higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

AUTOMOTIVE REPAIR AND MAINTENANCE
NQF LEVEL 3

(6021033)

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09:00–12:00

This question paper consists of 7 pages.

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DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA

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AUTOMOTIVE REPAIR AND MAINTENANCE
NQF LEVEL 3
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 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 Machining processes that can be done on an engine block when it is sent to engineering:

A Rebore the cylinder.
B Check the starter wiring and connections.
C Check the starter mounting brackets and bolts.
D Set the wheel alignment angle.

1.1.2 A diesel fuel additive commonly used is:

A Anti-freeze
B Diesel cloud point
C Swirl or turbulence
D Anti-foam

1.1.3 The angle formed between the steering axis inclination (SAI) and camber:

A Caster angle
B Ackermann's angle
C Camber angle
D Included angle

1.1.4 Type of braking calliper that uses two pistons:

A Floating calliper
B Drum brake
C Brake lining
D Fixed calliper

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

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

1.1.6 … is created when the heavy spot of a wheel rotates to the bottom.

A Static balance
B Dynamic balance
C Static imbalance
D Dynamic imbalance

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1.1.7 Angle that prevents the front wheels of a vehicle from slipping when the vehicle turns:

A Scrub radius
B Ackermann's angle
C Oversteer
D Camber angle

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

A To prevent the final drive gears from jamming
B To prevent damaging of the diff casing
C For smooth adjustment of the differential casing
D To ensure the inner wheel covers the same distance as the outer wheel

1.1.9 One of the functions of a synchroniser unit is to …

A allow drive shafts to turn at different speeds when cornering.
B provide permanent neutral by disconnecting the engine from the gearbox.
C bring two gears to the same speed before they are engaged.
D provide drive from the prop shaft through a 90° angle to the drive shaft.

(9 × 1) (9)

1.2 Indicate whether the following statements are TRUE or FALSE by writing only 'True' or 'False' next to the question number (1.2.1–1.2.6) in the ANSWER BOOK.

1.2.1 Back leakage in an injector is often tested when testing diesel fuel injectors.

1.2.2 A constant-velocity joint (CV joint) can operate through larger angles where large angle-steering movement is required.

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

1.2.4 The scrub radius is a combination of a caster angle and steering axis inclination, and it determines the point of intersection for the centre line of a wheel and the steering axis centre line.

1.2.5 Bleeding is a required process for the removal of air from a hydraulic braking system.

1.2.6 Spider gears are two conical gears mounted in the differential carrier of a final drive.

(6 × 1) (6)

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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 (1.3.1–1.3.5) in the ANSWER BOOK.

COLUMN A		COLUMN B	
1.3.1	Hand tool used to remove and install the wheel weight when balancing a wheel	A	side drive shaft
		B	combination hammer
1.3.2	Should not be reused in the differential	C	collapsible spacer
		D	thrust washer
1.3.3	Determines the remaining oxygen content in an exhaust emission pipe	E	lambda sensor
		F	mass airflow sensor
1.3.4	Contact between the crown wheel and pinion is too much to the heel rear end of the crown wheel teeth	G	noisy in operation
		H	glow plug
1.3.5	Device used to aid diesel engine starting during cold weather	I	spark plug

(5 × 1) (5)
[20]

QUESTION 2

2.1 Briefly explain EACH of the following types of suspension systems and give one example of where it could be used:

2.1.1 Independent suspension

2.1.2 Dependant suspension

(2 × 3) (6)

2.2 List FOUR prechecks that must be done on a wheel before it can be balanced. (4)

2.3 List FOUR negative effects that will result from an imbalanced front wheel. (4)

2.4 Which FOUR pieces of information must be loaded into a wheel-balancing machine's computer storage system before the wheel-balancing task can begin? (4)

2.5 Make a neat, labelled sketch to illustrate a positive camber angle. (5)
[23]

QUESTION 3

3.1 State the function or purpose of each of the following alternator components:

3.1.1 Stator

3.1.2 Rectifier

3.1.3 Voltage regulator

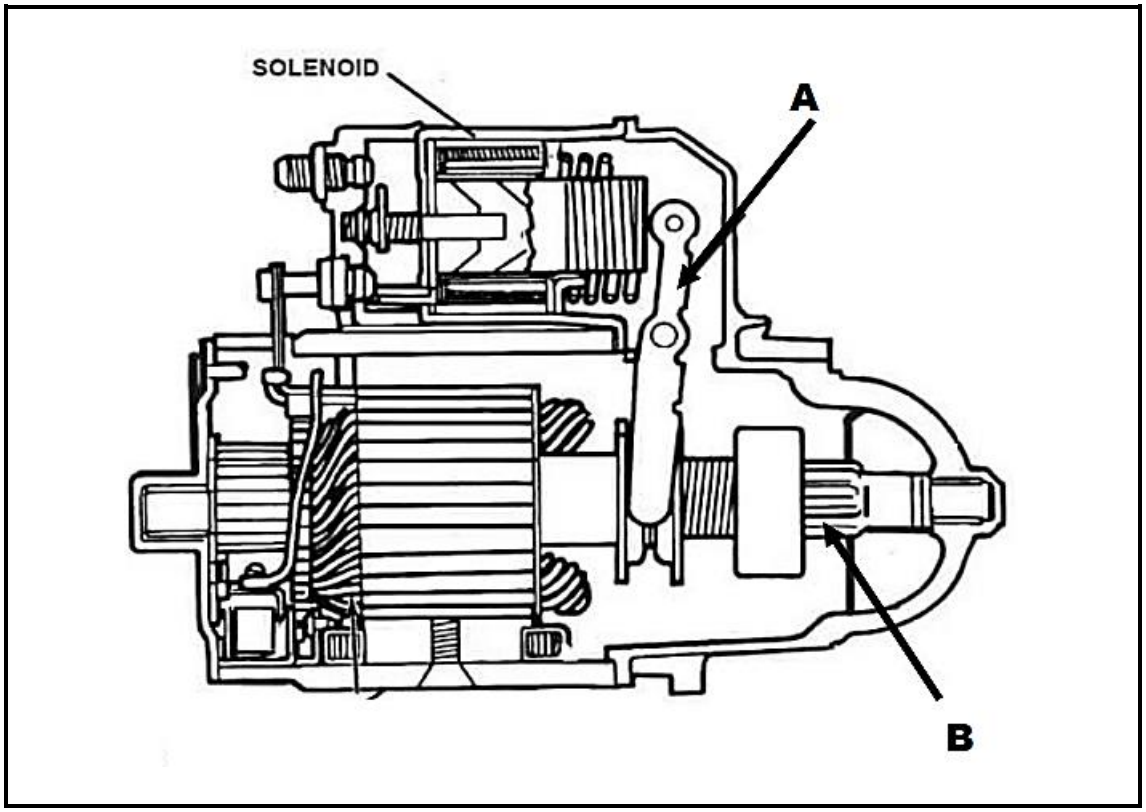
(3 × 2) (6)

3.2 Explain how to measure the charging voltage of an alternator in a vehicle. (4)

3.3 List FOUR components of a primary circuit for an ignition system. (4)

3.4 List FIVE steps/procedures to follow when removing a starter motor from a vehicle. (5)

3.5 The figure below shows a starter motor.



3.5.1 Name the parts labelled A and B. (2)

3.5.2 Explain the operation of a starter motor from the point the solenoid is activated until part B engages with the ring gear of the flywheel. (4)

[25]

QUESTION 4

4.1 List THREE tests that can be done to test for a faulty injector. (3)

4.2 Give THREE possible causes of a diesel engine producing excessive white smoke. (3)

4.3 Which FOUR safety precautions must be adhered to when working on diesel fuel-injection components? (4)

4.4 Give THREE reasons for a low engine compression pressure. (3)

4.5 Name FOUR precision measuring instruments used to measure engine components. (4)

4.6 What should be checked when a component is received back from machining/ engineering? (5)

[22]

QUESTION 5

5.1 Give a reason why a motor vehicle is equipped with brakes. (1)

5.2 List THREE characteristics of a good brake fluid. (3)

5.3 Give THREE causes of EACH of the following hydraulic brake system problems:

5.3.1 Spongy brake pedal

5.3.2 Brake squealing

(2 × 3) (6)

[10]

TOTAL: 100

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