Assessment Requirements

Unit LV13K – Knowledge of Diagnosis and Rectification of Light Vehicle Transmission and Driveline Faults

Content:

Electrical and electronic principles related to light vehicle transmission systems
a. The operation of electrical and electronic systems and components related to light vehicle transmission systems including:
   i. ECU
   ii. sensors and actuators
   iii. electrical inputs & outputs
   iv. voltages
   v. oscilloscope patterns
   vi. digital and fibre optic principles
b. The interaction between the electrical/electronic system, hydraulic system and mechanical components of the transmission systems.
c. Electronic and electrical safety procedures.

The operation light vehicle clutches and fluid couplings
a. The construction and operation of friction clutches (coil spring, diaphragm) including single and twin clutch designs.
b. The construction and operation of fluid couplings including:
   i. fluid flywheel
   ii. torque converter (torque multiplication, efficiency)
   iii. benefits of fluid couplings
   iv. benefits of torque converter over fluid flywheel

The operation of light vehicle transmissions and driveline systems
a. The construction and operation of manual gearboxes:
   i. 4, 5 & 6 speed gearboxes
   ii. gear arrangements
   iii. shaft and bearing arrangements
   iv. synchromesh devices
   v. interlock mechanisms
   vi. linkages
   vii. overdrive
   viii. lubrication
b. The construction and operation of automatic gearboxes including hydraulic and electronic control systems: operations of epicyclic gears (sun, planet, annulus and carrier), method for achieving different gear ratios using epicyclic gearing; hydraulic control systems, components and operation; electronic control system, components and operation.
c. The construction and operation of continuously variable transmissions (CVT) and the benefits of this type of gearbox design.
d. The construction and operation of the sequential manual gearbox (SMG).
e. The construction and operation of final drive systems including:
   i. conventional crown wheel and pinion
   ii. differential gears
   iii. limited slip differential
f. The construction and operation of light vehicle 4 wheel drive systems including third differential and differential locks.
g. The operation of light vehicle traction control systems and launch control.
h. The construction and operation of light vehicle hub arrangements.
i. The construction and operation of:
   i. drive shafts
   ii. prop shafts including flexible joints and couplings
   iii. universal joints
   iv. constant velocity joints
   v. sliding joints

Symptoms and faults in light vehicle transmissions and drive-line systems
a. Clutch and coupling faults:
   i. abnormal noises
   ii. vibrations
   iii. fluid leaks
   iv. slip
   v. judder
   vi. grab
   vii. failure to release
b. Gearbox faults:
   i. abnormal noises
   ii. vibrations
   iii. loss of drive
   iv. difficulty engaging or disengaging gears
   v. automatic gear box types
   vi. abnormal noises
   vii. vibrations
   viii. loss of drive
   ix. failure to engage gear
   x. failure to disengage gear
   xi. leaks
   xii. failure to operate
   xiii. incorrect shift patterns
   xiv. electrical and electronic faults
c. Final drive faults:
   i. abnormal noises
   ii. vibrations
   iii. loss of drive
   iv. oil leaks
   v. failure to operate
   vi. electrical and electronic faults
d. Drive-lines and couplings:
   i. abnormal noises
   ii. vibrations
   iii. loss of drive

Faults in light vehicle transmission systems
a. Interpret information for diagnostic tests, vehicle and equipment specifications, use of equipment, testing procedures, test plans, fault codes and legal requirements.
b. How to prepare equipment for use in diagnostic testing.
c. How to conduct systematic testing and inspection of transmission system, mechanical, hydraulic, electrical and electronic systems using appropriate tools and equipment including, mullet-meters, oscilloscope and pressure gauges.
d. How to carry out workshop based and road testing of vehicle and transmission system.
e. Evaluate and interpret test results from diagnostic and/or road testing.
f. Compare test result and values with vehicle manufacturer’s specifications and settings.
g. How to dismantle, components and systems using appropriate equipment and procedures.
h. Assess, examine and evaluate the operation, settings, values, condition and performance of components and systems.

i. Probable faults, malfunctions and incorrect settings.

j. Rectification or replacement procedures.

k. Operation of systems following diagnosis and repair to confirm operation and performance.

Measurements on components to include:

i. Settings

ii. Input and output values

iii. Voltages

iv. Current consumption

v. Resistance

vi. Output patterns with oscilloscope

vii. Pressures

viii. Condition

ix. Wear and performance