FEDERAL MINISTRY OF EDUCATION

National Technical Certificate (NTC) Curriculum in

AUTO ELECTRIC WIRING

February, 2025

Innovation Development and Effectiveness in the Acquisition of Skills (IDEAS) Project

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NATIONAL BOARD FOR TECHNICAL EDUCATION
Plot B, Bida Road, PMB 2239, Kaduna - Nigeria

NATIONAL TECHNICAL CERTIFICATE

CURRICULUM AND MODULE SPECIFICATIONS IN

AUTO ELECTRIC WIRING

FEBRUARY, 2025

GENERAL INFORMATION

AIM
To give training and impart the necessary knowledge and skills leading to the production of craftsmen and other skilled personnel who will be enterprising and self-reliant.

ENTRY QUALIFICATIONS

Craft Programme
Candidates must not be less than 14 years of age and should have successfully completed three years of Junior Secondary education or its equivalent. Special consideration may be given to sponsored candidates with lower academic qualifications who hold trade test certificates and National Skills Qualifications (NSQs), and are capable of benefiting from the programme.

The Curriculum
The Curriculum of each programme is broadly divided into three components:

a. General Education, which accounts for 30% of the total hours required for the programme.
b. Trade Theory, Trade Practice and Related Studies which account for 65% and
c. Supervised Industrial Training/Work Experience, which accounts for about 5% of the total hours required for the programme
   This component of the course which may be taken in industry or in the College production unit is compulsory for the full-time students.

Included in the curriculum are the teacher's activity and learning resources required for the guidance of the teacher.

Unit Course/Modules
A Course/Module is defined as a body of knowledge and skills capable of being utilized on its own or as a foundation or pre-requisite knowledge for more advanced work in the same or other fields of study. Each unit when successfully completed can be used for employment purposes.

Behavioral Objectives
These are educational objectives, which identify precisely the type of behavior a student should exhibit at the end of a course/module or programme. Two types of behavioral objectives have been used in the curriculum. They are:

a. General Objectives
b. Specific learning outcomes

General objectives are concise but general statements of the behavior of the students on completion of a unit of the week such as understanding the principles and application in:
a. Orthographic projection in engineering/technical drawing;
b. Loci in Mathematics

Specific learning outcomes are concise statements of the specific behavior expressed in units of discrete practical tasks and related knowledge the students should demonstrate as a result of the educational process to ascertain that the general objectives of course/programme have been achieved. They are more discrete and measurable expressions of the scope of the tasks contained in a teaching unit.

General Education in Technical Colleges
The General Education component of the curriculum aims at providing the trainee with complete secondary education in critical subjects like English Language, Physics, Chemistry, Biology, Entrepreneurial Studies and Mathematics to enhance the understanding of machines, tools and materials of their trades and their application as a foundation for post-secondary technical education for the above average trainee. Hence, it is hoped that trainees who successfully complete their trade and general education may be able to compete with their secondary school counterparts for direct entry into the University, Polytechnics, Innovation Enterprise Institutions (IEI) or Colleges of Education (Technical) for a Degree, ND, NID or NCE courses respectively. For the purpose of certification, only the first three courses in mathematics will be required. The remaining modules are optional and are designed for the above average students.

National Certification
The NTC programmes are run by Technical Colleges accredited by NBTE. NABTEB conducts the final national examination and awards certificates. Trainees who successfully complete all the courses/modules specified in the curriculum table and passed the national examinations in the trade will be awarded one of the following certificates:

S/NO	LEVEL	CERTIFICATE
	Technical Programme	
1.	Craft Level	National Technical Certificate (NTC)

Guidance Notes for Teachers Implementing the Curriculum
The number of hours stated in the curriculum table may be increased or decreased to suit individual institutions' timetable provided the entire course content is properly covered and the goals and objectives of each module are achieved at the end of the term.

The maximum duration of any module in the new scheme is 300 hours. This means that for a term of 15 weeks, the course should be offered for 20 hours a week. This can be scheduled in sessions of 4 hours in a day leaving the remaining hours for general education. However, properly organized and if there are

adequate resources, most of these courses can be offered in two sessions a day, one in the morning and the other one in the afternoon. In so doing, some of these programmes may be completed in lesser number of years than at present.

The sessions of 4 hours include the trade theory and practice. It is left to the teacher to decide when the class should be held in the workshop or in a lecture room.

Integrated Approach for Teaching Trade Theory, Trade Science and Trade Calculation
The traditional approach of teaching trade science and trade calculation as separate and distinct subjects in Technical College programmes is not relevant to the new programme as it will amount to a duplication of the teaching of mathematics and physical science subjects in the course. The basic concepts and principles in mathematics and physical science are the same as in the trade calculation and trade science. In the new scheme therefore, qualified persons in these fields will teach mathematics and physical science and the instructors will apply the principles and concepts in solving trade science and calculation problems in the trade theory classes. To this end, efforts have been made to ensure that mathematics and science modules required to be able to solve technical problems were taken as pre-requisite to the trade module.

Evaluation of Programme/Module
For the programme to achieve its objectives, any course started at the beginning of a term must terminate at the end of the term.

Instructors should therefore devise methods of accurately assessing the trainees to enable them give the students final grades at the end of the term. A national examination will be taken by all students who have successfully completed their modules. The final award will be based on the aggregate of the scores attained in the course work and the national examination.

General Goals of the Programme
This programme is designed to provide the trainee with the knowledge and skills in Auto Electric Wiring.

On completion of this programme, the trainee should be able to understand the following Auto Electric Wiring systems.

CURRICULUM TABLE (NTC)
NATIONAL TECHNICAL CERTIFICATE IN AUTO ELECTRIC WIRING PRACTICE

S/No	Subject Code	Module	YEAR 1						YEAR 2						YEAR 3						Total Hours
			Term 1		Term 2		Term 3		Term 1		Term 2		Term 3		Term 1		Term 2		Term 3		
			T	P	T	P	T	P	T	P	T	P	T	P	T	P	T	P	T	P	
1	CMA 11 – 14	Mathematics	2		2		2		2		2		2		2		2		2		216
2	CEN 11 – 17	English	2		2		2		3		3		3		3		3		3		288
3	CCH 10 – 12	Chemistry	2		2		2		1	2	1	2	1	2	1	2	1	2	1	2	288
4	CPH 10-12	Physics	2		2		2		1	2	1	2	1	2	1	2	1	2	1	2	288
5	CBM 10	Entrepreneurship													2		2		2		72
6	ICT 11-15	Computer studies							1	2	1	2	1	2	1	2	1	2			180
7	CTD 11 – 13	Drawings		3		3		3		3		3		3							216
8	AEW 111	Basic electrical concept	2	3																	
9	AEW 112	Auto workshop safety	2	3																	
10	AEW 113	Automotive parts and components	2	3																	
11	AEW 121	Conductors, Semi-conductors and Insulators			2	3															
	AEW 122	Auto- Electrical tools and equipment			2	4															
12	AEW 131	Electrical signs and symbols					2	3													
13	AEW 132	Starting system					2	3													
14	AEW 133	Battery					2	3													
15	AEW 134	Charging system					2	4													

16	AEW 211	Lightening system							2	3											
17	AEW 212	Accessories							2	4											
18	AEW 213	Colour coding							2	3											
19	AEW 221	Fuel system									2	4									
20	AEW 222	Wiring system									2	5									
21	AEW 223	Soldering									2	3									
22	AEW 231	Cooling system											2	4							
23	AEW 231	Fuses and relays											2	4							
24	AEW 311	Sensors													2	5					
25	AEW 312	Electronic control model (ECM)													2	5					
26	AEW 313	Actuators													2	5					
27	AEW 321	Basic trouble shooting															2	6			
28	AEW 331	Introduction to computerize diagnosis																	2	6	
29	AEW 332	Diagnostic tools and equipment																	2	6	
		GRAND TOTAL	**14**	**11**	**14**	**11**	**14**	**11**	**14**	**17**	**14**	**17**	**14**	**19**	**16**	**18**	**16**	**18**	**15**	**14**	**3204**

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PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN AUTO-ELECTRIC WIRING		
Course: Basic Electricity Concept	**Course Code: AEW111**	**Total Hours: 72HRS**
Year: 1 Term: 1	**Pre-requisite:**	**Practical: 3 theory: 2**
Goal: This module is designed to equip the trainee with fundamental knowledge and skills for Auto electric wiring		
General Objectives: On completion of this module, the trainee should be able to: 1.0 Understand electricity and its fundamental concept 2.0 Know electrical components and circuits 3.0 Know the relationship between electricity and energy 4.0 Know the connection between electricity and magnetism		

General Objective:1.0 Understand electricity and its fundamental concept						
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
1	1.1 Define electricity	Explain electricity	Textbooks Internet Board Marker projector			Magnets Batteries Circuit-Boards Multimeter
	1.2 Explain between static and current in electricity	Explain static and current in electricity	E-learning Textbooks Internet Board Marker Projector	Identify static current	Guide student to; Identify static current	
	1.3 Explain basic atomic theory	Discuss basic atomic theory	Textbooks Internet Textbooks Internet Board Marker Projector			
	1.4 Define the following: • Current • Voltage • Resistance	Explain the following: • Current • Voltage • Resistance	Textbooks Internet Board Marker Projector			
	1.5 State Ohm's Law	Explain Ohm's Law				

General Objective:2.0: Know electrical components and circuits						
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Learning Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
2-3	2.1 Explain Basic circuits components: • Resistors • Capacitors • Batteries • Bulbs • Switches etc	2.1 Discuss Basic circuits components: • Resistors • Capacitors • Batteries • Bulbs • Switches etc	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals	Identify Basic Circuits components: •Resistors •Capacitors •Batteries •Bulbs Switches	Guide student to: identify basic circuits components: • Resistors • Capacitors • Batteries • Bulbs • Switches	Circuit boards Resistors Capacitors Batteries Bulbs Switches
	2.2 Explain the functions and symbols of each components in 2.1	Discuss the functions and symbols of each components in 2.1	Textbooks Internet board marker projector	Demonstrate the functions of the components in 2.1 Identify circuits symbols	Guide student to: Identify circuits symbols Demonstrate the functions of the components in 2.1	
	2.3 Explain between series and parallel circuits	Explain the difference between series and parallel circuits	Textbooks Internet board marker projector	Identify series and parallel circuits	Guide student to: Identify series and parallel circuits	
	2.4 State the advantages and disadvantages of 2.3	Explain the advantages and disadvantages of 2.3	Textbooks Internet board marker projector	Demonstrate the application of series and parallel circuits	Guide student to: Demonstrate the application of series and parallel circuits	

	General Objective:30: Know the relationship between electricity and energy					
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
4-6	3.1 Define energy	Explain energy	Textbooks	Identify the forms of energy	Guide student to: Identify the forms of energy	Circuit boards Electroscope Multimeter

			Internet Board Marker Projector			
	3.2 Define electrical power	Explain electrical power	Textbooks Internet Board Marker Projector	Identify the importance of electrical power	Guide student to Identify the importance of electrical power	
	3.3 State the formula for calculating power in an electrical circuit	Discuss the formula for calculating power in an electrical circuit	Textbooks Internet Board Marker Projector	Calculate the electrical power in a circuit	Guide student to Calculate the electrical power in a circuit	
	3.4 Explain the effect of short circuits and overload in an electrical circuit	Explain the effect of short circuits and overload in an electrical circuit	Textbooks Internet board marker projector	Identify the effect of short circuits and overload in an electrical circuit	Guide student to: identify the effect of short circuits and overload in an electrical circuit	

	GENERAL OBJECTIVE 4.0 Know the connection between electricity and magnetism					
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
7-9	4.1 Explain the following; • Magnetism • Electromagnetism • Electromagnetic induction	Discuss the following; • Magnetism • Electromagnetism • Electromagnetic induction	Textbooks Internet board marker projector	Describe Magnetism Electromagnetism Electromagnetic induction	Guide student to: Describe Magnetism Electromagnetism Electromagnetic induction	Magnets Coil Experiment boards Wiring board
	4.2 Explain the relationship between electricity and magnetism	Discuss the relationship between electricity and magnetism	Textbooks Internet board marker projector	Demonstrate the relationship between electricity and magnetism	Guide student to Demonstrate the relationship between electricity and magnetism	
	4.3 Explain how electromagnets work and their applications	Describe how electromagnets work and their applications	Textbooks Internet board marker projector	Identify the application of electro magnets in vehicles	Guide student to Identify the application of electro magnets in vehicles	

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN AUTO ELECTRIC WORKS		
Course: AUTO WORKSHOP SAFETY	**Course Code: AEW 112**	**Total Hours: 96HRS**
Year: 3 Term: 1	**Pre-requisite:**	**Theoretical:**
		Practical:
Goal: This module is designed to provide the trainee with the knowledge and skills needed to competently carry out daily activities in an automotive workshop while observing relevant safety.		
General Objectives: On completion of this module, the trainee should be able to: 1.0. Understand workshop rules and safety regulations 2.0. Know Hazards in auto motive workshop 3.0. Know self-manual handling technique 4.0 Know fire fighting technique 5.0. Know basic first aid		

	Theory			**Practical**		
General Objective:1.0: Know workshop rules and safety regulations						
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
1-2	1.1 Explain workshop rules and safety regulations	Discuss workshop rules and safety regulations	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning	Observe workshop safety rules and regulations	Guide student to: Observe workshop safety rules and regulations	PPE Fire extinguishers Sand bucket
	1.2 Interpret workshop rules and safety regulations	Explain workshop rules and safety regulations	• Text books • E-library • E-learning	Use PPE	Use PPE	

	1.3 Explain the importance of safety rules and regulations in automotive workshop	Discuss the importance of safety rules and regulations in automotive workshop	• Text books • e-library • e-learning			
	1.4 Explain procedures for safe usage and maintaining tools, equipment and materials	Describe procedures for safe usage and maintaining tools, equipment and materials	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning			

	Theory			**Practical**		
General Objective:2.0: Know Hazards in automotive workshop						
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
3-5	2.1 Define Hazard	Explain Hazard	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning	Identify electric hazards. Identify electric hazards present in any electrical workshop	Guide student to identify Electric Hazards Demonstrate to student on how to stimulation environment where electrical hazards occurs and how to prevent it	PPE Fire extinguisher Sand bucket Hoist

	2.2 Explain the difference between near misses and accident	Discuss near misses and accident		Identify and mitigate electric hazards in an auto workshop	Guide student to identify near misses and accident	
	2.3 Explain types of hazards in auto shop	Discuss types of hazards in auto shop		Wear PPE	Guide student to wear PPEs	
	2.4 Explain the causes of hazards	Explain the causes of hazards				
	2.5 Describe the ways of controlling hazards	Discuss the ways of controlling hazards				
	2.6 Explain the procedures for reporting hazards	Describe the procedures for reporting hazards		Write accident report	Guide students on how write accidents report	
	2.7 Explain types of PPE uses and parts	Explain types of PPE uses and parts		Identify types of PPEs	Guide student to identify types of PPEs	

	General Objective:3.0: Know self-manual handling technique					
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
6	3.1 Define manual handling	Discuss manual handling	• Text books • E-library • E-learning • computer	Demonstrate manual handling procedures	Guide student to: Demonstrate manual handling procedures	PPE first aid kit
	3.2 List risk associated with manual handling	Explain risk associated with manual handling	• Text books • E-library • E-learning	Demonstrate risk control strategies in a workshop	Demonstrate risk control strategies in a workshop	
	3.3 Outline control strategies	Explain control strategies	• Text books • E-library • E-learning			

	General Objective:4.0: Know fire fighting technique					
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
7-9	4.1 Explain the element of fire	Discuss the element of fire	• Text books • E-library • E-learning	Use different fire extinguishers	Guide student to: Use different fire extinguishers	Fire extinguishers PPE
	4.2 Describe the element of fire	Explain the element of fire	• Text books • E-library • E-learning			
	4.3 List the fire prevention methods	Explain the fire prevention methods	• Text books • E-library • E-learning	Identify student to identify fire prevention methods	Guide student to identify fire prevention methods	
	4.4 List the types of fire equipment found in automotive shops	Explain types of fire equipment found in automotive shops	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library	Identify different equipment found in automotive shops: • Sand Bucket • Fire extinguisher • Fire Blanket • Fire alarm etc.	Guide students to identify different equipment found in automotive shops: • Sand Bucket • Fire extinguisher • Fire Blanket • Fire alarm etc.	
	4.5 List the types of fire extinguishers	Discuss types of fire extinguishers	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library	Identify types of Fire Extinguisher • Powder • Liquid • Detergent etc	Guide students to Identify types of Fire Extinguisher • Powder • Liquid • Detergent etc	
	4.6 Explain how to use fire extinguishers	Explain how to use fire extinguishers				

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN AUTO ELECTRIC WIRING				
MODULE: AUTOMOTIVE COMPONENTS AND PARTS			**COURSE CODE: AEW113**	**CONTACT HOURS:**
YEAR: 1	**TERM:** 1	**PRE: REQUISITE:**	**Theoretical:** 36 Hours **Practical:** 48 Hours	
GOAL: This module is designed to Introduce the Students to the basic component units of the Automotive				
GENERAL OBJECTIVES: On completion of this module, the trainee should be able to: 1.0 Know and Identify Automobile Powertrain components and functions 2.0 Know Transmission components Parts and function 3.0 Know Automotive Suspension components 4.0 Know Steering System components 5.0 Know the Brake System component parts and function				

	Theory			**Practical**		
GENERAL OBJECTIVE 1.0 Know Automobile Powertrain components and functions						
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
1-2	1.1 Define the Powertrain component	Discuss the Powertrain component	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library	.Dismantle the Engine	Guide student to: Dismantle the Engine	Complete Automotive engine Complete workshop tools box PPE
	1.2 Explain Location in the automobile	Explain Location in the automobile		Identify component parts of the power train	Identify component parts of the power train	
	1.3 List the components part by part	Explain the components part by part				
	1.4. Explain the Function of each part in 1.3	Discuss the Function of each part in 1.3				
	1.5. Explain operational principle of each component in 1.3	Explain operational principle of each component in 1.3		Identify each component in 1.3 above	Guide to students to identify each component in 1.3 above	

	1.6. Explain probable faults and remedies associated with list in 1.3	Discuss probable faults and remedies associated with list in 1.3		Identify and remediates faults associated in 1.3	Create probable faults associated in 1.3	

	Theory			**Practical**		
GENERAL OBJECTIVE 2.0: Know Transmission components Parts and function						
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
3-4	2.1. Define the Transmission component of the automobile	Discuss the Transmission component of the automobile	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library	Dismantle the Transmission component parts	Guide student to: Dismantle the Transmission component parts	Complete Automotive engine Complete workshop tools box PPE
	2.2 Describe Location in the automobile	Explain the Location in the automobile		Identify the various component parts of the Transmission system of the Automobile	Guide student to identify the various component parts of the Transmission system of the Automobile	
	2.3. List the components parts of the transmission system	Explain components part of the transmission system		Identify the various component parts of the Transmission system of the Automobile	Guide student to Identify the various component parts of the Transmission system of the Automobile	
	2.4. Explain the Functions of each part in 2.3	Discuss the Functions of each part in 2.3				
	2.5 Explain operational principle of each component in 2.3	Describe operational principle of each component in 2.3				
	2.6 Explain probable faults and	Discuss probable faults and remedies associated with list in 2.3		Identify the probable faults and remedies	Guide student to Identify the probable faults and remedies associated with list in 2.3	

	remedies associated with list in 2.3			associated with list in 2.3		
	General Objective:3.0: Know Automotive Suspension components					
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
5-6	3.1 Define the suspension component of the automobile	Explain the suspension component of the automobile	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library	Dismantle the brake component parts	Guide student to: Dismantle the brake component parts	Complete Automotive engine Complete workshop tools box PPE
	3.2 Describe Location in the automobile	Discuss Location in the automobile		Identify the various component parts of the brake system of the Automobile brake component parts	Identify the various component parts of the brake system of the Automobile brake component parts	
	3.3 List the components part of suspension system	Explain the components part of the suspension system		Identify the components part of the suspension system	Guide student to components part of the suspension system	
	3.4 Explain the Function of each part in 3.3	Describe the Function of each part in 3.3		Identify Function of each part in 3.3	Show student to identify Function of each part in 3.3	•
	3.5 Explain operational principle of each component in 3.3	Discuss operational principle of each component in 3.3				•
	3.6 Explain probable faults and remedies associated with list in 3.3	Discuss probable faults and remedies associated with list in 3.3		Identify and remediates probable faults and remedies associated with list in 3.3	Create probable faults and remedies associated with list in 3.3	

	General Objective:4.0: Know Steering System components					
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
7-8	4.1 Define the Steering component of the automobile	Explain the Steering component of the automobile	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library	Dismantle the Suspension component parts	Guide student to: Dismantle the Suspension component parts	Complete Automotive engine Complete workshop tools box PPE
	4.2 Describe Location in the automobile	Discuss Location in the automobile		Identify the various component parts of the suspension system of the Automobile	Identify the various component parts of the suspension system of the Automobile	
	4.3 List the components part by part	Explain components part by part				
	4.4 Explain the Function of each part in 4.3	Explain the Function of each part in 4.3				
	4.5 Explain operational principle of each component in 4.3	Discuss operational principle of each component in 4.3				
	4.6 Discuss probable faults and remedies associated with list in 4.3	Explain probable faults and remedies associated with list in 4.3				

GENERAL OBJECTIVE 5.0: Know the Brake System component parts and function						
9-10	5.1 Define the Transmission component of the automobile	Define the Transmission component of the automobile	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library	Dismantle the brake component parts	Guide student to: Dismantle the brake component part	Complete Automotive engine
	5.2Describe Location in the automobile	Describe Location in the automobile		Identify the various component parts of the brake system of the Automobile brake component parts	Identify the various component parts of the brake system of the Automobile brake component parts	Complete workshop tools box PPE
	5.3 List the components part by part	List the components part by part		Identify the various component parts of the brake system of the Automobile		
	5.4 Explain the Function of each part in 5.3	Explain the Function of each part in 5.3				
	5.5 Explain operational principle of each component in 5.3	Explain operational principle of each component in 5.3		Identify the operational principle of each component in 5.3	Guide the student to identify the operational principle of each component in 5.3	
	5.6 Discuss probable faults and remedies associated with list in 1.3	Discuss probable faults and remedies associated with list in 1.3		Remediate the probable faults and remedies associated with list in 1.3	Create a probable faults and remedies associated with list in 1.3	
	5.7 Define the Transmission component of the automobile	Define the Transmission component of the automobile				

	5.8 Describe Location in the automobile	Describe Location in the automobile				
	5.9 List the components part by part	List the components part by part		Identify the components part by part	Guide student to identify the components part by part	
	5.10 Explain the Function of each part in 5.3	Explain the Function of each part in 5.3				
	5.11 Explain operational principle of each component in 5.3	Explain operational principle of each component in 5.3				
	5.12 Discuss probable faults and remedies associated with list in 1.3	Discuss probable faults and remedies associated with list in 1.3				

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN AUTO ELECTRIC WIRING		
Course: Conductors, Semi-Conductors and Insulators	**Course Code: AEW121**	**Total Hours: 72HRS**
Year: 1 Term: 1	**Pre-requisite:**	**Practical:**
Goal: This module is designed to provide the trainee with the Basic concept of conductors and insulators		
General Objectives: On completion of this module, the trainee should be able to: 1. Know electrical conducting materials 2. Know non-electrical conducting materials 3. Know the properties of conductors, semi-conductors and insulators 4. Know safety requirement in handling electrical wires		

	Theoretical Content			**Practical Content**		
General Objective1.0: Know electrical conducting materials						
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**
1-2	1.1 Define a conductor	Explain a conductor	Textbooks Internet board marker projector	Differentiate between a conductor and a non-conducting materials	Guide student to : Differentiate between a conductor and a non-conducting materials	Diagram Conducting materials Wiring diagram
	1.2 List examples of conductors	Describe examples of conductors	Textbooks Internet board marker projector	Identify conductors	Guide student to Identify conductors	
	1.3 Explain conductors application in vehicle electrics	Explain conductors application in vehicle electrics	Textbooks Internet board marker projector	Identify areas of conductors application	Guide student to Identify areas of conductors application	
	1.4 Explain what makes a conductor material a conductor	Discuss what makes a conductor material a conductor	Textbooks Internet board marker projector	Use of multimeter in detecting current	Demonstrate the use of multimeter in detecting current	Multimeter

	Theoretical Content			**Practical Content**		
General Objective 2.0: Know non-electrical conducting materials						
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**
3-4	2.1 Define an insulator	Explain an insulator	Textbooks Internet board marker projector	Differentiate between insulators and non-insulators	Guide student to : Differentiate between insulators and non-insulators	Insulating materials Circuit diagram
	2.2 Explain types of insulators	Discuss various types of insulators	Textbooks Internet board marker projector	Identify insulators materials	Guide student to: Identify insulators materials	
	2.3 Explain the application of insulators in vehicle electrics	Discuss the application of insulators in vehicle electrics		Identify area of insulators application	Guide the student to Identify area of insulators application	

	Theoretical Content			**Practical Content**		
	General Objective 3.0: Know the properties of conductors, semi-conductors and insulators					
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**
5-6	3.1 Explain the term properties of materials	Discuss the term properties of materials	Textbooks Internet board marker projector	Identify various materials properties	Guide student to: Identify various materials properties	Conducting materials Circuits

	3.2 State the properties of a conductors	Explain the properties of a conductors	Textbooks Internet board marker projector	Identify properties of a conducting material	Guide student to Identify: properties of a conducting material	
	3.3 State the properties of semi-conductors	Explain the properties of semi-conductors		Identify: properties of a semi-conducting material	Guide student to Identify: properties of a semi-conducting material	
	3.4 State the properties of an insulator	Discuss the properties of an insulator	Textbooks Internet board marker projector	Identify insulating material	Guide student to: Identify insulating material	
	3.5 Differentiate between conductors, semi-conductors and insulators	Compare the properties of conductors, semi-conductors and insulators	Textbooks Internet board marker projector	Identify the distinguishing properties of a conducting material, semi-conducting and insulating material	Guide student to: Identify the distinguishing properties of a conducting material, semi-conductors and insulating material	

General Objective: 4.0 Know safety requirement in handling electrical wires						
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**
7-9	4.1 State the need for safety in handling conductors, semi-conductors and insulators	Discuss the need for safety in handling conductors, semi-conductors and insulators	Textbooks Internet Marker-Board Maker-pen Projector	Identify potential hazard	Guide student to: Identify potential hazard	Electric motors

	4.2 Explain safety measures in handling • Wires • Circuits • appliances	Discuss safety measures in handling • Wires • Circuits • appliances	Computer Flip-Chart Journals E-learning E-library	Demonstrate how to prevent electrical hazards	Guide student to: Demonstrate how to prevent electrical hazards	
	4.3 Define electrical hazards and how to prevent them	Explain electrical hazards and how to prevent them		Use insulators to prevent hazards	Guide student to: Use insulators to prevent hazard	

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN AUTO ELECTRIC WIRING		
Course: AUTO ELECTRIC TOOLS AND EQUIPMENTS	**Course Code:AEW122**	**Total Hours: 96HRS**
Year: 2 Term: 1	**Pre-requisite:**	**Practical:**
Goal: This module is designed to equip the trainee with the knowledge and Skills essential for handling tools and equipment used in auto electrical repairs and maintenance		
General Objectives: On completion of this module, the trainee should be able to: 1.0 understand the importance of tools and equipment in auto cars 2.0. Know basic tools and equipment used in auto cars repair 3.0. Know the safety protocols in using auto electric tools and equipment		

Year	**Theoretical**			**Practical**		
	General Objective:1.0: Know the importance of tools and equipment in auto cars					
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
1-3	1.1 Explain auto electric systems of vehicles	Explain auto electric systems of vehicles	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library	Identify auto electric systems of vehicles	Guide students to: Identify auto electric systems of vehicles	System charts and diagram Diagnostic tools and equipment Repair and maintenance tools
	1.2 State the reasons for right tools and equipment in auto electric repair	Explain the reasons for right tools and equipment in auto electric repair		Identify repair activity that require auto electric tools and equipment	Guide students to Identify repair activity that require auto electric tools and equipment	
	1.3 Explain the risk involve in using wrong auto electric tools and equipment.	Discuss the risk involve in using wrong auto electric tools and equipment.		Identify risk involve in using wrong auto electric tools and equipment.	Guide students to Identify risk involve in using wrong auto electric tools and equipment.	

	Theoretical			**Practical**		
General Objective:2.0: Know basic tools and equipment used in auto cars repair						
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
4-6	2.1State types of electric tools and equipment used in auto electric 2.2 State the functions of the following auto electric tools and equipment: • Multimeter • Wrench set • Wire strippers • Soldering iron • Fuse pullers • Battery chargers • Jump start cables • Battery terminal cleaners • Wire brushes • Insulation tapes • Test lamp	State types of electric tools and equipment used in auto electric Explain the functions of the following auto electric tools and equipment: • Multimeter • Wrench set • Wire strippers • Soldering iron • Fuse pullers • Battery chargers • jump start cables • Battery terminal cleaners • Wire brushes • Insulation tapes • Test lamp	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library	Use each tool and equipment in 2.1	Guide the learners to use each tool and equipment in 2.1	Multimeter Wrench set Wire strippers Soldering iron Fuse pullers Battery chargers jump start cables Battery terminal cleaners Wire brushes Insulation tapes Test lamp
	2.3 Explain the areas where the tools in 2.2 are used	Explain the areas where the tools in 2.2 are used		Identify the areas where the tools in 2.2 are used	Guide the students to identify the areas where the tools in 2.2 are used	

	Theoretical			**Practical**		
General Objective:3.0: Know the safety protocols in using auto electric tools and equipment						
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
7-9	3.1 Explain Electric Power Protection 3.3 Explain types of Electrical Power Protection equipment 3.3 Explain the functions and how to apply Electric Power Equipment	Explain Electric Power Protection Explain types of Electrical Power Protection equipment Explain the functions and how to apply Electric Power Equipment	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library	Identify types of Electrical Power Protection equipment	Guide to students to identify types of Electrical Power Protection equipment	PPEs

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE AUTO ELECTRIC WIRING		
Course: AUTO ELECTRIC SIGNS AND SYMBOLS	**Course Code: AEW131**	**Total Hours: 72HRS**
Year: 1 Term: 2	**Pre-requisite:**	**Practical:**
Goal: This module is designed to provide the student with the requites knowledge and skills on electrical Signs and Symbols		
General Objectives: On completion of this module, the trainee should be able to: 1.0. Know electrical signs and symbols in Automotive system 2.0. Know and recognise Automotive electrical components 3.0. Know how to interpret wiring diagrams and Schematics 4.0. Know safety precautionary measures in handling electrical system		

General Objective:1.0: 1.Know electrical signs and symbols in Automotive system						
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
1-2	1.1 Explain how to interpret common electrical signs and symbols used in automotive wiring diagrams	Discuss how to interpret common electrical signs and symbols used in automotive wiring diagrams	Textbook Marker-Board Marker pen Internet Computer Projector Flip-Chart	Identify and interpret common electrical signs and symbols used in automotive wiring diagrams	Guide students to Identify and interpret common electrical signs and symbols used in automotive wiring diagrams	Automotive Electrical symbol charts, circuit board, Scanners, Software as Alldata, Auto data
	1.2 List different types of sign and symbols in Automotive system	List different types of sign and symbols in Automotive system	Textbook Marker-Board Marker pen Internet Computer Projector Flip-Chart			
	1.3 Explain significance of different lines, shapes	Discuss significance of different lines,		Interpret schematics diagram	Guide students to Interpret schematics diagram	

	and icons in schematics diagram	shapes and icons in schematics diagram				

General Objective:2.0: Know and recognize Automotive electrical components						
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
3-4	2.1 Describe functions and locations of components parts as: batteries, fuses, relays, switches, and motors in automobiles	Discuss functions and locations of components parts as: batteries, fuses, relays, switches, and motors in automobiles		Identify locations of components parts as: batteries, fuses, relays, switches, and motors in automobiles	Guide the students to Identify locations of components parts as: batteries, fuses, relays, switches, and motors in automobiles	Automotive Electrical symbol charts, circuit board, Scanners, Software as Alldata, Auto data
	2.2 Differentiate between power supply, grounding, and signal flow on a circuit	Explain power supply, grounding, and signal flow on a circuit		Identify between power supply, grounding, and signal flow on a circuit	Guide students to Identify between power supply, grounding, and signal flow on a circuit	
	2.3 Differentiate between power supply, grounding, and signal flow on a circuit	Explain power supply, grounding, and signal flow on a circuit		Identify between power supply, grounding, and signal flow on a circuit	Guide students to Identify between power supply, grounding, and signal flow on a circuit	

General Objective:3.0 Know how to interpret wiring diagrams and Schematics						
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
5-6	3.1 Explain how to read simple automotive circuit diagram	Explain how to read simple automotive circuit diagram	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library	Read simple automotive circuit diagram	Guide the students to read simple automotive circuit diagram	Automotive Electrical symbol charts, circuit board, Scanners, Software as Alldata, Auto data
	3.2 Outline the procedures for tracing circuits faults during diagnoses	Explain the procedures for tracing circuits faults during diagnoses		Trace circuit faults during diagnoses	Guide students to trace circuit faults during diagnoses	
	3.3 Explain signs and symbols used in circuits diagrams	Explain signs and symbols used in circuits diagrams		Identify signs and symbols used in circuits diagrams	Guide the students to identify signs and symbols used in circuits diagrams	
General Objective:4.0 Know safety precautionary measures in handling electrical system						
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
7-9	4.1 Explain electrical safety measures while working with automotive wiring	Discuss electrical safety measures while working with automotive wiring	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart	Identify electrical safety measures while working with automotive wiring	Guide the students to Identify electrical safety measures while working with automotive wiring	

	4.2 Explain electrical hazards warning sign as; short circuits, overloads	Explain electrical hazards warning sign as; short circuits, overloads	Journals E-learning E-library	Identify electrical hazards warning sign as; short circuits, overloads	Guide the student to Identify electrical hazards warning sign as; short circuits, overloads	
	4.3 Explain how to use diagrams in troubleshooting and repairing electrical faults in vehicles	Discuss how to use diagrams in troubleshooting and repairing electrical faults in vehicles		Use diagram to Troubleshoot and repair basic electrical faults vehicles	Guide the students in using diagram to Troubleshoot and repair basic electrical faults vehicles	

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN AUTO ELECTRIC WORKS		
Module: AUTO MOTIVE STARTING SYSTEM	**Course Code: AEW132**	**Total Hours: 96HRS**
Year: 3 Term: 1	**Pre-requisite:**	**Theoretical:**
		Practical:
Goal: This module is designed to introduce the trainee to the knowledge and skills required to repair starter motors and alternators. It includes testing and servicing electrical system components and associated parts.		
GENERAL OBJECTIVES: On completion of this module, the trainee should be able to: 1.0 Know the function and arrangement of a charging system. 2.0 Know the function and arrangement of a starting system. 3.0 Know procedures for testing and assessing electrical system components. 4.0 Know procedures for servicing electrical system components and/or associated parts.		

	Theory			**Practical**		
GENERAL OBJECTIVE 1.0 Understand the function and arrangement of a charging system						
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
1-2	1.1 Explain the purpose and functioning of a charging system	Discuss the purpose and functioning of a charging system	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library	Identify charging system components	Guide students to: Identify charging system components	Complete tool box • Starter motor/alternator test bench • Digital multimeter • Special tools
	1.2 Describe the arrangement and purpose of charging system components	Explain the arrangement and purpose of charging system components		Dismantle Alternator	Guide the students to Dismantle Alternator	
	1.3 Define the term 'electromagnetic induction'	Explain the term 'electromagnetic induction'				

	1.4. Explain the basic construction of an alternator.	Discuss the basic construction of an alternator				*Materials (including consumables)* • Light grease • Emery cloth/sand paper • Connecting wires and terminals
	1.5. Define the term 'voltage rectification'.	Explain the term 'voltage rectification'				•
	1.6. Describe the principles of voltage regulation.	Discuss the principles of voltage regulation				•

	Theory			**Practical**		
GENERAL OBJECTIVE 2.0: Understand workshop safety rules and application in machine shop						
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
3-4	2.1. Explain the purpose and functioning of a starting system.	Discuss the purpose and functioning of a starting system	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library	Identify Starter motor and accessories	Guide students to: Identify Starter motor and accessories	Complete tool box • Starter motor/alternator test bench • Digital multimeter • Special tools *Materials (including consumables)* • Light grease
	2.2 Describe the main parts of a starter motor.	Explain the main parts of a starter motor		Identify different starter motor layouts.	to identify different starter motor layouts.	
	2.3. Define the term 'motor principle'	Explain the term 'motor principle'				
	2.4. Explain the basic construction of a starter motor	Describe the basic construction of a starter motor				

	2.5 Describe different winding arrangements of a starter motor.	Discuss winding arrangements of a starter motor.				• Emery cloth/sand paper • Connecting wires and terminals
	2.6 Describe different starter motor layouts.	Discuss different starter motor layouts.				
GENERAL OBJECTIVE 3.0: Know procedures for testing and assessing electrical system components						
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Objectives**	**Teacher's Activities**	• **Learning Resources**
5-7	3.4 Access and apply correct information, tools and equipment for testing starter motor and alternator	Access and apply correct information, tools and equipment for testing starter motor and alternator	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library	Identify common faults in starter motor and alternator circuits	Guide students to: Identify common faults in starter motor and alternator circuits	Complete tool box • Starter motor/alternator test bench • Digital multimeter • Special tools *Materials (including consumables)* • Light grease • Emery cloth/sand paper • Connecting wires and terminals
	3.5 Describe common faults in starter motor and alternator circuits	Describe common faults in starter motor and alternator circuits		Carryout procedures for measuring starter motor and alternator circuits and components.	To carryout procedures for measuring starter motor and alternator circuits and components.	
	3.3 Explain procedures for interpreting electrical wiring diagrams.	Explain procedures for interpreting electrical wiring diagrams.		Read and interpret direct, indirect and intermittent Fault(s)	To read and interpret direct, indirect and intermittent Fault(s)	
	3.4 Explain procedures for measuring starter motor and alternator	Explain procedures for measuring starter motor and alternator circuits and components.		Apply procedures for assessing starter motor and alternator condition	Apply procedures for assessing starter motor and alternator condition	

	circuits and components.					
	3.5 Explain procedures for interpreting readings related to faults where the cause may be direct, indirect or intermittent	Explain procedures for interpreting readings related to faults where the cause may be direct, indirect or intermittent				
	3.6 Explain procedures for applying functional testing	Explain procedures for applying functional testing				
	3.7 Explain the procedures for assessing starter motor and alternator condition and giving recommendations on scope of repair.	Explain the procedures for assessing starter motor and alternator condition and giving recommendations on scope of repair.				

	GENERAL OBJECTIVE 4.0: Know procedures for servicing electrical system components and/or associated parts.					
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
8-10	Explain the Steering component	Explain the Steering component of the automobile starter	Textbooks Internet Marker-Board	Identify the tools and equipment for repairing starter	Guide students to: Dismantle the Suspension component parts	Complete tool box

	of the automobile starter		Maker-pen Projector Computer Flip-Chart Journals E-learning E-library	motor and alternator and associated parts		•Starter motor/ alternator test bench •Digital multimeter • Special tools *Materials (including consumables)* • Light grease •Emery cloth/ sand paper • Connecting wires and terminals
	4.2 Explain procedure for diagnosing and isolating faults in starter motor and alternator circuits.	Discuss Location in the automobile starter motor and alternator		Carryout the procedures for removing and installing starter motor and alternator components.	To identify the various component parts of the suspension system of the Automobile	
	4.3 Explain procedures for removing and installing starter motor and alternator components.	Explain procedures for removing and installing starter motor and alternator components.		Carryout dismantling and assembling starter motor and alternator	Guide the students to Carryout dismantling and assembling starter motor and alternator	
	4.4 Explain procedures for dismantling and assembling starter motor and alternator.	Explain the function of each part in 4.3		Carryout procedures for inspecting and evaluating starter motor and alternator components and/or associated parts.	Guide the students to Carryout procedures for inspecting and evaluating starter motor and alternator components and/or associated parts	
	4.5 Explain procedures for inspecting and evaluating starter motor and alternator components and/or associated parts.	Discuss operational principle of each component in 4.3		Apply procedures for repairing and replacing starter motor and alternator components and/or associated parts	Guide the students to apply procedures for repairing and replacing starter motor and alternator components and/or associated parts	•

	4.6 Explain procedures for repairing and replacing starter motor and alternator components and/or associated parts.	Explain probable faults and remedies associated with list in 4.3		Carryout procedures for adjusting and pre- and post-repair testing of starter motor and alternator components and/or associated parts.	Guide the students to Carryout procedures for adjusting and pre- and post-repair testing of starter motor and alternator components and/or associated parts	
	4.7 Explain procedures for adjusting and pre- and post-repair testing of starter motor and alternator components and/or associated parts.					

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN AUTO ELECTRIC WIRING		
Course: BATTERY	**Course Code: AEW133**	**Total Hours: 72HRS**
Year: 1 Term: 2	**Pre-requisite:**	**Practical:**
Goal: This module is designed to provide the trainee with the fundamental working principles of automotive batteries functions and maintenance		
General Objectives: On completion of this module, the trainee should be able to: 1.0. Understand the construction and purpose of auto motive batteries 2.0. Know common battery fault and symptoms of fault 3.0 Understand the procedures for servicing auto batteries 4.0. Know how to maintain automotive batteries		

General Objective:1.0: understand the construction and purpose of auto motive batteries						
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
1-2	1.1 State the functions of auto batteries	Explain the functions of auto batteries	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library	Identify battery parts	Guide students to: Identify battery parts	Lead battery Battery diagram Assorted battery types
	1.2 Explain how to construct a lead acid battery	Describe how to construct a lead acid battery		Identify a primary cell	Guide students to: Identify a primary cell	
	1.3 Define primary cell	Discuss primary cell		Identify battery parts	To identify battery parts	
	1.4 Explain the following components • Battery case • Positive and negative plate • Separator • Electrolyte	Discuss the following components • Battery case • Positive and negative plate • Separator • Electrolyte				

	• Positive and negative terminals	• Positive and negative terminals				
	1.5 List types of batteries	Discuss types of battery	Textbooks Internet board marker projector			

General Objective:2.0: Know common battery fault and symptoms of fault						
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
3-4	2.1 State the reason for a good battery	Discuss the reason for a good battery	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library			
	2.2 Describe the symptom of a fault battery	Explain the symptom of a fault battery		Identify faulty battery symptoms	Guide students to: Identify faulty battery symptoms	Battery fault battery
	2.3 Explain the common battery fault • Terminal • Corrosion • Leakage • Weak cell • Low voltage • Inability to retain charge	Discuss the common battery fault • Terminal • Corrosion • Leakage • Weak cell • Low voltage • Inability to retain charge		Identify common battery faults	Guide students to: Identify common battery faults	Live battery Battery service kit Multimeter Hydrometers Hydrated discharge tester

	Theoretical			**Practical**		
General Objective:3.0: Understand the procedures for servicing auto batteries						
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
5-6	3.1 State the reason for servicing automotive battery	Discuss the reason for servicing automotive battery	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library			Battery Battery service kit PPEs Hydrometer High trade discharge tester Spanner Screw driver
	3.2 Explain the safety measures to be taken during battery service	explain the safety measures to be taken during battery service		Demonstrate safety procedures during battery	Guide students to : Demonstrate safety procedures during battery	
	3.3 Describe servicing activities carried out on a battery.	Discuss servicing activities carried out on a battery.		Carry out battery servicing activity	To carry out battery servicing activity	
GENERAL OBJECTIVE 4.0: Know how to maintain automotive batteries						
7-9	4.1 Explain battery maintenance	4.1 Explain battery maintenance	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library			
	4.2 State the safety precaution to be taken during battery maintenance	4.2 State the safety precaution to be taken during battery maintenance		Demonstrate safety precaution to be taken during battery maintenance	Guide students to; Demonstrate safety precaution to be taken during battery maintenance	Hydrometer High rate discharge Tester multimeter
	4.3 State the procedures for the following:	Discuss procedures for the following:		Identify various battery maintenance procedures	Guide the students to: Identify various battery maintenance procedures	

	• Handling and preparation of electrolyte • Hydrometer testing • Load testing a battery	• Handling and preparation of electrolyte • Hydrometer testing • Load testing a battery				Battery charging station
	4.4 Explain battery charging procedures	Explain battery charging procedures		Carry out battery charging procedures	To carry out battery charging procedures	
	4.5 Explain the term jump starting a battery	Discuss the term jump starting a battery		Demonstrate procedures for jump starting a battery	To demonstrate procedures for jump starting a battery	
	4.6 Differentiate between normal trickle and fast charging method of battery	Explain normal trickle and fast charging method of battery		Carry out battery procedures	To carry out battery procedures	

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN AUTO ELECTRIC WIRING		
Course: CHARGING SYSTEM	**Course Code: AEW134**	**Total Hours: 72HRS**
Year: 1 Term: 1	**Pre-requisite:**	**Practical:**
Goal: This module is designed to introduce the trainee to knowledge and skills required to maintain automotive charging system.		
General Objectives: On completion of this module, the trainee should be able to: 1.0. Understand the operation principle of a charging system 2.0.Know the component parts and roles in charging operation 3.0 Know the faults and corresponding rectifications for a charging system		

General Objective:1.0: Understand the operation principle of a charging system						
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
1-3	1.1 Define the terms "permanent" and "temporary" magnets	Discuss "permanent" and "temporary" magnets	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library	Identify Permanent and temporary magnets	Guide students to: Identify Permanent and temporary magnets	Magnet
	1.2 Define the term poles and magnetic field	Explain the term poles and magnetic field		Perform simple experiment to show Magnetic field	Guide the students to Perform simple experiment to show Magnetic field	Magnet
	1.3 Describe electrical safety measures to adhere to when working on electrical systems	Discuss electrical safety measures to adhere to when working on electrical systems		Identify safety procedure while working on electrical systems	Guide the students to Identify safety procedure while working on electrical systems	PPE, First Aid box

General Objective:2.0: Know the component parts and their roles in charging operation						
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Learning Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
4-6	2.1 Describe the operating principle of an alternator	Explain the operating principle of an alternator	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library	Identify common faults, causes and remedies related to charging systems	Guide student to: Identify common faults, causes and remedies related to charging systems	Alternator Starter motor
	2.2 State the functions of the different components of a charging system	State the functions of the different components of a charging system				○
	2.3 Explain the operation of the voltage regulator/rectifier in an alternator	Explain the operation of the voltage regulator/rectifier in an alternator		Identify voltage regulator/rectifier in an alternator	Guide students to identify voltage regulator/rectifier in an alternator	○

Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Learning Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
General Objective 3.0. Know the faults and corresponding rectifications for a charging system						
7-9	3.1 Outline tools and equipment for rectifying faults on a charging system	Explain tools and equipment for rectifying faults on a charging system	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library	Identify and select tools and equipment for rectifying faults on a charging system	Demonstrate to students how to identify and select tools and equipment for rectifying charging system	workshop manual manufacturer's specifications - technical literature - measuring equipment - special tools - Complete tool box - Test lamps • Magnets
	3.2 Explain procedures for dismantling and assembling an alternator and associated components	Discuss procedures for dismantling and assembling an alternator and associated components		Carryout Procedures for dismantling and assembling alternator	Demonstrate to students how to dismantle and assemble alternator and associated components	
	3.3 Explain the procedures for measuring and evaluating	Explain the procedures for measuring and		Carryout the procedures for measuring and	Guide the students to Carry out the procedures for	

	wear and tear on component parts.	evaluating wear and tear on component parts.		evaluating wear and tear on component parts.	measuring and evaluating wear and tear on component parts.	• Emery cloths/sand paper workshop manual -manufacturer's specifications - technical literature - measuring equipment - special tools
	3.4 Explain procedures for repairing or replacing component parts of a charging system	Explain procedures for repairing or replacing component parts of a charging system		Carryout repair and replacement of charging system component	Guide the students on how to Carry out repair and replacement of charging system component	
	3.5 Describe procedures for functional performance testing of components	Describe procedures for functional performance testing of components		Apply procedure to test component parts	Demonstrate to students the procedure to carrying out test on components	workshop manual -manufacturer's specifications - technical literature - measuring equipment - special tools

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN AUTOELECRTRIC WIRING		
Course: LIGHTNING SYSTEM	**Course Code: AEW211**	**Total Hours: 96HRS**
Year: 2 Term: 2	**Pre-requisite:**	**Practical:**
Goal: This module is designed to provide the trainee with the knowledge and skills of automotive lightning system repairs, control and safety regulation		
General Objectives: On completion of this module, the trainee should be able to: 1.0. Know types of automotive lightning 2.0. Know lightning control systems 3.0. Know lightning safety and regulations 4.0. Know lightning system repairs procedures		

	Theoretical content			**Practical**		
General Objective:1.0: Know types of automotive lightning						
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
1-2	1.1 Explain the purpose of the lightning system	Explain the purpose of the lightning system	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library			Vehicle lighting system Demonstration board
	1.2 Explain types of lighting system and their application	Discuss types of lighting system and their application		Identify types of lightning system	Guide students to identify types of lightning system	
	1.3 Sate reasons for the different types of lightening system in vehicles	Explain reasons for the different types of lightening system in vehicles				

3-4	**Theoretical Content**			**Practical Content**		
	General Objective 2.0: Know lightning control systems					
	Specific Learning Outcome	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
	2.1 Define sensor	Explain sensor	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library	Identify sensor used in lighting system	**Guide student to:** Identify sensor used in lighting system	Assorted lighting system sensors Head lamps Headlamp sensors Lightning system demonstration board
	2.2 Explain the concept of automatic headlight	Discuss the concept of automatic headlight				
	2.3 State the reason for daytime running lights (DRLs)	Explain the reason for daytime running lights (DRLs)		Identify the reason for DRLs	To identify the reason for DRLs	
	2.4 State the types of sensors used in lightning system control	Explain the types of sensors used in lightning system control		Identify the types of sensors used in lightning system control	Guide students to Identify the types of sensors used in lightning system control	

5-7	**Theoretical Content**			**Practical Content**		
	General Objective 3.0: Know lightning safety and regulations					
	Specific Learning Outcome	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
	3.1 Explain lighting system	Discuss lighting system	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart	Carry out safety measures in lightning system	Guide students to: Carry out safety measures in lightning system	Head lamp adjustment gauge Related Legal document
	3.2 State reason for proper head light aiming	Explain reason for proper head light aiming		Carry out head light adjustment	Guide students to Carry out head light adjustment	

	3.3 State the legal requirement for the lighting system	Discuss the legal requirement for the lighting system	Journals E-learning E-library	Identify the legal requirement for various lighting system	Guide students to Identify the legal requirement for various lighting system	

8-10	**Theoretical Content**			**Practical Content**		
	General Objective 4.0: Know lighting system repairs procedures					
	Specific Learning Outcome	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
	4.1 Explain the reason for lighting system maintenance	Discuss the reason for lighting system maintenance	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library	Identify reason for lighting system maintenance	Guide students to: Identify reason for lighting system maintenance	Electrical tool box Maintenance charts Safety
	4.2 Explain lighting system basic maintenance activities	Discuss lighting system basic maintenance activities		Perform basic maintenance activities on the lighting system	Guide students to perform basic maintenance activities on the lighting system	
	4.3 state the safety precaution in lighting system maintenance	Explain the safety precaution in lighting system maintenance		Identify and observes safety procedures in lighting system maintenance	Guide students to Identify safety procedures in lighting system maintenance	

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN AUTO-ELECTRIC WIRING		
Module: AUTO ELECTRICAL ACCESSORIES	**Course Code: AEW212**	**Total Hours: 72HRS**
Year: 2 Term: 1	**Pre-requisite:**	**Practical:**
Goal: This unit is design to equip the learner with knowledge and skills on how electrical accessories work in vehicles and their importance in modern cars		
General Objectives: On completion of this module, the trainee should be able to: 1.0 Know what electrical accessories are and their functions 2.0 Know how electrical accessories are powered 3.0 Know common faults with electrical accessories 4.0 Know how to rectify faults in electrical accessories		

General Objective:1.0: Know what Electrical Accessories are and their Functions						
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
1-2	1.1 Define Auto Electrical Accessories	Explain Accessories and their Importance	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library			Charts & Diagrams Live Accessories
	1.2 State Basic Vehicle Electrical Systems	Give Basic Vehicle Electrical Systems Overview		Identify Basic Electrical Accessories	Guide students: Identify basic electrical accessories	
	1.3 State Common Electrical Accessories in Motor Vehicles	Discuss Electrical Accessories in Vehicles		Identify Electrical Accessories	Guide students to: Identify Electrical Accessories	

General Objective:2.0: Know how electrical accessories are powered						
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Learning Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
3-4	2.1 Explain how electrical accessories are powered	Discuss the roles of the battery, alternator, fuses and relays in powering accessories	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library	Identify battery/alternator functions. Identify fuses and relays functions	Guide students to: Identify battery/alternator functions. Identify fuses and relays functions	-Live batteries -Alternators -Relays -Fuses -Electrical system - Demonstration board
	2.2 Explain the effects of low battery capacity, faulty alternator, fuses and relays in the performance of accessories	Discuss the needs for correct specifications of batteries, alternators, fuses and relays in vehicles		Identify battery specifications	Guide students to: Identify battery specifications	Same as above -Multimeter -Fuse puller
	2.3 Explain how to select electric accessories specifications correctly	Explain how to select electric accessories specifications correctly		Select electric accessories specifications correctly	Guide the students on how to select electric accessories specifications correctly	
	2.4 Explain how to rectify faulty selected specifications of accessories	Explain how to rectify faulty selected specifications of accessories		Rectify faulty selected specifications of accessories	Guide the students on how to rectify faulty selected specifications of accessories	

	General Objective:3.0: Know common faults with electrical accessories					
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
5-7	3.1 State the common faults associated with accessories	Discus electrical accessories' common faults and symptoms	Textbooks Internet Marker-Board	Identify accessories faults and symptoms	Guide students to: Identify accessories faults and symptoms	*Trouble shooting *Charts and diagrams

	3.2 State the procedures for detecting faults in accessories	Discuss faults detection procedures in electrical accessories and the safety measures required	Maker-pen Projector Computer Flip-Chart Journals E-learning E-library	Detect common faults in accessories	Guide students to: Detect common faults in accessories	*Multimeter *Test lamps *Vehicle manuals *System diagrams *Wiring Diagrams
	3.3 Explain how to rectify detected faults in electric accessories and the safety measures required	Explain how to rectify detected faults in electric accessories and the safety measures required		Rectify detected faults in electric accessories and the safety measures required	Gide the students on how to rectify detected faults in electric accessories and the safety measures required	

	GENERAL OBJECTIVE 4.0 Know how to rectify faults in electrical accessories					
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
8-10	**4.1** Explain the step-by-step procedures for fault detection in accessories	Discuss the step-by-step procedures for fault detection in accessories	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library	Detect faults in accessories	Guide the students on the step-by-step procedures for fault detection in accessories	
	4.2 State the procedures for fault rectification in accessories	Discuss the step-by-step fault rectification in accessories		Rectify faults in accessories	Guide students to: Rectify faults in accessories	*Trouble shooting charts/diagrams *Multimeter *Diagnostic scan tools
	4.3 List safety procedures to be observed while rectifying faults in electrical accessories	Discuss safety measures in accessories faults identification and rectifications				*Safety charts *Manufacturers manuals *PPEs

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN AUTOELECRTRIC WIRING		
Course: Auto-Electrical Colour Coding	**Course Code: AEW213**	**Total Hours: 96HRS**
Year: 2 Term: 1	**Pre-requisite:**	**Practical:**
Goal: This module is designed to provide the trainee with the knowledge and skill of importance of colour coding in automotive electrical systems and how they work		
General Objectives: On completion of this module, the trainee should be able to: 1.0. Know the principles and purpose of colour coding 2.0. Know common automotive wire colour coding 3.0. Know how to interpret colour codes		

	Theoretical content			**Practical**		
General Objective:1.0: Know the principles and purpose of colour coding						
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
1-3	1.1 Define colour coding	Explain the principles of colour coding	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library			*Charts
	1.2 State the purpose of colour coding	Discuss the importance of colour coding		Identify the functions of colour coding	Guide students to: Identify the functions of colour coding	*Charts *Diagram *Wire Harness
	1.3 Explain why colour coding is globally accepted	Discuss the global overview of colour coding		List the global views on colour coding	Guide students to List the global views on colour coding	*Wire harness

5-6	**Theoretical Content**			**Practical Content**		
	General Objective 2.0: Know common automotive wire colour coding					
	Specific Learning Outcome	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
	2.1 State common automotive wire colour codes	Discuss various colour codes	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library	Identify common colour codes	Guide students to**:** identify common automotive wire colour coding	*Vehicle wiring board
	2.2 State the functions of various colour codes	Discuss the functions of each colour code		Identify the functions of various colour codes	Guide students to: Identify the functions of various colour codes	*Vehicle wiring board
	2.3 Explain colour codes applications in vehicle electrical system	Discuss the applications of each colour code in vehicle electrical system		Identify their applications in the vehicle	Guide student to: Identify their applications in the vehicle	*Vehicle wiring board

7-9	**Theoretical Content**			**Practical Content**		
	General Objective 3.0: Know how to interpret colour codes					
	Specific Learning Outcome	**Teacher's Activities**	**Resources**	**Specific Learning Outcome**	**Teacher's Activities**	**Resources**
	3.1 Explain how to interpret colour codes	Discuss the standard procedures for interpreting colour codes	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library	Identify basic colour codes	Guide students to: Identify basic colour codes	*Charts *Diagrams
	3.2 State some common exceptions in colour coding	Explain some common exceptions in colour coding		Identify some common exceptions in colour coding	Guide the students to identify some common exceptions in colour coding	*Charts *Diagrams *Vehicle wiring board
	3.3 Explain the dangers in colour code miss-interpretation	Explain the dangers in colour code miss-interpretation				

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN AUTO ELECTRIC WIRING		
Course: Automotive fuel system	**Course Code:AEW221**	**Total Hours: 72HRS**
Year: 1 Term: 1	**Pre-requisite:**	**Practical:**
Goal: This module is designed to provide the trainee with the basic knowledge and skills to work on the fuel system of the automobile		
General Objectives: On completion of this module, the trainee should be able to: 1.0. Know importance fuel in the motor vehicle 2.0. Know the major components of fuel system 3.0. Know working principle of fuel injector and carburetion system 4.0. Know fuel system maintenance and troubleshooting		

	Theoretical Content			**Practical Content**		
General Objective1.0: Know importance fuel in the automobile						
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**
1-2	1.1 Define fuel	Explain fuel	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library			Injection pump and injector nozzle service kit • Tachometer • Injector tester Materials (including consumables) • Diesel fuel • Spray containers • Emery cloth/sand paper
	1.2 Explain the fuel system	Discuss fuel system				
	1.3 Explain importance of fuel system in engine performance	Discuss importance of fuel system in engine performance		Identify fuel system components	Guide students to: Identify fuel system components	
	1.4 Outline types of fuel for Automobile (Gasoline ,Diesel ,LPG,CNG, Electric)	Explain types of fuel for Automobile (Gasoline ,Diesel ,LPG,CNG, Electric)		Identify types of fuel for Automobile (Gasoline ,Diesel ,LPG,CNG, Electric)	Guide students to identify types of fuel for Automobile (Gasoline ,Diesel ,LPG,CNG, Electric)	

General Objective 2.0: Know the major components of fuel system						
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**
3-4	2.1 List components of fuel system	Explain components of fuel system	Textbooks Internet Marker Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library	Identify fuel system components	Guide students to: Identify fuel system components	Injection pump and injector nozzle service kit • Tachometer • Injector tester Materials (including consumables) • Diesel fuel • Spray containers • Emery cloth/sand paper
	2.2 Explain functions of fuel system components	Discuss functions of fuel system components				
	2.3 Explain fuel system components material construction	Discuss fuel system components material construction				
	2.4 Discuss Location and Operation of fuel system components	Explain Location and Operation of fuel system components		Identify location of fuel system components locations	Guide students to: Identify the location of fuel system components	

General Objective 3.0: Know working principle of fuel injector and carburetion system						
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**
5-7	3.1 Explain working principle of carburetor system	Discuss working principle of carburetor system	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library			Injection pump and injector nozzle service kit • Tachometer • Injector tester Materials (including consumables) • Diesel fuel • Spray containers • Emery cloth/sand paper
	3.2 List types of injections system	Explain types of injections system		Identify types of injections system	Guide students to: Identify types of injections system	
	3.3 Differentiate between Injection and Carburation system	Discuss Injection and Carburation system		Identify the differences between Injection and Carburation systems	Guide students to Identify the differences between Injection and Carburation systems	
	3.4 Explain the Advantage of one over the other in 3.3	Discuss the Advantage of one over the other in 3.3				

General Objective: 4.0 Know fuel system maintenance and troubleshooting						
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**
8-10	4.1 Explain signs of failing fuel system	Discuss signs of failing fuel system	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library			Injection pump and injector nozzle service kit • Tachometer • Injector tester Materials (including consumables) • Diesel fuel • Spray containers • Emery cloth/sand paper Complete tool box Fuel removal Special tools Pressure tester Workshop handbook Sediment bowl Fuel tank Fuel pumps Diagnostic tool Fire extinguisher
	4.2 Describe how to check fuel leakages in the system	Explain how to check fuel leakages in the system		Identify procedure for checking fuel leakages in the system	Guide students to: Identify procedure for checking fuel leakages in the system	
	4.3 Explain cleaning and replacement of fuel pump, filters and Injectors .	Discuss cleaning and replacement of fuel pump, filters and Injectors .		Demonstrate procedures for cleaning and replacement of fuel pump, filters and Injectors	Demonstrate to students the procedures for cleaning and replacement of fuel pump, filters and Injectors	
	4.4 Demonstrate procedure to diagnose fuel pump	Describe procedure to diagnose fuel pump		Perform fuel pump diagnosis	Guide students to Perform fuel pump diagnosis	
	4.5 Explain effect of fuel contamination	Explain effect of fuel contamination				
	4.6 Explain fuel handling Safety precautions, Fire hazards and prevention, Environmental concern vs fuel disposal	Explain fuel handling Safety precautions, Fire hazards and prevention, Environmental concern vs fuel disposal		Identify fuel handling Safety precautions, Fire hazards and prevention, Environmental concern vs fuel disposal	Guide students to: Identify fuel handling Safety precautions, Fire hazards and prevention, Environmental concern vs fuel disposal	

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN AUTOELECTRIC WIRING		
Course: AUTO ELECTRIC WIRING	**Course Code: AEW222**	**Total Hours: 72HRS**
Year: 3 **Term: 3**	**Pre-requisite:**	**Theoretical:**
		Practical:
Goal: This module is designed to provide the trainee with knowledge and skills on basic wiring protocols and troubleshooting procedures		
General Objectives: On completion of this module, the trainee should be able to: 1.0 Know basic electricity 2.0 Know safety requirement in Auto electric wiring and circuit trouble shooting technique 3.0 Know wiring procedures		

General Objective 1.0: Know basic electricity						
year	**Theoretical**			**Practical**		
weeks	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
1-3	1.1 State Ohms law	Explain Ohms law	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library			Circuits diagram Conductors materials Insulators materials Batteries Multimeter Circuits boards All circuits components
	1.2 Differentiate between conductors and insulators	Explain conductors and insulators		Identify conductors and insulators	Guide students to: Identify conductors and insulators	
	1.3 Define circuit	Explain circuit and its components		Identify circuit components	To identify circuit components	

Year	Theoretical			Practical		
	General Objective:2.0 Know safety requirement in Auto electric wiring and circuit trouble shooting technique					
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
4-6	2.1 Explain the concept of auto electric wiring	Discuss the concept of auto electric wiring	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library			Wiring diagrams charts PPE
	2.2 state the safety requirement in auto electric wiring	Discuss the safety requirement in auto electric wiring		Identify safety measures in auto electric wiring	Guide students to: Identify safety measures in auto electric wiring	
	2.3 Define trouble shooting	Discuss trouble shooting		Carryout trouble shooting exercise	Guide students to Carryout trouble shooting exercise	
	2.4 State common fault in auto wiring system and how to rectify them	Explain common fault in auto wiring system and how to rectify them		Identify and rectify common faults in auto wiring system	Guide students to identify common fault in auto wiring system and how to rectify them	

	Theoretical			Practical		
General Objective:3.0: Understand wiring procedures						
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
7-9	3.1 Mention auto electric wiring tools and their uses	Explain auto electric wiring tools and their uses	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library	Identify wiring tools and their uses	Guide students to: Identify wiring tools and their uses	Wire stripper Pliers Multimeter Crimping tools Soldering iron Screw driver Assorted connectors
	3.2Explain wire preparation techniques	Discuss wire preparation techniques		Demonstrate wire preparation technique	Demonstrate to students wire preparation technique	
	3.3 Explain how to make a simple electrical connection	Discuss how to make a simple electrical connection		Connect two or more wires together	Guide the students on how to Connect two or more wires together	

	3.4 Define soldering	Explain soldering				
	3.5 Explain how to build a simple circuit	3.5 Explain how to build a simple circuit		Demonstrate how to build a simple circuit	Show students how to build simple circuit	

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN AUTO ELECTRIC WIRING		
Course: Soldering	**Course Code:AEW223**	**Total Hours: 72HRS**
Year: 2 **Term: 2**	**Pre-requisite:**	**Practical:**
Goal: This module is designed to provide the trainee with the essential knowledge and skills for making reliable and durable electrical connections and soldering in vehicles' wiring system **General Objectives:** On completion of this module, the trainee should be able to: 1.0. Know basic soldering principles 2.0. Know basic soldering tools, materials and their applications 3.0. Know soldering techniques and safety requirements.		

General Objective:1.0: Know basic soldering principles						
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
1-3	1.1 Define soldering	Explain soldering principles	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library	Identify soldering operations	Guide students to: Identify soldering operations	
	1.2 State the importance of soldering in electrical circuits and wiring	Discuss the importance of soldering in electrical circuits and wiring		List the importance of soldering	Guide students to: List the importance of soldering	*Charts *Diagrams
	1.3 State the limitations of soldering	Explain soldering limitations		Identify soldering limitations	Guide students to: Identify soldering limitations	*Soldered joints

General Objective:2.0: Know basic soldering tool, materials and their applications						
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
4-6	2.1 State the tools used in soldering	Discuss essential soldering tools	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library	Identifying soldering tools	Guide students to: Identifying soldering tools	*Soldering iron stand *Soldering iron *Complete soldering station
	2.2 State the materials used in soldering	Explain the materials used in soldering		Identify materials used in soldering	To identify materials used in soldering	*Soldering flux *soldering wire *Circuit board
	2.3 Explain the applications of soldering tools and materials	Discuss the application of soldering tools and materials		Demonstrate the use of soldering tools and materials	Guide students to: Demonstrate the use of soldering tools and materials	*Complete soldering station

	Theoretical			**Practical**		
General Objective:3.0: Know soldering techniques and safety requirements						
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
7-9	3.1 Explain soldering procedures	Discuss the step-by-step guide for soldering wire in automobile systems	Textbooks Internet Marker-Board Maker-pen Projector	Identify soldering procedures	Guide students to: Identify soldering procedures	*Sample circuit board *Solder *Flux

	3.2 State the qualities of a good soldered joint/wires	Explain the qualities of good soldering	Computer Flip-Chart Journals E-learning E-library	List the qualities of good soldering	Guide students to : List qualities of good soldering	*Sample soldered joints
	3.3 State safety measures to be observed during soldering	Explain soldering safety measures		Apply safety measures during soldering	Guide students to: Apply safety measures during soldering	*Blower *PPE
	3.4 Explain essential tips for successful soldering in auto electrical works	Discuss tips for successful soldering		Identify tips for successful soldering	Guide student to; Identify tips for successful soldering	
	3.5 State common mistakes to avoid during soldering	Explain common soldering mistakes		Identify common mistakes in soldering	Guide students to: Identify common mistakes in soldering	

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN AUTO ELECTRIC WIRING		
Course: Automotive cooling system	**Course Code:AEW231**	**Total Hours: 72HRS**
Year: 2 Term: 2	**Pre-requisite:**	**Practical:**
Goal: This module is designed to introduce the student to the operational principle of the automobile cooling system and its maintenance procedures **General Objectives:** On completion of this module, the trainee should be able to: 1.0. Know the operating principles of a cooling system 2.0. Know the Procedure for inspecting and testing cooling system 3.0. Know Procedure for service maintenance of the cooling system		

General Objective: 1.0. Know the operating principles of a cooling system						
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
1-3	1.1 Define the cooling system of the Automobile	Explain the cooling system of the Automobile	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library	Read and interpret a simple cooling system layout drawing	Guide students to: Read and interpret a simple cooling system layout drawing	Complete workshop tools Cleaning agents • Cooling flush
	1.2 Outline the layout of cooling system	Explain the layout of cooling system		Identify the component parts of the cooling system	Guide students to identify the component parts of the cooling system	
	1.3 List types of Cooling system	Discuss types of Cooling system				
	1.4 Describe the component parts and functions of the cooling system	Explain the component parts and functions of the cooling system				

General Objective:2.0: Know the Procedure for inspecting and testing cooling system						
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
4-6	2.1 Explain procedure for visually inspecting a cooling system.	Discuss procedure for visually inspecting a cooling system.	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library	Carryout visual inspection of the cooling system	Guide students to: Carryout visual inspection of the cooling system	Complete workshop tools Cleaning agents • Cooling flush • Anti-freeze tester • Block crack tester (CO detector) • Pressure tester • Thermometer • Belt tension gauge • Special tools
	2.2 Explain procedure for flushing cooling system.	Describe procedure for flushing cooling system.		Carry out procedures for flushing cooling system	Guide students to carry out procedures for flushing cooling system	
	2.3 State simple cooling system testing procedure	Explain simple cooling system testing procedure				
	2.4 State procedures for diagnosing cooling system common faults.	Explain procedures for diagnosing cooling system common faults.	•			
General Objective:3.0 Know procedure for service maintenance of the cooling system						
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**• Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
7-9	3.1 Explain the procedures. of general component removal	Discuss the procedures of general component removal	Textbooks Internet Marker-Board	Carryout procedures. of general	Guide students to: Carryout procedures. of general component removal	Complete workshop tools

			Maker-pen Projector Computer Flip-Chart Journals E-learning E-library	component removal		• Anti-freeze tester • Block crack tester (CO detector) • Pressure tester • Thermometer • Belt tension gauge • Special tools
	3.2 Explain procedure for replacing cooling system	Discuss procedure for replacing cooling system		Carryout procedure for replacing cooling system	Guide students to : Carryout procedure for replacing cooling system	
	3.3. State safety precaution in removal and replacement of cooling system components	Discuss the precautions in removal and replacement of cooling components		Apply safety measures during soldering	Guide students to: Apply safety measures during soldering	

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN AUTO ELECTRIC WIRING		
Course: Fuses and Relays	**Course Code: AEW231**	**Total Hours:**
Year: 2 Term: 3	**Pre-requisite:**	**Practical:**
Goal: This module is designed to provide the trainee with knowledge and skills required to handle automotive fuses and relays faults.		
General Objectives: On completion of this module, the trainee should be able to: 1.0. Know the working principles of fuses and their applications 2.0. Know the working principles of relays and their applications 3.0. Know common fuses and relay faults, symptoms and remedies		

	Theoretical Content			**Practical Content**		
General Objective1.0: Know the working principles of fuses and their applications						
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Learning Resources**	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**
1-3	1.1 Define a fuse	Describe fuses and their construction	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library	Identify a fuse	Guide students to : Identify a fuse	*Real live fuses
	1.2 State the importance of a fuse in a circuit or component	Explain the importance of fuses				*Circuit Diagrams *Circuit Board
	1.3 Mention types of fuses commonly used in auto wiring and systems	Discuss types of automotive fuses		Select types of fuses	Guide a students to: Select types of fuses	*Assorted fuse types
	1.4 State the working principles of a fuse	Explain how a fuse works		Demonstrate how a fuse works	Guide a students to: Demonstrate how a fuse works	*Circuit Board *Diagrams

General Objective 2.0: Know the working principles of relays and their applications						
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**
4-6	2.0 Define a relay	Describe relays and their construction	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library	Identify a relay	Guide students to : Identify a relay	*Real live relays
	2.1 State the importance of relays in a circuit or component	Explain relay functions				*Circuit diagrams *Circuit board
	2.2 Explain types of relays	Describe relay types and their applications		Identify types of relay	Guide students to: Identify types of relay	*Assorted real live relays
	2.3 State the working principles of a relay	Explain how a relay works		Demonstrate how a relay works	Guide students to: Demonstrate how a relay works	*Circuit board *Diagrams
	2.4 Name the components of a relay	Discuss relay components and their functions		Identify relay components	Guide students to: Identify relay components	*Complete relay components

General Objective 3.0: Know common fuses and relays' faults, symptoms and remedies						
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**
7-9	3.1 State common fuses and relay faults and symptoms	Discuss fuse and relay faults	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library	Identify fuse and relay faults and symptoms	Guide students to: Identify fuse and relay faults and symptoms	*Multimeter *Test lamps *Fuses and relays
	3.2 State the procedures for testing fuses and relays	Describe fuse and relay testing procedures		List fuse and relay testing procedures	Guide students to: List fuse and relay testing procedures	*Troubleshooting charts for fuses and relays
	3.3 Explain the procedures for replacing a blown fuse and faulty relay	Discuss fuse and relay replacement procedures		Identify how to replace faulty fuse and relay	Guide students to: Identify how to replace faulty fuse and relay	*Electrical tool box *Fuse puller *Wiring diagrams

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN AUTO ELECTRIC WORKS		
Course: Introduction to Automotive Sensors	**Course Code: AEW311**	**Total Hours: 96HRS**
Year: 3 Term: 1	**Pre-requisite:**	**Theoretical:**
		Practical:
Goal: This module is design to equip the student with knowledge and skill on the applications of sensors in modern vehicles and their functions		
General Objectives: On completion of this module, the trainee should be able to: 1.0. Know the concepts of sensor technology in vehicles 2.0. Know automotive sensors and their applications in vehicle systems 3.0. Know the procedures for sensor faults rectification 4.0. Know safety requirements in handling automotive sensor		

General Objective:1.0: Know the concepts of sensor technology in vehicles						
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
1-3	1.1 Define sensor	Explain general sensor principles	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library			
	1.2 Explain automotive sensors	Discuss automotive sensors		Select an automotive sensor	Guide students to: Select an automotive sensor	*Assorted live auto sensors *Diagrams
	1.3 State the functions of automotive sensors	Explain the roles of sensors play in vehicle systems		Identify sensor roles in a vehicles' system	Guide students to: Identify sensor roles in a vehicle system	*Live vehicle system *Models
	1.4 Explain how sensors are classified	Discuss sensor classifications		Identify sensors by classification	Guide students to: Identify sensors by classification	*Manuals *Pictures

	1.5 Differentiate between "passive" and "active" sensors	Explain the difference between passive and active sensor		Identify passive and active sensors	Guide students to: Identify passive and active sensors	*Active sensors *passive sensors *Diagrams/pictures

General Objective:2.0: Know automotive sensors and their applications in vehicle systems						
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
4-5	2.1 List types of automotive sensors	Discuss types of automotive sensors	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library	Identify types of sensors	Guide students to: Identify types of sensor	*Real live automotive sensors
	2.2 State their applications in vehicle systems	Explain where each sensor type can be found in the vehicle		Identify sensor applications in vehicle system	Guide students to: Identify sensor applications in vehicle system	Vehicle system models with sensors in place
	2.3 Explain how sensors work in vehicle's system	Discuss sensor operations in vehicle system		Identify when a sensor is at work in a system	Guide students to: Identify when a sensor is at work in a system	Same as in above

	General Objective:3.0: Know the procedures for sensor faults rectification					
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
6-8	3.1 Explain common sensor parts	Discuss common sensor parts	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals	Identify common sensor faults	Guide students to: Identify common sensor faults	*Multimeter *Live sensors
	3.2 Outline the procedures for sensor faults detection and rectifications	Explain the procedures for sensor faults detection and rectification		Identify sensor fault detection and rectification procedures	Guide students to: Identify sensor fault detection and rectification procedures	• Diagnostic scan tools • Multimeter • Oscilloscope

	3.3 State the procedures of replacing a sensor	Discuss procedures for sensor replacement	E-learning E-library	Replace a sensor	Guide a students to: Replace a sensor	• Same as in above • Vehicle manuals

	General Objective:4.0: Know safety requirements in handling automotive sensors					
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
9-10	4.1 Explain safety requirements in handling sensors	Discuss general automotive sensor safety	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library	Apply sensor safety measures	Guide students to: Apply sensor safety measures	*Diagrams *Manuals
	4.2 State the safety measures to be taken during sensor routine checks and services	Explain types of sensor routine checks and services and the safety procedures to be observed		Safely perform routine checks/services on sensors	Guide students to: Safely perform routine checks/services on sensors	• Scan tools • Manuals • Electrical system models with sensors
	4.3 State the safety measures to be taken during sensor replacement	Explain the safety measures to be taken during sensor replacement		Observe safety while replacing sensor	Observe safety while replacing sensor	•

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN RENEWABLE ENERGY CRAFT PRACTICE		
Course: Introduction to Electronic Control Module (ECM)	**Course Code: AEW312**	**Total Hours: 96HRS**
Year: 3 Term:1	**Pre-requisite:**	**Practical:**
Goal: This module is designed to provide the trainee with the knowledge of application of Electronic Control Module (ECM) in modern vehicles and their functions		
General Objectives: On completion of this module, the trainee should be able to: 1.0. Know the concept of Electronic Control Module (ECM) application in modern vehicles 2.0 Know Electronic Control Module (ECM) and their functions 3.0. Know safety requirements in handling ECM		

General Objective:1.0: Know the concept of Electronic Control Module (ECM) application in modern vehicles						
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
1-3	1.1 Define an ECM	Explain ECM	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library			*ECM *Charts *Manuals
	1.2 State the functions of ECM in vehicles	Discuss ECM functions in vehicles		Identify ECM functions	Guide students to: Identify ECM functions	*Training models
	1.3 Explain the structure and layout of the ECM	Discuss ECM physical structure and layout		Identify ECM components	Guide students to: Identify ECM components	*models
	1.4 Explain ECM working principles	Discuss how the ECM works				
	1.5 State the importance of the ECM in modern vehicles	Explain the importance of the ECM				Same as above

General Objective:2.0: Know Electronic Control Module (ECM) and their functions						
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
4-7	2.1 List types of automotive ECM	Explain types of ECM used in vehicles installation	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library	Identify types of ECM	Guide students to Identify types of ECM	*Live ECM *Assorted ECM
	2.2 Explain vehicle systems using ECM	Discuss vehicle systems with ECM		Identify ECM in vehicles system	Guide students to: Identify ECM in vehicles system	*Vehicle electric model
	2.3 Describe how the ECM functions in a vehicle systems	Discuss ECM operations in vehicle systems collectors		Identify ECM operations	Guide students to: Identify ECM operations	*Same as above
	2.4 Explain common ECM faults	Discuss ECM common faults				*Scan tools *Test lamps
	2.5 State the procedures for detecting and rectifying ECM faults	Discuss ECM replacement procedures		Carry out ECM replacement	Guide students to: Carry out ECM replacement	*Scan tools *Multimeters *System diagrams
	2.6 Explain procedures for ECM replacement	Discuss ECM replacement procedures		Carry out ECM replacement	Guide students to: Carry out ECM replacement	*Scan tools *multimeter *Test lamps
General Objective:3.0: Know safety requirements in handling ECM						
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
8-9	3.1 State safety measures in handling ECM	Explain general ECM safety measures	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library	Apply safety measures in handling ECM	Guide students to: Apply safety measures in handling ECM	*Manuals *Diagrams
	3.2 Explain routine ECM checks and the safety required	Discuss ECM routine checks and the safety measures involved		Perform ECM routine checks safety	Guide students to: Perform ECM routine checks safety	*Scan tools *Multimeter

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN AUTOELECTRIC WIRING		
Course: Automotive Actuators	**Course Code: AEW313**	**Total Hours: 72HRS**
Year: 3 Term: 1	**Pre-requisite:**	**Theoretical:**
		Practical:
Goal: This module is designed to provide the trainee with knowledge and skills of operations of actuators in vehicle systems, their Functions and Maintenance		
General Objectives: On completion of this module, the trainee should be able to: 1.0. Know actuator principles in vehicle system 2.0. Know actuators and their applications 3.0. Know actuator maintenance procedures		

	General Objective:1.0: Know actuator principles in vehicle system					
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
1-3	1.1 Define an actuator	Discuss general actuator principles	Textbooks Internet Marker Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library			
	1.2 Explain an automotive actuator	Discuss actuators in vehicle systems		Identify auto motive actuators	Guide students to: Identify automotive actuators	Live actuators All types of actuators
	1.3 State the functions of automotive actuators	Explain actuator roles in vehicle systems operations		Identify auto motive actuators functions in vehicle	To identify auto motive actuators functions in vehicle	
	1.4 Explain how actuators are classified	Discuss actuator classifications				
	1.5 Differentiate between the followings: - Electric actuators -Hydraulic actuators and -Pneumatic actuators	Discuss the difference between electric, hydraulic and pneumatic actuators		Select different types of actuators	Guide students to Select different types of actuators	

General Objective:2.0: Know actuators and their applications						
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
4-6	2.1 List types of automotive actuators	Discuss types of actuators	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library			Live actuators Demonstration model
	2.2 State their applications in vehicle systems	Explain types of actuators and the systems they are used on		Identify automotive actuators	Guide students to: Identify automotive actuators	
	2.3 Explain how actuators work in vehicle systems	Discuss actuator operations		Identify automotive actuators in vehicle system	To identify automotive actuators in vehicle system	

General Objective:3.0: Understand actuator maintenance procedures						
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
7-9	3.1 Explain actuator common faults	Discuss actuator faults	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library	Identify actuators common fault	Guide students to Identify actuators common fault	Multimeter Scan tools Tool box
	3.2 State the procedures for detecting faults in actuators and rectifying them	Explain procedures for actuator faults detection and rectification		Rectify actuators faults	Guide students to Identify actuators common fault and rectifying them	
	3.3 State the procedures for replacing a actuator	Discuss actuator replacement procedure		Replace actuators	Guide students to replace actuators	
	3.4 State the safety requirements in handling actuators	Explain actuator general safety measures				

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN AUTO ELECTRIC WIRING		
Course: Basic Electrical Trouble Shooting	**Course Code: AEW321**	**Total Hours: 96HRS**
Year: 3 Term:2	**Pre-requisite:**	**Practical:**
Goal: This module is designed to provide the trainee with the process of troubleshooting vehicle electrical systems and components		
General Objectives: On completion of this module, the trainee should be able to: 1.0 Know the concept of Electrical trouble shooting 2.0 Know basic electrical concepts 3.0 Know tools for electrical troubleshooting 4.0 Know basic electrical troubleshooting procedures		

General Objective:1.0: Know the concept of electrical troubleshooting						
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
1-2	1.1 Define troubleshooting	Explain what troubleshooting is all about	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library			*Diagram
	1.2 Explain electrical troubleshooting	Discuss electrical troubleshooting stating the reasons		Identify reasons for electrical troubleshooting	Guide students to: Identify reasons for electrical troubleshooting	*Circuit boards *Wiring diagrams\ *Electrical components *Electrical models
	1.3 State common electrical system and components faults	Explain electrical systems and components faults		Identify system/component faults	Guide students to: Identify system/component faults	*Same as above

General Objective:2.0 Know basic electrical concepts						
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
3-4	2.1 Define electricity	Explain basic electricity concepts	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library			*Circuit board *Diagrams
	2.2 Define the following: -Voltage -Current -Resistance	Explain voltage, current and resistance				
	2.3 State Ohm's law	Discuss Ohm's law				
	2.4 Explain electric current	Discuss circuits		Identify circuit components	Guide students to: Identify circuit components	

	Theoretical			**Practical**		
General Objective:3.0: Know tools for electrical trouble shooting						
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
5-7	3.1 List tools for electrical troubleshooting	Explain electrical troubleshooting tools	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library	Identify troubleshooting tools	Guide students to: Identify troubleshooting tools	*Scan tools *Multimeter *Complete electrical tool box *Safety charts
	3.2 State the application of various tools	Explain the use of each tool in troubleshooting		Use troubleshooting tools	Guide students to: Use troubleshooting tools	
	3.3 Explain safety measures in handling tools	Discuss safety in tools handling		Apply safety in using tools	Guide student to: Apply safety in using tools	

General Objective:4.0: Know basic electrical trouble shooting procedures						
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
8-10	4.1 Explain the procedures for electrical troubleshooting	Discuss step-by-step procedures in troubleshooting systems and components	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library	Identify troubleshooting tools	Guide students to: Identify troubleshooting Tools	*Scan tools *Multimeter *Complete electrical tool box *Safety charts
	4.2 State the procedures for replacing electrical system components	Explain how to replace electrical components				
	4.3 Explain how to read and interpret circuit diagrams	Explain how to read and interpret circuit diagrams		Read and interpret circuit diagrams	Guide students on how to read and interpret circuit diagrams	

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN AUTO ELECETRIC WIRING		
Course: Introduction to Computerized Diagnosis	**Course Code: AEW331**	**Contact Hours:7 2 HRS**
Year: 3 Term: 3	**Pre-requisite:**	**Theoretical:** **Practical:**
Goal: This module is designed to provide the trainee with the knowledge and skills in Computerized Diagnostic Systems used in Modern Vehicles to Help Identify and Trouble Shoot Vehicle System Faults		
General Objectives: On completion of this module the student should be able to: 1.0. Understand the basic concepts of computer diagnosis 2.0 Know engine management basic operations 3.0. Know diagnostic tools and their operations		

PROGRAMME: NATIONALTECHNICAL CERTIFICATE IN AUTO ELECTRIC WIRING						
COURSE: Introduction to Computerize Diagnosis			**Course Code;**		**Contact Hours:**	
Course Specification: Theoretical content				**PRACTICAL CONTENT**		
Week	**General Objective** 1.0. Understand the basic concepts of computer diagnosis					
	Specific Learning Outcome:	**Teachers Activities**	**Resources**	**Specific Learning Outcome:**	**Teacher Activities**	**Resources**
1-2	1.1 Define computer diagnosis	Explain the concepts of computer diagnosis	Textbooks Internet Marker Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library			*Diagnostic tools
	1.2 State the reasons for vehicle computer diagnosis	Explain reasons for computer diagnosis				*Manuals *Diagnostic tools
	1.3 State the importance of computer diagnosis	Discuss the advantages of computer diagnosis				*Same as I above

General Objective 2.0: Know engine management basic operations						
3-6	2.1 Define engine management	Discuss basic engine management principles	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library			*Manuals *Scan tools
	2.2 Define the following:- -Sensor -electronic control modules (ECM) -Actuators	Explain the following engine management components:- Sensors; ECM; Actuators		Identify engine management components	Guide students to: Identify engine management components	*Real live -sensors -ECM Actuators
	2.3 Explain the working relationship between sensors, ECM and Actuators	Discuss sensors, ECM and actuator relationships				*Same as in above
	2.4 State sensor types and their applications in the vehicle	Explain sensor types and their applications in the vehicle		Identify types of sensors	Guide students to: Identify types of sensors	*Assorted sensors
	2.5 Explain ECM types and their applications in vehicle system	Discuss ECM types and where they are used in vehicle system		Identify types of ECM and their applications	Guide students to: Identify types of ECM and their applications	*Various ECMs
	2.6 Mention actuator types and their applications	Explain actuator types and their applications		Identify types of actuators and their applications	Guide students to: Identify types of actuators and their applications	*Different actuators
General Objective 3.0: Know diagnostic tools and their operations						
Week	**Specific Learning Outcome**	**Teachers Activities**	**Resources**	**Specific Learning Outcome**	**Teachers Activities**	**Resources**
7-9	3.1 Define original equipment manufacturers (OEM) diagnostic tool	Explain OEM tools with examples	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart	Identify OEM tools	Guide students to: Identify OEM tools	*OEM diagnostic tools
	3.2 Define universal diagnostic tools	Discuss universal diagnostic tools with examples		Identify universal diagnostic tools	Guide students to: Identify universal diagnostic tools	*Various universal diagnostic tools

	3.3Explain the merits and demerits of OEM and universal diagnostic tools	Outline the merits and demerits of each of the above	Journals E-learning E-library			*OEM tools *Universal tools *Manuals
	3.4 Explain the operational principles of both OEM and universal diagnostic tools	Discuss the operational principles of OEM and universal diagnostic tools		Identify operational difference between OEM and universal tools	Guide students to: Identify operational difference between OEM and universal tools	*OEM tools *Universal scan tools *Manuals
	3.5 State safety procedures in handling diagnostic tools	Explain safety measures in handling diagnostic tools		Identify safety measures in handling diagnostic tools	Guide students to: Identify safety measures in handling diagnostic tools	*Same as above *Safety charts

PROGRAMME: NATIONAL TECHNICAL CERTIFICATE IN AUTO ELECTRIC WIRING		
Module: INTRODUCTION TO AUTO DIAGNOSTIC TOOLS AND EQUIPMENTS	**Course Code: AEW332S**	**Total Hours: 96HRS**
Year: 3 Term: 3	**Pre-requisite:**	**Practical:**
Goal: This module is designed to introduce the trainee to the world of automotive repairs and technology using modern tools and equipment		
General Objectives: On completion of this module, the trainee should be able to: 1.0 Know the complex nature of modern vehicle diagnosis and repairs 2.0. Know auto diagnostic tools, equipment and their applications 3.0. Know the safety requirements in the handling of diagnostic tools and equipment		

Year	**Theoretical**			**Practical**		
	General Objective:1.0: Know the complex nature of modern vehicle diagnosis and repairs					
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
1-3	1.1 Define automotive diagnosis	Explain auto diagnosis	Textbooks Internet Marker-Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library	Identify types of auto diagnosis systems of vehicles	Guide students to: Identify types of auto diagnosis systems of vehicles	*Diagnostic charts *Diagrams
	1.2 State advantages of modern vehicle diagnosis	Compare the challenges of modern vehicle diagnosis and older generations one		Identify advantages of modern vehicle diagnosis	Guide students to: Identify advantages of modern vehicle diagnosis	*Diagnostic diagram *Models
	1.3 State advantages of using modern diagnostic tools and equipment	Discuss the benefits of using diagnostic tools and equipment in modern vehicle repairs		Identify risk involve in using wrong auto diagnostic tools and equipment.	Guide students to: Identify risk involve in using wrong auto electric tools and equipment.	*Diagnostic tools *Diagnostic equipment

	Theoretical			**Practical**		
General Objective:2.0: Know auto diagnostic tools, equipment and their applications						
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
4-6	2.1 List auto diagnostic tools	Discuss in details various diagnostic tools and their uses	Textbooks Internet Marker Board Maker-pen Projector Computer Flip-Chart Journals E-learning E-library	Identify diagnostic tools and their uses	Guide students to: Identify diagnostic tools and their uses	*Brake fluid testers *Fuel pressure testers *Compression testers
	2.2 List auto diagnostic equipment	Discuss in details various diagnostic equipment and heir uses		Identify diagnostic equipment and their uses	Guide students to: Identify diagnostic equipment and their uses	*OBD II scanners *Multimeters *Osciloscopes
	2.3 State the difference between tools and equipment	Explain the difference between tools and equipment		Identify the difference between tools and equipment	Guide students to: Identify the difference between tools and equipment	

	Theoretical			**Practical**		
General Objective:3.0 Know the safety requirements in the handling of diagnostic tools and equipment						
Week	**Specific Learning Outcomes**	**Teacher's Activities**	**Resources**	**Specific Learning Objectives**	**Teacher's Activities**	**Learning Resources**
7-9	3.1 State safety requirements in using diagnostic tools and equipment	Explain all safety protocols to be observed while using diagnostic tools and equipment	Textbooks Internet Marker Board Maker-pen Projector Computer Flip-Chart	Observe safety while handling tools and equipment	Guide students to: Observe safety while handling tools and equipment	*PPEs
	3.2 Explain procedures for the storage of tools and equipment	Discuss the procedures for storing diagnostic tools and equipment		Store tools and equipment correctly	Guide students to:	*Tools and equipment manufacturing manuals *Workshop manuals

			Journals E-learning E-library		Store tools and equipment correctly	
	3.3 State the procedures for updating diagnostic tools and equipment	Discuss how diagnostic tools and equipment are updated		Carry out update of tools and equipment	Guide students to: Carry out update of tools and equipment	*Tools and equipment manufacturers' manuals *Internet access

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EQUIPMENT LIST FOR NTC AUTO ELECTRIC WIRING

SN	EQUIPMENT/TOOL	QUANTITY
1	Magnets Batteries	Assorted
3	Multimeter	64
4	Circuit Boards	12
5	Resistors	Assorted
6	Capacitors	Assorted
7	Batteries Bulbs	4
8	Switches	Assorted
9	Electroscope	12
10	Magnets Coil	12
11	Experiment Boards	4
12	Wiring board	64
13	PPE	Assorted
14	Fire Extinguisher	7
15	Sand Bucket	7
16	Hoist	2
17	First Aid Kit	12
18	Complete Dead Automotive Engine	4
	Complete Live Automotive Engine	2
19	Complete Workshop Tool Box	13
20	Conducting Materials	Assorted
21	Wiring Diagram	Assorted
	Insulating Materials	Assorted
	Circuit Diagram	12
	Electric Motors	4
	System Charts and Diagram	4
	Diagnostic Scan Tools and Equipment	12
	Wrench Set	16
	Wire Strippers	20
	Soldering Iron	16
	Fuse Pullers	Assorted

	Jump start cables	16
	Battery Terminal Cleaners	16
	Wire Brushes	16
	Insulation Tapes	Assorted
	Test Lamp	16
	Circuit Safety Diagram	12
	Battery Diagram	4
	Battery Types	Assorted
	Battery Service Kit	12
	Hydrometers	4
	High Rate Discharge Tester	4
	Spanner Set	12
	Screw Driver Set	12
	Battery Charging System	4
	Manufacturer's Workshop Manual	4
	Measuring Equipment Special Tools	assorted
	Vehicle Lighting System	1
	Demonstration Board	4
	Assorted Lighting System Sensors	Assorted
	Head amp adjustment gauge	2
	Related Legal document	assorted
	Maintenance Safety Charts	4
	Conductors Materials	assorted
	Fuel Pressure Tester	13
	Compression Testers	13
	OBD II scanners	13
	Oscilloscopes	4
	Wire Harness	assorted
	Vehicle Wiring Board	4
	Live Vehicle System	2
	Active Sensors	assorted
	Passive Sensors	assorted
	Real Live Automotive Sensors	assorted
	Vehicle System Models with Sensors in place	2

	Electrical System Models with sensors	2
	ECM	assorted
	Complete Electrical Tool Box	13
	Actuators	assorted
	OEM Diagnostic Tools (for any auto brand)	1

AUTO ELECTRIC WORKSHOP SETTING

	BATTERY SECTION CONTENT	**AUTO DIAGNOSIS AND REPAIR SECTION CONTENT**
	Battery Chargers	Magnet
	Hydrometer	Circuit Boards
	High rate Discharge Tester	Resistors
	Battery Service Kit	Capacitors
	Battery terminal cleaner	Batteries Bulbs
	Multimeter	Switches
	Fire Extinguisher	Electroscope
	Test Lamp	Magnets Coil
	Battery Chargers	Experiment Boards
		Wiring Board
		PPE
		Fire Extinguisher
		Sand Bucket
		Hoist
		First Aid Kit
		Complete Dead Automotive Engine
		Complete Live Automotive engine
		Complete Workshop Tools Box
		Conducting Materials
		Wiring Diagram
		Insulating Materials
		Circuit Diagram
		Electric Motors
		System Charts and Diagram

		Diagnostic Scan Tools and Equipment
		Wrench Set
		Wire Strippers
		Soldering Iron
		Fuse Pullers
		Jump Start Cables
		Wire Brushes
		Insulation Tapes
		Test Lamp
		Circuit Safety Diagram
		Spanner Set
		Screw Driver Set
		Spanner Set
		Screw Driver Set
		Battery Charging Station
		Manufacturer's Wprkshop Manual
		Measuring Equipment special tools
		Vehicle Lighting System
		Demonstration Board
		Assorted Lighting System Sensors
		Head Lamp Adjustment Gauge
		Related Legal Document
		Maintenance Safety Charts
		Conductors Materials
		Fuel Pressure Tester
		Compression Testers
		OBD II Scanners
		Oscilloscopes
		Wire Harness
		Vehicle Wiring Board
		Live Vehicle System
		Active Sensors
		Passive Sensors
		Real Live Automotive Sensors

		Vehicle System Models with Sensors in Place
		Electrical System Models with Sensors
		ECM
		Complete Electrical Tool Box
		Actuators
		OEM Diagnostic Tools (for any auto brand)

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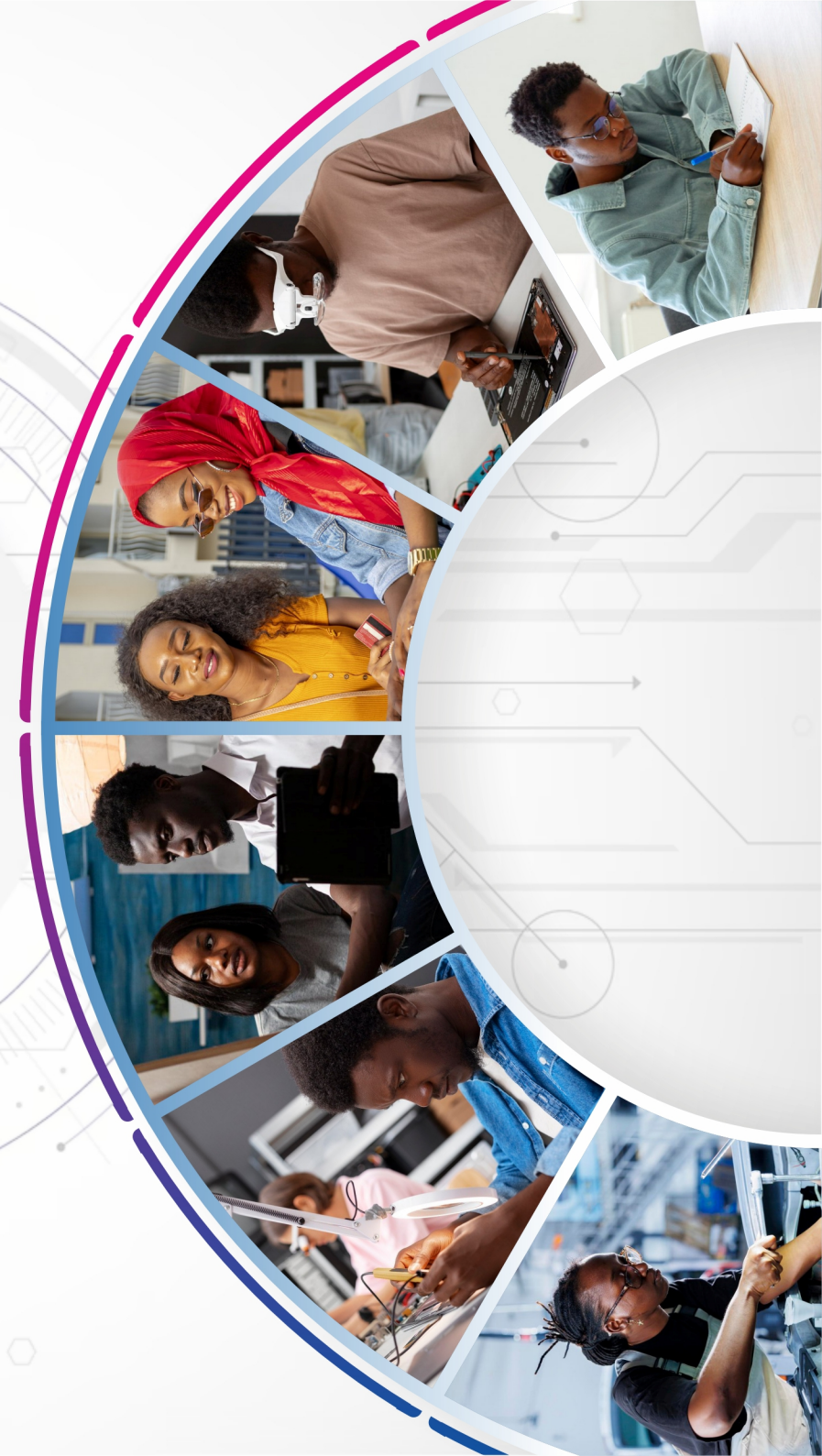

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