UNIT-3.

TRANSMISSION SYSTEMS

① Explain constant Mesh gear Box:

Constant mesh gear box is an example for the application of ordinary gear train in automobiles. In this type, the main shaft gear wheels and the lay shaft gear wheels, giving different ratios on engaging with each other, are always in mesh (i.e), all the gear wheels are always being meshed with their pair.

Constant mesh gear box uses double helical gears for its transmission the main benefit of double helical (or) stronger helical gear is that it helps "quieter (less noisy) operation.

Constant Mesh Gear Box Gear Shifting:

1. First gear: Drive is through ABCD gear pairs and D_1 engages with D.

2. Second gear:

Speed gear Drive is thro ABEF and D_1 engages with F.

3. Third gear:

Drive is thro' ABGH and D_2 engages with H.

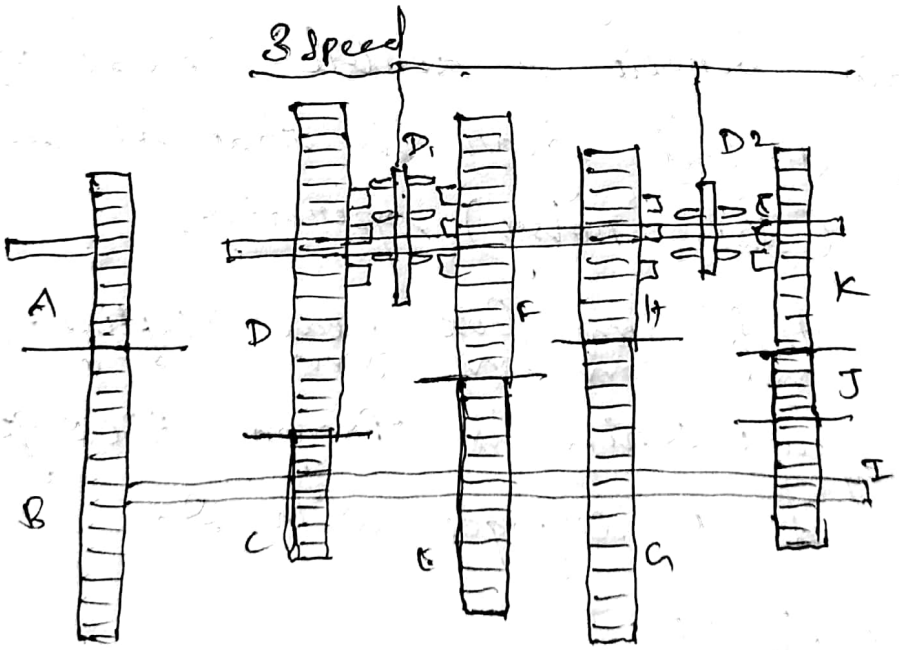
4. Fourth Gear: Drive is thro' ABIJ and D_2 engages with J.

5. Fifth Gear or Top Gear:

Drive is thro' ABKL and D_3 engages with L.

6. Reverse Gear:

Drive is through ABMNP and D_3 engages with P. The dog (D_3) is shifted to the idler gear which is in constant mesh. This changes the direction of drive and the reverse gear is obtained.



D_1 - Dog clutch - 1

D_2 - Dog clutch - 2

(3) Explain Differential operation and its construction:

During turning of a Vehicle, the outer wheel will have to travel greater distance as compared to the inner wheel. In case of a non driving wheel, the difference between the speed of the inner and outer wheel is self adjusted according to the requirement. whereas a differential is required to distribute power to the driving wheels according to the situation.

Operation of Differential:

The two wheels on the driving axle must be inter connected in order to receive their energy from the same source, the "driving shaft".

The axle is in two halves, each half is attached to a wheel at one end and at the other end to a gear.

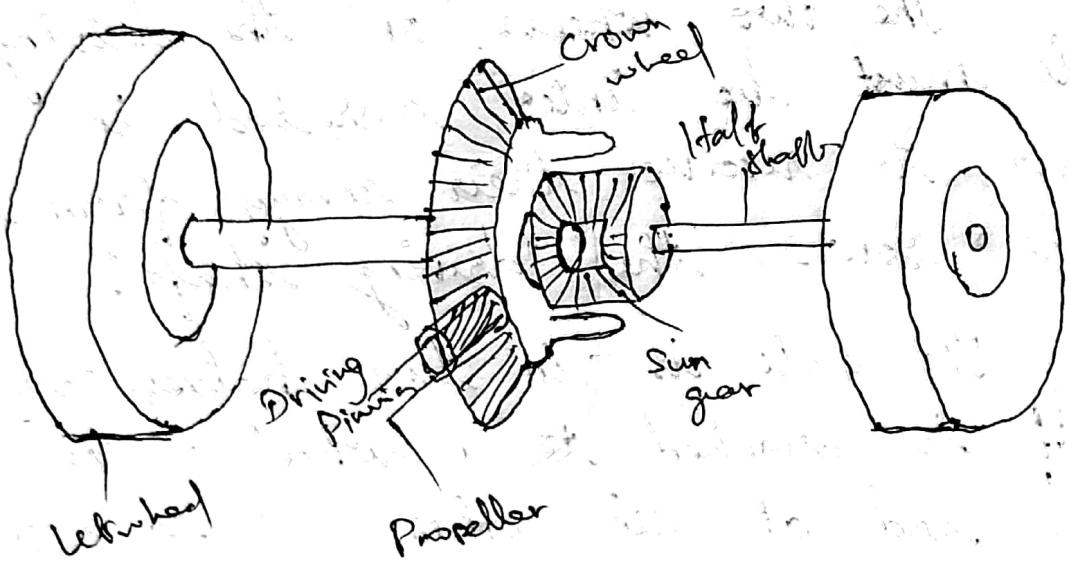
The main advantage of differential is, the difference in speed of the two wheels is compensated without loss of tractive force.

Construction: The differential unit consists of the following parts.

(a) Bevel pinion: which is fixed with the propeller shaft which then rotates the crown wheel.

(b) Crown wheel: Receives the power from bevel pinion and connected with the half shaft (axle) to rotate two bevel gears and two differential pinions.

(c) Half shaft: These half shafts have contact with the sun gears, and by means of the half shaft, the output power is transmitted to the rear wheels.



Briefly Explain about Torque converter Gear Box and its principles?

Torque converter Gear Box:

A torque converter is a fluid coupling or clutch that disengages when the Vehicle is stopped and transfers power as engine RPM increases. when the Vehicle is in motion and not under acceleration, the torque converter slips and transfers power as Vehicle speed decreases.

Torque converter principles:

* The purpose of Torque converter is to transmit engine torque to the driving wheels. It also increases or decreases torque to suit Varying road and operating conditions.

* In a manual transmission system, the driver manually selects the appropriate gear ratio to suit.

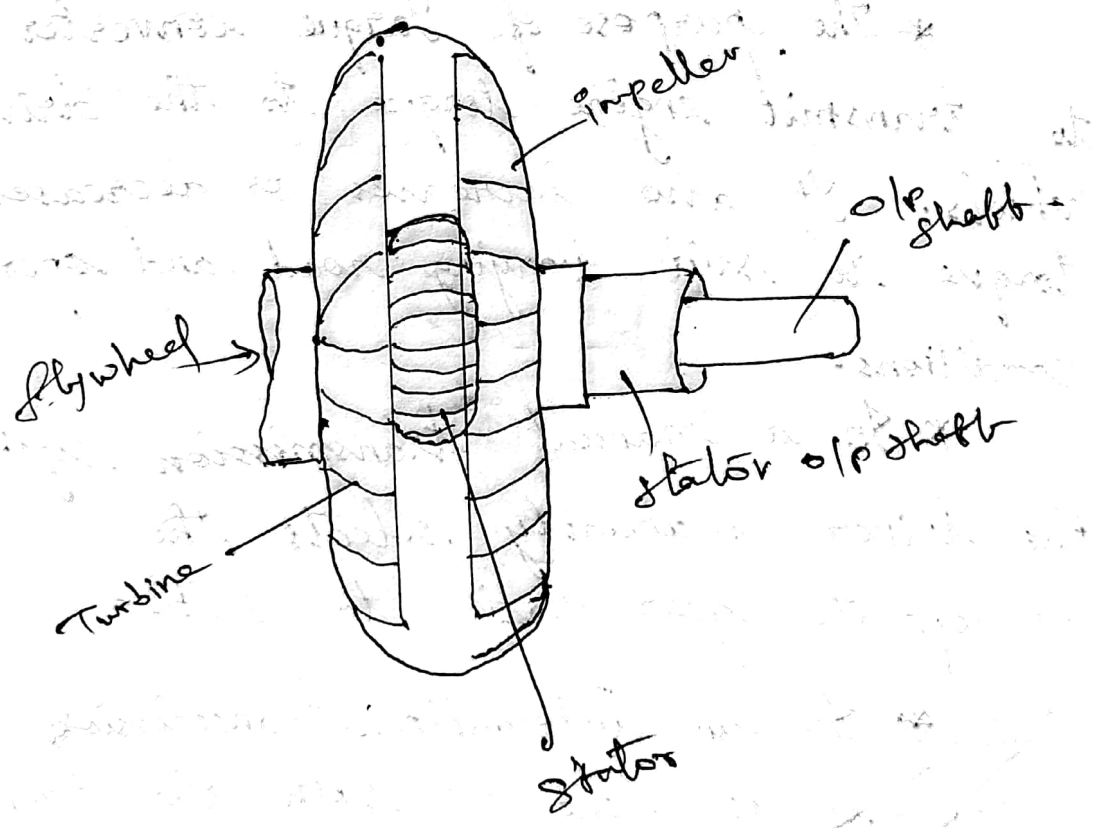
* In an automatic transmission system it is done by both the transmission control system, automatically selecting the gearing according to load and speed, and by the torque converter.

Torque converter has basically three elements:

1. The Impeller
2. Turbine and
3. Stator

Advantages:

* Provides noise free operation.
* Fuel consumption is reduced.
* Wear and tear is greatly reduced.



④ Explain briefly Synchromesh Gear Box:

Synchromesh type gear box is similar with constant mesh gear box principle, but a slight deviation is that in constant type, the gear wheels are always in meshed condition with their pair, where as in synchromesh type, a synchromesh device is used. Gears on the lay shaft are fixed on it while those on main shaft are free to rotate on main shaft.

Synchronizing:

When the synchronizing unit is moved to either end that is left or right, the female cone is mounted over the male cone.

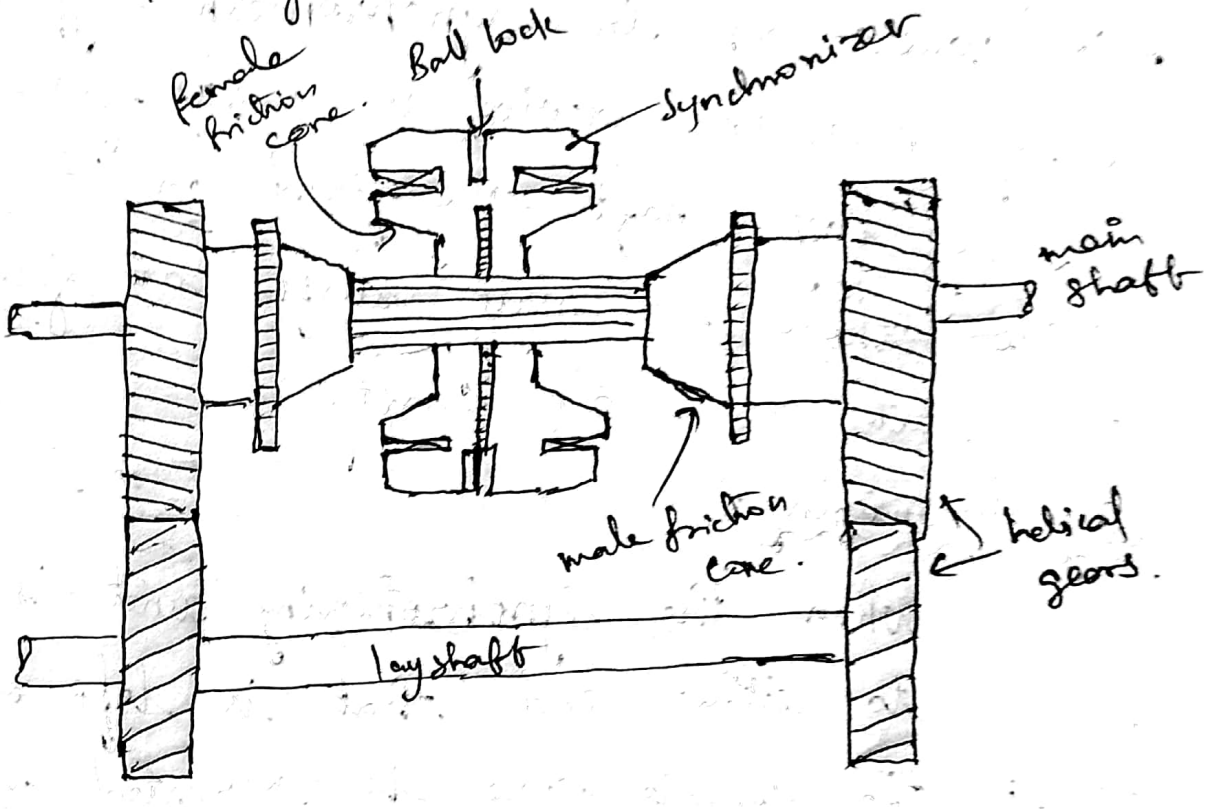
As the gear 1 and 4 are free to move over the main shaft, when the synchronizing unit comes in contact, due to friction, the gear 1 or 4 gets locked to main shaft and thus the desired gear ratio is achieved.

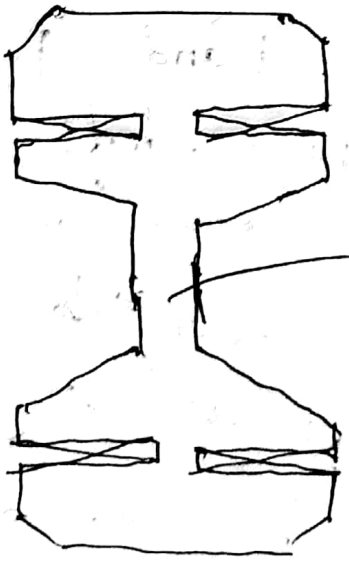
Advantages:

* Shifting of gear is easier.
* less noisy.

Disadvantages:

* Complex in designing.
* High initial cost.





(5) Explain Multi-plate clutch and its working:

Introduction:

The multiplate clutch is an advanced form of single plate clutch type where the number of frictional and the metal plates is increased, the torque transmitting capacity is increased, with no change in its size.

Construction of Multi-plate clutch:

The cover is bolted with the flywheel. Outer plates engage with the cover by means of external splines. These outer plates, which may be plain steel or fitted with cork or friction material inserts, act on inner plates, which are splined to the inner hub.

Working of MPC:

While the flywheel is rotating, the pressure plates rotate

and press against the friction plate. This causes the friction plates and the clutch shaft to rotate as well. When the pedal is pressed, the flywheel continues to rotate but the friction plates are released. This happens because they are not fully pressed by the pressure plates. Thus the clutch shaft also stops rotating.

Advantages:

* Increased friction surfaces.
* Increased torque.