higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

DIESEL TRADE THEORY N2

(11040192)

November 2022 (X-paper)
09:00–12:00

Drawing instruments may be used.

This question paper consists of 8 pages.

100Q1E2221

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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. Start each section on a new page.
5. Use only a black or a blue pen.
6. Write neatly and legibly.

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QUESTION 1

1.1 Various options are provided as possible answers to the following questions. Choose the answer and write only the letter (A–D) next to the question number (1.1.1–1.1.10) in the ANSWER BOOK.

1.1.1 The purpose of a slip joint is to allow a change in …

A angle of drive.
B length of the shaft.
C speed of rotation.
D diameter of the shaft.

1.1.2 In a Hotchkiss drive, rear torque is absorbed by …

A a torque tube.
B rear springs.
C a radius rod.
D a universal joint.

1.1.3 The included angle is the sum of …

A camber and caster.
B caster and kingpin inclination (KPI).
C camber and kingpin inclination.
D castor and steering axis inclination (SAI).

1.1.4 An imbalances wheel during vehicle operation …

A makes a load noise when its heavy point hits the road surface.
B deflects the vehicle's longitudinal direction.
C bounces vertically or deflects from side to side (as seen from front or rear).
D creates a standing wave.

1.1.5 Sulphur content of diesel fuel is expressed by an index called …

A octane number.
B cetane number.
C calorific value.
D carbon content.

1.1.6 The angle between the kingpin centre line and the vertical in the plane of the wheel is called …

A caster angle.
B camber angle.
C kingpin inclination (KPI).
D toe-out.

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1.1.7 A high pressure injector pump is mechanically driven by the …

A crankshaft gear.
B camshaft gear.
C rocker shaft gear.
D input shaft gear.

1.1.8 A low pressure lift pump is normally mounted on the side of the … pump.

A vacuum
B accelerator
C converter
D injector

1.1.9 When the slip angle is greater at the front than the rear, the vehicle tends to …

A oversteer.
B understeer.
C straight steer.
D side steer.

1.1.10 Which type of air filter can be used in a diesel engine that operates in dusty conditions?

A Dry type
B Wet type
C Oil bath type
D Whirl type

(10 × 1) (10)

1.2 Indicate whether the following statements are TRUE or FALSE by writing only 'True' or 'False' next to the question number 1.2.1–1.2.10) in the ANSWER BOOK.

1.2.1 The purpose of a shock absorber is to prevent unnecessary oscillations of the spring blades of a vehicle.

1.2.2 When testing injectors on a running diesel engine, the injector inlet pipe can be loosened and if a misfire occurs, the injector is still in working order.

1.2.3 The cornering force provided by the slip angle is called cornering power.

1.2.4 The universal joint in a Hotchkiss rear-wheel drive arrangement is lubricated by oil.

1.2.5 Ball and trunnion universal joints are used in the front axles of most military vehicles.

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1.2.6 Primary fuel filters are used to filter smaller particles from the fuel.

1.2.7 The thickness of the copper washer fitted between the injector and the cylinder head is not important.

1.2.8 During servicing of an injector the first test to be carried out is the leak test.

1.2.9 The function of an injector is to deliver diesel into the combustion chamber.

1.2.10 When the gear ratio through the transmission is 1:1, the transmission is in neutral.

(10 × 1) (10)
[20]

QUESTION 2

2.1 State FOUR advantages of direct injection systems. (4)

2.2 State ONE function of each of the following diesel fuel system components:

2.2.1 Lift pump

2.2.2 Glow plugs

2.2.3 Leak-off pipes

(3 × 1) (3)

2.3 List FIVE requirements of a good diesel pump. (5)

2.4 State the importance of each of the following components of the prop shaft:

2.4.1 Slip joint

2.4.2 Hooke's type universal joint

(2 × 1) (2)

2.5 Give TWO reasons why a divided Hotchkiss drive is used on heavy vehicles. (2)

2.6 State FOUR advantages of a *constant velocity (CV) joint* compared to the *Hooke's type universal joint*. (4)
[20]

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QUESTION 3

3.1 Give THREE reasons why wheel alignment is of great importance. (3)

3.2 List FIVE preliminary checks before wheel alignment is carried out. (5)

3.3 State TWO functions of the residual pressure check valve on a master cylinder. (2)

3.4 List FOUR important reasons for the use of a tandem master cylinder. (4)

3.5 State TWO possible causes for each of the following brake system defects:

3.5.1 No brakes

3.5.2 Dragging brakes

3.5.3 Spongy pedal

(3 × 2) (6)

[20]

QUESTION 4

4.1 FIGURE 1 shows a diagram of a synchronizing unit. Name the labelled components (A–F) in your ANSWER BOOK.

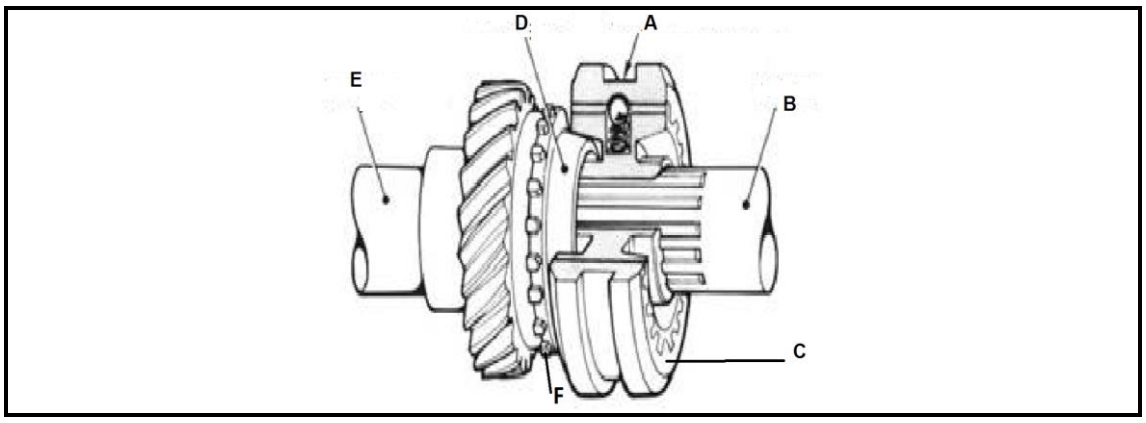


FIGURE 1

(6 × 1) (6)

4.2 Explain the operation of a synchronizing unit shown in FIGURE 1 during gear selection. (5)

4.3 Explain the operation of a differential when the vehicle is cornering. (5)

4.4 FIGURE 2 shows a diagram of a differential assembly used on a truck. Name the labelled components (A–D) in your ANSWER BOOK.

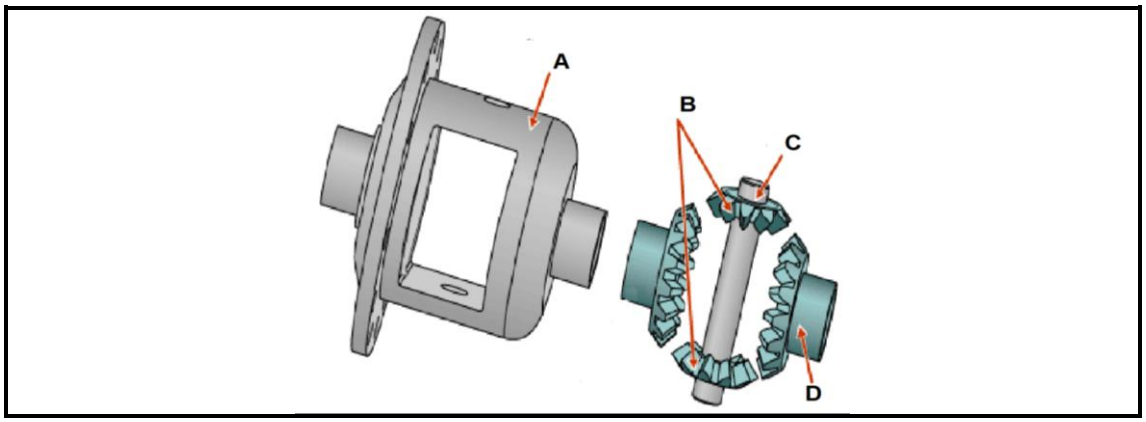


FIGURE 2

☆ (4 × 1) (4)
[20]

QUESTION 5

5.1 State TWO advantages of using *coil springs* over a *leaf spring* on a suspension. (2)

5.2 Give TWO functions of each of the following suspension components:

5.2.1 Centre bolt

5.2.2 Swinging rear shackle

5.2.3 Rebound clips

(3 × 2) (6)

5.3 Explain the following terms:

5.3.1 Oversteer ☆

5.3.2 Understeer

(2 × 1) (2)

5.4 Explain the following wheel balancing terms:

5.4.1 Static balance

5.4.2 Dynamic balance

(2 × 2) (4)

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5.5 State TWO advantages of each of the following axles for rear-wheel drive vehicles:

5.5.1 Semi floating axle

☆

5.5.2 Full floating axle

5.5.3 Three quarter axle

(3 × 2) (6)
[20]

TOTAL: 100

☆

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