- (i)First gear:
- The dog clutch (0,) is shifted to left side for engaging on (7), as shown in Figure 3.22. Now, the power is transmitted through the gear (1) => (2) => (4) => (7) to the dog clutch 0, Then, it is transmitted to the main shaft through splines. Hence, the first gear speed is obtained.

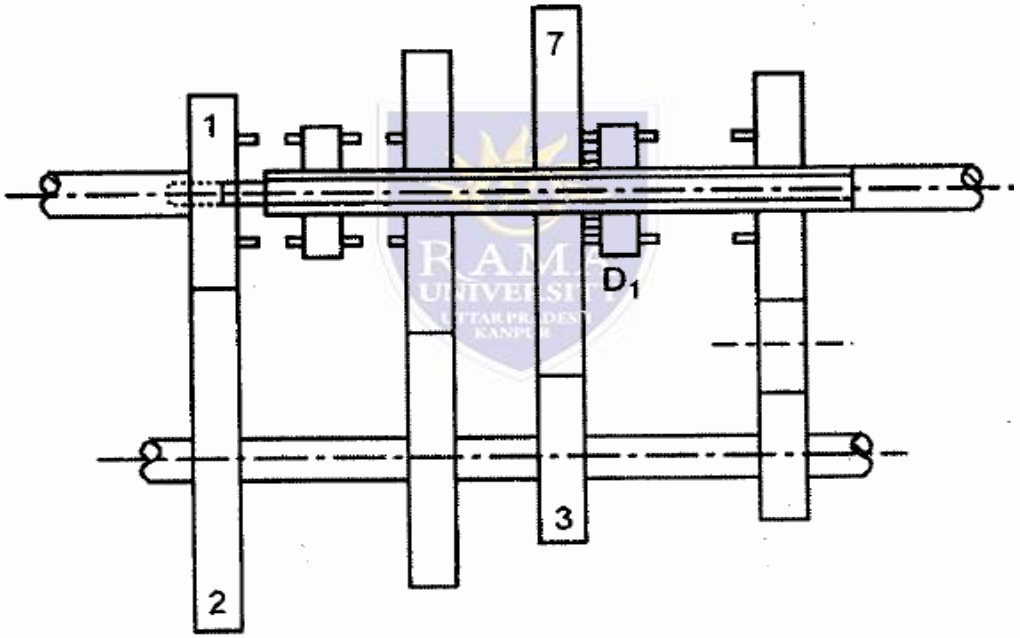

Figure 3.22 First gear of constant mesh gearbox

- (ii) Second gear:
- In this, the dog clutch (0,) is disengaged and the dog clutch (02) is shifted to right to lock with the gear (8) as shown in Figure 3.23. Therefore, the power is transmitted from clutch shaft through (1) => (2) => (3) => (8) to dog clutch (02) and then to the main shaft. So, the main shaft rotates with the second gear speed.

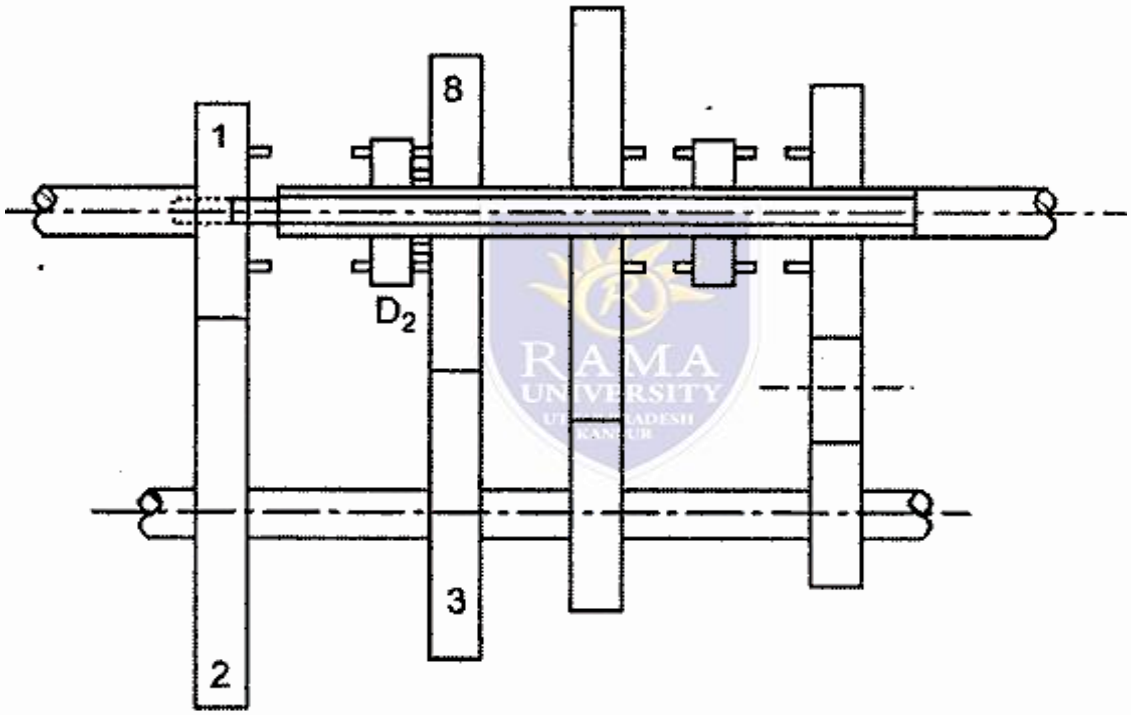

Figure 3.23 Second gear of constant mesh gearbox

- (iii) Third or top gear:
- The dog clutch (D2) is moved left to engage with the gear (I) on clutch shaft as shown in Figure 3.24. Now, the engine speed is directly supplied to the main shaft. It is called top gear speed
- iv) Reverse gear:
- First, the dog clutch O2 is disengaged. Then the dog clutch 01 is shifted to right to engage with the gear (6). Therefore, the power is transmitted from clutch shaft through (I) ~ (2) ~ (5) ~ (Idler gear) ~ (6) to dog clutch (02) and then to the main shaft. The idler gear causes the main shaft to rotate in the opposite direction.

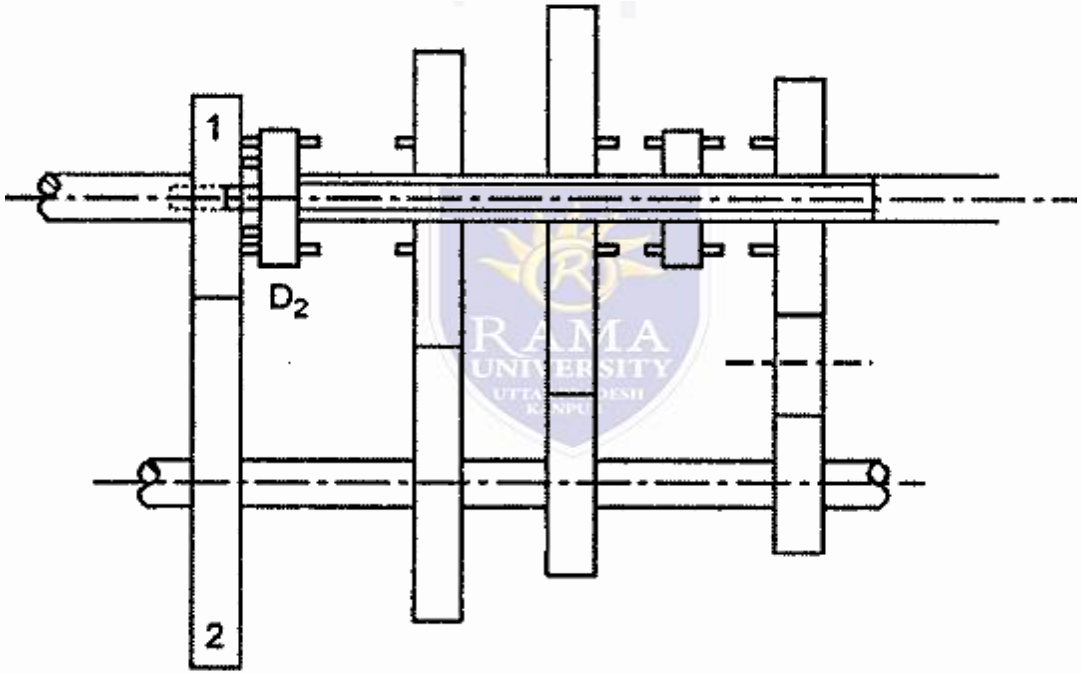

Figure 3.24 Third gear of constant mesh gearbox

- As compared with the sliding mesh type, the constant mesh type gearbox meshes more readily with the gears having less danger of damaging during meshing because the gear
- diameters are smaller with few numbers of teeth. So, this type has more defects when compared to a synchromesh type. The necessity of double clutching is needed so that it is not used to any large extent

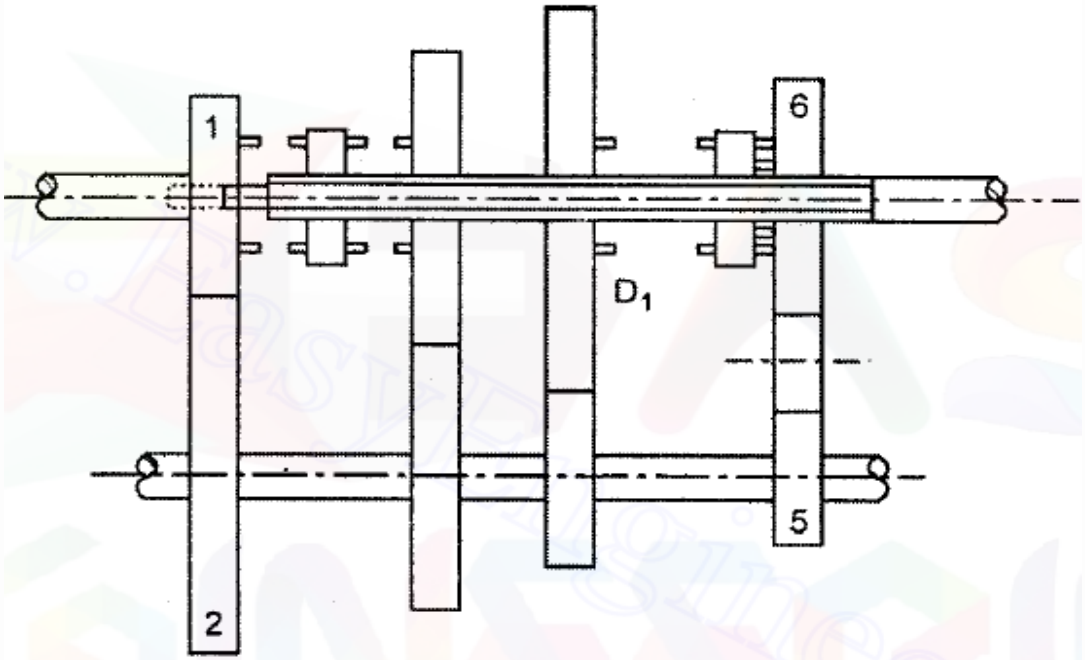

Figure 3.25 Reverse gear of constant mesh gearbox

- Advantages of the constant mesh gearbox over the sliding mesh type:
- 1. Helical or double helical gear teeth can be used for the gears instead of spur gears except reverse gears. So, a quicker gearing can be achieved.
- 2. Synchronizing devices can be used for smooth engagement of gears.
- 3. Only damage occurs on dog clutch teeth and not to teeth of gear wheels.
- 4. Once the dog clutches are engaged, there is no motion between their teeth but the power is transmitted through the sliding action of the teeth of one wheel on those of the other when the gear teeth are engaged. To transmit the motion properly, the teeth are suitably shaped.
- Synchromesh Gearbox
- To simplify the operations of changing gears without the occurrence of clashes and their consequent damage,
- a synchromesh gearbox is used in different types of motor vehicles.
- The synchronizer helps to synchronize the speeds of two gears to be engaged without necessity of faster running gear to slow down.
- Nowadays, both helical gears and synchromesh units are used in car gearboxes
- . It is used for easy and noiseless gear changing operation.
- The arrangement is similar to a constant mesh gearbox. But, it has synchromesh unit instead of dog clutches. Synchromesh device first engages two gears into frictional contact. Once their speed attains equal or synchronized, they are engaged smoothly. Generally, synchromesh units are connected with top two gears only. The reverse and first gears are not connected with synchromesh units.
- They are engaged when the vehicle is stationary.
- The main features of this type of gearbox are as follows.