higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

T440**(E)**(J30)T

NATIONAL CERTIFICATE

DIESEL TRADE THEORY N2

(11040192)

30 July 2018 (X-Paper)
09:00–12:00

This question paper consists of 10 pages.

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, neat and fully labelled.
5. Write neatly and legibly.

QUESTION 1

1.1 Name the types of injector spray nozzles shown in FIGURE 1, by writing only the answer next to the letter (A–D) in the ANSWER BOOK. (4)

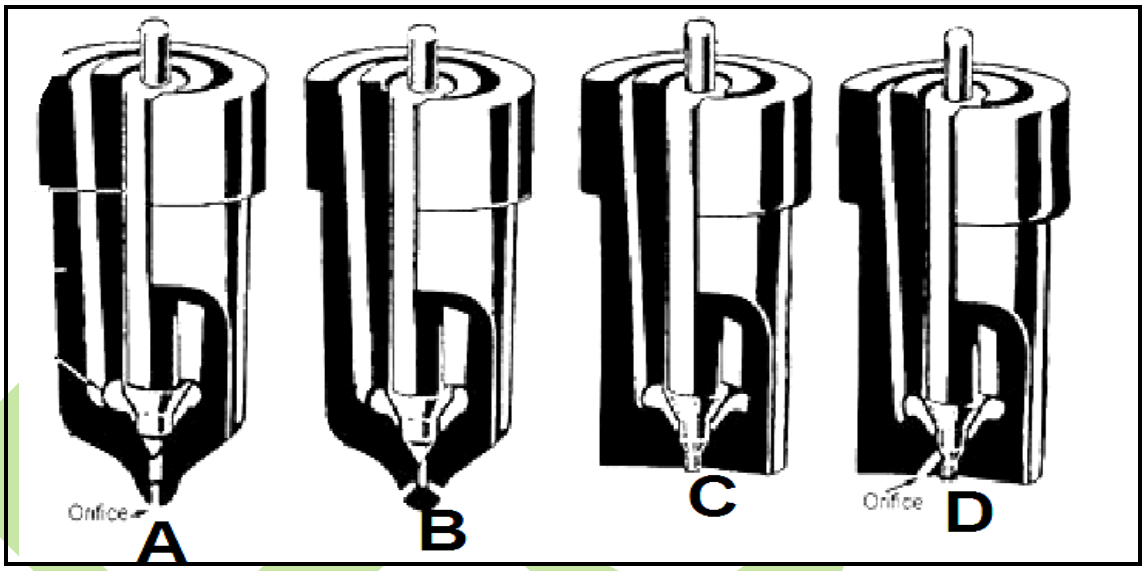

FIGURE 1

1.2 State TWO functions of diesel fuel injectors. (2)

1.3 Give THREE reasons why a copper washer is fitted between the injector tip and the cylinder head on a diesel engine. (3)

1.4 State SIX advantages of a diesel engine when compared to a petrol engine. (6)

1.5 Name TWO basic types of injector pumps used on diesel engines. (2)

1.6 State ONE purpose of each of the following diesel fuel system components:

1.6.1 Lift pump

1.6.2 Glow plugs

1.6.3 Leak-off pipes

(3 × 2) (6)

[23]

QUESTION 2

2.1 Choose a description from COLUMN B that matches an item in COLUMN A. Write only the letter (A–F) next to the question number (2.1.1–2.1.6) in the ANSWER BOOK.

COLUMN A		COLUMN B	
2.1.1	Shift forks	A	holds transmission in the selected gear
2.1.2	Shift linkage	B	fit into grooves cut in the outer side of the synchro collar
2.1.3	Detent mechanism	C	internal shift rail or external rod
2.1.4	Spring tension	D	various configurations for different vehicle transmission types
2.1.5	Interlocking mechanism	E	holds detent balls into detent notches in shift rail
2.1.6	Shift patterns	F	prevents selection of two gears at once

(6 × 1) (6)

2.2 FIGURE 2, below, shows a diagram of a propeller shaft used on a vehicle.

Name the components labelled (A–F), in the ANSWER BOOK. (6)

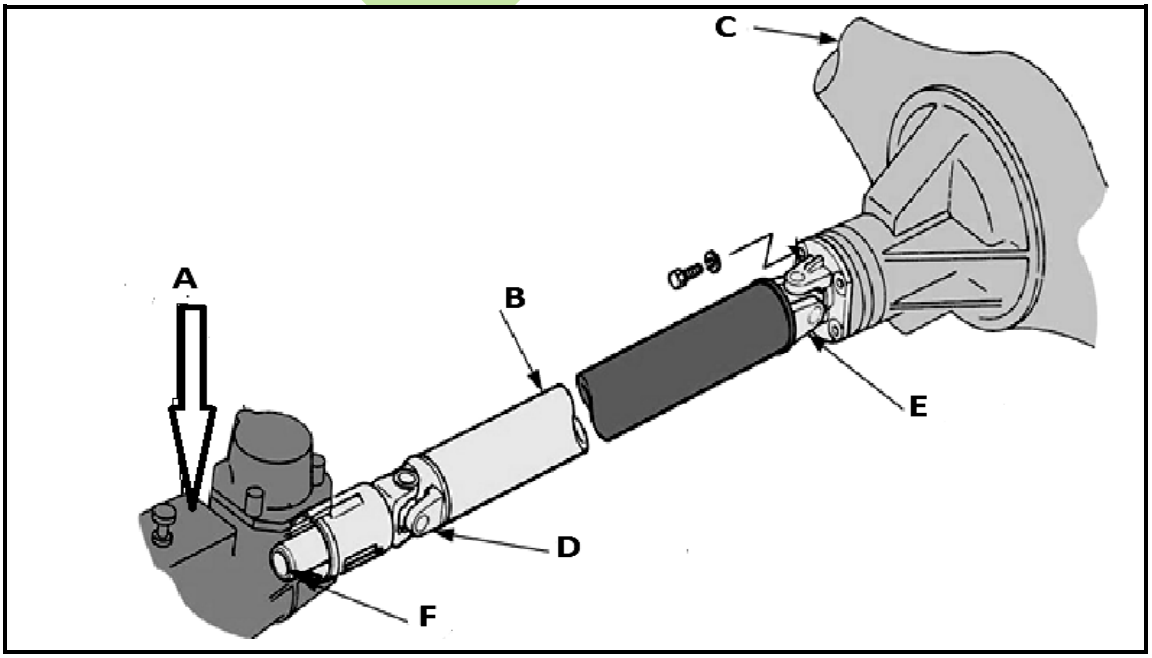

FIGURE 2

2.3 State ONE function of EACH of the following components of a driveshaft:

2.3.1 Slip joint (1)

2.3.2 Hooke's type universal joint (1)

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

2.5 Give TWO reasons for the use of the differential unit. (2)

2.6 FIGURE 3, below, shows a diagram of a (1–2) gear synchronising unit used on a four- speed gearbox.

Name the components labelled (A - E) in the ANSWER BOOK. (5)

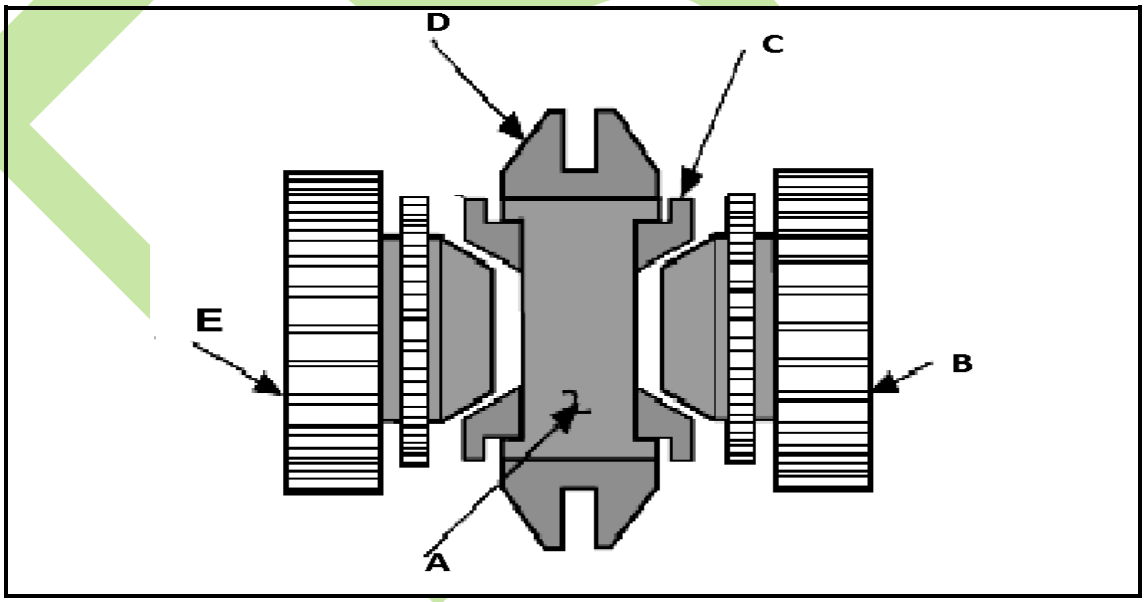

FIGURE 3

2.7 State TWO reasons for the use of a synchronising unit. (2)
[25]

QUESTION 3

3.1 FIGURE 4, below, shows a diagram of a leaf spring used on a truck.

Name the components labelled (A–C) in the ANSWER BOOK. (3)

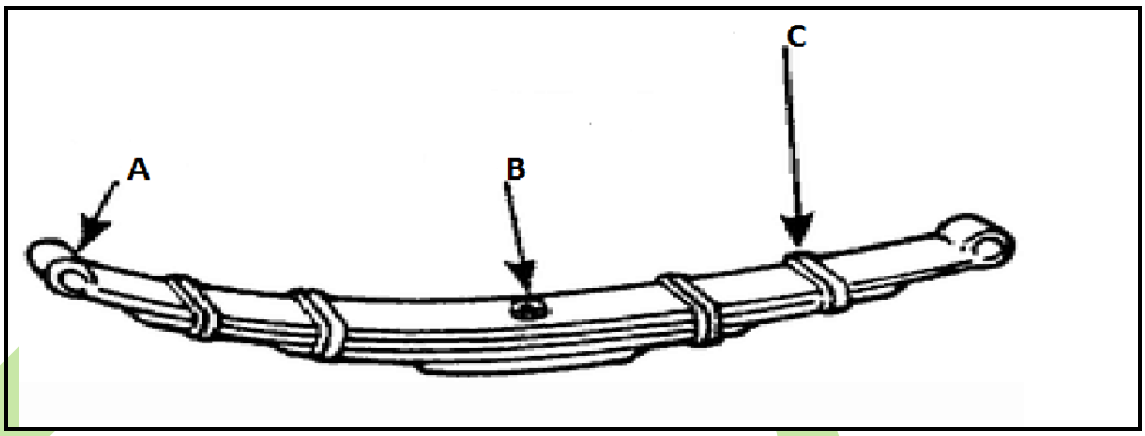

FIGURE 4

3.2 Give ONE purpose of each of the following suspension components:

3.2.1 The component indicated as B in FIGURE 4.

3.2.2 Swinging shackle

3.2.3 The component indicated as C in FIGURE 4.

(3 × 1) (3)

3.3 FIGURE 5, below, shows a diagram of a constant velocity joint.

Name the components labelled (A–F) in the ANSWER BOOK. (6)

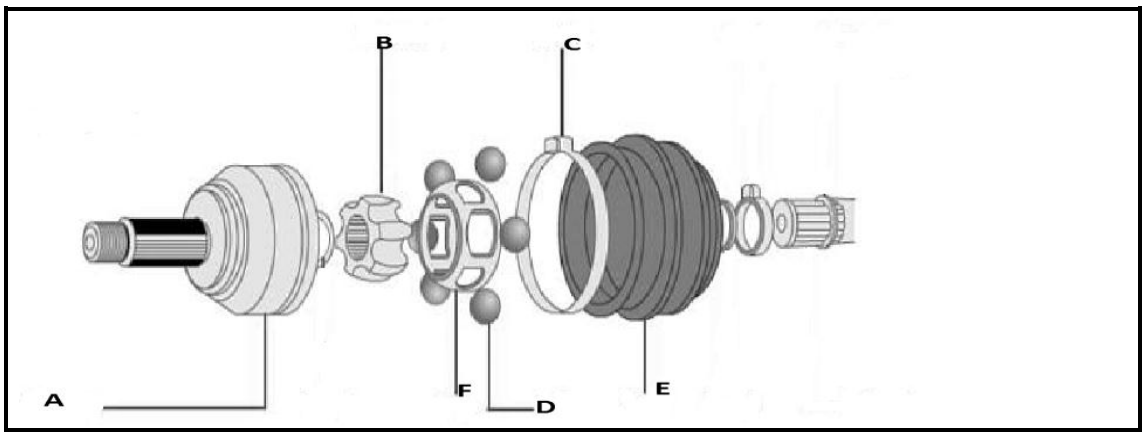

FIGURE 5

3.4 State TWO advantages of using a constant velocity joint. (2)

[14]

QUESTION 4

4.1 FIGURE 6, below, shows a diagram of a linkage steering system.

Name the components labelled (A–F) in the ANSWER BOOK. (6)

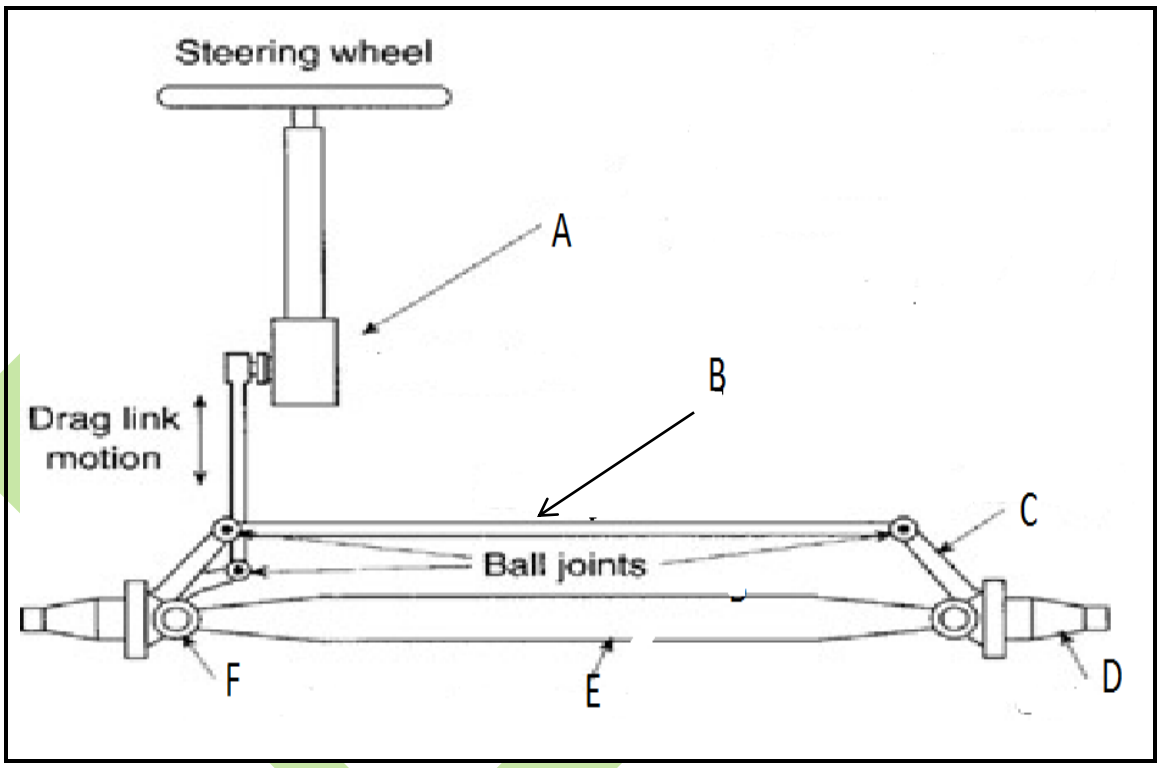

FIGURE 6

4.2 Explain in detail the following steering geometry terms:

4.2.1 Camber (2)

4.2.2 Included angle (2)

4.2.3 Toe-out on turns (2)

[12]

QUESTION 5

5.1 FIGURE 7, below, shows a diagram of a braking system.

Name the components labelled (A–F) in the ANSWER BOOK. (6)

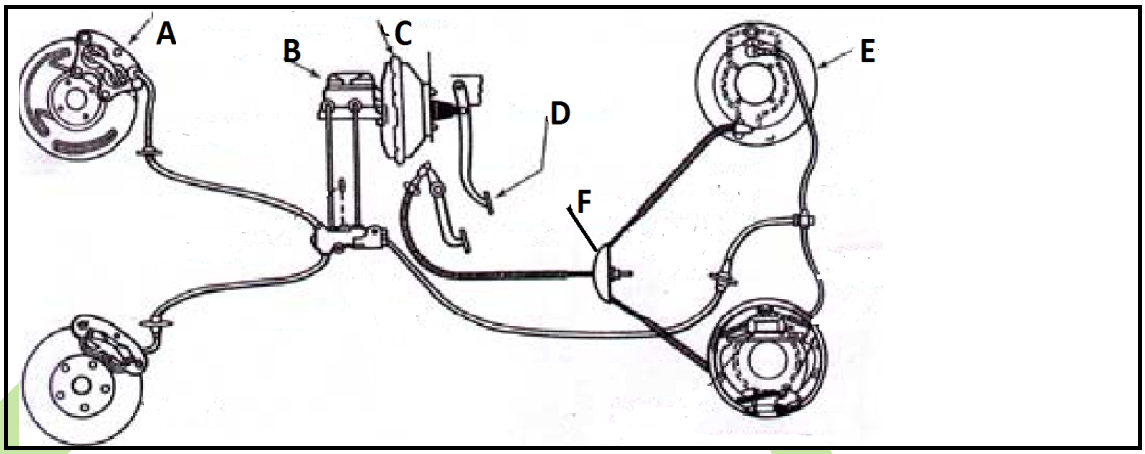

FIGURE 7

5.2 Give ONE purpose of EACH of the following brake system components, as shown in FIGURE 7:

5.2.1 Component C (1)

5.2.2 Component F (1)

5.3 FIGURE 8, below, shows a diagram of a residual pressure master cylinder.

Name the components labelled (A–F) in the ANSWER BOOK. (6)

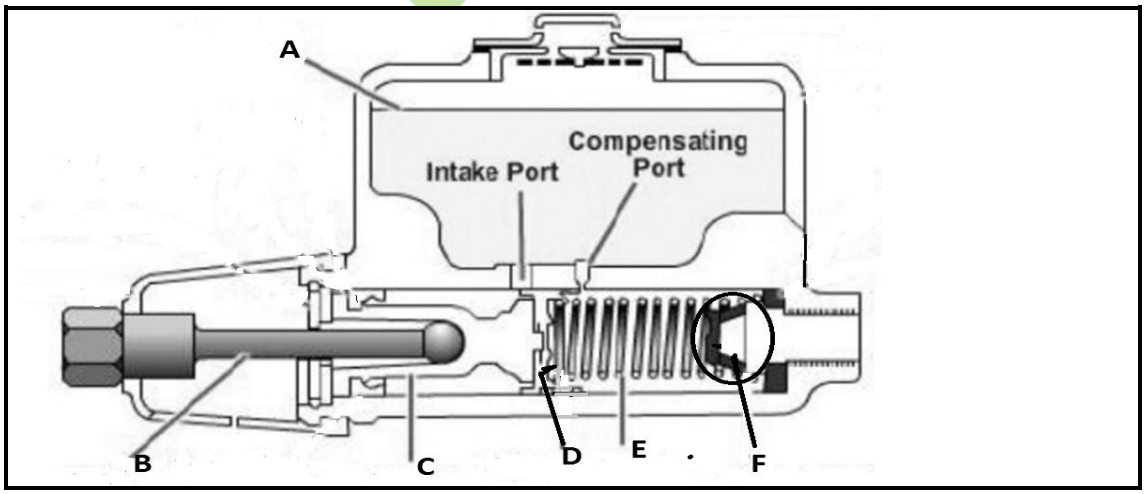

FIGURE 8

5.4 Give TWO functions of a check valve in a brake master cylinder. (2)
[16]

QUESTION 6

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 (6.1–6.10) in the ANSWER BOOK.

6.1 … is a symptom caused by brake disc run-out.

A Spongy pedal
B Rapid wearing of the brake pads
C Localised wearing of the brake pads
D Judder during braking

6.2 The torque available at the contact between the driving wheels and the road is known as ... effort.

A tractive
B brake
C clutch
D NONE of the above

6.3 Incorrect steering axis inclination (S.A.I.) causes ...

A the vehicle to pull to the side of lesser inclination.
B the tendency to assume toe-out orientation.
C poor recovery of the steering wheel after making a turn.
D the generation of a braking effect at tight corners.

6.4 A vehicle ride will be more comfortable if the ... is kept to the minimum.

A vehicle mass
B sprang mass
C unsprung mass
D ALL of the above

6.5 The cetane rating of diesel fuel is in the order of ...

A 45.
B 25.
C 60.
D 70.

6.6 The compression ratio for diesel engines usually lies in the range of .... :1.

A 6–10.
B 10–15.
C 15–25.
D 25–40.

6.7 The main function of the brake fluid is …

A lubrication.
B power transmission.
C cooling.
D NONE of the above

6.8 The basic characteristics of a brake fluid is …

A a high boiling point .
B low viscosity.
C its compatibility with rubber and metal parts.
D ALL of the above

6.9 The main feature of the MacPherson strut suspension is that …

A the vertical size of the suspension can be made more compact.
B non-vertical external forces are supported by the suspension arms.
C the unsprung mass in lighter.
D the assembly is slightly more complicated in design.

6.10 When turning a corner the …

A front wheels are toeing out.
B front wheels are turning on different angles.
C inside front wheels have a greater angle than the outside wheels.
D ALL of the above

(10 × 1) **[10]**

TOTAL: 100