higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

DIESEL TRADE THEORY N2

6 April 2020

This marking guideline consists of 6 pages.

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QUESTION 1

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

QUESTION 2

2.1
- Mechanical efficiency is high
- Relatively cheap to manufacture
- Reduced side thrust (Any 2 × 1) (2)

2.2
- Gears are more expensive to manufacture.
- Gears cannot be slid into mesh easily.
- Thrust bearings have to be fitted because of side thrust.
- Gears have less resistance to corrosion. (Any 3 × 1) (3)

2.3
- Input shaft
- Cluster shaft/gear
- Second gear
- Synchrocone
- Synchrohub
- Output/main shaft (6)

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2.4
- When a car makes a turn, the outer wheel has to turn faster than the inner wheel, due to the difference in the length of the paths they take.
- The pinion drives the crown wheel and carrier that are bolted together.
- The carrier is rotating the differential cross pin in a tumbling action and the planetary gears fit on this cross pin thus can turn on the cross pin.
- The planetary gears are meshing with the sun gears that are connected with splines to the side shafts.
- When moving straight ahead, the pinion drives the crown wheel, carrier and cross pin while the cross pin tumbles the planetary gears thus driving the sun gears
- thus the planetary gears and sun gears will not rotate into each other but will rotate the side shafts at equal revolutions in the same direction. (6)

2.5
- Power goes to the wheel of least resistance
- therefore if one wheel is in loose gravel or mud
- the power will go to that wheel causing it to spin and the vehicle will be stuck. (3)

[20]

QUESTION 3

3.1
- Smoother in operation with less vibration and kickback at steering.
- CV joints can operate through larger range of angles.
- Inner CV joints are like slip joints.
- Protected from dirt and water. Keeps grease in. (Any 3 × 1) (3)

3.2
- Semifloating axle unit
- Three-quarter floating unit
- Full-floating axle unit (3)

3.3 Hotchkiss drive
- Propeller shaft solid
- Universal joints protect from dirt/water
- Greater bending loads as it takes load

Torque tube drive
- Propeller shaft is hollow
- U joints are exposed
- Transmit torque only, no loads

(6)

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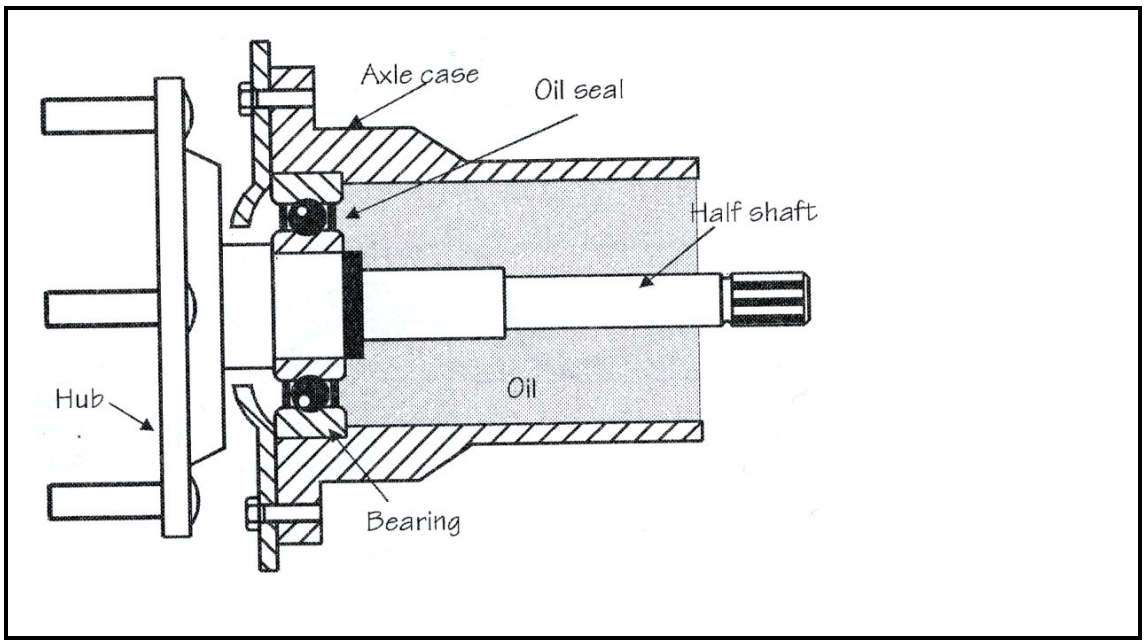
3.4



(6)

3.5
- It prevents one wheel from slipping by transferring the torque
- from the wheel of most resistance to the one of least resistance. (2)

[20]

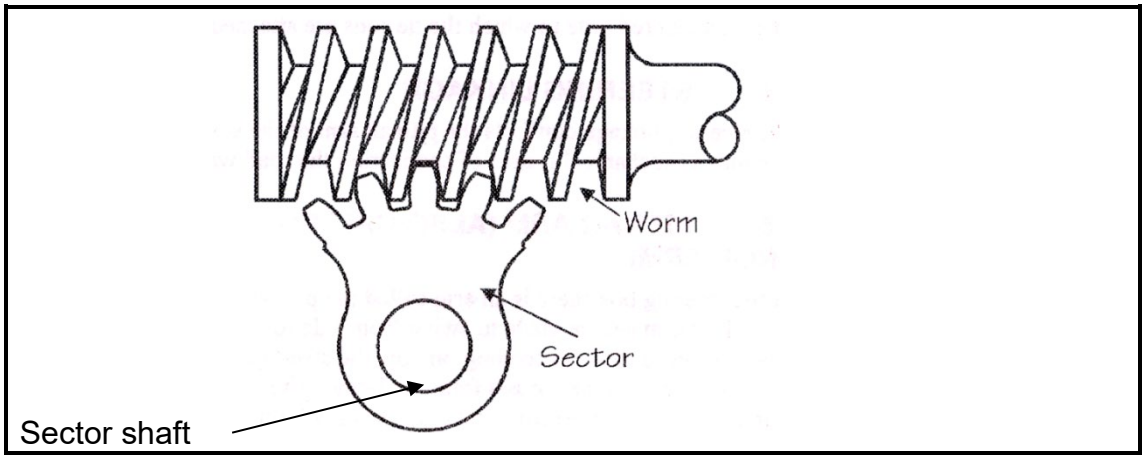
QUESTION 4

4.1
- Provides precise control of front wheel direction.
- Maintains the correct effort needed to turn the front wheels.
- Transmits road feel to the driver's hands.
- Absorbs most of the shock going to the steering wheel.
- Allows for suspension action to take place. (Any 3 × 1) (3)

4.2
- Helps provide steering stability.
- Reduces steering effort and tyre wear. (2)

4.3
- Relatively cheap to manufacture and maintain.
- Simple connection to axle and body.
- Can be easily up-rated by addition of leaves. (3)

4.4



(5)

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4.5
- Steering linkages for damage or wear
- Suspension and chassis for damage
- Spring/suspension height
- Steering box free play and mounting bolts
- Wheel bearing free play (Any 4 × 1) (4)

4.6
- Steering gear worn out
- Steering linkage ball joints loose or worn
- Pitman arm loose on rocker shaft
- Steering box mounting bolts loose (Any 2 × 1) (2)

4.7 Kerb mass is the full operating mass of the vehicle with all fluids topped to specification, but without any passengers in the vehicle. (1)
[20]

QUESTION 5

5.1
- It has a longer life
- It is reliable
- It has a small fire hazard
- Lower fuel consumption
- Less maintenance costs
- No radio interference
- Higher thermal efficiency (Any 4 × 1) (4)

5.2
- The in-line injector pump
- The distributor single-element pump (2)

5.3 When the engine is cold the driver turns on the ignition key to switch to the 'on' position. A large current flows from the battery to the glow plugs. In a few seconds the glow plug tips will heat to a dull, red glow. The glow plug control circuit automatically turns the glow plug off after a few seconds of operation.
When the engine is hot, a sensor checks the temperature of the engine coolant and sends this electrical data to the control unit. If the engine is already warm, the control unit will not turn the glow plugs on. (4)

5.4
- To regulate the maximum injection pump gallery fuel pressure
- To relieve operating loads on certain types of lift pump
- To provide continuous fuel circulation and therefore relieve the line pressure
- To clear the system of any air trapped and so prevent air locks from building up in the fuel system (Any 3 × 1) (3)

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5.5
- Greater heat dissipation
- Cleaner disc surface as centrifugal forces throw out dirt
- Self-adjusting
- Simple construction
- Easy to service (Any 3 × 1) (3)

5.6 The function of the compensator is to allow each wheel actuator to receive an equal pull force. (1)

5.7
- The check valve system has to maintain a standing pressure in the system.
- It prevents air or dirt from getting into the brake system.
- It keeps pedal free play to a minimum.
- It keeps seals in light contact with bore surfaces to avoid leakage or air entry. It prevents fluid from re-entry when bleeding the brakes. (Any 3 × 1) (3)

[20]

TOTAL: 100

NB: Other possible answers to questions are acceptable.

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