higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

NATIONAL CERTIFICATE (VOCATIONAL)

AUTOMOTIVE REPAIR AND MAINTENANCE
NQF LEVEL 4

(6021034)

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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 4
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. Formula $$V = \frac{\pi}{4} \times d^2 \times h$$
7. Write neatly and legibly.

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QUESTION 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 (1.1–1.10) in the ANSWER BOOK.

1.1 The compression ratio of a diesel engine is normally between …

A 10:1 and 15:1.
B 5:1 and 10:1.
C 14:1 and 22:1.
D 25:1 and 30:1.

1.2 Torque convertor oil flows in … direction(s).

A one
B two
C three
D four

1.3 Which one of the components is not re-usable in a differential?

A Crown wheel
B Pinion flange
C Bearing cap
D Collapsible spacer

1.4 Which one of the following is not a recommended question to ask a customer as part of diagnosing reduction type differentials?

A Is it only noisy in turns?
B What is the engine RPM?
C When does the noise occur?
D Is it noisy on acceleration or deceleration?

1.5 While inspecting the EFI system, which of the following is an unnecessary inspection?

A Fuel leaks
B Kinked fuel lines
C Vacuum leaks
D Washer leaks

1.6 Which one is not the correct installation procedure of an injector?

A Remove the old O-ring from the connector pipe-end of the injector.
B Install the new O-ring taking care not to stretch or tear it.
C Lubricate the new O-ring with engine oil or some brake fluid.
D Align the delivery pipe and insert it straight onto the injector.

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1.7 Which one of the components below is not a hydraulic power steering component?

A Sector unit
B Multiplying lever
C Control valve
D Torque sensor

1.8 Identify the test not recommended to perform when working on advanced electronic circuits.

A Light drop test
B Vibrate slightly
C Swing slightly
D External heating

1.9 Which one is not a type of air-conditioner gas?

A CHC
B HFC
C CFC
D HCFC

1.10 Which one of the following is not a safety rule when working with EVs?

A Demarcate the work-bay for EV.
B Remove the key from the ignition.
C Disconnect the negative of the aux battery.
D Remove the service plug and put in your pocket.

(10 × 1) **[10]**

QUESTION 2

Indicate whether the following statements are TRUE or FALSE writing only 'True' or 'False' next to the question number (2.1–2.5) in the ANSWER BOOK.

2.1 The drive side of a gear tooth is also called the convex side of the tooth.

2.2 You can feel for fuel leaks on diesel fuel injector lines as it is oily.

2.3 Most adaptive headlight systems can turn the headlights up to 5 degrees per side.

2.4 A technician/mechanic has to be certified to work on an EV.

2.5 The best seat position for a driver of a vehicle is with their arms slightly bent when holding the steering wheel.

(5 × 1) **[5]**

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QUESTION 3

Choose a term from COLUMN B that matches a description in COLUMN A. Write only the letter (A–K) next to the question number (3.1–3.10) in the ANSWER BOOK.

COLUMN A		COLUMN B	
3.1	OBD	A	change power flow 90^0
3.2	Coefficient of friction	B	allows wheels on same axle to rotate at different speeds
3.3	Analogue signal	C	a measurement of the friction between a tyre and road
3.4	Final drive	D	vehicle occupant-restraint system designed to inflate extremely quickly
3.5	EP120	E	detects if a loss of grip occurs among the car's wheels
3.6	Airbag	F	one that continually changes strength
3.7	Pre-load	G	adjustment to eliminate any semblance or losses
3.8	differential	H	lubricant used in final drives
3.9	Traction control system	I	detects if all wheels are on the vehicle
3.10	Safety Assist Technology	J	driver assist technologies, to avoid accidents and mitigate injuries
		K	Vehicle computer that diagnosis problems on the vehicle

(10 × 1) **[10]**

QUESTION 4

4.1 There are internationally recognised safety regulations when building and working on EVs. Name any FOUR of these regulations. (4)

4.2 Make a freehand drawing to illustrate the fillet radius on a crankshaft. (4)

4.3 Compare the SI engines ignition system to that of a CI engine. (6)

4.4 A cylinder has a diameter of 65 mm and a height of 74 mm. Calculate the volume of the cylinder in cm^3. (4)

4.5 FIGURE 1 shows the components of an automatic gearbox hydraulic pressure flow chart. Name the components (1–8) in FIGURE 1 and write only the number and answer in the ANSWER BOOK. (8)

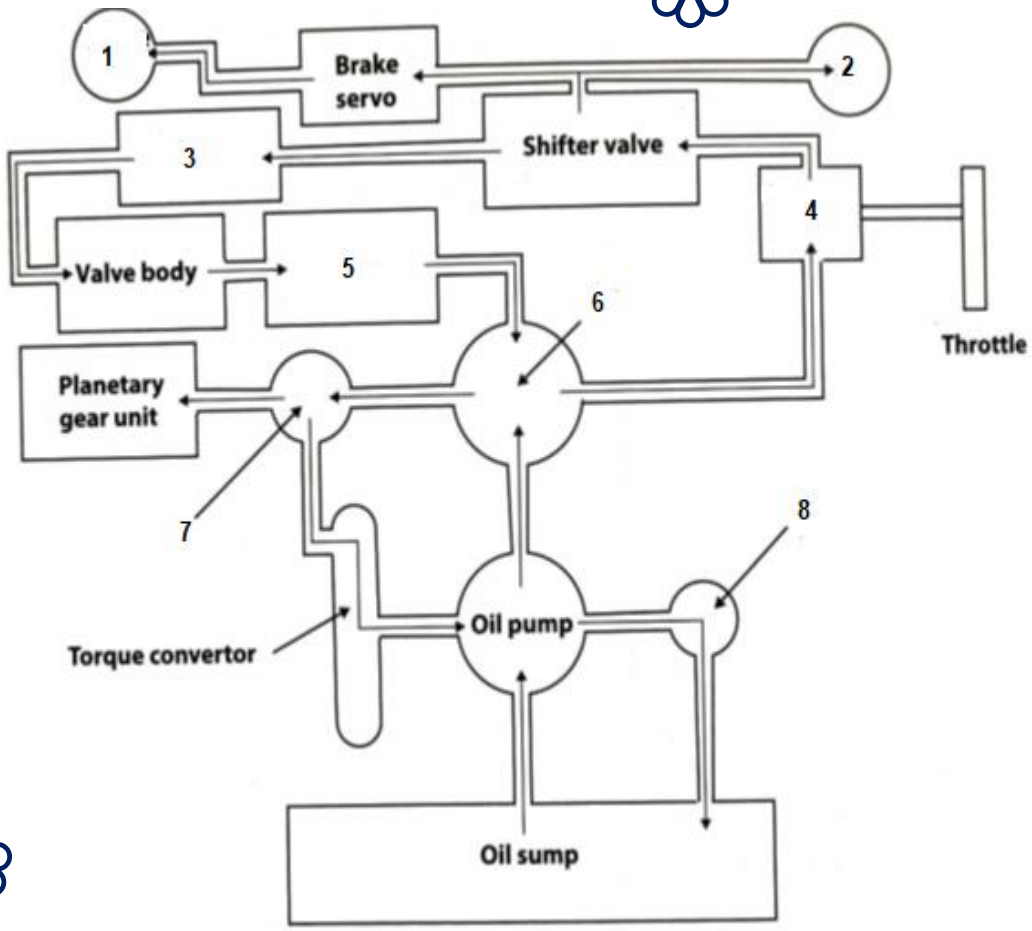

FIGURE 1

4.6 An automatic gearbox oil filling has a cold and hot filling level. What are the cold and hot temperature ranges in degrees Celsius? (2)

[28]

QUESTION 5

5.1 State, in the correct sequence, the power flow in a two-speed double-reduction final drive when selected in low-speed reduction? (5)

5.2 What does CO stand for as part of the fuel system, and explain what CO is. (2)

5.3 Describe how to adjust the EFI system for the fuel setting defined in QUESTION 5.2. (8)

5.4 Describe the working principal of a rotating injector pump. (10)

[25]

QUESTION 6

6.1	List and describe the FOUR methods used to detect a leakage on an AC system. (4 × 2)	(8)
6.2	List the THREE main components of TCS (Traction Control System).	(3)
6.3	Name the TWO types of HBA (Hydraulic Brake Assist) systems available.	(2)
6.4	How are airbags classified by international standards?	(2)
6.5	List SEVEN relevant tools and components that are used to construct circuits of advanced electronic systems	(7)
		[22]
	TOTAL:	**100**

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