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ANSWER BANK

ELEMENT ONE

Demonstrate knowledge of car and light commercial vehicle transmission construction.

1. Name the Three gear types in the picture below.



1: Spur

2: Double Helical

3: Helical

3. Which type of these illustrated gears is most commonly used in transmissions today?

Helical

4. Name the gear type most commonly used in a sliding application such as reverse gear.

Spur

5. Name the gear type most commonly used in an Industrial application

Double Helical

6. Name the components labelled 1 to 5 on diagram of the single shaft interlock system below.

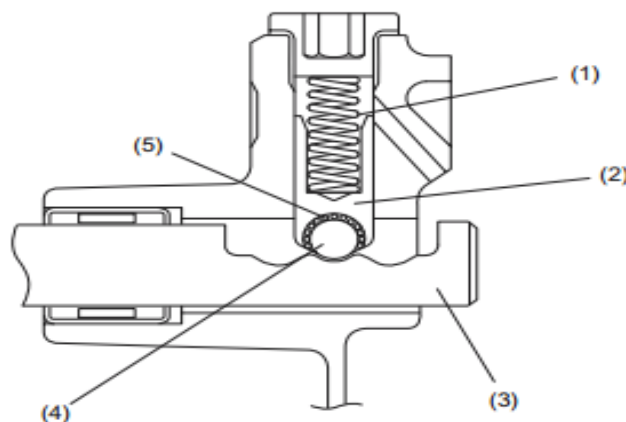
1: Detent Spring

2: Detent Spring Cup

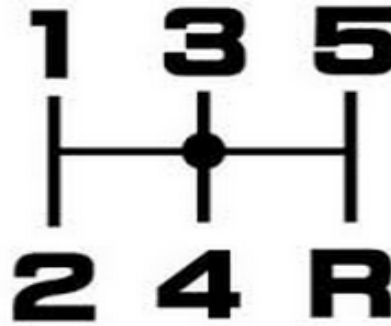
3: Shift Rod

4: Detent Ball

5: Machined Groove

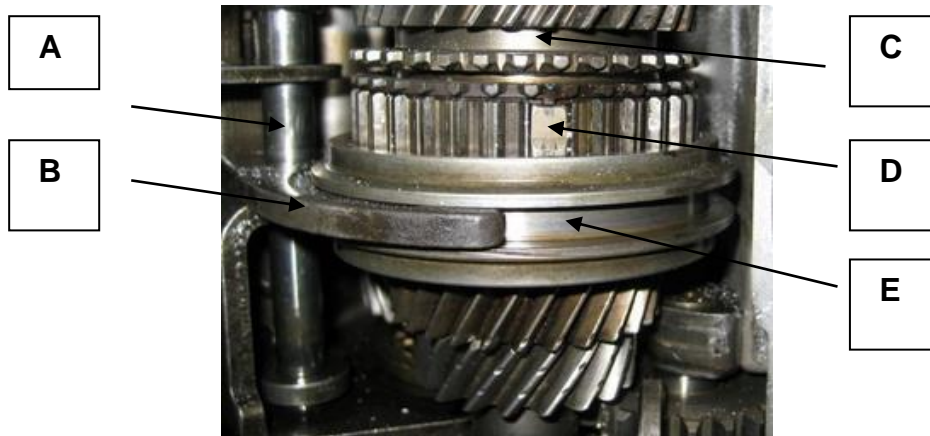


7. With this type of gear shift pattern what is required to stop the engagement of reverse when shifting from 5th to 4th.



A: Reverse Gear lock out

8. Name the components labelled A and E on the diagram below, and describe the function of the complete assembly.



A: Shift Rod

B: Shift Fork

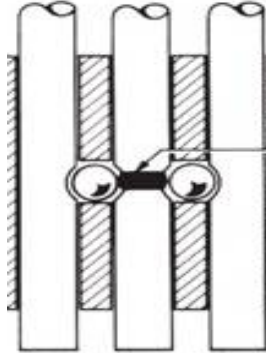
C: Synchromesh Cone

D: Synchromesh Hub

E: Synchromesh Sleeve

9. **What is the name of the mechanism illustrated below and what is its function.**

A: Shaft interlock pin. **B:** To prevent 2 gears being selected simultaneously.



10. **Name the components labelled A and B on the diagram below, and describe the function of the complete assembly.**

A: Shift up Paddle

B: Shift Down Paddle

Function: The driver would push or pull on “paddle” type switches usually mounted on the steering wheel to signal the desire to change gears. The signal is then processed by the gearbox ECU which signals the clutch and gear actuators when it is appropriate to change gear.

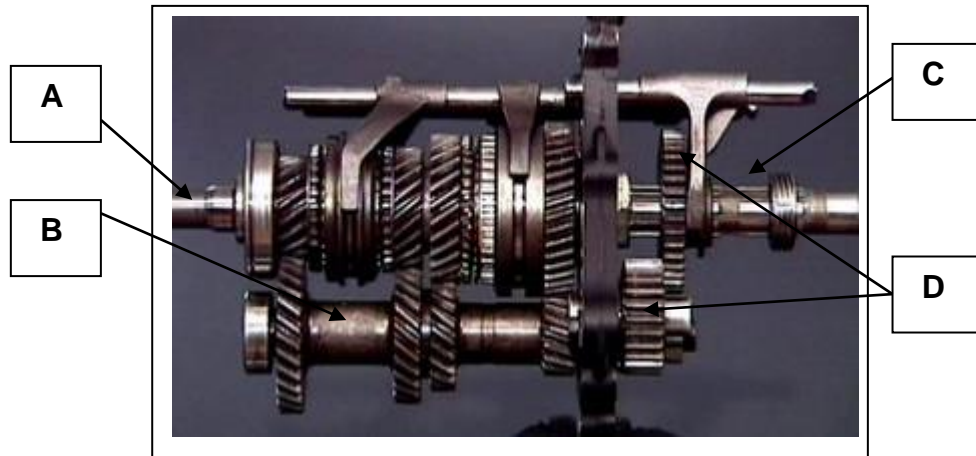


11. **Describe the method and use of clutch actuators.**

The principle of the actuator is to automatically push the clutch release arm (and hence clutch) to remove drive from the engine to the gearbox. This action is simply taking the place of a clutch cable and your foot in a conventional setup.

In most cases an electric motor is used which has a worm drive or similar method of engaging the clutch pressure plate to disengage engine load to the transmission. This system is used either by push button or paddle system. The benefits are instant with a lag free smooth fast gear change.

12. Name the components A to D on the inline gearbox shown below.



A: Input Shaft

B: Counter or Lay Shaft

C: Output or Main Shaft

D: Reverse Gears

13. What is a 'Synchromesh unit' and describe its function.

It is a mechanism for matching up the gear speeds when shifting gear allowing a smooth change without clashing.

During this phase the selector fork is moving the synchroniser sleeve and the baulk ring towards the gear cone. As the baulk ring makes contact with the selected gear cone their speed is matched.

14. List two methods in which bearings, and bushes may be lubricated in a gearbox.

Any two of the following.

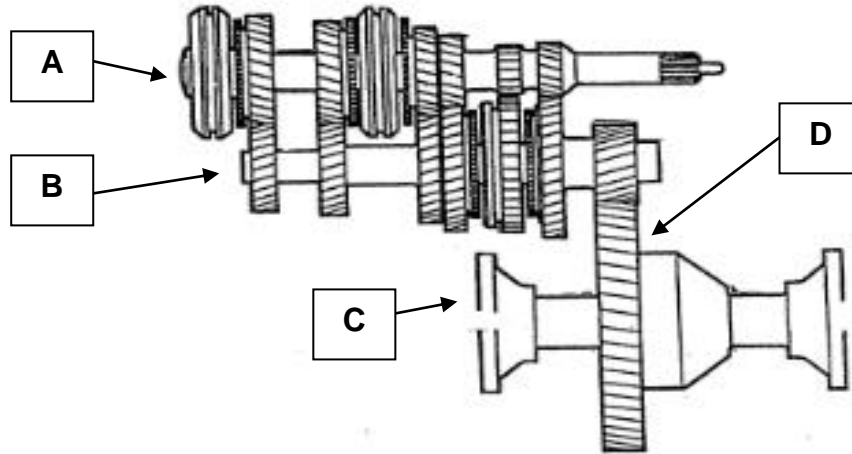
- 1: Splash fed oil
- 2: Sealed bearings
- 3: Oil impregnated
- 4: Pressure fed oil

15. In a front wheel drive gearbox describe the power flow from the input shaft to the drive axles.

Power flows through the input shaft which is part of the main shaft which is meshed to the output shaft.

The power then flows from the output shaft via the pinion gear to crownwheel and out through the drive axle shafts.

16. Name the Four major components labelled A - D on the diagram of a FWD transaxle assembly below.



A: Mainshaft

C: Drive axle

B: Output Shaft

D: Crownwheel

ELEMENT TWO

Demonstrate knowledge of car and light commercial vehicle manual transmission operation.

- 1. Describe in detail the operation of a transmission with a single cone, baulk ring type synchromesh unit as it moves from neutral through synchronisation to the engagement of the gear.**

Neutral

During this phase of operation the synchromesh unit is spinning freely with the baulk ring and the gear to be selected moving at different speeds.

Synchronisation

During this phase the selector fork is moving the synchroniser sleeve and the baulk ring towards the gear cone. As the baulk ring makes contact with the selected gear cone their speed is matched.

Engagement

During this phase the selector sleeve, baulk ring and the gear cone are travelling at the same speed and the teeth are aligned allowing the selector fork to push the selector sleeve onto the desired gear to be selected to ensure drive at the desired ratio.

Selection

It is the movement of the selector rail backward and forwards that allows the selector fork to engage and disengage the required gear. The selector fork transmits the gear lever motion to the synchroniser sleeve, which in response engages or disengages the desired gear located along the main shaft.

- 2. What gear has been selected in the illustration below.** 1st Gear



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3. The steps for a typical change sequence of an electronic (semi-automatic) transmission have been jumbled below. Please indicate the correct order from start to finish (where 1 is the start point and 9 is the finish point) by placing the appropriate step number in the appropriate box.

- ECU receives information about engine RPM, throttle position and vehicle speed
- ECU retards ignition timing to reduce torque
- ECU signals to the clutch actuator to release the clutch
- Driver activates paddle switch to change gear
- ECU signals clutch actuator to engage.
- ECU receives electric signal from paddle switch.
- ECU signals actuators to select gear.
- ECU returns ignition timing to normal
- ECU signals actuator to engage gear

4. On the diagram below, draw the power flow through the gearbox from the input shaft to the output shaft when 3rd gear is selected.

