higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

DIESEL TRADE THEORY N2

(11040192)

9 April 2021 (X-paper)
09:00–12:00

Drawing instruments may be used.

This question paper consists of 6 pages.

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE
DIESEL TRADE THEORY N2
TIME: 3 HOURS
MARKS: 100

INSTRUCTIONS AND INFORMATION

1. Answer all the questions.
2. Read all the questions carefully.
3. Number the answers according to the numbering system used in this question paper.
4. Sketches must be large and neat and may be done in pencil.
5. Use only a black or blue pen.
6. Write neatly and legibly.

QUESTION 1

Various options are given as possible answers to the following questions. Choose the answer and write only the letter (A–D) next to the question number (1.1–1.10) in the ANSWER BOOK.

1.1 Which one of the following is not a function of a gear box?

A The gear ratio allows the vehicle to move at a slow pace.
B It provides a permanent neutral.
C It provides forward and reverse gears.
D It supplies an extremely rich mixture for a cold-starting engine.

1.2 If … it is a symptom of air in the braking system.

A the brake pedal is spongy
B it is very difficult to push the brake pedal down
C the parking brake does not release
D the brake grabs

1.3 Checking the … is a precheck that should be carried out before performing wheel alignment.

A low beam of the headlight
B engine oil
C tyre pressure
D brake fluid level

1.4 Steering wheel play is normally caused by …

A low tyre pressure.
B a damaged tyre.
C too much clearance in the steering gearbox.
D the camber angle.

1.5 The purpose of toe-out on a turn is to allow the …

A vehicle to travel straight forward.
B inner wheels to turn at a shorter radius than the outer wheels.
C vehicle curb height.
D speed to synchronise with the selected gear.

1.6 The main function of a brake servo unit in a braking system is to …

A allow the wheels to turn at different speeds when driving around a corner.
B keep good traction force on the wheels.
C allow an equal pull force on each wheel for the parking brake.
D increase the pressure in the system to improve the braking force.

1.7 The … should be measured with a dial gauge during the precheck on the crown wheel.

A axial and radial runout
B caster and camber angles
C pinion height
D backlash

1.8 The ... is part of the suspension system.

A shock absorber
B fuel filter
C brake drum
D camber

1.9 A/An … is a device that is used to pump fuel into the cylinders of a diesel engine.

A fuel pump
B injection pump
C nozzle
D diesel fuel filter

1.10 An advantage of the Hotchkiss drive is that …

A it is an open drive and can easily be damaged.
B the gearbox can easily be removed.
C it requires two universal joints that demand a lot of attention.
D it vibrates and becomes noisy when worn out.

(10 × 1) **[10]**

QUESTION 2

Indicate whether the following statements are TRUE or FALSE by writing only 'True' or 'False' next to the question number (2.1–2.5) in the ANSWER BOOK.

2.1 The main function of a shock absorber is to control spring movement.

2.2 A synchronised unit is used in a manual gearbox to prevent gears from grinding.

2.3 The pinion gear usually has about four times more teeth than the crown wheel gear.

2.4 The injectors in the direct injection system of a diesel engine are mounted at the top of the combustion chamber.

2.5 The sprung mass is the weight of all the parts that are not supported by the suspension such as the wheels and differentials.

(5 × 1) **[5]**

QUESTION 3

3.1 Define the *curb height* of a vehicle. (2)

3.2 Make TWO sketches to show the difference between the negative camber angle and the positive camber angle. (6)

3.3 Give FOUR reasons why the correct wheel alignment is very important. (4 × 2) (8)

3.4 FIGURE 1 shows a diagram of a steering box. Name the parts indicated in the diagram by writing only the answer next to the letter (A–F) in the ANSWER BOOK.

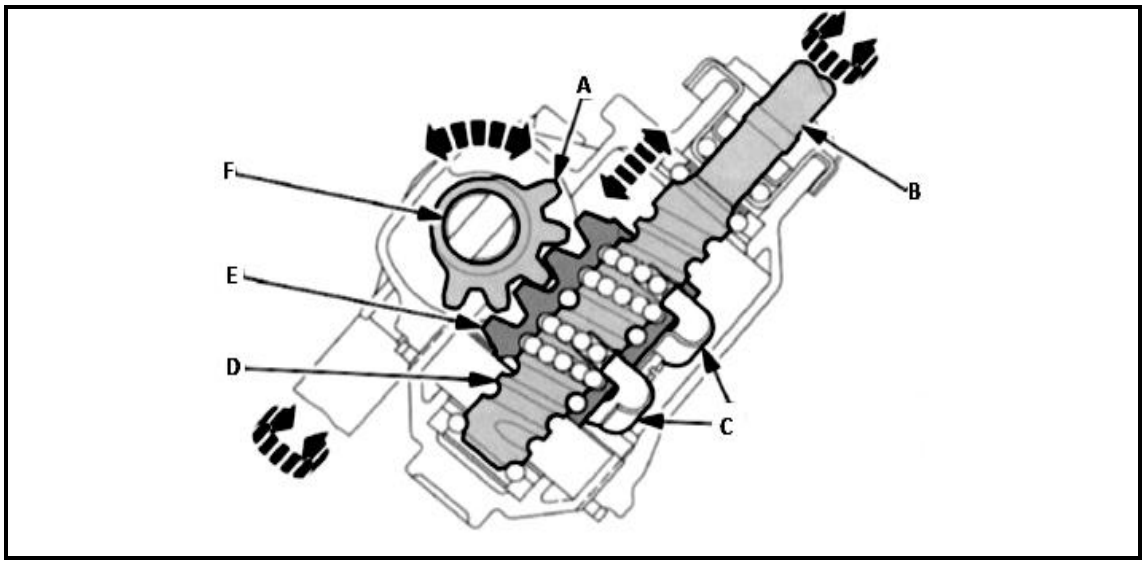

FIGURE 1

(6)
[22]

QUESTION 4

4.1 State FOUR functions of the gearbox. (4)

4.2 Give TWO reasons for each of the following gearbox problems:

4.2.1 Jumping out of gear

4.2.2 Gearbox noise in neutral

4.2.3 Gearbox oil leak

(3 × 2) (6)

4.3 State the power flow when the first gear is selected in a four-speed synchromesh gearbox. (6)

4.4 State TWO functions of a synchroniser unit in a gearbox. (2)
[18]

QUESTION 5

5.1 Name TWO types of disc brake callipers. (2)

5.2 State TWO advantages of a disc brake assembly. (2)

5.3 Explain the procedure to follow when bleeding hydraulic brakes. (7)

5.4 FIGURE 2 shows a diagram of a braking system. Name the parts indicated in the diagram by writing only the answer next to the letter (A–F) in the ANSWER BOOK.

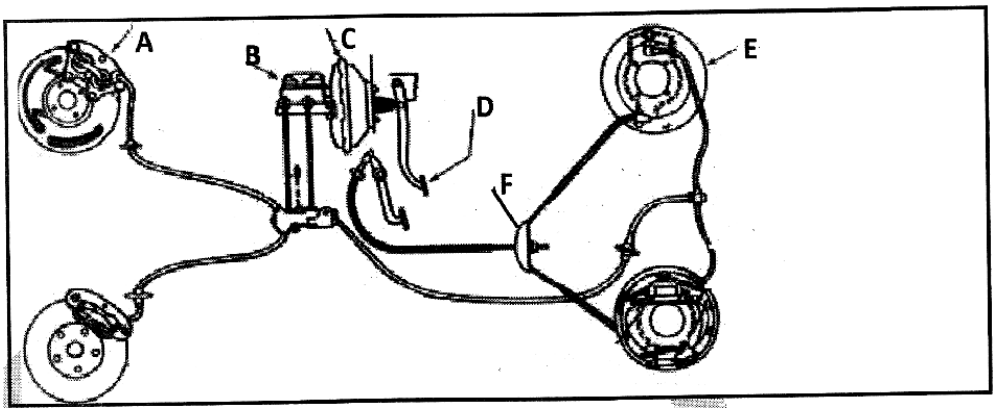

FIGURE 2 (6)

5.5 State ONE function of component F in the brake system shown in FIGURE 2. (1)

5.6 Explain the operation of component C. (2)

[20]

QUESTION 6

6.1 Explain the power flow in the differential when a vehicle is turning. (5)

6.2 Name the tool used to measure the backlash between the crown wheel gear and the pinion gear. (1)

6.3 Explain the function of the universal joint in a drive shaft. (2)

6.4 Differentiate between *direct injection* and *indirect injection* in a diesel engine. (2)

6.5 Give TWO reasons for fitting a copper washer between the injector nozzle and the cylinder head of a diesel engine. (2)

6.6 Briefly explain FOUR requirements of an efficient injector. (8)

6.7 Make a neat sketch of a Ricardo combustion chamber. Indicate the following in the sketch: Position of glow plug, pre-combustion chamber, injector and piston. (5)

[25]

TOTAL: 100