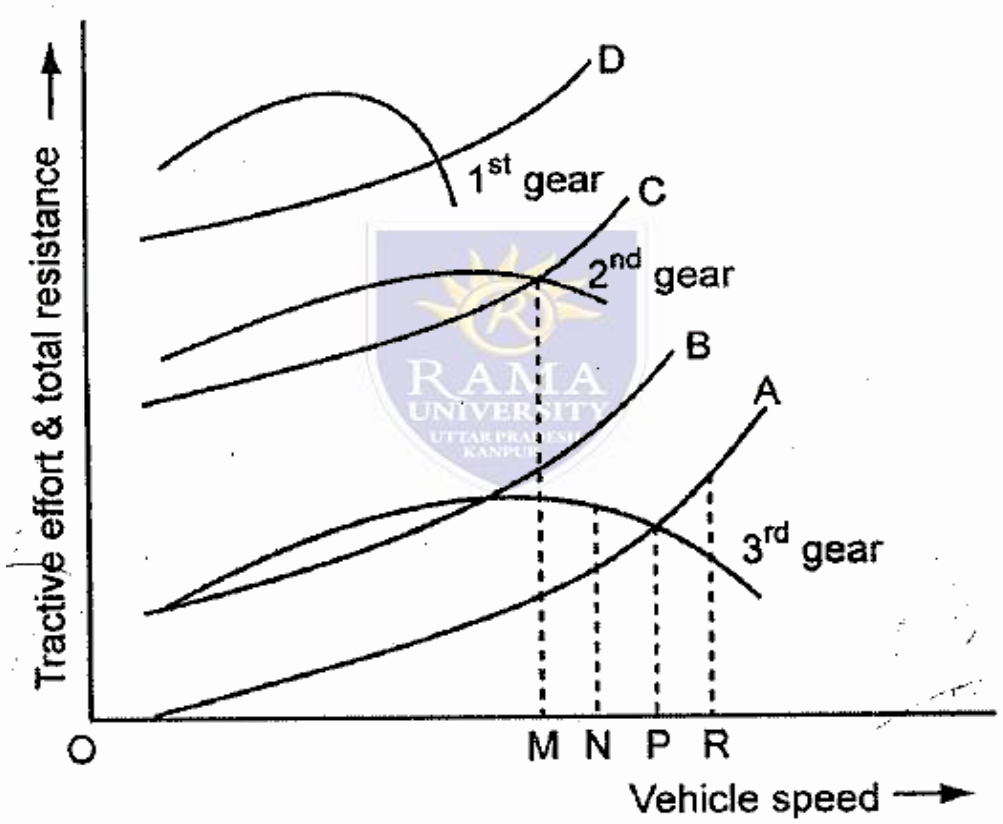
- Tractive Effort
- The torque available on the wheel produces a driving force which is parallel to the road known as tractive effort.
- The graph shows the detail of total resistance for the particular road with different gradients.
- The curves A, B, C. D are total resistance curves for different gradients.
- The curves 1, 2, 3 represent the tractive effort in first, second and third gears respectively.



- Both curves are plotted with the same scales in Figure When the vehicle is running in 3rd gear on a gradient,
- it will give the total resistance curve. So, OP is the stabilizing speed. If the speed at any instant is more than OP, say OR, then the excess resistance called tractive effort will be decelerated to OP.
- Similarly, if the speed at any instant is less than OP, say ON, then the excess tractive effort will be accelerated to speed OP.
- In the same 3rd gear, the next higher gradient curve B is considered.
- In this case, the stabilizing speed has slightly decreased.
- The curve C does not cross the curve of 3rd gear. So, the vehicle is not able to run at this gradient in 3rd gear. Therefore, we are lina position to shift on to 2nd gear.
- Now, the stabilizing speed OM is obtained. Similarly, the vehicle is not able to run in the 2nd gear for gradient D.
- Thus, the vehicle has to be shifted in the gear.
- The vehicle requires more acceleration at the time of starting to gain the required speed quickly.
- The maximum tractive effort is available in the first gear. Therefore, the vehicle is running in the first gear at the beginning. Then, it is shifted to 2nd gear and so on.
- Similarly, when the vehicle is running across a steeper gradient, then it is always shifted to the first gear by accelerating at very slow

- TYPESOF GEARBOX
- There are many types of gearboxes. Generally, it can be classified as follows.
- 1. Manual transmission
- (a) Sliding mesh gearbox
- (b) Constant mesh gearbox
- (c) Synchromesh gearbox
- 2. Epicyclic gearbox
- 3. Automatic transmission
- (a) Hydramatic gearbox
- (b) Torque converter gearbox.

- 1. Sliding Mesh Gearbox
- Among the manual gear transmissions, this sliding mesh type is simple in construction. It consists of the following parts.
- 1. Output shaft
- 2. Low and reverse sliding gear
- 3. Second sliding gear
- 4. Clutch
- 5. Input shaft
- 6. Clutch gear
- 7. Counter shaft drive gear
- 8. Counter shaft
- 9. Low speed gear
- 10. Second gear
- 11. Reverse gear
- 12. Reverse idler gear
- 13. Gear shift fork.
- 13. Gear shift fork.

- It is the simplest type of gearbox. In this gearbox, spur gears are used.
- Figure shows the construction of a sliding mesh type transmission having three forward and one reverse speeds.
- There are three gears (1, 6 and 5) attached on the main shaft and four gears (2, 3, 4 and 7) on the lay shaft.
- The two gears on the main shaft (6 and 5) can be slided by a shafting yoke and mesh with the gears (3 and 4) on lay shaft. Therefore, it is called sliding mesh gearbox. A separate idler gear 8 is mounted on idler shaft.

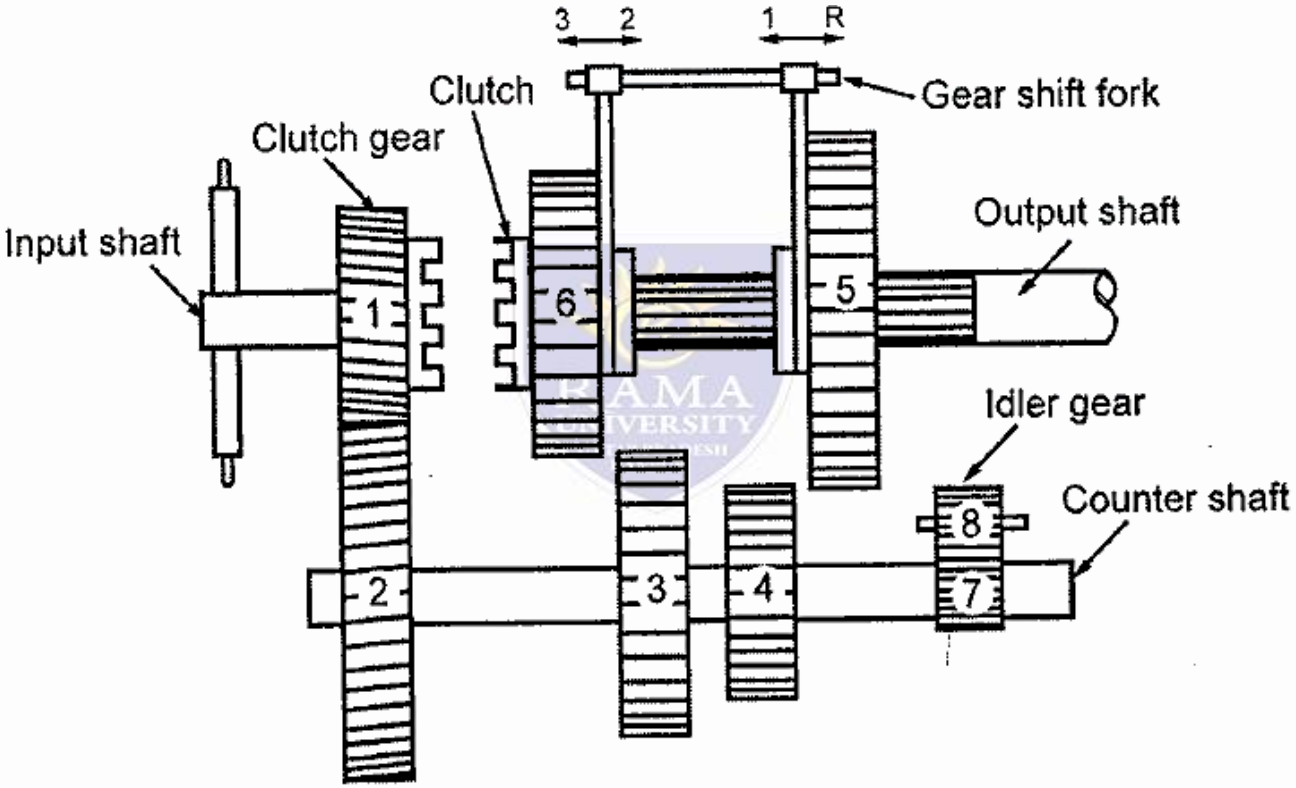


Figure 3.16 Sliding mesh gearbox

- (i) Gears in neutral:
- When the engine is running and the clutch is engaged, the counter shaft is driven by the cultch gear. The cultch gear rotates in opposite direction to the counter shaft. The low speed and high speed gears that are fitted on the transmission main shaft or gearbox shaft do not rotate because they are not engaged with any driving gears. Therefore, there 1s no motion transmitted from clutch to output shaft. Hence, the vehicle is stationary.
- (ii) First or low speed gear:
- When the gear shift fork moves towards direction (1) by operating the gear shift lever, the sliding gear (5) on the output shaft will be shifted forward to mesh with low speed gear (4) on the countershaft. It results the rotations of input shaft being transmitted in the order (1) (2) (4) (5) to tum the output shaft, as shown in Figure 3.17. This gear combination is the one that produces the lowest speed from the input shaft and low transmission.

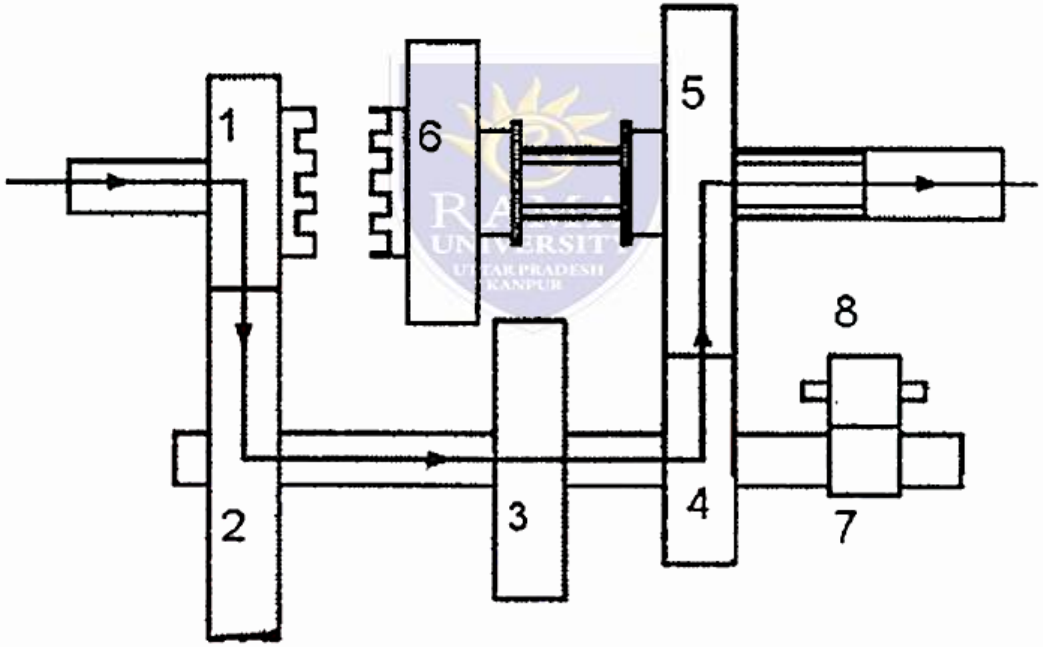


Figure 3.17 First or low speed gear