higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

DIESEL TRADE THEORY N2

21 November 2022

This marking guideline consists of 6 pages.

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QUESTION 1

1.1	1.1.1	B		
	1.1.2	B		
	1.1.3	C		
	1.1.4	C		
	1.1.5	B		
	1.1.6	C		
	1.1.7	B		
	1.1.8	D		
	1.1.9	B		
	1.1.10	C		
			(10 × 1)	(10)
1.2	1.2.1	True		
	1.2.2	True		
	1.2.3	False		
	1.2.4	False		
	1.2.5	False		
	1.2.6	False		
	1.2.7	False		
	1.2.8	False		
	1.2.9	True		
	1.2.10	False		
			(10 × 1)	(10)
				[20]

QUESTION 2

2.1
- Easy starting
- High thermal efficiency
- Low fuel consumption
- Less heat loss occurs
- Glow plugs are not required for cold starting (Any 4 × 1) (4)

2.2 2.2.1 A lift pump transfers fuel from the tank to the fuel inlet connection on the injector pump.

2.2.2 Glow plugs heat the air in pre-combustion chambers to help start a cold diesel engine.

2.2.3 Leak-off pipes allow carefully controlled fuel seepage between the injector nozzle and needle to provide lubricants for the sliding pair.

(3 × 1) (3)

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2.3
- Must be clean, no dust and spillages are allowed.
- Due to fine tolerances of equipment and parts, a constant temperature must be maintained.
- Due to diesel fuel that may cause fire hazards extractor fans must be used.
- Care must be taken when handling or storing fuel. Remember that diesel oil is slippery also do not smoke in the test room.
- The test room must be equipped with the correct tools and care must be taken that testing equipment are calibrated as specified.
- Must have good lighting. (Any 5 × 1) (5)

2.4 2.4.1 A slip joint allows for the change in length of the propeller shaft

2.4.2 Hooke's type universal joint transmits drive through varying angles. (2 × 1) (2)

2.5
- To reduce vibration at high revolutions
- Reduce the risk of sagging and whipping at high speed
- To maintain the same torsional circumferential stress per length (Any 2 × 1) (2)

2.6
- Smoother operation with less vibration and kickback at the steering wheel
- Can operate through larger range of angles
- Inner CV joints are like slip joints
- Protected from dirt and water by rubber boots (4)

[20]

QUESTION 3

3.1
- To ensure that the vehicle can be handled safely at high speeds
- To minimize excessive tyre wear
- To obtain maximum fuel economy
- For good road holding and safety when driving the vehicle
- To reduce hard steering, steering wandering, noise and pulling to one side (Any 3 × 1) (3)

3.2
- Steering linkages for damage or wear
- Suspension and chassis for damage
- Spring/suspension height
- Inspect tyres for wear or damage
- Tyres should be inflated to specifications
- Steering box free play and mounting bolts
- Wheel bearing free play (Any other relevant answers) (5 × 1) (5)

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3.3
- It keeps pressure in the brake pipes to prevent the entry of air and dirt into the brake system.
- It keeps the pedal free travel to a minimum.
- It keeps the wheel cylinder seal lips in light contact with the cylinder bore to avoid entry of air or leakage past the seals.
- It prevents the re-entry into the master cylinder of fluid pumped into the
- line during the bleeding operation. (Any 2 × 1) (2)

3.4
- The hydraulic systems for rear and front wheels are completely separated.
- Failure or leakage in the front system will not affect the rear system and vice versa.
- Failure of either the front or rear system will quickly be noticed by the driver due to the fact that there will be a sudden increase in the brake pedal travel required to apply the brakes.
- Two separate master cylinder circuits replaced together and is operated by a common push rod and foot pedal. (Any four relevant answers) (4)

3.5 3.5.1
- Broken line, hose or other leak
- Air in the system
- Low fluid level in the master cylinder
- Seal or piston damage (Any 2 × 1)

3.5.2
- Over-adjusted parking brake
- Master cylinder problem
- Brake fluid contamination
- Master cylinder reservoir cap vent clogged (Any 2 × 1)

3.5.3
- Air in the system
- Shoes not cantered in drum
- Soft hose
- Brake drums cracked, worm or too thin (Any 2 × 1)

(3 × 2) (6)

[20]

QUESTION 4

4.1
A Selector fork groove
B Main shaft/output shaft
C Outer sleeve
D Gear wheel outer cone/friction cone
E Input shaft
F Dog teeth

(6 × 1) (6)

4.2 During the first part of gear engagement, the selector fork moves the complete synchromesh hub towards the selected gear.✓ The first contact is made by the internal cone of the hub and the external cone of the selected gear.✓ The friction between them matches the speed of the hub and the free moving gear in a few moments.✓ Further movement of the gear lever overcomes the detent and slides the sleeve on its splines towards the gear.✓ The splines on the sleeve slide over the dog teeth on the selected gear, locking it to gear to the output shaft.✓ (5)

4.3 When a vehicle negotiates a curve or corner the distances travelled by the inner and outer wheels will be different.✓ As a result, the rolling resistance and the speed of each wheel are different:✓ the inner road wheel has high resistance and the outer road wheel must speed up.✓ Consequently, the differential housing driven by the engine begins to wind itself around the inner sun wheel. The planet gears are made to rotate and in so doing they also turn the outer sun gear at a faster speed.✓ The same amount of torque is transmitted to each wheel.✓ (5)

4.4
A Differential housing/cage/carrier
B Planetary gear/spider gear
C Cross pin/cross shaft
D Sun gear/side shaft gear (4 × 1) (4)

[20]

QUESTION 5

5.1
- Light in weight
- Maintenance free
- Provides a softer ride
- Do not induce self-steering when a hump is encountered
- Coil springs are versatile – there are a variety of coil springs for different purposes
- Can be used on independent suspension systems
- Takes up less space
- No friction between the spirals (Any 2 × 1) (2)

5.2 5.2.1
- Centre bolt holds the leaves of the spring together
- Secures the leaf spring to the axle

5.2.2
- A swinging shackle allows for the change in length of the leaf spring.
- Allows forward movement for the chassis during brake application.

5.2.3
- Rebound clips keep the leaves in alignment during rebound.
- Distributes the load during rebound and hence protects the main leaf from breaking.

(3 × 2) (6)

5.3 5.3.1 Is when the vehicle turns more sharply than normal.

5.3.2 Occurs when the front slip angles are greater than the rear causing the vehicle to take a long radius to turn.

(2 × 1) (2)

5.4 5.4.1 When out of balance, weights are evenly distributed about the axis of rotation✓ in a single plane so that the wheel will come to rest in any position.✓

5.4.2 Occurs when all centrifugal forces acting✓ on unbalanced weights cancel out during rotation.✓

(2 × 2) (4)

5.5 5.5.1
- Design is simple
- Manufacturing costs are low
- Assembly has low mass (Any 2 × 1) (2)

5.5.2
- The hub can carry a large mass
- Axle shaft carries no mass
- Axle shaft can be removed without removing the wheel
- If the axle is broken the vehicle can still be towed on all wheels

(Any 2 × 1) (2)

5.5.3
- Axle drives and retains the wheel
- Axle housing supports the load of the wheel through a bearing (2)

[20]

TOTAL: 100

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