

higher education & training

Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

MARKING GUIDELINE

NATIONAL CERTIFICATE
APRIL EXAMINATION
MOTOR TRADE THEORY N2
25 MARCH 2014

This marking guideline consists of 7 pages.

QUESTION 1

1.1 ADVANTAGES OF ELECTRONIC IGNITION SYSTEM

- Mechanical points as switching a device is not constant; wear✓
 - Once the distributor is set, it is fixed and does not alter to suit varying conditions✓
 - No moving parts✓
- (3)

1.2 The coil transforms a low voltage (12 V) from battery into a high voltage (14 000-24 000 V).✓

The coil is a simple device - essentially a high-voltage transformer made up of two coils of wire. One coil of wire is called the **primary coil**. ✓

Wrapped around it is the **secondary coil**. ✓

The secondary coil normally has hundreds of times more turns of wire than the primary coil. The key to the coil's operation is what happens when the circuit is suddenly broken by the points. The magnetic field of the primary coil collapses rapidly. The secondary coil is engulfed by a powerful and changing magnetic field.✓

This field induces a current in the coils -- a very high-voltage✓ current because of the number of coils in the secondary winding.

The secondary coil feeds ✓ this voltage to the distributor via a very well-insulated, high-voltage wire.

(6)

- 1.3
- Supply voltage test
 - Spark test
 - Internal resistance
- (3)

1.4 1.4.1 The vacuum advance unit

1.4.2 Located in the distributor

(2 x 1) (2)

- 1.5 1.5.1
- Carbon fouling
 - Oil fouling
 - Lead fouling

- 1.5.2
- Fuel mixture too rich/heat range is wrong.
 - Worn engine (rings, bore, valve guides worn)
 - Excessive high-speed operation

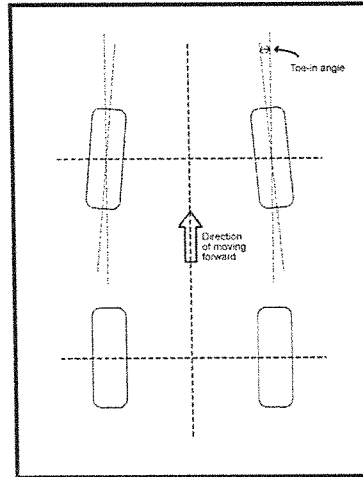
(2 x 3) (6)
[20]

QUESTION 2

- 2.1
- To enable the vehicle to move from rest✓
 - To provide a permanent neutral✓
 - To enable the engine torque to be increased in stages✓
 - To provide forward and reverse gears✓
 - To prevent engine from straining✓
 - To assist the vehicle to adapt to different road conditions ✓ (Any 2 x 1) (2)
- 2.2
- 2.2.1 FUNCTION: A synchromesh unit prevents gear engagement until the speeds of the rotating components are synchronised. (1)
- 2.2.2 OPERATION: When you select a gear, the spring-loaded✓ inserts move the baulk ring into contact✓ with the conical face of the gear. The grooves in the face of the baulk ring make contact before the dog teeth. The collar and the gear speed is synchronised before the teeth engage. ✓ The force exerted by the driver now presses the sleeve against the teeth of the baulk ring and forces the conical face against the cone of the selected gear, until the friction✓ created, causes the two components to rotate at the same speed. Smooth and rapid gear changes are thus ensured. ✓ (5)
- 2.3
- Rushing the gear change ✓
 - Deffective synchro unit✓
 - Worn of broken gear teeth ✓ (Any 2 x 1) (2)
- 2.4 Power goes to the wheel of least resistance✓ and in the event that one wheel is in gravel or mud, power will go✓ to the wheel causing that wheel to spin and vehicle being stuck. ✓ (3)
- 2.5
- Backlash between crown wheel and pinion✓
 - Radial run-out✓
 - Axial run-out✓
 - Tooth contact pattern ✓ (Any 3 x 1) (3)
- 2.6
- The pinion gear turns the crown wheel ✓
 - Transfers drive through 90 degrees✓ (2)
- [18]

QUESTION 3

3.1 3.1.1 Toe-in is when the front wheels point inwards or towards the centre line of the vehicle to provide straight line stability. ✓

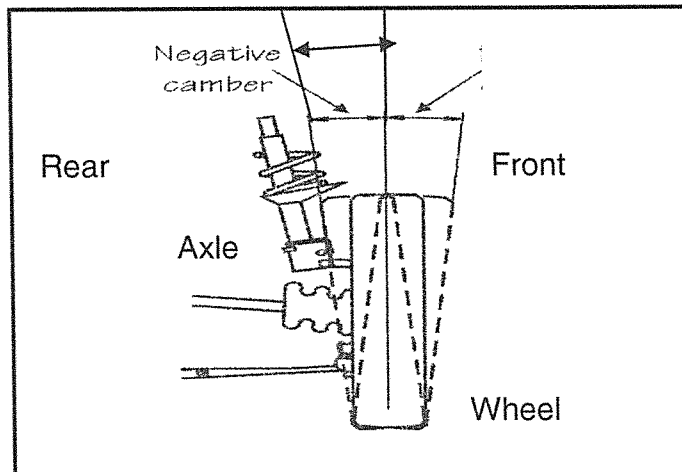


✓

✓

(3)

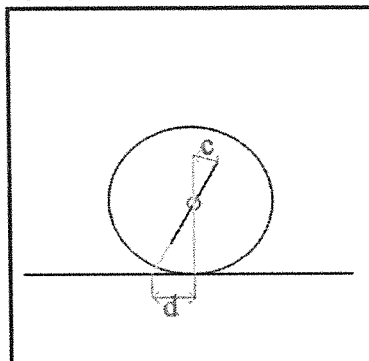
3.1.2 Negative camber is the inward tilt of the top of the wheel and tyre assembly when viewed from the front of the car. ✓



✓✓

(3)

3.1.3 Castor angle is the forward or rearward tilt of the axle when viewed from the side of the vehicle.



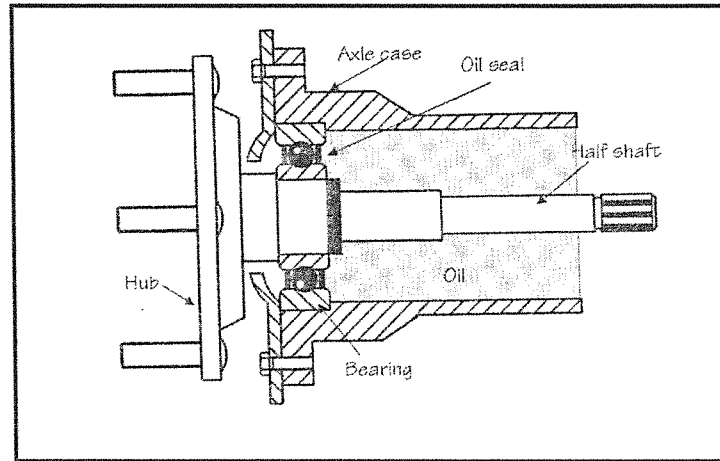
(3)

- 3.2 A = Ackerman's angle✓
B = Track rod angle✓
C = Steering arm angle✓
D = Centre line✓ (4)
- 3.3 Oversteering:
 • Low tyre pressure/incorrect tyre pressure✓
 • Cornering at high speed causing large load transfer✓
 • Mixed tyre arrangements ✓ (Any 2 x 1) (2)
- 3.4 Adjustments to steering box:
 • End float adjustment✓
 • Backlash adjustments✓
 • Lock stops adjustments✓ (3)
- 3.5 A drag link connects the pitman arm on the steering gear✓ with the steering arm on the spindle. Rotation of the steering gear input shaft causes the pitman arm to rotate back and forth. As this motion occurs, the drag link pushes or pulls the steering arm causing the wheel to pivot on its kingpin. ✓ (2)
[20]

QUESTION 4

- 4.1
 • 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✓
 • Protect from dirt and water. Keeps grease in.✓
 • No speed variation.✓ (Any 3 x 1) (3)
- 4.2 4.2.1
 • The main function of the shock absorber is to control the spring rebound.✓
 • The function of the shock absorber is to keep the tyre on the road and absorb or control spring oscillations.✓ (Any 1 x 1) (1)
- 4.2.2
 • Lever-type shock absorber✓
 • Direct-acting telescopic shock absorber✓ (2)
- 4.3
- | | |
|--|--|
| <p style="text-align: center;">TORQUE TUBE DRIVE</p> <ul style="list-style-type: none"> • Propeller shaft is solid • Universal joints protect from dirt/water • Greater bending loads as it takes loads • Using stiff springs | <p style="text-align: center;">HOTCHKISS TYPE</p> <ul style="list-style-type: none"> • Propeller shaft is hollow • Universal joints are exposed • Transmit torque only, no loads • Can use softer springs |
|--|--|
- (Any 3 x 1) (Any 3 x 1) (6)

4.4



(Labelling = 3 marks, Sketch and accuracy = 3 marks) (6)

4.5 It prevents simultaneous engagement of two gears. ✓✓ (2)
[20]

QUESTION 5

5.1 The carburettor atomises the petrol into droplets, ✓ it also controls the correct amount of petrol into the air steam and it allows the engine to function under different conditions. ✓ The carburettor also mixes air and fuel into suitable proportions. ✓ (3)

5.2

- Too little fuel in float bowl to supply needs of carburettor ✓
- Can cause a lean mixture or no fuel to carburettor ✓
- Poor engine performance, misfire. ✓
- To mix air and petrol in suitable proportions. ✓ (Any 3 x 1) (3)

5.3.1 **ADVANTAGES OF DISC BRAKES**

- Greater heat dissipation ✓
- Cleaner disc surface ✓
- Simple construction, easier to service. ✓
- Brake pads can be changed quickly and easier ✓
- Greater resistance to brake fade ✓ (Any 3 x 1) (3)

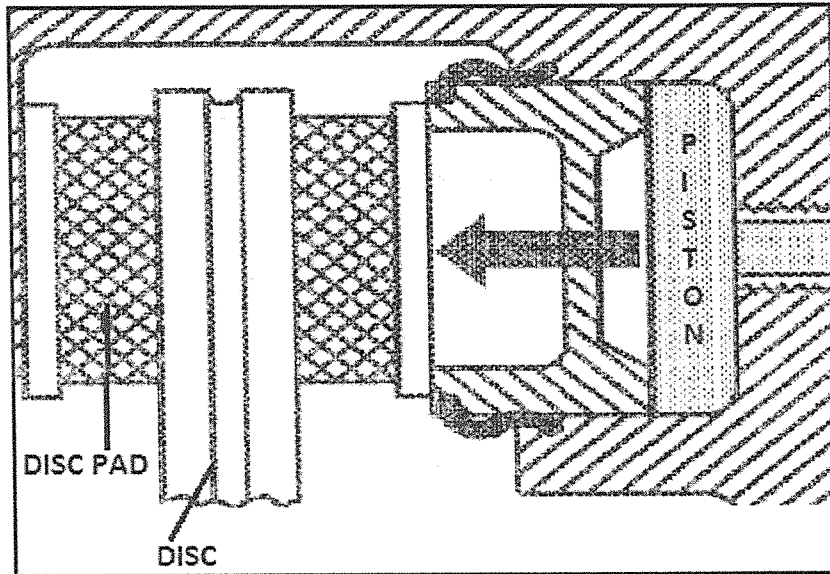
5.3.2 **DISADVANTAGES OF DISC BRAKES**

- Corrosion of disc due to water being open and exposed ✓
- No self-energising action ✓
- Difficult to arrange effective handbrake mechanism ✓ (3 x 1) (3)

5.4 **DRAWING BRAKES**

- Over adjusted parking brake or push rod ✓
- Master cylinder faulty ✓ (2)

5.5



(4)

5.6

The ability/property of the brake fluid to absorb moisture from the air.✓
The moisture it attracts leads to more water✓ and this in turn lowers the boiling point of brake fluid,✓ leading to possible brake failure.✓

(4)

[22]

TOTAL: 100