



higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE
DIESEL TRADE THEORY N3

(11041823)

14 April 2020 (X-paper)
09:00–12:00

This question paper consists of 7 pages.

241Q1A2014




DEPARTMENT OF HIGHER EDUCATION AND TRAINING
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DIESEL TRADE THEORY N3
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. Write neatly and legibly.
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QUESTION 1


Choose a term from COLUMN B that matches a description in COLUMN A. Write only the letter (A–L) next to the question number (1.1–1.10) in the ANSWER BOOK.


COLUMN A		COLUMN B
1.1	Damping unwanted spring movement caused by bumps in road	A rack and pinion
1.2	Maintaining chassis and body to stop vehicle from swaying when travelling	B hydra-gas suspension
1.3	Used mostly in steering system of light vehicles 	C vacuum servo unit
1.4	Angle of front wheels sloping slightly to the outside when viewed from the front	D handbrake
1.5	Distance between wheels viewed from closer together in front than behind or closer together from behind than in front	E shock absorbers
1.6	Keeps the vehicle moving straight ahead. Also found on supermarket trolleys	F toe-in or toe-out
1.7	Increases force applied to brake pedal	G stabiliser bar
1.8	Prevents stationary vehicle from rolling forward or backward	H caster 
1.9	Equalises applied force on handbrake cables 	I leave spring
1.10	Used inn an air brake system to deliver pressured air to brakes	J compressor
		K camber
		L compensator


(10 × 1)

[10]

QUESTION 2

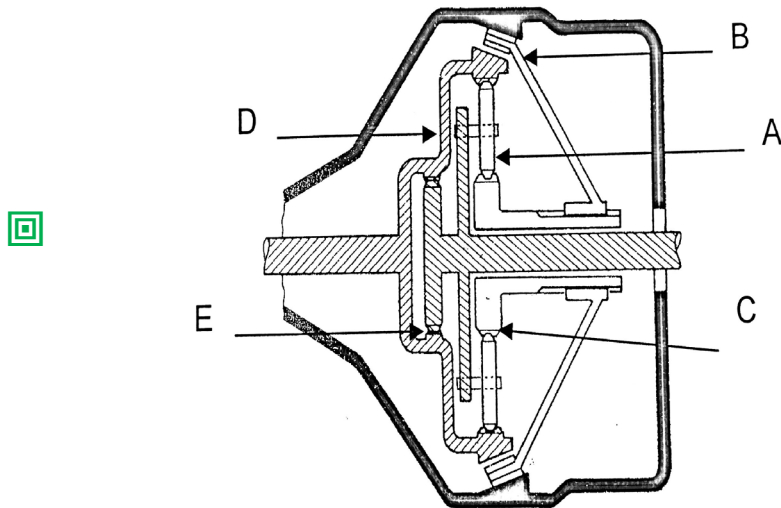
Indicate whether the following statements are TRUE or FALSE by writing only 'True' or 'False' next to the question number (2.1–2.10) in the ANSWER BOOK. 

- 2.1 Mechanical diesel injectors are activated by means of the camshaft from the engine to inject diesel into the combustion chamber of a diesel engine.
- 2.2 When testing injectors on a running one-cylinder diesel engine the injector inlet pipe can be loosened and if a misfire occurs the injector is still in working order.
- 2.3 The first test during servicing of an injector is the leak test.
- 2.4 The purpose of the heat absorbent insert block on a ricardo-type combustion chamber design is to cool the air to improve combustion.
- 2.5 A glow plug heats air in the combustion chamber for easier starting of an indirect injection-type diesel engine. 
- 2.6 The function of an injector is to deliver diesel to the combustion chamber.
- 2.7 A fuel filter is used to clean the air moving into the engine.
- 2.8 Pre-air filters are used to remove bigger dirt particles from the air.
- 2.9 The thickness of a copper washer fitted between the injector and the cylinder head is not important.
- 2.10 Gravity-feed diesel fuel systems do not need a fuel lift pump for correct operation.

 (10 × 1) **[10]**

QUESTION 3

3.1 FIGURE 1 shows a sectional sketch of an overdrive unit.

**FIGURE 1**

3.1.1 Identify the indicated parts by writing only the answer next to the letter (A–E) in the ANSWER BOOK. (5)

3.1.2 State whether the unit in FIGURE 1 is in overdrive and give a reason for your answer. (2)

3.1.3 Indicate the power flow through the overdrive by naming the parts in the correct order. (4)

3.2 Show each of the following drives by means of neat sketches:

3.2.1 Tandem drive

3.2.2 Four-wheel drive



(2 × 2) (4)

3.3 Give THREE advantages of a planetary gear set compared to a conventional gear set. (3)

3.4 Name TWO functions of a stator in a torque converter. (2)

[20]

QUESTION 4

- 4.1 Calculate the cylinder diameter of an engine with a compression ratio of 16:1, a stroke length of 105 mm and a clearance volume of 205 cm³.

Use the following formula:

$$Cr = \frac{V_s + V_c}{V_c} ; V_s = \frac{\pi d^2}{4} \times L_s ; N = 1 - \left[\frac{1}{R} \right]^{0.4} \quad (8)$$

- 4.2 Calculate the compression ratio of an engine with an air standard efficiency of 60%. (4)

- 4.3 Describe the FOUR mechanical defects that may cause a low compression pressure in a diesel engine. (4)

- 4.4 Show each of the following on a crankshaft by means of neat sketches:

4.4.1 Static balance

4.4.2 Dynamic balance

(2 × 2) (4)
[20]

QUESTION 5

- 5.1 FIGURE 2 shows a sectional view of a mechanical governor.

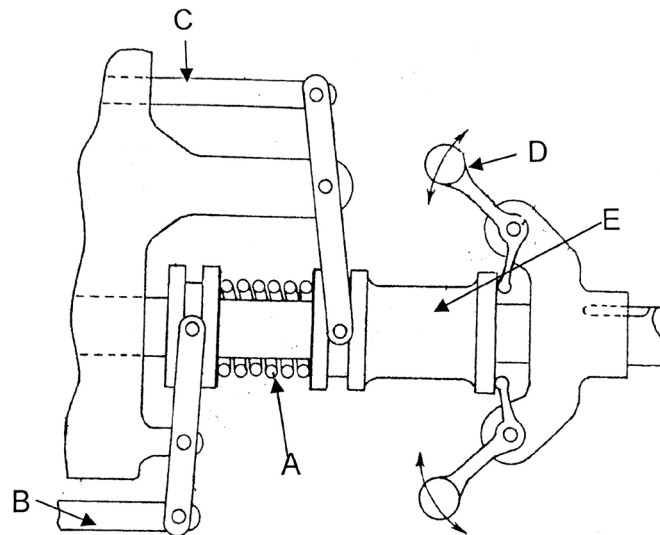





FIGURE 2

- 5.1.1 Identify the indicated parts by writing only the answer next to the letter (A–E) in the ANSWER BOOK. (5)
- 5.1.2 Describe the operation of the governor when the vehicle moves up a steep incline. (5)

- 5.2 Describe in detail how to calibrate an inline injection pump.  (6)
- 5.3 Name FOUR advantages of a torque converter compared to a fluid coupling. (4)
- [20]**

QUESTION 6

- 6.1 Inspection is a crucial component of any workshop process to minimise the number of vehicles returned owing to defective workmanship.
- Give FIVE functions of an inspection system in a workshop. (5)
- 6.2 State FIVE advantages of using a computer for the administration of a garage.  (5)
- 6.3 All tools and equipment of workshop should be recorded in an inventory.
- 6.3.1 Give FOUR entries that should be made in the inventory register for tools. (4)
- 6.3.2 How regularly should stock be checked? (1)
- 6.3.3 Briefly describe how you will go about taking stock of tools. (3)
- 6.4 Give TWO reasons why a job card should be completed by the receptionist or the manager.  (2)
- [20]**
- TOTAL: 100**