRUCTIONAL TECHNIQUE
1.0	PRODUCTION OF IRON AND STEEL	1.1 How steel and iron are produced	1.2 The process of producing Iron and Steel. (Blast furnace, Iron and coke, *lime*, etc.)	1.3 Discuss with trainees
2.0	WHOLE NUMBERS	2.1 Understand the principles of the following • Addition • Subtraction • Division • Multiplication	2.2 Explain the process of • Addition of whole numbers • Subtraction of whole numbers • Multiplication of whole numbers • Division of whole numbers	2.3 Discuss
3.0	FERROUS AND NON-FERROUS METALS	2.1 Identify ferrous and non-ferrous metals	2.2 Explain the composition of various ferrous and non-ferrous metals (Tin, Brass, Copper, mild steel, etc.).	2.3 Discuss with trainees
4.0	DECIMAL SYSTEM OF MEASUREMENT	4.1 Principles of decimal.	4.2 The principles of decimal.	4.3 Discuss with work examples

TRADE SCIENCE AND CALCULATIONS

TASK		CRITICAL SKILLS	SUB-SKILLS	INSTRUCTIONAL TECHNIQUE
5.0	TRANSFER OF HEAT	5.1 The principles of the three methods of heat transfer	5.2 Heat transfer • Conduction • Convection • Radiation Link them to the welding situation	5.3 Discuss
6.0	CONVERSION OF MEASUREMENT	6.1 The principles of converting measurement	6.2 The process of converting the following measurement. Imperial to metric • Inches to metric • Metric to inches	6.3 Teaching method of conversion with assignments
7.0	EXPANSION AND CONTRACTION	7.1 The principles of expansion and contraction.	7.2 Expansion and contraction and their effects on weld metal	7.3 Discussion/explanation
8.0	DISTORTION	8.1 The three types of distortion. • Angular • Transversal • Longitudinal	8.2 Define distortion and it causes, effects and possible methods of controlling distortion	8.3 Discuss
9.0	PROPERTIES OF METALS	9.1 The mechanical properties of metals.	9.2 Properties of metal. • Toughness • Conductivity • Ductility • Malleability, etc	9.3 Discussion/explanation

TRADE SCIENCE AND CALCULATIONS

TASK		CRITICAL SKILLS	SUB-SKILLS	INSTRUCTIONAL TECHNIQUE
10.0	BASIC ELEMENTS AND THEIR MELTING POINT	10.1 The basic element; their melting point, chemical symbol and their atomic weight.	10.2 State the basic element, their melting point, atomic weight and their chemical symbol, e.g. Element SY AW MP Gold – Au 1972 1063°C	10.3 Discuss
11.0	HEAT TREATMENT OF METALS	11.1 The principles of heat treatment of metals.	11.2 The heat treatment processes • Annealing • Normalizing • Post heating, etc.	11.3 Discuss
12.0	PERIMETERS	12.1 The principles of calculating perimeters of geometrical figures.	12.2 Calculating the distance around a simple geometrical figures (Rectangle, Triangle, etc.)	12.3 Discuss with trainees using any appropriate teaching aid.
13.0	CIRCUMFERENCE	13.1 The principles of calculating the circumference of a circle	13.2 Calculating the circumference of a circle. $\pi 2$ or $2\pi r$	13.3 Discuss with trainees using the appropriate teaching aid.
14.0	AREAS AND VOLUMES	14.1 The principles of calculating the areas and volumes of simple geometrical figures.	14.2 The process of calculating the areas and volumes of geometrical figures such as Triangle, Rectangle, Square, Cuboids. Formulate for different figures.	14.3 Discuss with trainees using the right teaching aid.

TRADE SCIENCE AND CALCULATIONS

TASK		CRITICAL SKILLS	SUB-SKILLS	INSTRUCTIONAL TECHNIQUE
15.0	COSTING	15.1 The basic principles of costing.	15.2 The procedure for costing simple fabrication work. i.e. • Material cost • Labour cost • Time • Transportation • Over heads, etc.	15.3 Discuss with trainees using the appropriate teaching aid

CERTIFICATE ONE - TRADE DRAWING

TASK		CRITICAL POINTS	SUB-POINTS	INSTRUCTIONAL TECHNIQUE
1.0	INTRODUCTION TO TECHNICAL DRAWING	1.1 The basic tools and equipment used in technical drawing.	1.2 Basic technical drawing tools and equipments. • Set square • Scale rule • Compasses • Tee square, etc	1.3 Demonstration/identification
2.0	LETTERING AND TYPES OF LINES	2.1 The importance of lettering and the differences of lines.	2.2 How to write in the context of technical drawing. The difference in lines and their applications.	2.3 Demonstrate by using the appropriate teaching aid.
3.0	CONSTRUCTION OF ANGLES	3.1 The principles of constructing angles	3.2 How to construct and bisect different types of angles. • Acute • Obtuse • Reflex, etc.	3.3 Demonstration with trainees activity.
4.0	CONSTRUCTION OF PLAIN GEOMETRICAL FIGURES	4.1 The principles of constructing geometric figures.	4.2 How to construct plain geometrical figures such as Triangles, Square, Rectangles, Circles, Parallelogram, Polygons, etc.	4.3 Demonstration with trainees activity.

CERTIFICATE ONE - TRADE DRAWING

TASK		CRITICAL POINTS	SUB-POINTS	INSTRUCTIONAL TECHNIQUE
5.0	CONSTRUCTION OF ELLIPSE	5.1 The principles of constructing ellipse	5.2 How to construct ellipse taken into consideration the major and minor axis	5.3 Demonstration
6.0	CONSTRUCTION OF PARABOLA	6.1 The principles of constructing parabola.	6.2 How to construct Parabola taking into consideration the major and minor axis	6.3 Demonstration
7.0	PICTORIAL DRAWING	7.1 The principles of pictorial drawing using the isometric and oblique projections	7.2 How to construct pictorial objects using the Isometric and Oblique projections.	7.3 Demonstration
8.0	BASIC DEVELOPMENT	8.1 The principles of development.	8.2 How to develop simple objects; • Cylinder • Cone, etc	8.3 Demonstration

CERTIFICATE ONE - TRADE PRACTICALS

TASK		CRITICAL SKILLS	SUB-SKILLS	INSTRUCTIONAL TECHNIQUE
1.0	ARC PRACTICE	1.1 Basic tools and equipment used in welding shop. 1.1.2 Striking and maintaining the arc 1.1.3 Simple laying of beads in a straight line. 1.1.4 Current setting and speed of travel. 1.1.5 Starting and re-starting of a bead.	1.2.1 The various tools and equipment used in the welding workshop and demonstrate their usage. • Wire brush • Chipping hammer • AC/DC welding plant etc. The chipping hammer to chip off slag after welding. 1.2.2 Striking the arc using the two methods (tapping and scratching). 1.2.3 Mark a straight line on a plate and lay a bead. 1.2.4 The appropriate current for the work piece and during welding. The speed of travel as well as the arc length. 1.2.5 Starting a weld bead on a plate, chipping off the slag at the crater, and re-starting the weld.	1.3 Guide trainees to identify and use various tools and equipment. Demonstrate the use of tools and equipment. 1.3.1 Demonstrate for trainees to observe. 1.3.2 Guide the trainees in laying the bead. 1.3.3 Guide the trainees in selecting the appropriate current whiles you observe. As an exercise mark a straight line on a plate and lay a bead. 1.3.4 Demonstrate for trainees to observe and practice.

Note: Safety must be observed at all levels in accordance to the Health and Safety Regulation ACT 1974

CERTIFICATE ONE – TRADE PRACTICALS

TASK		CRITICAL SKILLS	SUB-SKILLS	INSTRUCTIONAL TECHNIQUE
2.0	GAS PRACTICE	2.1.1 Setting up of oxy-fuel gas welding equipment.	2.2.1 Assemble the oxy-fuel gas welding equipment and test for leakages.	2.3.1 Assist trainees to assemble the oxy-fuel gas welding equipment.
		2.1.2. Welding flames:	2.2.2 Types of flames: • Neutral • Carburizing • Oxidizing	2.3.2 Guide trainees with a step by step procedure for lighting and adjusting the flames.
		2.1.3 Laying of beads without a filler rod.	2.2.3 Laying of beads without filler rod.	As an exercise, mark a straight line and lay a straight bead without a filler rod
		2.1.4 Depositing of beads with the filler rod on 1.5mm mild steel sheet.	2.2.4 Laying of beads with a filler rod.	Guide trainees to lay a bead with a filler rod on a sheet of plate

CERTIFICATE ONE – TRADE PRACTICALS

TASK		CRITICAL SKILLS	SUB-SKILLS	INSTRUCTIONAL TECHNIQUE
2.0	WELDING JOINTS	2.1.5 Types of welding joints i. Butt ii. Edge iii. Corner iv. Fillet v. Lap	2.2.5 Preparation of edge with 1.5mm and 5mm steel plates.	2.3.5 Guide trainees to set the root gap, tack and weld the joint.
		2.1.6 Butt weld on 2 mm mild steel plate in the flat positions by leftward technique.	2.2.6 Prepare the edges of 2mm mild steel plates, tack them, start the weld from right to left direction.	2.3.6 Observe trainees prepare the metals, tack and weld using the leftward technique.
		2.1.7 Butt weld on 5 mm mild steel plate in the flat position by rightward technique.	2.2.7 Prepare the edges of 5mm mild steel plates, tack them, start the weld from left to right direction.	2.3.7 Observe trainees prepare the metals tack and weld using the rightward technique.
		2.1.8 Basic Brazing of simple joints on 1.5mm mild steel plate.	2.2.8 Prepare the edges of the 1.5mm mild steel plate. Use suitable flux and a suitable filler rod. Tack them and perform the brazing process.	2.3.8 Guide trainees in the process.
		2.1.9 Basic Bronze welding of simple groove joint on 5mm mild steel plate	2.2.9 Prepare the edges of the 5mm mild steel plates into a single vee butt joint, tack them using the appropriate flux, filler rod and a suitable flame to perform the bronze welding.	2.3.9 Guide trainees in the process.

CERTIFICATE ONE - TRADE PRACTICALS

TASK		CRITICAL SKILLS	SUB-SKILLS	INSTRUCTIONAL TECHNIQUE
3.0	ARC PRACTICE	3.1.1 Padd welding on 10mm mild steel plate.	3.2.1 Preparation of surface of the 10mm mild steel plate. Use the appropriate electrode, current setting and the right sequence to perform padd welding.	3.3.1 Demonstrate for trainees to observe.
	WELDING POSITION	Types of positions i. Flat ii. Horizontal iii. Vertical iv. Overhead	3.2.2 Preparation of surface of 10mm mild steel plate, using the appropriate jig or fixture to perform the welding in the various positions.	3.3.2 Demonstrate for trainees to observe.
		3.1.3 Joining two pieces of mild steel plate in various position using the five basic welding joints – (Butt, Corner, Edge, Lap and Fillet).	3.2.3 Prepare the edges of the mild steel plate. Set appropriate root gap and current. And perform the welding on one joint to the other.	3.3.3 Guide trainees to perform the said task.

CERTIFICATE ONE - TRADE PRACTICALS

TASK		CRITICAL SKILLS	SUB-SKILLS	INSTRUCTIONAL TECHNIQUE
3.0	ARC PRACTICE	3.1.4 Testing and inspection of welds.	3.2.4 Types of test: i. Destructive – E.g. a. Bend, b. tensile etc. ii. Non-destructive – E.g. a. visual inspection b. x-ray c. gammery etc.	3.3.4 Discuss with trainees how they can identify various defects in a weld piece.
		3.1.5 Basic metal arc cutting processes.	3.2.5 Selection of electrode size and current.	3.3.5 Demonstrate for trainees to observe and practice.

LEVEL – CERTIFICATE ONE – TEST SPECIFICATION TABLE
TRADE THEORY (OBJECTIVE)

NO	TOPIC	COGNITIVE KNOWLEDGE	AFFECTIVE UNDERSTANDING	PSYCHOMOTOR APPLICATION	TOTAL
1.	Personal Safety	1	1	1	3
2.	Safety on Gas	1	-	1	2
3.	Safety on Arc	-	1	-	1
4.	High Pressure System	2	-	-	2
5.	Manual Metal Arc Welding Process	1	1	1	3
6.	Functions of Electrode Coating	2	1	2	3
7.	Flame Adjustment	1	1	-	4
8.	Low Pressure System	1	2	1	3
9.	Basic Edge Preparation	-	-	1	1
10.	Welding Position	-	1	-	1
11.	Oxy-Fuel Gas Cutting	1	-	1	2
		10	8	7	25

LEVEL – CERTIFICATE ONE – TEST SPECIFICATION TABLE
TRADE THEORY (SUBJECTIVE)

NO	TOPIC	COGNITIVE KNOWLEDGE	AFFECTIVE UNDERSTANDING	PSYCHOMOTOR APPLICATION	TOTAL
1.	Welding Terms and Their Definition	2	-	-	2
2.	High Pressure System	-	1	-	1
3.	Manual Metal Arc Welding process	-	1	-	1
4.	Safety	1	-	-	1
	Total	3	2	-	5

LEVEL – CERTIFICATE ONE – TEST SPECIFICATION TABLE
TRADE SCIENCE AND CALCULATION (OBJECTIVE)

NO	TOPIC	COGNITIVE KNOWLEDGE	AFFECTIVE UNDERSTANDING	PSYCHOMOTOR APPLICATION	TOTAL
1.	Production of Steel and Iron	2	1	-	3
2.	Ferrous/Non-Ferrous	1	2	-	3
3.	Distortion	2	-	1	3
4.	Heat Transfer	1	1	-	2
5.	Properties of Metals	3	-	-	3
6.	Elements and their Melting Point	1	1	-	2
7.	Heat Treatment	2	-	2	4
8.	Conversion of Measurement	-	-	1	1
9.	Costing	2	1	1	4
	Total	14	6	5	25

LEVEL – CERTIFICATE ONE – TEST SPECIFICATION TABLE
TRADE SCIENCE AND CALCULATION (SUBJECTIVE)

NO	TOPIC	COGNITIVE KNOWLEDGE	AFFECTIVE UNDERSTANDING	PSYCHOMOTOR APPLICATION	TOTAL
1.	Ferrous/Non-Ferrous	-	1	-	1
2.	Conversion of Measurements	1	-	-	1
3.	Properties of Metal	1	1	-	2
4.	Element and their Meeting Point	1	-	-	1
		3	2	-	5

LEVEL – CERTIFICATE ONE – TEST SPECIFICATION TABLE
DRAWING (SUBJECTIVE)

NO	TOPIC	COGNITIVE KNOWLEDGE	AFFECTIVE UNDERSTANDING	PSYCHOMOTOR APPLICATION	TOTAL
1.	Construction of Angles	-	-	3	3
2.	Plain Geometrical figures	-	-	2	2
3.	Ellipse	-	-	1	1
4.	Parabola	-	-	1	1
5.	Development	-	-	1	1
6.	Isometric projection	-	-	1	1
7.	Oblique projection	-	-	1	1
	Total	-	-	10	10