WASSCE / WAEC AUTO ELECTRICAL WORK SYLLABUS

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1. PREAMBLE

This examination syllabus has been evolved from the Senior Secondary School Trade Curriculum. The examination syllabus does not replace the curriculum.

The syllabus has been arranged to subsume six themes: battery, starting, ignition, charging, lighting and auxiliary systems.

2. OBJECTIVE

The objective of the syllabus is to test candidates' knowledge, skills and attitude in the field of Auto Electrical Works. Specifically, candidates are to:

(i) understand the concepts in auto electrical works;
(ii) use tools and equipment to carry out maintenance and repair on motor vehicles;
(iii) understand the safety practices and observe them in the work environment.

3. EXAMINATION SCHEME

There will be three papers, Papers 1, 2 and 3, all of which are to be taken. Papers 1 and 2 shall be composite paper to be taken at one sitting.

PAPER 1: will consist of forty multiple-choice objective questions, all which are to be answered in 45 minutes for 40 marks.

PAPER 2: will consist of six structured short-answer questions. Candidates will be required to answer any four of them in 1 hour for 60 marks.

PAPER 3: will be a practical test of 2 hour duration. It will consist of three skill-based questions out of which candidates will be required to answer two for 100 marks.

A list of materials for the test shall be made available to schools not less than two weeks

before the taking of the paper for procurement and relevant preparation for the test to be made.

Alternatively, the Council may consider testing candidates' familiarity with the practical work prescribed in their syllabus in the event that the materials for the actual practical test cannot be acquired. For this test, two compulsory essay questions will be set. Candidates will be given 2 hours to answer them for 100 marks.

Industrial Attachment:

This should be done by the candidates during the long vacation between their SS II and SS III courses. It will be supervised and assessed by their subject teachers. It will carry 10 marks.

4. DETAILED SYLLABUS

TOPIC	NOTES
1. BATTERY	
1.1 Concept of battery	Definition, distinction between motor vehicle battery and other batteries
1.2 Uses of battery	Treatment should include vehicle battery assembly and as power source in soldering
1.3 Types, Constructional details and ratings	Lead-acid and Nickel-alkaline types
1.4 Charging	Safety rules Electrolyte preparation Battery cleaning and connection Charging mode State of charge Treatment should include electrolyte testing
1.5 Testing and Maintenance	Specific gravity test of electrolyte Cell voltage and polarity tests Tools and equipment Treatment should include electrolyte topping up, hydrometer reading and interpretation, over-charging symptoms and idle-battery safe-keeping hint
2. STARTING SYSTEM	
2.1 Purpose and components of starting system	Treatment should include battery, flywheel, starter motor, switch and solenoid
2.2 Circuit diagram	Drawing and reading of circuit diagram Treatment should include the location of the

	components and their sequential arrangement in a
2.3 Types of starter motor	vehicle.
	Axial and Inertia.
2.4 Repair of starter motors	Treatment should include pinion engagements
	Dismantling and assembling Bushing and brush replacement Commutator soldering/repair Trouble shooting and rectification
	Treatment should include armature servicing, diagnosis and repairs/restoration
3. <u>IGNITION SYSTEM</u>	
3.1 Purpose and components of ignition system	
	Ignition system assembly
3.2 Circuit diagram	Treatment should include circuit cables, ignition switch, battery, coil, distributor, capacitor, high tension leads and sparking plugs
	Drawing and reading of circuit diagram
3.3 Construction and operation of ignition coil	Treatment should include line diagram and conventional symbols
	Circuit diagram
3.4 Types of Ignition System	Treatment should include the internal construction of the coil
3.5 Timing	Conventional contact breaker and electronic ignition systems
3.6 Faults and repairs	Concept and timing faults such as retarded ignition and over-advanced ignition
	Hard starting Jerking Back firing etc.
4. <u>CHARGING SYSTEM</u>	
4.1 Purpose and components of charging system	Emphasize the use of multimeter, scanner, test lamps etc.

4.2 Alternator	Charging system assembly as a sub-system in a motor vehicle Treatment should include switch, battery, cables, alternators, voltage regulators.
4.3 Circuit diagram	Constructional details Conversion of a.c. to d.c.(rectification) Function of each part of an alternator
4.4 Faults and repairs	Drawing and reading of circuit diagram Treatment should include graphical and pictorial representation, need for diagrammatic representation and how to remove and fix the charging system units
5. <u>LIGHTING SYSTEM</u>	Brush and Bearing replacement Diode testing, repair and replacement
5.1 Purpose and classification of lighting in a motor vehicle	Treatment should include bearing seizure, charging failure etc.
5.2 Head lamps	
5.3 Circuit diagram	Obligatory and non-obligatory lights
5.4 Maintenance and repairs	Types Features Setting of head lamps Classification, drawing and reading of circuit diagram
6. <u>AUXILIARY SYSTEM</u>	Trouble shooting Treatment should include tools, equipment and procedures for repairing faults such as broken headlamp lens, bulb failure, non-aligned headlamps, open and short circuits etc.
6.1 Concept and components of auxiliary system	
6.2 Constructional details and operation of	

auxiliary system component	Definition, uses and units Treatment should include needs for auxiliary system
6.3 Maintenance and repairs of auxiliary Components	Treatment should include water temperature gauge, oil pressure gauge, fuel gauge, horn relay, wiper switch, screen watcher pump, indicator and door switch Troubleshooting Treatment should include tools and equipment and Procedures for repairs of faults such as the failure of horn, screen wiper, oil pressure gauge, fuel gauge etc.

LIST OF FACILITIES AND MAJOR EQUIPMENT/MATERIALS REQUIRED:

(1) Motor batteries
(2) Battery head moulder set
(3) A complete tool box
(4) Polythene hand gloves sets
(5) Ammeter, voltmeter, multimeter
(6) High rate discharge tester
(7) Spanners, hand drilling machine
(8) Vice
(9) Bench/Table
(10) Wire brush, bearing extractor, pulley extractor
(11) Feeler gauge, soldering iron and lead
(12) Emery cloth, wooden file, aprons
(13) Jumper cable, magnetic pick-up
(14) Googles, plastic trays
(15) Hydrometer
(16) Tester (Screw driver type)
(17) Battery charger, testing lamp, cable stripper, insulation tape

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GOOD LUCK!