1503/105
VEHICLE TECHNOLOGY, BODYWORK
AND WORKSHOP TECHNOLOGY
June/July 2021
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.

*his paper consists of **THREE** sections; **A**, **B** and **C**.*
*Answer a total of **FIVE** questions as follows:*
*Answer at least **TWO** questions from Section **A**;*
*at least **ONE** question from Section **B**;*
*and at least **ONE** question from section C in the answer booklet provided.*
Maximum marks for each part of a question as shown.
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.

Turn over

SECTION A: VEHICLE TECHNOLOGY

Answer at least TWO questions from this section.

1. (a) State **two** advantages of each of the following:

(i) Front wheel drive over rear wheel drive for a vehicle with a front engine.
(ii) Four wheel drive over two wheel drive.
(iii) Separate chassis and vehicle body over integral body construction.

(6 marks)

(b) Using a labelled diagram, explain the operation of a multi-plate clutch..

(14 marks)

2. (a) Using a sketch, describe the operation of drum brakes. (8 marks)

(b) With the aid of a sketch, explain the operation of the anti-lock braking system.

(12 marks)

3. (a) (i) State **two** advantages of independent suspension system.
(ii) Using sketches, describe the operation of the stabilizer bar used in independent suspension. (8 marks)

(b) (i) Distinguish between:

I. Camber angle and caster angle;
II. Oversteer and understeer.

(ii) With the aid of a sketch, describe the operation of a rack and pinion steering box.

(12 marks)

4. (a) (i) Explain **two** negative effects of driving a vehicle with:

I. a tyre with low pressure;
II. unbalanced wheels.

(5 marks)

(ii) State **two** advantages of:

I. aluminium alloy wheel rims over pressed steel wheel rim.
II. radial ply tyres.

(8 marks)

(b) (i) State the functions of each of the following components on a motor vehicle transmission system:

I. Universal joint;
II. differentiate lock.

(ii) Using a diagram, describe the operation of planetary gear set.

(12 marks)

SECTION B: VEHICLE BODYWORK

Answer at least ONE question in this section.

5. (a) (i) State **three** functional requirements for the design of a car body.
(ii) Explain the function of the following vehicle paint constituents, giving an example of each constituent:

I. Binder;
II. Pigment. (7 marks)

(b) (i) Explain the roles of an air transformer in spray painting:
(ii) Distinguish between air spray painting and airless spray painting. (7 marks)

(c) Explain **three** safety precautions that should be observed during spray painting. (6 marks)

6. (a) Explain

(i) **two** forces that act on a motor vehicle chassis.
(ii) **two** techniques used in panel beating. (8 marks)

(b) Sketch the following panel beating tools, stating the function of each:

(i) Shrinking and flat face hammer.
(ii) pry and surfacing spoon. (4 marks)

(c) (i) State **four** properties required by upholstery fabric.
(ii) Explain the function of each of the following upholstery tools:

I. Webbing stretcher;
II. Upholster's pins;
III. Tack hammer;
IV. Ripping chisel. (8 marks)

SECTION B: WORKSHOP TECHNOLOGY

Answer at least ONE question in this section.

7. (a) (i) State **two** safety regulations that govern the use of power driven machines.

(ii) Explain the following workshop processes:

I Anodizing;
II Electroplating
III Soldering;
IV Heat treatment. (10 marks)

(b) (i) State **two**:

I, devices used for work holding during machine drilling.
II. types of workshop materials. (4 marks)

(ii) Sketch the following workshop tools and label the parts:

I. Chisel
II. Snips
III. Scribing block. (6 marks)

8. (a) Explain **three** factors to consider when designing the layout of a workshop.

(b) (i) Define the term ductility as applied to workshop materials
(ii) Distinguish between soft soldering and hard soldering. (5 marks)

(c) Explain the following machining process and state the application of each:

(i) Turning
(ii) Facing
(iii) Knurling. (9 marks)

THIS IS THE LAST PRINTED PAGE.