 Province of the

EASTERN CAPE

EDUCATION

**DIRECTORATE SENIOR CURRICULUM MANAGEMENT (SEN-FET)**

**HOME SCHOOLING SELF-STUDY WORKSHEET ANSWER SHEET**

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| **SUBJECT** | AUTOMOTIVE | **GRADE** | 12 | **DATE** | JUNE 2020 |
| **TOPIC** | **SYSTEMS AND CONTROL (AXLES, STEERING GEOMETRY** **AND ELECTRONICS) (SPECIFIC)** | **TERM** **REVISION** | (Please tick) | **TERM 3****CONTENT** | (√ ) |

**ANSWERS TO SELF – STUDY ACTIVITY**

**QUESTION 1**

* 1. **Purpose of the following alignment applications in vehicle:**
		1. To overcome the tendency of wheels with positive camber to point outwards.
		2. To overcome the tendency of wheels with negative camber to point outwards.
		3. To enable a vehicle to navigate a circle/curve effectively without skidding.
	2. Camber
	3. **Functions of the following steering angles:**
		1. Camber angle brings the contact point of tyre directly on the road in order to achieve less steering effort.
		2. Caster angle gives self-steering action to the steering and keeps the wheel in the straight-ahead position.
		3. Kingpin inclination is designed to bring the front wheel back to the straight-ahead position after rounding a corner without any driver effort.
	4. F**actors to be considered before wheel alignment is checked or adjusted:**
* Kerb mass must be checked against the manufacturer’s specifications
* Uneven wear on the tyres
* Tyre pressure
* Check wheel nuts with torque wrench
* Correct preload on the hub (wheel bearings) with torque wrench
* Check kingpin and bushes
* Suspension ball joints
* Check suspension bushes for excessive movement
* Steering box play whether secure on chassis
* Check the tie-rod ends
* Sagged springs
* Check shock absorbers (Any 4)
	1. **Types of wheel imbalance:**
* Dynamic imbalance
* Static imbalance

**QUESTION 2**

**2.1 Preliminary wheel alignment check:**

* Kerb mass against the manufacturers specifications.
* Uneven wear on the tyres.
* Tyre pressure.
* Run-out on the wheels.
* Correct preload on the wheel bearings.
* Kingpins and bushes.
* Suspension ball joints for wear, locking and lifting.
* Suspension bushes for excessive free movement.
* Steering box play and whether secure on chassis.
* Tie-rod ends.
* Sagged springs, which include riding height.
* Ineffective shock absorbers.
* Spring U-bolts.
* Chassis for possible cracks and loose cross-members. **(Any 5)**

**2.2 Toe-out on turns:**

This toe-out effect in a turn gives a true rolling motion to the front wheels  in a corner without scuffing.

**2.3 Dynamic balance of the wheel and tyre assembly:**

Dynamic balance of the wheel and tyre assembly refers to the equal distribution of all weights around the axis of rotation in all rotation parts.

2**.4 Reasons of the speed control system:**

* The speed control system is to control the throttle opening electronically.
* To keep the vehicle speed constant.

**2.5 Disadvantages of the speed control:**

* The system is expensive.
* High maintenance costs if the system becomes faulty.

**2.6 Diode:**

The function of the diode is to permit current to flow in only one direction  and to block it from flowing in the opposite direction.

**2.7 Advantages of an electric fuel pump:**

* Immediate supply of fuel when the ignition switch is turned on.
	+ Low operational noise.
	+ Less discharge pulsation of fuel.
	+ Compact and light design.
	+ Prevents fuel leak and vapour lock.

**(Any 2)**

**2.8 Aspects that an injector needs to fulfil:**

• Precise fuel flow rate

• Good linearity

• Wide active range

• Good spray characteristics

• No leakage

• Silent operation

• Durability

• To cope with different needs for different engines

**(Any 2)**

**2.9 Ackerman principle:**

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2.6.1 Ackerman angle steering principle / geometry.

2.6.2 Parts:

A – Rear axis

B – Longitudinal axis

C – Steering arms

D – Front wheels

E – Extended centre lines from steering arms

F – Intersection

2.6.3 If the centre lines of the steering arms are extended  they will intersect on the longitudinal axis of the vehicle.