



**higher education
& training**

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE

MOTOR TRADE THEORY N3

31 JULY 2018

This marking guideline consists of 6 pages.

QUESTION 1

- 1.1
- Sequence of servicing is in ascending order and will be easy to advise on any query.
 - If a complaint is received and the job number quoted, the original copy is easily located.
 - Easy to check if all jobs have been charged for. (3 × 1) (3)
- 1.2
- Bring the customer to a level where she/he can be reasoned with by being a good listener.
 - Obtain all the facts about the work from records such as job cards, invoices, et cetera.
 - Apply quality control checks to the car to ascertain the nature of the complaint.
 - Determine what could be done to satisfy the customer and do so immediately.
 - Follow up the completed work by contacting the customer in two or three weeks' time. (5 × 1) (5)
- 1.3
- Cleanliness
 - Lighting
 - Change rooms
 - Floor space and ventilation
 - Protective clothing and appliances
 - Drinking water
 - First aid (Any 5 × 1) (5)
- 1.4
- 1.4.1
- $$N = 1 - \left(\frac{1}{r}\right)^{0,4}$$
- $$0,63 = 1 - \left(\frac{1}{r}\right)^{0,4} \checkmark$$
- $$0,63 - 1 = - \left(\frac{1}{r}\right)^{0,4} \checkmark$$
- $$0,37 = \left(\frac{1}{r}\right)^{0,4} \checkmark$$
- $$R = 12,009 : 1 \checkmark \quad (4)$$
- 1.4.2
- $$V_s = \frac{\pi d^2}{4} \times SL$$
- $$= \frac{\pi \times (9,5)^2}{4} \times 8,8 \checkmark$$
- $$= 623,763 \text{ cm}^3 \checkmark \quad (2)$$
- 1.4.3
- $$V_c = \frac{V_s}{CR-1} \checkmark$$
- $$= \frac{623,763}{12,009-1} \checkmark$$
- $$= 56,659 \text{ cm}^3 \checkmark \quad (3)$$

- | | | | |
|-----|--|---------|--------------------|
| 1.5 | <ul style="list-style-type: none"> • Emitter • Base • Collector | (3 × 1) | (3)
[25] |
|-----|--|---------|--------------------|

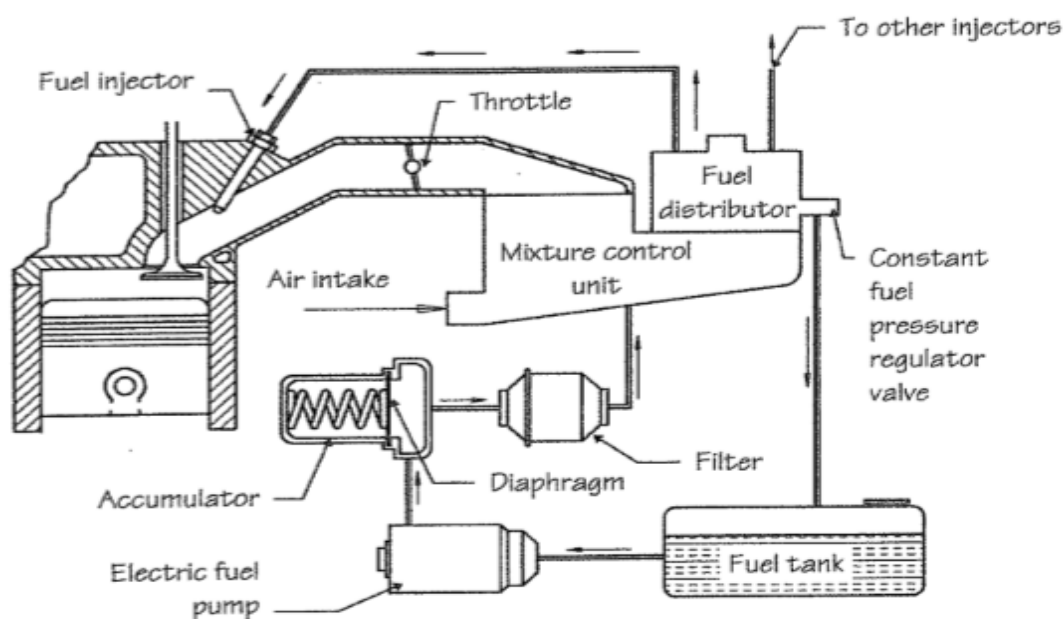
QUESTION 2

- | | | | |
|-----|--|---|-----|
| 2.1 | It is used to transmit a drive in one direction only. | | (2) |
| 2.2 | 2.2.1 | <p>A – Direction of freewheel
 B – Direction of drive
 C – Spring
 D – Drive drum
 E – Roller
 F – Drive shaft</p> <p>(6 × 1)</p> | (6) |
| | 2.2.2 | <p>When the gearbox main shaft turns the inner member in one direction, the rollers are forced towards the narrow section and a wedging action is produced to transmit positive drive to the outer member and output shaft.✓✓</p> <p>When the accelerator pedal is released, there will be over-run conditions which will rotate the outer member in a clockwise direction and unwedge the rollers.✓✓</p> | (4) |
| 2.3 | <ul style="list-style-type: none"> • The pump✓ is an integral part of the torque converter housing which is bolted to the crankshaft and therefore turns when the engine turns.✓ • The turbine✓ is not connected to any member in the torque converter but will turn through the centrifugal force of the oil thrown onto its vanes.✓ • The stator✓ is attached to a hub around which it can turn in one direction only. It changes the direction of the oil leaving the turbine so that it enters the pump in the same direction that the pump is turning.✓ <p>(3 × 2)</p> | | (6) |
| 2.4 | <ul style="list-style-type: none"> • Pulling off and accelerating can be done more smoothly. • There is no strain on the engine, as the connection between the engine and the propeller shaft is made by fluid, which allows for slip. • Clutch pedal has been eliminated and there is no necessity for bothersome gear shifting. • Engine overload is prevented at low speed. <p>(4 × 1)</p> | | (4) |
| 2.5 | <ul style="list-style-type: none"> • In the fluid coupling no special provision has to be made to circulate the oil through a cooler because less heat is generated in the fluid coupling. • The fluid coupling is simple in design, reducing manufacturing costs. • Very little maintenance on the fluid coupling is necessary. <p>(3 × 1)</p> | | (3) |
- [25]

QUESTION 3

- 3.1 An electric pump supplies the injectors with petrol at a constant pressure.✓
 An electronic control unit is used to determine the amount of petrol that must be injected according to engine speed and engine load conditions.✓
 The electronic control system is activated by electronic impulses supplied by a number of sensors.✓ These sensors supply electronic information on the engine speed, inlet manifold depression, engine temperature, et cetera to the control unit.✓ The control unit processes these instructions and gives an instruction of its own to the electromagnetically operated injectors to admit fuel into the inlet port.✓ The injector remains open for a longer or shorter period in a time measured system according to the signal it receives.✓ (6)

3.2



SKETCH = 4
 LABELS = $(12 \times \frac{1}{2}) = 6$ (10)

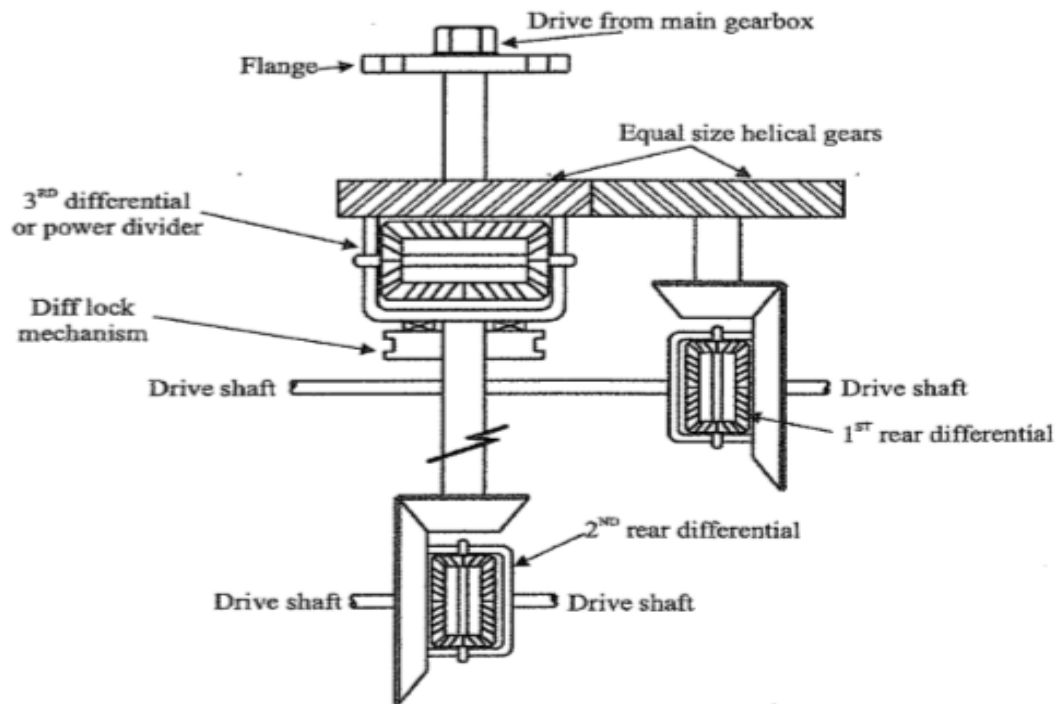
- 3.3
- Reduces the required number of steering wheel turns from lock to lock
 - Lessens kickback at the steering wheel
 - Minimises driver fatigue (3 × 1) (3)
- 3.4
- Power from the engine is required to drive the power steering oil pump
 - A broken drive belt will make the steering very heavy
 - Power steering often becomes light at high speeds with not enough feel at the steering wheel
 - Increased weight and cost (Any 3 × 1) (3)
- 3.5
- Dirty fluid
 - Air in the system
 - Low fluid level
 - Loose belt (Any 3 × 1) (3)

[25]

QUESTION 4

- 4.1
- Constant acceleration cam
 - Convex or spherical cam
 - Tangent cam
- (3)
- 4.2
- 4.2.1 The exhaust valve opens for exhaust gasses to escape early before the piston reaches BDC on the power stroke when very little turning effect is made on the crankshaft.
- 4.2.2 When the piston reaches BDC on the induction stroke, a fresh charge is still entering the cylinder and the inlet valve is only closed after the piston has reached $\pm 42^\circ$ at BDC.✓ The momentum of the incoming gasses will allow more gas to enter the cylinder and the valve is closed before some of the mixture is lost due to compression.✓
- (2 × 2) (4)
- 4.3 The W-head valve layout (1)
- 4.4
- The spark plug can be situated in the best place in the combustion chamber.
 - The engine can run quietly because of the smaller valve clearances
 - Cylinder head tightening cannot affect the valve clearance
- (3 × 1) (3)
- 4.5
- Sleeve valve
 - Sodium filled valve
 - Masked inlet valve
 - Slide valve
 - Rotary valve
- (5 × 1) (5)

4.6



SKETCH = 3
LABELS = 6 (9)
[25]

TOTAL: 100