higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE

DIESEL TRADE THEORY N2

(11040192)

27 November 2023 (X-paper)
09:00–12:00

Drawing instruments may be used.

This question paper consists of 8 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. Use only a black or blue pen.
5. Write neatly and legibly.

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QUESTION 1

1.1 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 (1.1.1–1.1.6) in the ANSWER BOOK.

1.1.1 … smoke from a diesel engine's exhaust generally indicates too much fuel is being injected into the engine.

A Green
B Blue
C Grey
D Black

1.1.2 Which ONE of the following does not indicate a faulty injector?

A Nozzle wetness
B Blue nozzle body
C Excessive leak
D Blowholes

1.1.3 The tyre size is normally found on the …

A treaded pattern.
B side walls.
C inside of a tyre.
D machine instruction manual.

1.1.4 … is when balance weights are evenly and equally distributed about the axis of rotation in a single plane, so that the wheel may come to rest in any position.

A Dynamic balancing
B Stick on wheel weight
C Imbalance
D Static balancing

1.1.5 Tracking refers to …

A alignment of front wheels with one another.
B alignment of rear wheels with one another.
C alignment of the direction of two front wheels in relation to the two-rear wheels.
D front axle.

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1.1.6 A … contains the driving gears to drive the vehicle and also to support the weight of the vehicle.

A dead axle
B prop shaft
C inner CV joint
D live axle

(6 × 1) (6)

1.2 Indicate whether the following statements are TRUE or FALSE by writing only 'True' or 'False' next to the question number (1.2.1–1.2.9) in the ANSWER BOOK.

1.2.1 The purpose of glow plugs in a spark ignition engine is to improve swirl motion of the intake air.

1.2.2 Master cylinder converts foot-pedal force to hydraulic pressure within brake system pipes.

1.2.3 Caster angle and kingpin inclination angle assist with the directional stability of a vehicle.

1.2.4 Wheel alignment indicates the correct adjustment of the pinion depth and differential carrier bearings.

1.2.5 Judder when braking is a symptom caused as a result of brake disc runout.

1.2.6 A correct contact pattern between the pinion gear teeth and crown wheel gear teeth is one located at the centre line of the gear teeth.

1.2.7 Universal joints turn at a constant speed, it is smooth in operation with less vibration and kicks back to the steering.

1.2.8 A collapsible spacer is a device used to set pinion bearing pre-loading and it is not re-usable.

1.2.9 Coil springs are firmly fixed at the front end of the spring by a shackle pin or bolt to the chassis frame.

(9 × 1) (9)

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1.3 Choose a term from COLUMN B that matches a description in COLUMN A. Write only the letter (A–I) next to the question number (1.3.1–1.3.7) in the ANSWER BOOK.

COLUMN A		COLUMN B	
1.3.1	Provide a smooth ride	A	brake calliper
1.3.2	A brake system part found only in a disc brake	B	shock absorber
1.3.3	A small space between the crankshaft and the bearing allows a thin film of oil to lubricate the surfaces	C	back leakage
1.3.4	Wear between the needle valve and its holder allowing fuel to leak back into the injector body	D	oil clearance
1.3.5	Fuel is injected into the combustion chamber above the piston in a cylinder	E	synchroniser
1.3.6	It synchronises the speed of gear before selection	F	interlocking mechanism
1.3.7	Prevent two gears from engaging at the same time	G	seat tightness
		H	indirect injection
		I	direct injection

(7 × 1) (7)

[22]

QUESTION 2

2.1 Explain the operation of a differential when cornering. (4)

2.2 Name THREE types of spring mechanisms used on suspension systems. (3)

2.3 State FOUR advantages of a fully-floating rear axle. (4)

2.4 State FOUR functions of a gearbox. (4)

2.5 Name TWO types of gears found in a manual gearbox. (2)

2.6 State THREE reasons why thrust washers are used in gearboxes. (3)

[20]

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QUESTION 3

3.1 Name TWO types of steering boxes used on heavy vehicles. (2)

3.2 List FIVE wheel alignment fundamental angles. (5)

3.3 Explain SEVEN preliminary checks before wheel alignment can be done or reset. (7)

3.4 FIGURE 1 below shows a diagram of a steering link rack and pinion. Name the parts indicated by writing the answers next to the letters (A–F) in the ANSWER BOOK. (6)

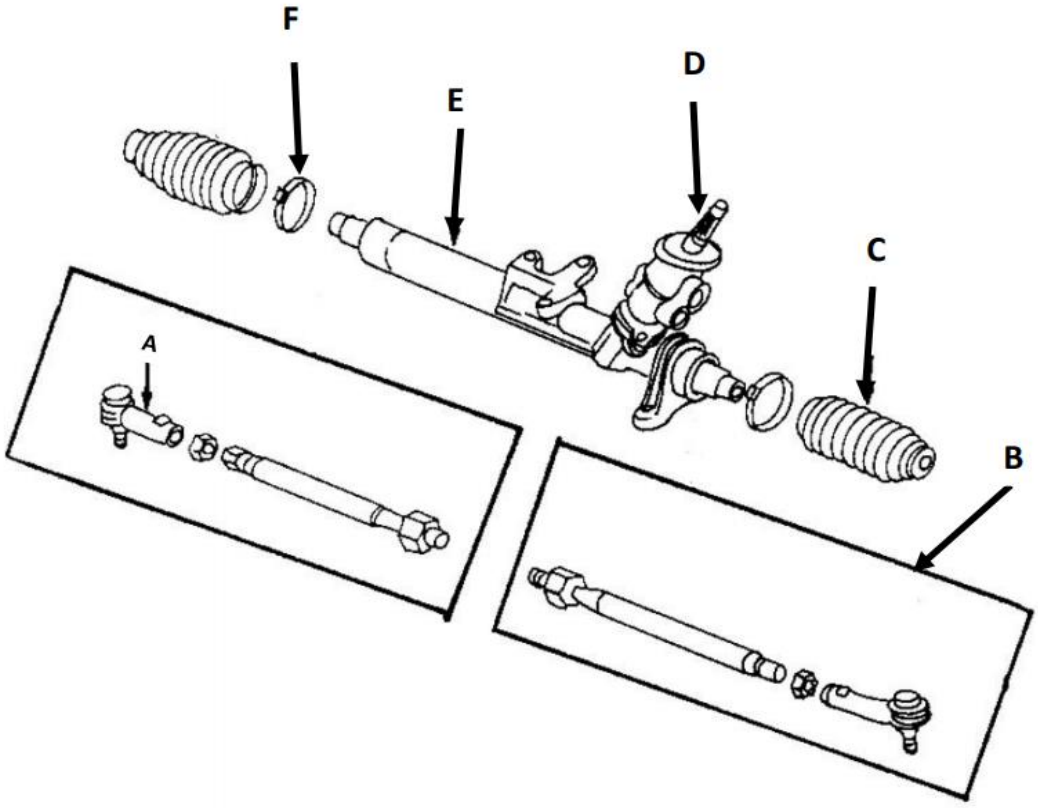

FIGURE 1

[20]

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QUESTION 4

4.1 FIGURE 2 below shows TWO types of fuel injection systems on DIAGRAM 1 and DIAGRAM 2. Study both diagrams and answer the following questions:

4.1.1 Name the parts indicated by writing the answers next to the letters (A–E) in the ANSWER BOOK. (5)

4.1.2 List the name (type) of a fuel injection system in both DIAGRAM 1 and DIAGRAM 2. (2)

4.1.3 Describe the difference between these two types of fuel injection systems shown below. (4)

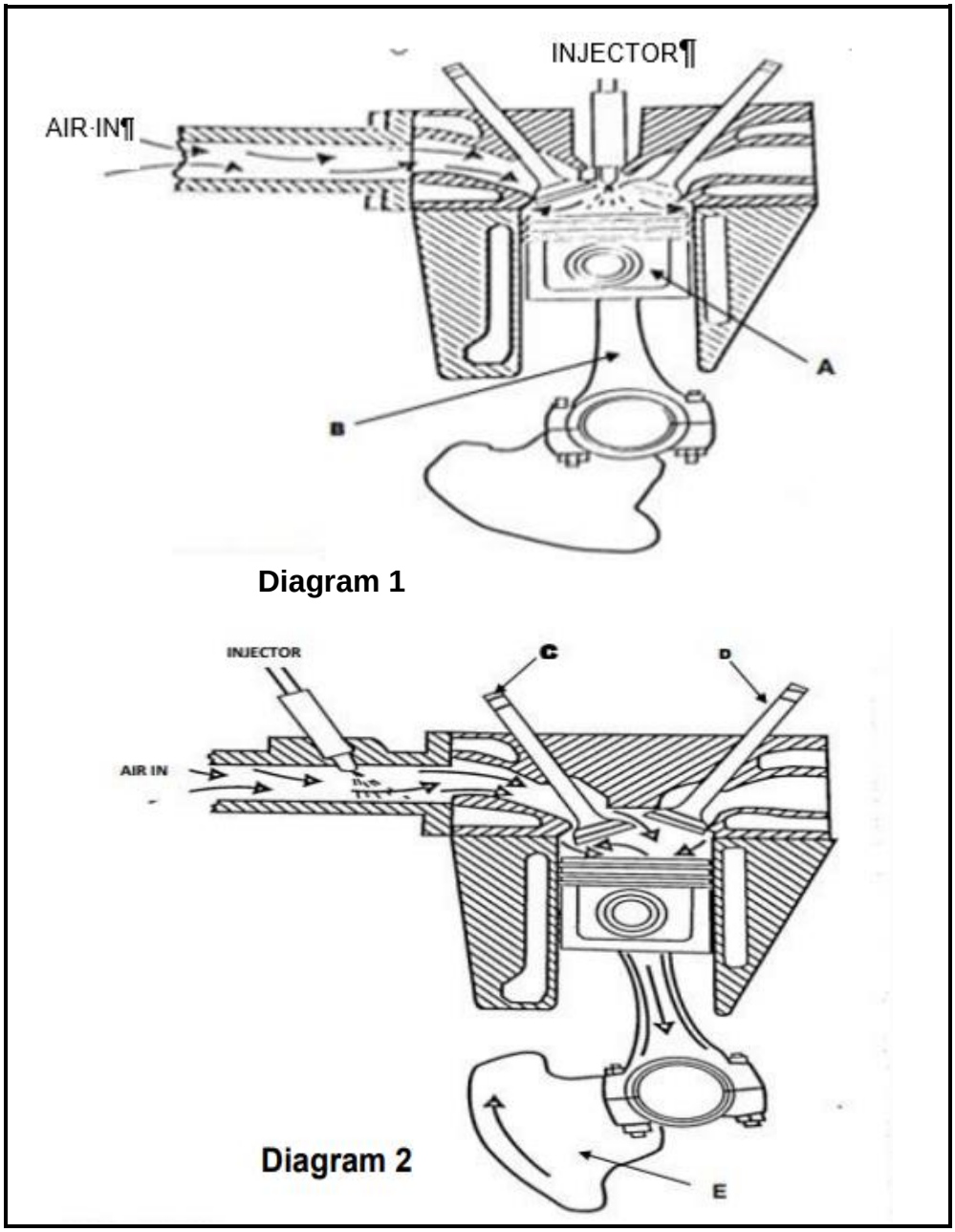

FIGURE 2

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4.2 Briefly explain FOUR requirements for an efficient injector. (4)

4.3 Name FOUR tests to be done on an injector nozzle. (4)

4.4 State whether the compression ignition engine uses octane or cetane fuel rating. (1)
[20]

QUESTION 5

5.1 Explain THREE advantages of constant-velocity joints as compared to Hooke's universal joint. (3)

5.2 State the function and disadvantage of a hand or park brake compensator. (2)

5.3 State THREE functions of a check valve in a hydraulic brake system. (3)

5.4 State FOUR advantages of a disc brake assembly over a drum brake. (4)

5.5 List any THREE components for each of the following types of brakes.

5.5.1 Drum brake

5.5.2 Disc brake

(2 × 3) (6)
[18]

TOTAL: 100

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