higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

AUTOMOTIVE REPAIR AND MAINTENANCE
NQF LEVEL 3

(6021033)

16 November 2022 (X-paper)
09:00–12:00

This question paper consists of 8 pages.

365Q1N2216

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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 question 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 given as possible answers to the following questions. Choose the answer and write only the letter (A–D) next to the question number (1.1.1–1.1.9) in the ANSWER BOOK.

1.1.1 When disassembling an engine, it is necessary to lay out parts neatly on the workbench …

A to inspect components in an orderly manner.
B to identify parts.
C Only A is correct.
D Both A and B are correct.

1.1.2 … is the approximate gear ratio for the first gear.

A 1,7 to 1
B 3,8 to 1
C 2,8 to 1
D 1 to 1

1.1.3 Lifting equipment used to remove an engine from a vehicle.

A Two-post hoist
B Four-post hoist
C Hydraulic trolley jack
D Standard engine hoist/crane.

1.1.4 One of the main functions of a gearbox is to …

A enable engine phases of operation.
B provide four strokes of an engine.
C allow lubrication.
D enable engine torque to be increased in stages.

1.1.5 The purpose of a differential on a vehicle is to ....

A allow the wheels of a vehicle to brake.
B deliver equal amounts of torque to each road wheel.
C synchronise the speed of the gear selected.
D support the weight of the wheels.

1.1.6 When a wheel is said to have a heavy spot it will cause the heavy spot to rotate to the bottom. This is called …

A static balance.
B dynamic balance.
C static imbalance.
D dynamic imbalance.

1.1.7 One of the machining processes that can be done on an engine block when it is sent to engineering.

A Re-bore the cylinder
B Check starter wiring and connections
C Check starter mounting brackets and bolts
D None of the above

1.1.8 One of the most important reasons for adjusting correct backlash between crown wheel gear and pinion gear of a final drive is …

A to allow for an oil clearance.
B to prevent damaging of the diff casing.
C for smooth adjustment of the differential casing.
D to ensure that the inner wheel covers the same distance as the outer wheel

1.1.9 One of the functions of a synchroniser unit.

A Allows drive-shafts to turn at different speed when cornering
B Provides permanent neutral by disconnecting engine from the gearbox
C Bringing two gears to the same speed before they are engaged
D Provides drive from prop-shaft through a 90° angle to the drive-shaft

(9 × 1) (9)

1.2 Indicate whether the following statements are TRUE or FALSE. Choose the answer and write only 'True' or 'False' next to the question number (1.2.1–1.2.7) in the ANSWER BOOK.

1.2.1 Planetary gears are mounted on the ring gear of a final drive.

1.2.2 Sliding/slip joint can operate through a larger angle, where large angle steering movements are required.

1.2.3 The rotation of the planetary gears allows the driving wheels of a vehicle to turn at different speeds.

1.2.4 A collapsible spacer should not be re used when re-assembling the final drive.

1.2.5 Front wheel drive vehicle requires one CV joint.

1.2.6 Back leakage in an injector nozzle is often caused by wear between needle valve and its holder.

1.2.7 In a Hotchkiss drive, the propeller shaft has a solid round cross section.

(7 × 1) (7)

[16]

QUESTION 2

2.1 Name any TWO types of springs used in a suspension system of a vehicle. (2)

2.2 State any TWO functions of a shock absorber. (2)

2.3 Define the following spring terminology:

2.3.1 Spring rate

2.3.2 Sprung weight

(2 x 2) (4)

2.4 List any THREE wheel alignment angles. (3)

2.5 Name any TWO types of steering gearboxes. (2)

2.6 List any FOUR pre-checks to be done on a wheel before starting with wheel balancing. (4)

2.7 FIGURE 1 below shows two hand tools used when balancing a wheel. Name the tools and their functions by writing the answer next to the questions number (2.7.1–2.7.2) in the ANSWER BOOK.

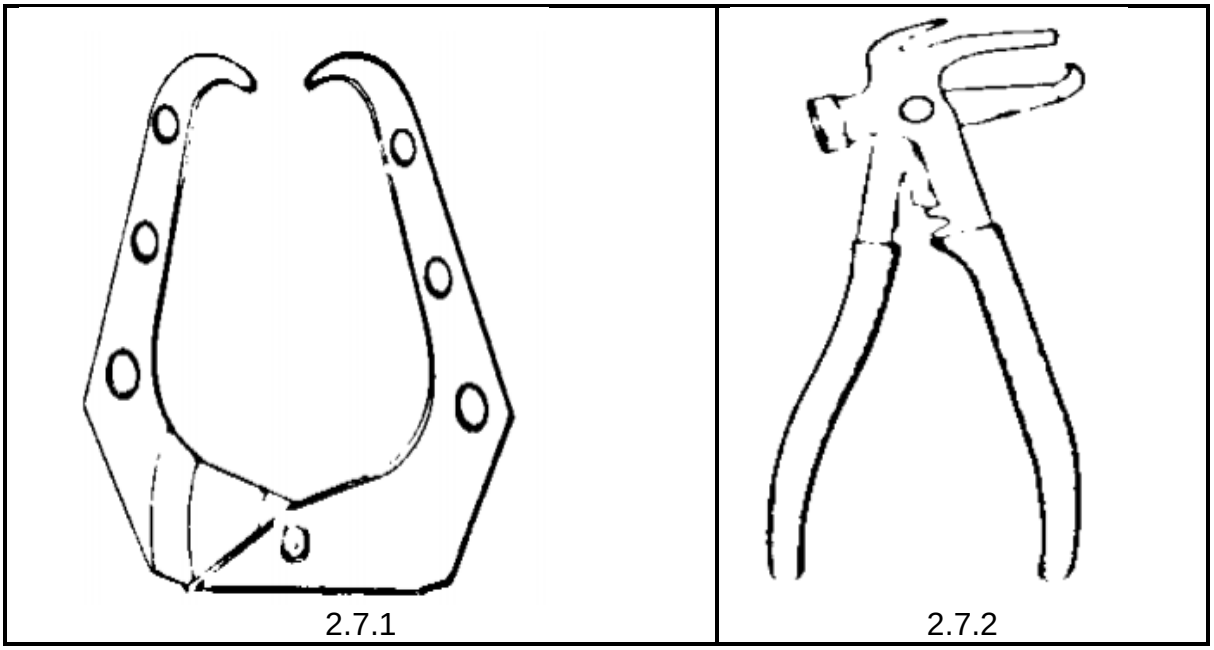

FIGURE 1

(2 × 2) (4)

2.8 Name TWO types of wheel weights that are used to balance wheels. (2)

[23]

QUESTION 3

3.1 State the function of the following alternator components:

3.1.1 Rectifier

3.1.2 Voltage regulator

(2 × 2) (4)

3.2 FIGURE 2 below shows a charging system diagram.

Name the parts indicated by writing the answer next to the letter (A–D) in the ANSWER BOOK.

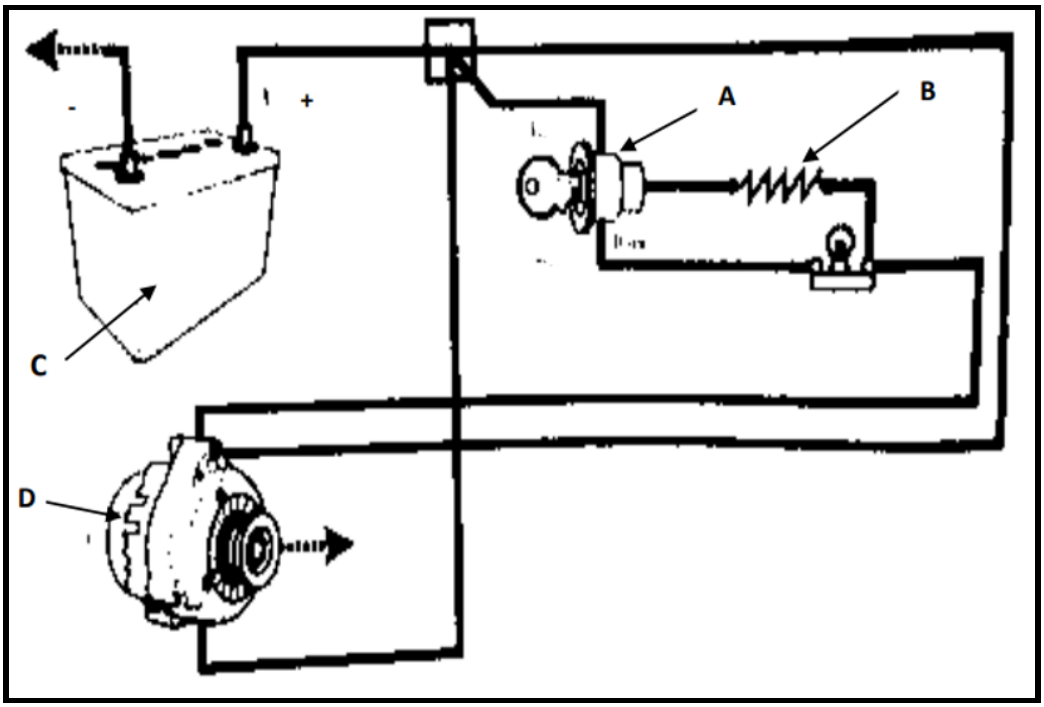

FIGURE 2 (4)

3.3 List SEVEN steps/procedures to be followed when removing a distributor assembly from an engine. (7)

3.4 Name FOUR tests that can be done on a starter motor. (4)

3.5 List ANY FIVE precautionary safety measures that must be adhered to when working on a starter motor. (5)

[24]

QUESTION 4

4.1 State the function for each of the following components of a brake system.

4.1.1 Hand/park brake compensator

4.1.2 Brake booster

(2 × 2) (4)

4.2 Explain why it is necessary to bleed a hydraulic brake system. (2)

4.3 FIGURE 3 below is a diagram of a braking system.

Name the parts indicated by writing the answer next to the letter (A–D) in the ANSWER BOOK.

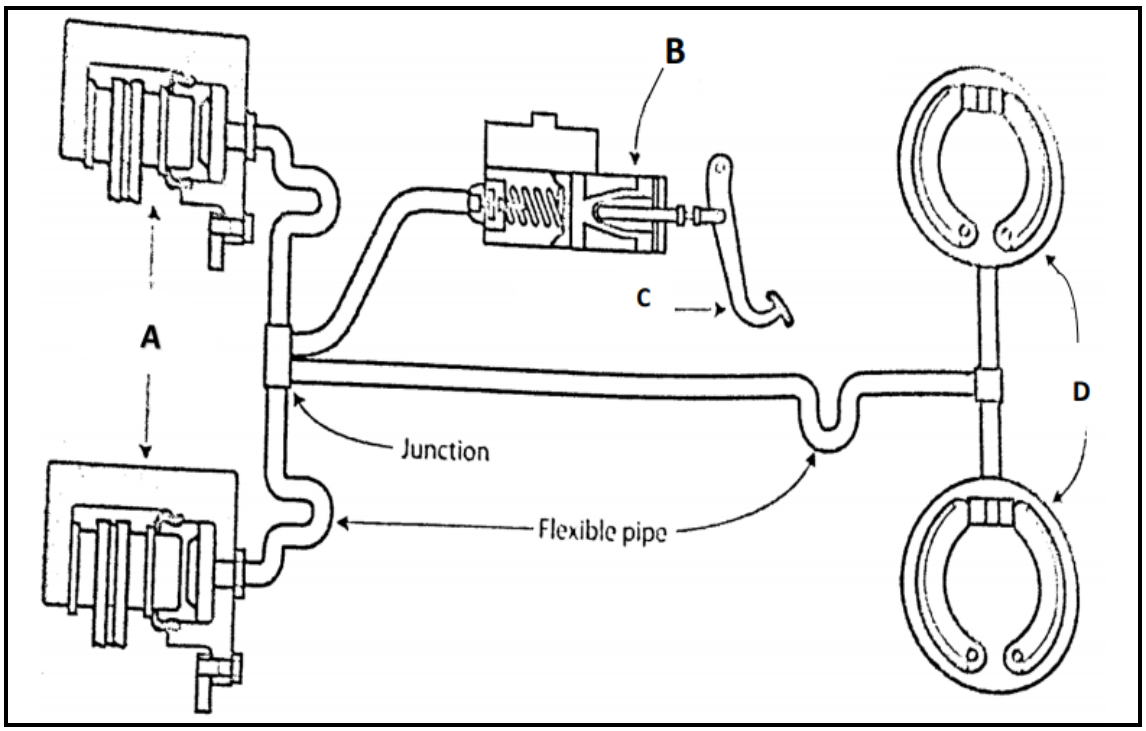

FIGURE 3

(4)
[10]

QUESTION 5

5.1 Define the following terms with regard to a diesel engine.

5.1.1 Diesel cloud point

5.1.2 Diesel knock

(2 × 2) (4)

5.2 Name any THREE fuel additives used in petrol and give a function of each additive. (3 × 2) (6)

5.3 Explain the procedure to follow when performing a compression test on an engine. (5)

5.4 State any THREE causes for a low engine compression ratio. (3)

5.5 List any FOUR precision measuring instruments that are used when measuring engine components. (4)

5.6 What should be checked when components are received back from machining/engineering? (5)

[27]

TOTAL: 100

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