Province of the
EASTERN CAPE
EDUCATION

DIRECTORATE SENIOR CURRICULUM MANAGEMENT (SEN-FET)

HOME SCHOOLING SELF-STUDY WORKSHEET ANSWER SHEET

SUBJECT	AUTOMOTIVE	**GRADE**	12	**DATE**	MAY 2020
TOPIC	SYSTEMS & CONTROL	**TERM 1 REVISION**	(Please tick)	**TERM 2 CONTENT**	(√)

QUESTION 1

1.1 Differences between an automatic and manual gearbox:

- There is no clutch pedal in a motor vehicle with an automatic gearbox. / There is a clutch pedal in a motor vehicle with a manual gearbox.
- There is no need to change gears, the shifting of the gears happens automatically.
- Automatic transmission uses thin oil while manual gearbox uses thicker oil.
- Automatic transmission uses torque converter while manual gearbox uses clutch assembly. (Any 2)

1.2 Advantages of automatic gearbox:

- It reduces driver fatigue
- It ensures great reduction of wheel spin under bad road conditions
- The vehicle can be stopped suddenly without the engine stalling
- The system dampens all engine torsional vibrations
- Easier to drive (e.g. Disabled person with one leg) (Any 2)

1.3 Torque converter:

1.3.1 Torque converter function:

- Transfers engine torque to the transmission.
- It multiplies the engine torque to the transmission.
- Provides a direct-drive, or mechanical link from the engine to the transmission.
- The torque converter dampens all engine torsional vibrations.
- The torque converter acts as a flywheel. (Any 2)

1.3.2 Labelled Parts:

- A – One-way clutch / Turbine
- B – Turbine / Impeller
- C – Pump
- D – Turbine shaft
- E – Gearbox housing

1.4 Single epicyclic gear train:

- Overdrive forward
- Overdrive reverse
- Gear reduction forward
- Gear reduction reverse
- Direct drive
- Neutral (Any 5)

1.5 Purpose of gear ratio in the gearbox:

- It is used in order to utilise the usable torque developed in a relatively limited speed range of the engine over a greater road speed range.
- Allows different speeds depending on the different loads. (Any 1)

QUESTION 2

2.1 Principle of operation of a torque converter:

The pump spins, □ throwing oil outwards into the curved vanes of the turbine. □ The stator intercepts the oil □ and redirects the path of the oil to enter the pump smoothly. □ The torque produced by the redirected oil is increased when it leaves the pump again to enter the turbine. □

2.2 Function of the following components of an automatic transmission system:

2.2.1 **Brake bands** are placed around the annulus to enable the annulus to come stationary position in order to change to another gear.

2.2.2 **Hydraulic pistons** control the brake bands or the multidisc clutches which allow the change of gear.

2.2.3 **Oil pumps** are built into the transmission in order to control the brake bands and the multidisc clutches.

2.3 States of torque converter speed:

2.3.1 **Stall speed** is the point when the pump has reached the highest velocity but the turbine is still at rest.

2.3.2 **Increasing speed** is at the point where the turbine begins to turn and the vehicle starts moving.

2.4 Type of oil used in automatic transmission:

Automatic transmission fluid (ATF)

2.5 Methods of cooling oil in automatic transmission system:

- The use of special oil cooler alongside the engine cooling radiator
- Oil circulates through a tank built into the bottom of a radiator tank.