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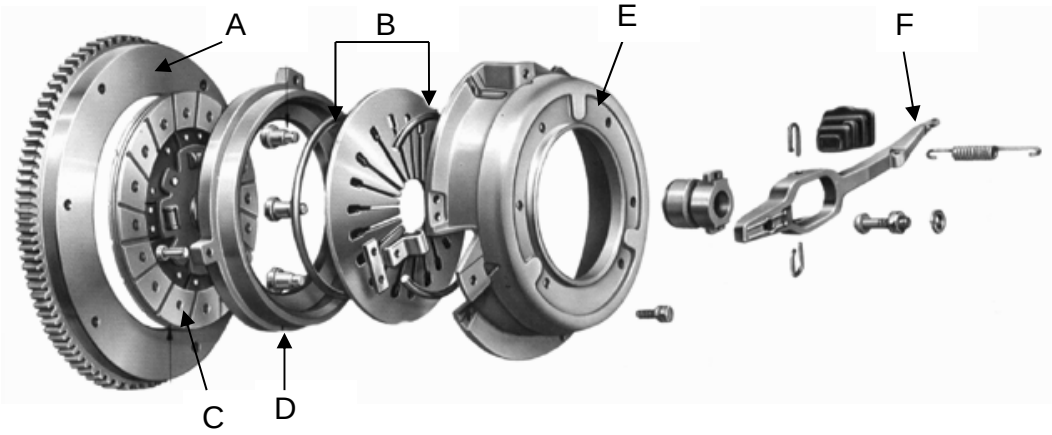
ANSWER BANK

ELEMENT ONE
Demonstrate knowledge of manual clutch operation.

1 State the function of a clutch system and describe the power flow from the engine flywheel to the gearbox input shaft

The function of a clutch is to smoothly disconnect and connect the power from the engine to the gearbox.
The power flows from the engine flywheel to the clutch cover then to the pressure plate and clutch plate and friction linings. The clutch plate hub is splined and fits onto the gearbox input shaft which transmits the power to the gearbox.

2.A Name the clutch components labelled below.



A	Flywheel	D	Pressure plate
B	Fulcrum rings	E	Clutch cover
C	Clutch plate	F	Clutch release fork

2B What is the function of the components shown above?

A. The flywheel provides a means of securing the clutch pressure plate and allows a friction surface for the clutch plate surface to contact with during disengagement.

B Acts as a fulcrum for the clutch diaphragm spring to lever against.

C The clutch plate transmits the power from the engine to the transmission input shaft when the clutch is engaged.

E. The clutch cover is bolted to the flywheel and holds all the other components together.

F. The clutch release fork transmits motion and force from outside the bell housing to the release bearing.

3. What advantage does a multi-plate clutch have over a single plate type and where would you be likely to find one?

Multi plate clutches have a larger friction surface area which reduces the likelihood of slippage and they have a more compact design.
Multi plate clutches are normally found on motorcycles.

4. Describe what happens to the clutch disc when the clutch pedal is depressed?

When the clutch pedal is pushed down the release bearing forces on to the pressure plate fingers which pulls the pressure plate disc away from the clutch plate and this allows the flywheel to become free from the gearbox input shaft and allows the driver to change gears.

5. What is meant by the term “clutch pedal free play”

Clutch pedal free play is the free movement of the clutch pedal before it starts to operate the clutch.

ELEMENT TWO
Demonstrate knowledge of a manual transmission.

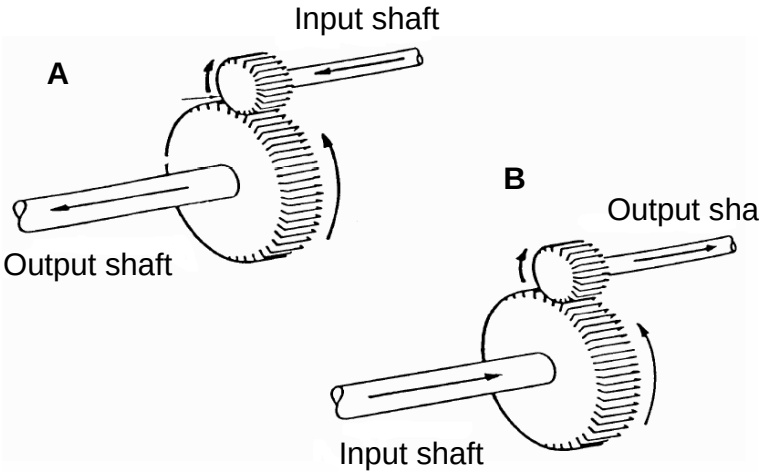
1. Explain the main purpose of a manual transmission.

A manual transmission allows the driver to change gears to vary the vehicle speed in relation to engine RPM speed and torque.

2. Complete the table by providing a brief description for each inline transmission component listed.

Input shaft	The input shaft is a long shaft that extends from the rear of the engine to the inside of the transmission housing. The shaft is made of case hardened steel with a helical gear machined at the transmission and machined splines on the other
Lay gear	The lay gear or countershaft is constructed from case hardened material with several different sized gears machined on to it. The lay gear is located below both the input shaft and the main shaft.
Mainshaft	The main shaft or output shaft holds the output gears and synchronizers. The input shaft and main shaft are in direct line from the front of the transmission to the rear.
Reverse idler gear	The reverse idler gear is used to reverse the rotation of the output shaft, thereby allowing the driver to reverse the vehicle. The reverse idler gear rotates on a stationary shaft known as the reverse idler shaft. The reverse idler gear is driven by the lay shaft reverse gear.
Selector fork	The gear selector forks allow for the selection of gears that are located along the main shaft. The selector fork engages the required gear through a selector shaft.
Synchro mesh assembly	Synchro mesh hubs are designed to bring components that are rotating at different speeds to one synchronised speed. The action of the synchro mesh hub eliminates gear clashing on gear selection, reduces wear and damage to gears and locks the output gear to the output shaft. Synchro mesh hubs consist of a hub, sleeve, baulk rings and shift plates.

3. From the diagrams explain why will happen with the output shaft speed and torque in relationship to the input shaft speed and torque.



A - will cause a decrease in speed and an increase in torque.

B - will cause an increase in speed and a decrease in torque.

3. On selecting a lower gear in a transmission, which of the following statements is correct (please circle A, B C or D). The transmission output shaft will

A Increase speed and decrease torque

B Decrease speed and decrease torque

C Increase speed and increase torque

D Decrease speed and increase torque

4. Which three of the following gear ratios are overdrive ratios (please circle A, B, C, D, E, F as appropriate)?

A 3.2333:1

B 1.7822:1

C 1.2999:1

(D) **0.7252:1**

(E) **0.4251:1**

(F) **0.5298:1**

6. Identify each of the following transmission components and outline their main function:

Component: Lay gear

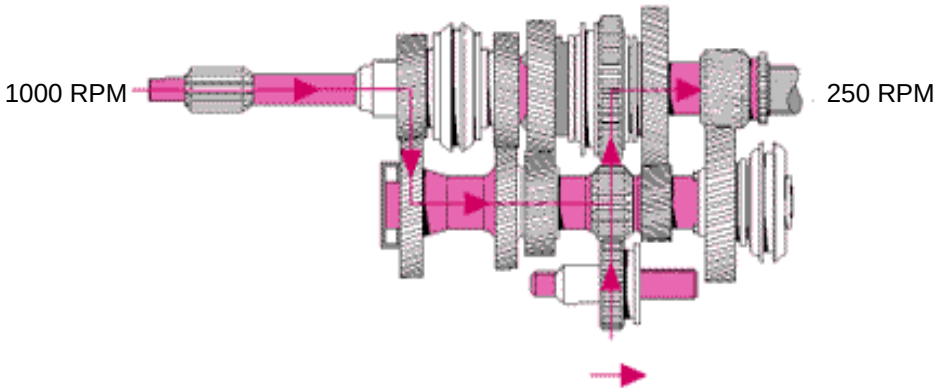
Function:

The lay gear rotates when the engine is running and the clutch is engaged. It transfers drive from the input shaft to the desired gear on the main shaft when the driver selects the gear

Component: Input shaft

Connects the clutch plate to the input shaft of the gearbox. The splines on the input shaft locate into the clutch plate centre hub, where engine torque is transferred to the helical gear of the input shaft, this helical gear is in constant mesh with the gears on the lay shaft

7. Identify the gear shown and describe the relationship between the input and output speeds.



Gear: First Gear

Relationship: The input speed is 4 times faster than the output speed.

8. Which type of transmission layout is used in motorcycle transmissions?

Indirect transmission

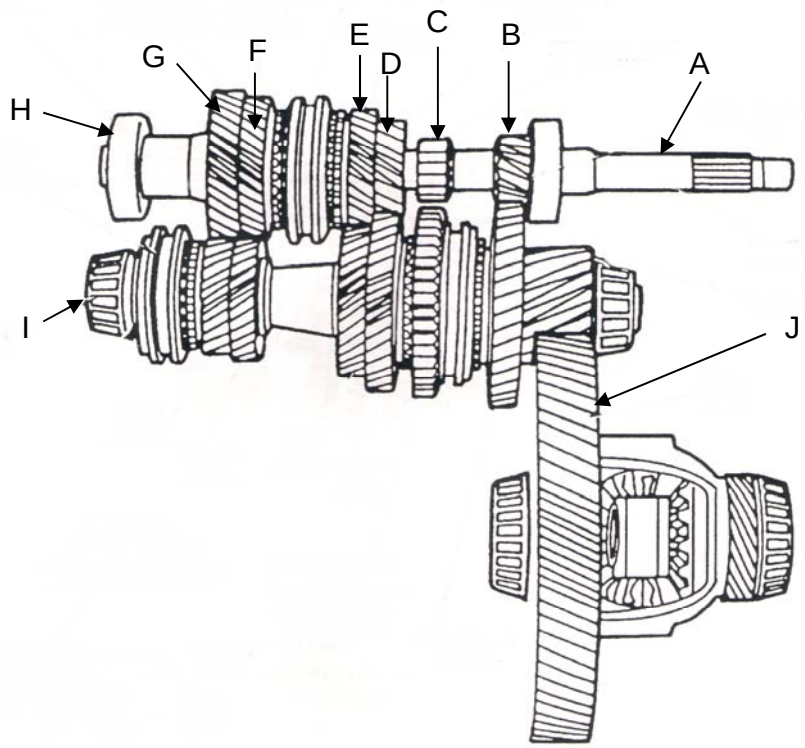
9. State whether the following statements are true or false. Circle T or F as appropriate

(T) / F Motorcycle transmissions are usually sequential, meaning the gears can only be accessed in ascending or descending order.

(T) / F Motorcycle clutches are usually a multi-plate configuration.

(T) / F Many scooters do not have a clutch lever, they use a centrifugal type clutch which automatically engages power to the gearbox as the engines revs increase.

10. Name the transaxle components labelled A-J in the following diagram.



A Input shaft

B First gear

C Reverse gear

D Second gear

E Third gear

F Fourth gear

G Fifth gear

H Ball bearing

I Tapered roller bearing

J Differential final gear drive