

Auto Electrical Work syllabus

Every examinable topic area in WAEC Auto Electrical Work, in one place — with how the papers are structured and answers to common questions. Compiled by waeccbt.com; not an official WAEC document.

How the papers work: Three papers, all compulsory; Papers 1 and 2 form a composite paper taken at one sitting. Paper 1: 40 multiple-choice objective questions, 45 minutes, 40 marks. Paper 2: six short-structured questions of which candidates answer any four, 1 hour, 60 marks. Paper 3: a 2-hour practical test of three skill-based questions of which candidates answer two, 90 marks; the materials list reaches schools at least two weeks before. Alternative to Practical: two compulsory essay questions in 2 hours for 100 marks if materials cannot be obtained. Industrial attachment during the long vacation between SS2 and SS3, assessed by the subject teacher, carries 10 marks. This bank practises Paper 1 and the knowledge behind Papers 2 and 3.

1. Safety and basic electricity

- Workshop safety: shock, burns from batteries and hot components, fire, correct dress and tools
- Units: volt, ampere, ohm, watt; Ohm's law; series and parallel circuits
- Wiring: cable sizes, colour codes, terminals, fuses, relays, earth return system
- Use of the multimeter and test lamp; circuit diagrams and symbols

2. Battery

- Lead-acid battery: construction, plates, separators, electrolyte, terminals
- Nickel-alkaline (nickel-cadmium) battery: construction and advantages
- Specific gravity test with the hydrometer; high-rate discharge test; open-circuit voltage
- Charging: constant current and constant voltage; trickle and boost charging; precautions
- Battery faults: sulphation, low electrolyte, loose terminals; maintenance and care

3. Starting system

- Purpose and principle of the starter motor
- Types: inertia (Bendix) drive and pre-engaged (solenoid) starters; axial starters
- Components: armature, commutator, brushes, field coils, solenoid, drive pinion, ring gear
- Starter circuit; testing; common faults: slow cranking, no operation, pinion not disengaging

4. Ignition system

- Purpose of ignition; coil ignition: battery, ignition switch, coil, distributor, contact breaker, condenser, rotor, spark plugs, HT leads
- Contact breaker versus electronic (transistorised) ignition
- Ignition timing: static and dynamic; retarded and over-advanced timing and their effects
- Spark plugs: construction, heat range, gap; faults: hard starting, jerking, misfiring, backfiring

5. Charging system

- Purpose of the charging system; dynamo and alternator
- Alternator: rotor, stator, slip rings, brushes, rectifier diodes, regulator
- Rectification of a.c. to d.c.; three-phase output
- Voltage regulator: function and testing; diode and alternator testing; drive belt tension
- Charging faults: no charge, overcharging, warning light stays on

6. Lighting system

- Obligatory lights: headlamps, side lamps, tail lamps, brake lamps, number plate lamp, direction indicators
- Non-obligatory lights: fog lamps, reversing lamps, interior lamps, spot lamps
- Headlamp construction: sealed beam and replaceable bulb; dip and main beam; headlamp setting
- Lighting circuits, switches, dimmer switch, fuses and relays; faults and testing

7. Auxiliary electrical systems

- Instruments: fuel gauge, temperature gauge, oil pressure gauge and warning lights
- Horn and horn relay; windscreen wipers and washers
- Direction indicators and flasher unit; hazard warning
- Heater blower, radio, central locking; fault finding in auxiliary circuits

Frequently asked questions

How is WAEC Auto Electrical Work examined?

Three compulsory papers plus industrial attachment. Paper 1 is 40 objective questions in 45 minutes (40 marks); Paper 2 is six short-structured questions of which you answer four in 1 hour (60 marks); Paper 3 is a 2-hour practical of three skill-based questions of which you answer two (90 marks). Industrial attachment assessed by your teacher carries 10 marks.

What if practical materials are unavailable?

The Council may set an Alternative to Practical paper of two compulsory essay questions answered in 2 hours for 100 marks.

When is the industrial attachment?

During the long vacation between SS2 and SS3. It is supervised and assessed by your subject teacher for 10 marks.

Which systems must I know?

Battery, starting, ignition, charging, lighting and auxiliary systems: their components, circuits, testing and common faults, plus basic electricity, wiring and use of the multimeter.

What calculations come up?

Ohm's law, power ($P = VI$), bulbs in series and parallel, fuse rating from load current, battery capacity in ampere-hours, charging current and time, specific gravity readings and voltage drops.

Do I need to know electronic ignition?

Yes. You should compare contact-breaker (mechanical) ignition with transistorised or electronic ignition and know the advantages of the electronic type.

What about ignition timing faults?

You should know the effects of retarded timing (loss of power, overheating, poor economy) and over-advanced timing (pinking, hard starting, kick-back) and how static and dynamic timing are set.

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