Province of the
EASTERN CAPE
EDUCATION

DIRECTORATE SENIOR CURRICULUM MANAGEMENT (SEN-FET)

HOME SCHOOLING SELF-STUDY WORKSHEET ANSWER SHEET

SUBJECT	AUTOMOTIVE	GRADE	11	DATE	AUGUST 2020
TOPIC	CONTROL SYSTEMS (SPECIFIC)	**TERM 1 REVISION**	(√)	**TERM 2 CONTENT**	()

QUESTION 1

1.1

- The final drive provides a drive at right angles from the drive shaft to the side shafts of the rear axle assembly.
- It provides a constant reduction between the speed of the drive wheels and the engine in order to develop the engine revolutions required to drive the vehicle with ease.

1.2

- Ability to move a vehicle when only one wheel has traction.
- Better acceleration on the road (even though one wheel may be airborne).
- Reduction in shock load on the driving shaft and axles when an airborne wheel returns to the ground. □
- Easier and more effective handling of the vehicle on bumpy roads. (Any 3).

1.3

1.3.1

- To transmit force from the steering centre link or the rack gear to the steering knuckle.
- This causes the wheel to turn.
- The outer tie rod end connects with an adjusting sleeve, which allows the length of the tie rod to be adjustable.
- This adjustment is used to set a vehicle's alignment. (Any 2)

1.3.2

- It is used for allowing free movement on two planes at the same time, including rotating in those planes.
- Combining two such joints with control arms enables motion in all three planes, allowing the front end of an automobile to be steered and a spring and shock (damper) suspension to make the ride comfortable.

1.3.3

- It changes the rotary motion of a crank or the steering box to a second crank or link in a different plane or axis.
- It converts the sweeping motion of the steering box to the linear motion needed to pull the tie rods and ultimately turn the vehicle's wheels.

1.4

- It has no operating arms or links.
- When mounted diagonally, it helps to reduce body roll.
- Can be mounted inside coil springs, thus it is more compact.
- It is relatively cheap to manufacture and reliable. (Any 3)

1.5

- They control the up-and-down movement of the body on the springs for the comfort of the passengers.
- They keep the wheels in full contact with the road for driving control and safety.

1.6 It is fitted to reduce body roll above the spring and axles when the vehicle is

cornering and thus helps the car on a more even keel.

1.7

- Smoother engine performance because the torsion of the crankshaft is not concentrated on a specific section, but is distributed evenly over the length of the crankshaft.
- The heat caused by the power strokes is evenly distributed and prevents local overheating or cooling:

o Causing minimal vibration to improve engine balance

o Achieving smooth running

o Achieving longer engine life

o Causing user comfort.   (Any 2)

1.8   1-5-3-6-2-4 OR 1-4-2-6-3-5

1.9 Performs the same tasks as a normal limited slip differential, often with pressurised hydraulic clutches, only with sophisticated electronics fine-tuned.

1.10 The spark plug provides a gap in the combustion chamber over which a high-tension spark from the ignition coil may 'jump' to ignite the compressed mixture of air and petrol in the cylinder.

1.11

- A much higher voltage from the ignition coil is required to bridge the gap and may cause the ignition coil to overheat.
- Misfiring occurs at high engine revolutions and at engine load because of insufficient voltage to bridge the gap.
- The engine will be difficult to start, especially during cold conditions. (Any 2)

1.12 The spark duration will be very quick and the spark will be thin and weak.

- The effects of this may be bad starting and high exhaust emission levels.
- Will result in an increase in fuel consumption.
- A worn engine will cause carbon deposits to bridge the gap and will result in misfiring.
- Uneven engine performance will cause loss of power.

1.13 The distributor directs the high voltage from the ignition coil to the various spark plugs predetermined firing order.

QUESTION 2

2.1 Bevel gear

2.2 Functions of final drive

- It provides a drive at right angles from the drive shaft to the side shafts of the axle assembly.
- It provides constant reduction between the speed of the drive wheel and the engine.

2.3 Advantages of using hypoid gear assembly in final gear.

- Quiet in operation
- It offers stronger drive
- It ensures more efficient lubrication
- It accommodates lower floor assembly
- The pinion can be designed with larger and stronger teeth.   (Any 3)

2.4 Functions of differential unit.

- It allows the drive wheel to rotate at different speeds when the car navigates a sharp curve or corner □
- It enables even torque to be transmitted to the side shaft irrespective of the difference in the speed of rotation between the wheels.

2.5

2.5.1 Four-wheel drive

2.5.2 **A** Half shaft

    B Front differential

    C Rear differential

    D Front drive shaft

    E Rear drive shaft

2.5.3 Purpose of four-wheel drive

To enable better traction in unfavourable conditions.

2.6

2.6.1 **Function of the master cylinder**

It converts the applied force on the brake pedal into an effective pressure in the hydraulic brake lines

2.6.2 Function of the vacuum servo unit.

It improves the efficiency of the brake system by increasing the force

on the drums or disc with relatively less applied force on the brake

pedal.

4

2.7 Factors that determine the braking distance of a car.

- Weather conditions.
- Road surface.
- Amount of brake pressure applied.
- Condition of the tyre.

2.8 **Working principles of a starter solenoid**

A solenoid consists of an iron core placed inside an electric coil. When electric current passes through the coil, a magnetic field develops around the coil ☐ which pulls the core into the coil.

2.9 **Starter solenoid drive mechanism.**

- Bendix drive.
- Mechanical engaged drive.

2.10 In a cold spark-plug, the distance between the tip of the insulator at the firing point and the steel housing is relatively short. While in hot spark plug, the distance between the tip of the insulator at the firing point and the steel housing is relatively long.