Assessment Requirements

Unit LV12K – Knowledge of Light Vehicle Transmission and Driveline Units and Components

Content:

The operation of clutch operating systems

a. Clutch operating mechanisms
   i. pedal and lever
   ii. hydraulic operated
   iii. mechanical
   iv. cable operated
   v. hydraulic components
   vi. master cylinder
   vii. slave cylinder
   viii. hydraulic pipes
   ix. electrical and electronic components (fluid level indicators)

The operation of friction clutches

a. The reasons for fitting a clutch.
b. The construction and operation of:
   i. hydraulically and cable operated clutches
   ii. coil spring clutches
   iii. diaphragm spring clutches
   iv. single plate clutches
   v. multi plate clutches

The operation of manual gearboxes

a. The reasons for fitting gearboxes, to provide neutral, reverse, torque multiplication.
b. Different gearbox types: transverse and inline layouts.
c. The layout and construction of gears and shafts for 4, 5 and 6 speed gearbox designs, sliding mesh, constant mesh and synchromesh gearboxes reverse gear,
d. The construction and operation of:
   i. gear selection linkages
   ii. selector forks and rods
   iii. detents and interlock mechanisms
e. The construction and operation of synchromesh devices.
f. The arrangements for gearbox bearings:
   i. bushes
   ii. oil seals
   iii. gaskets and gearbox lubrication
   iv. speedometer drive
g. The electrical and electronic components including reverse lamp switch
h. Calculate gear ratios and driving torque for typical gearbox specifications.

The operation of driveline components

a. The layout and construction of propshafts and drive shafts used in front wheel, rear wheel and four-wheel drive systems.
b. The reasons for using flexible couplings and sliding joints in transmissions systems.
c. The reason for using constant velocity joints in drive shafts incorporating steering mechanisms.
d. The construction and operation of:
   i. universal joints

   ii. sliding couplings
   iii. constant velocity joints
e. The simple stresses applied to shafts: torsional, bending and shear.
f. The construction and operation of:
   i. final drive units
   ii. crown wheel & pinion
   iii. bevel
   iv. hypoid and helical gears
   v. differential gears
   vi. sun & planet gears
   vii. lubricants
   viii. lubrication bearings and seals
   ix. limited slip differential
g. The reasons for fitting a differential.
h. Calculate final drive gear ratios.
i. Calculate the overall gear ratio from given data (gearbox ratio x final drive ratio).

The testing and inspection techniques used for light vehicle transmission systems

a. The techniques and procedures used for inspecting and testing clutches and clutch mechanisms including:
   i. clearances
   ii. pedal and lever settings
   iii. cables & linkages
   iv. hydraulic system
   v. leaks
   vi. adjustments
   vii. travel
b. The techniques and procedures used for inspecting and testing gearboxes including:
   i. leaks
   ii. gear selection
   iii. synchromesh operation
   iv. abnormal noise
c. The techniques and procedures used for inspecting and testing drive line systems (prop & drive shafts, couplings) including:
   i. security
   ii. serviceability of rubber boots
   iii. leaks
   iv. alignment
   v. balance weights (where applicable)
d. The techniques used when inspecting and testing final drive systems including:
   i. fluid levels
   ii. leaks
   iii. noise

The faults and symptoms associated with vehicle transmissions systems

a. The faults and symptoms associated with transmission systems:
   i. clutch faults
   ii. gearbox faults
   iii. drive line faults (propshaft, drive shaft
   iv. universal and constant velocity joints)
   v. universal joint alignment
   vi. final drive faults
b. Faults and symptoms to include mechanical, electrical and hydraulic systems.

The procedures for dismantling, removal and replacement of transmission units and components

a. The preparation, testing and use of tools and equipment, electrical meters and equipment used for dismantling removing and replacing transmission systems and components.
b. appropriate safety precautions:
    i. PPE
    ii. vehicle protection when dismantling
    iii. removing and replacing transmission systems and components
c. The importance of logical and systematic processes.
d. The inspection and testing of transmission systems and components
e. The preparation of replacement units for re-fitting or replacement of transmission systems or components.
f. The reasons why replacement components and units must meet the original specifications (OES):
    i. warranty requirements
    ii. to maintain performance
    iii. safety requirements
g. Refitting procedures.
i. The inspection and testing of units and system to ensure compliance with manufacturer's, legal and performance requirements.
j. The inspection and re-instatement of the vehicle following repair to ensure customer satisfaction:
    i. cleanliness of vehicle interior and exterior
    ii. security of components and fittings
a. re-instatement of components and fittings

Types of wheel bearing arrangements:

i. driven wheels
ii. fully floating
iii. three quarter floating
iv. semi floating axles