

1503/105
VEHICLE TECHNOLOGY, BODYWORK
AND WORKSHOP TECHNOLOGY
Oct./Nov. 2019
Time: 3 hours



THE KENYA NATIONAL EXAMINATIONS COUNCIL
CRAFT CERTIFICATE IN AUTOMOTIVE ENGINEERING
MODULE I

VEHICLE TECHNOLOGY, BODYWORK AND
WORKSHOP TECHNOLOGY

3 hours

INSTRUCTIONS TO CANDIDATES

You should have the following for this examinations:

Answer booklet;

Drawing instruments.

*This paper consists of **THREE** sections; **A**, **B** and **C**.*

*Answer a total of **FIVE** questions, taking at least **TWO** questions from section **A**, at least **ONE** question from section **B** and at least **ONE** question from section **C**.*

Maximum marks for each part of a question as indicated.

Candidates should answer the questions in English.

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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.

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AND WORKSHOP TECHNOLOGY**

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SECTION A: VEHICLE TECHNOLOGY

Answer at least **TWO** questions from this section.

1. (a) State **three** vehicle layouts and list **one** advantage for each layout. (6 marks)
- (b) (i) State **two** advantages of a continuously variable transmission (CVT).
(ii) With the aid of sketches, explain the operation of continuously variable transmission. (14 marks)
2. (a) Explain **two** desirable characteristics of a steering system. (2 marks)
It should provide be reliable
- (b) With the aid of diagrams, explain the following steering geometry terms:
It should be freely turn. Steering is required
- (i) toe-in; *The wheels pull back when the vehicle moves forward*
- (ii) camber; *The angle between the wheel axis and the vertical axis line at the top*
- (iii) caster. *is created when the axis of the road wheel trails behind the axis of the steering knuckle producing caster trail* (6 marks)
- X(c) With the aid of a diagram, explain the operation of a power assisted steering system. (12 marks)
3. (a) State the function of a suspension system. (2 marks)
To ensure that the road wheel remain in contact with the road surface
- (b) Illustrate the layout of the wishbone front suspension system. (6 marks)
To ensure that the front and rear axles are correctly located
- (c) With the aid of a diagram, explain the operation of a hydro-pneumatic suspension. (12 marks)
4. (a) Explain **three** advantages of disc brakes. (3 marks)
- (b) With the aid of a diagram, explain the operation of a hydraulic retarder. (17 marks)

Upward movement of the suspension and force be
the falling air into the body
- the piston is forced upward and the links open the
sliding valves resulting the pressurized fluid starts flow
into the lower chamber of each sphere which raise
the suspension to its normal riding height
Best design is that the vehicle ground

SECTION A: VEHICLE TECHNOLOGY

Answer at least **TWO** questions from this section.

1. (a) State **three** vehicle layouts and list **one** advantage for each layout. (6 marks)
- (b) (i) State **two** advantages of a continuously variable transmission (CVT).
- (ii) With the aid of sketches, explain the operation of continuously variable transmission. (14 marks)

2. (a) Explain **two** desirable characteristics of a steering system. (2 marks)
should be flexible and as good.
- (b) With the aid of diagrams, explain the following steering geometry terms:
- (i) toe-in; - *is the arrangement of wheel/truck balancing*
- (ii) camber; - *is the angle b/w wheel axis and the vertical line at the top.*
- (iii) caster. - *is the angle that b/w the back ward/forward tilting of kingpin from the vertical axis at the time.* (6 marks)

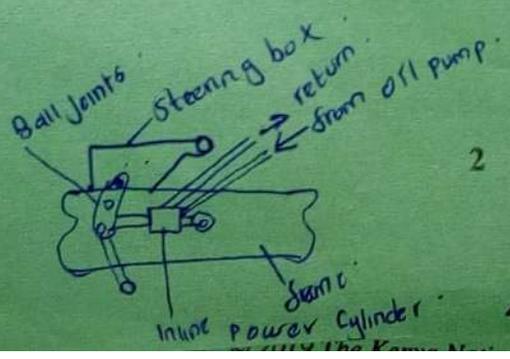
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- (c) With the aid of a diagram, explain the operation of a hydro-pneumatic suspension. (12 marks)

4. (a) Explain **three** advantages of disc brakes. (3 marks)
- (b) With the aid of a diagram, explain the operation of a hydraulic retarder. (17 marks)

2(c)
 When the steering wheel is turned, the pressurized hydraulic fluid enters to the power cylinder through control valve, which is mounted internally. The pressurized fluid provides both expanding & contracting movement depending on the operation of valve.

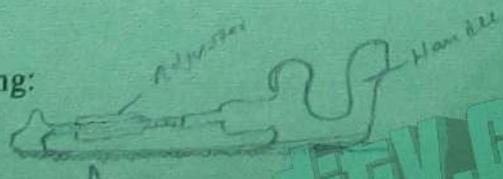


3(b) Illustration
 Two V-shaped links are used. They are located also front suspension across member by pivot which allows both the links to move. To ensure that the lower link remains correctly located the rod is offset.

SECTION B: VEHICLE BODYWORK

Answer at least ONE question in this section.

5. (a) Explain the following:
- (i) synthetic paints;
 - (ii) stoving paints.
- (4 marks)
- (b) Explain the following terms as used in paints:
- (i) pigments;
 - (ii) thinners;
 - (iii) binders.
- (6 marks)
- (c) (i) State the function of a spray painting gun;
- (ii) Sketch a spray gun and label it.
- (5 marks)
- (d) State five properties of upholstery materials.
- (5 marks)
6. (a) (i) Explain the term "shrinking" as used in panel beating. (2 marks)
- (ii) State the function of spray painting. *Mineral corrosion and protect vehicle body in clean lines for aesthetic appearance* (2 marks)
- (b) Sketch a saloon car and label the following parts:
- (i) bonnet;
 - (ii) roof;
 - (iii) boot;
 - (iv) front wing;
 - (v) front door;
 - (vi) rear door.
- (7 marks)
- (c) Sketch the following:
- (i) body file;
 - (ii) dolly;
 - * (iii) shaping hammer.
- (9 marks)



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SECTION C: WORKSHOP TECHNOLOGY

Answer at least ONE question in this section.

- 7.
- (a) Define the following properties of materials:
- (i) ductility;
 - (ii) hardness;
 - (iii) malleability;
 - (iv) toughness.
- (4 marks)
- (b) With the aid of a diagram, explain the operation of a blast furnace.
- (16 marks)
8. (a) (i) Illustrate a reading of 5.71 mm on a micrometer screw gauge. (4 marks)
- (ii) Sketch the following hand tools:
- (I) Ball peen hammer;
 - (II) Diamond chisel.
- (4 marks)
- (b) With the aid of sketches, illustrate the following welding techniques:
- (i) leftward;
 - (ii) rightward.
- (6 marks)
- (c) Illustrate the following fits:
- (i) clearance;
 - (ii) interference.
- (6 marks)

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SECTION B: VEHICLE BODYWORK

Answer at least ONE question in this section.

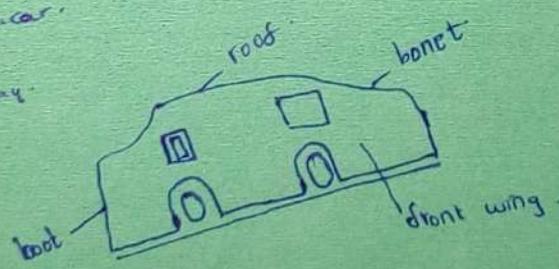
- 5/
- (a) Explain the following:
- (i) synthetic paints;
 - (ii) stoving paints.
- (4 marks)

- (b) Explain the following terms as used in paints:
- (i) pigments; - It is used to give the paint its colour.
 - (ii) thinners; - It is used together with the primer for mixing it.
 - (iii) binders. -
- (6 marks)

- (c) (i) State the function of a spray painting gun;
- (ii) Sketch a spray gun and label it.....
- (5 marks)

- (d) State five properties of upholstery materials.
- (5 marks)

- 6/
- (a) (i) Explain the term "shrinking" as used in panel beating.
- (ii) State the function of spray painting.
- (2 marks)
- (2 marks)

- (b) Sketch a saloon car and label the following parts:
- (i) bonnet; - found in front.
 - (ii) roof; - up the car.
 - (iii) boot; - behind the car.
 - (iv) front wing; - side wing.
 - (v) front door; ...
 - (vi) rear door. -
- 
- (7 marks)

- (c) Sketch the following:
- (i) body file;
 - (ii) dolly;
 - (iii) shaping hammer.
- (9 marks)

