

2503/305  
AUTO ELECTRICS AND  
ELECTRONICS  
Oct. / Nov. 2021  
Time: 3 Hours



THE KENYA NATIONAL EXAMINATIONS COUNCIL  
DIPLOMA IN AUTOMOTIVE ENGINEERING  
MODULE III

AUTO ELECTRICS AND ELECTRONICS

3 hours

INSTRUCTIONS TO CANDIDATES

*You should have the following for this examination:*

*Answer booklet;*

*Drawing instruments.*

*This paper consists of EIGHT questions in TWO sections; A and B.*

*Answer FIVE questions taking at least TWO questions from each section.*

*All questions carry equal marks.*

*Candidates should answer the questions in English.*

**This paper consists of 4 printed pages.**

**Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.**



## SECTION A

*Answer at least TWO questions from this section.*

- 1/ (a) *improve fuel economy / increase engine power*  
 State four advantages of electronic fuel injection system. (4 marks)
- (b) *Prevent excessive emission / smooth engine operation*  
 With the aid of a diagram, explain the operation of the metering and fuel distribution unit of a K-jetronic fuel system. (16 marks)

- 2/ (a) State two:  
 (i) functions of an air conditioning system.  
 (ii) types of refrigerants. (4 marks)

- (b) With the aid of a diagram, explain the operation of an air conditioning system of a car. (16 marks)

3. (a) With the aid of a diagram, explain the operation of a permanent magnet windscreen wiper system. (10 marks)

- (b) With the aid of a diagram, explain the operation of an electric horn. (10 marks)

- 4 (a) State four advantages of an electronic ignition system. *- reduces exhaust emission (4 marks)  
 - increases engine power*
- (b) With the aid of a diagram, explain the operation of a transistor ignition system. *- Improves fuel (16 marks)  
 - enables smooth operation*

*Chlorofluoro Carbon  
 Hydrochlorofluoro Carbon  
 Hydrofluoro Carbon*

## SECTION B

*Answer at least TWO questions from this section.*

5. (a) State two causes for each of the following charging system faults:  
 (i) charging lamp stays on;  
 (ii) alternator does not charge. (4 marks)

- (b) A faulty alternator has been brought to the workshop for repair. Describe the procedure followed in overhauling and explain the tests carried out in each case. (16 marks)

*It works by manipulating refrigerant thru a liquid air sensor state  
 AS the refrigerant changes state it absorbs heat and humidity from the the remote auto allows the system shut off cool by air to change the refrigerant thru high liquid air sensor state the air conditioning system maintain to control pressure and temperature*



6. (a) State two causes for each of the following starter motor faults:

- (i) starter motor chatters;
- (ii) no cranking.

(4 marks)

(b) Describe the procedure of overhauling a light duty starter motor. Assume the unit is still mounted on the engine. (16 marks)

7. Complete the lighting circuit shown in figure 1. Cut the answer sheet along the dotted line and hand it in together with the answer booklet. (20 marks)

8. (a) State two causes for each of the following car alarm faults:

- (i) alarm goes off randomly; *Loose connector faulty sensor loose on battery*
- (ii) alarm produces noise continuously. *faulty connectors to the fitting alarm when says is on the sensor*

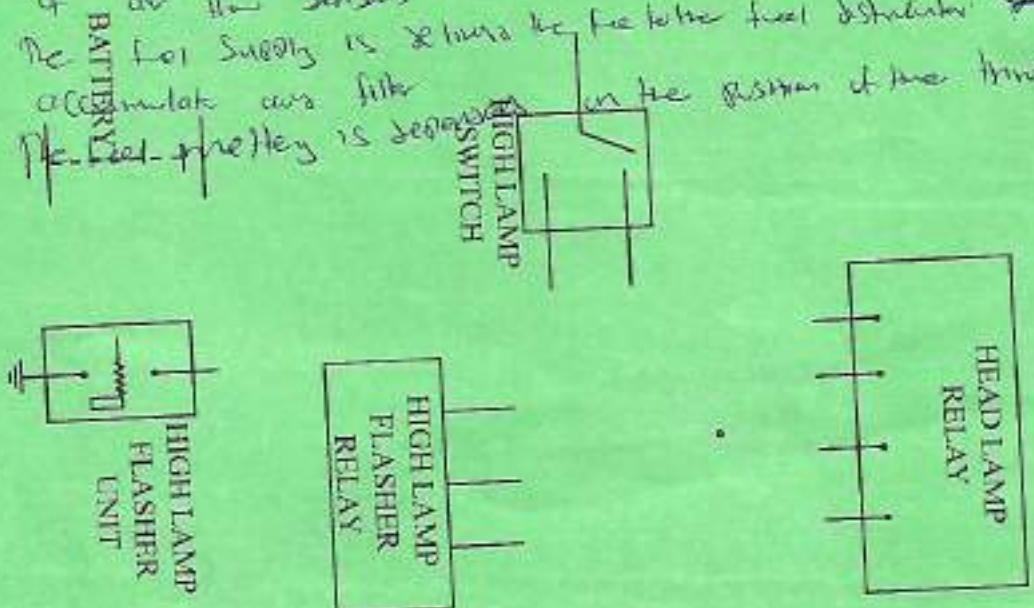
(4 marks)

(b) Describe the procedure of installing an alarm system in a vehicle. (16 marks)

- Attach the sensor to any metal surface
  - Place the horn of siren facing down to
  - Drive a hole in the bulkhead of the car / the thickness of the siren
  - Place the alarm power line near the car battery ready to be cut after installation
  - Attach or test to the wires mentioned above
  - Check on the alarm's instructions manual
  - Mount the siren sensors
  - Drill a hole in the dash board for the led
  - Feed the led indicator wire through the hole and secure it with double side mounting tape
  - Locate the wire that connects the light battery on the dash
  - Connect the sensor to this wire wire
  - ~~Secure~~ Secure and attach all alarm input and ~~output~~ <sup>output</sup> to the sensor
  - Mount the module under the dash board
  - Bundle together all the wires and stuff them under the dash board
  - Connect the alarm power wire to the car battery
  - Test the alarm for functions
- ~~It works by~~



**Key term** It has injection valves that inject fuel continuously into the intake port where it is mixed with air from the intake valves when the air-fuel mixture is drawn into the combustion chamber. It has three main functions: correct air-flow measurement, fuel supply, and fuel metering. The air-flow is controlled by a throttle valve and it can be either controlled by air flow sensors. The fuel supply is returned to the fuel distributor <sup>via</sup> ~~the~~ an accumulator and filter. The fuel pressure is dependent on the position of the throttle.



Excess bulb left  
leaving

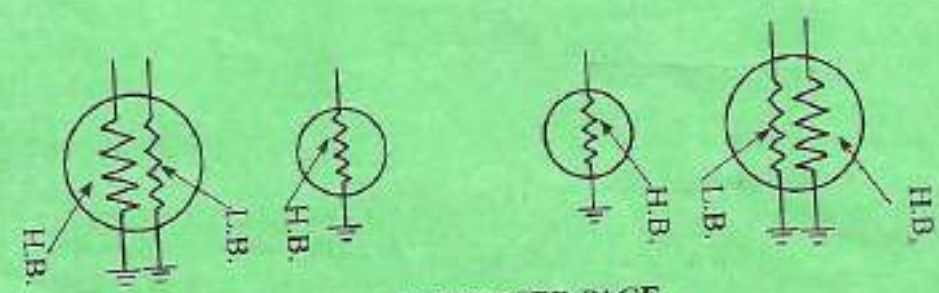
FIG. 1

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FUSES

H.B. - HIGH BEAM  
L.B. - LOW BEAM



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