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COURSE NAME : AUTOMOTIVE TRANSMISSION SYSTEM

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DESIGNATION : GUEST FACULTY

TOPIC : **CLUTCH SYSTEM**

Clutch

- Clutch is a mechanical device that facilitates transmission of power and motion from one component (the driving member) to another (the driven member) when engaged, with a provision for disengagement whenever required.
- In the simplest application, clutches connect and disconnect two rotating coaxial shafts. One shaft is attached to a power unit (the driving member) while the other shaft (the driven member) provides output power for work. The motions involved are rotary in nature.

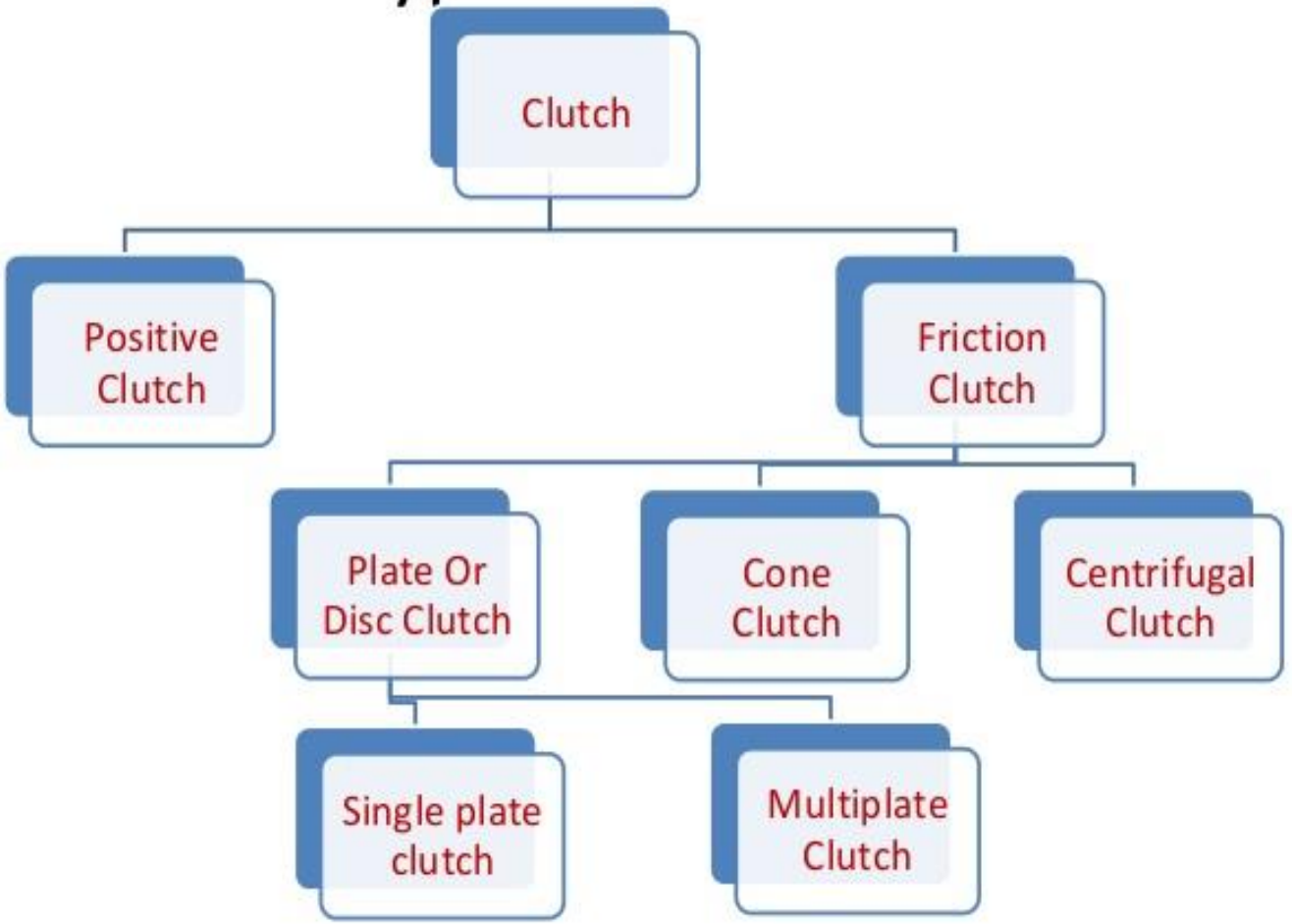
Purpose

- A clutch is designed with the following requirements
  - Allow the vehicle to come to a stop while the transmission remains in gear
  - Allow the driver to smoothly take off from a dead stop
  - Allow the driver to smoothly change gears
  - Must be able to transmit power and torque without slipping

PRINCIPLE OF CLUTCH

- It operates on the principle of friction. When two surfaces are brought in contact and are held against each other due to friction between them, they can be used to transmit power. If one is rotated, then other also rotates. One surface is connected to engine and other to the transmission system of automobile. Thus, clutch is nothing but a combination of two friction surfaces.

Types Of Clutch



FRICTION CLUTCH

- The vast majority of clutches ultimately rely on frictional forces for their operation. The purpose of friction clutches is to connect a moving member to another that is moving at a different speed or stationary, often to synchronize the speeds, and/or to transmit power. Usually, as little slippage (difference in speeds) as possible between the two members is desired.

TYPES OF FRICTION CLUTCH

I. single plate clutch

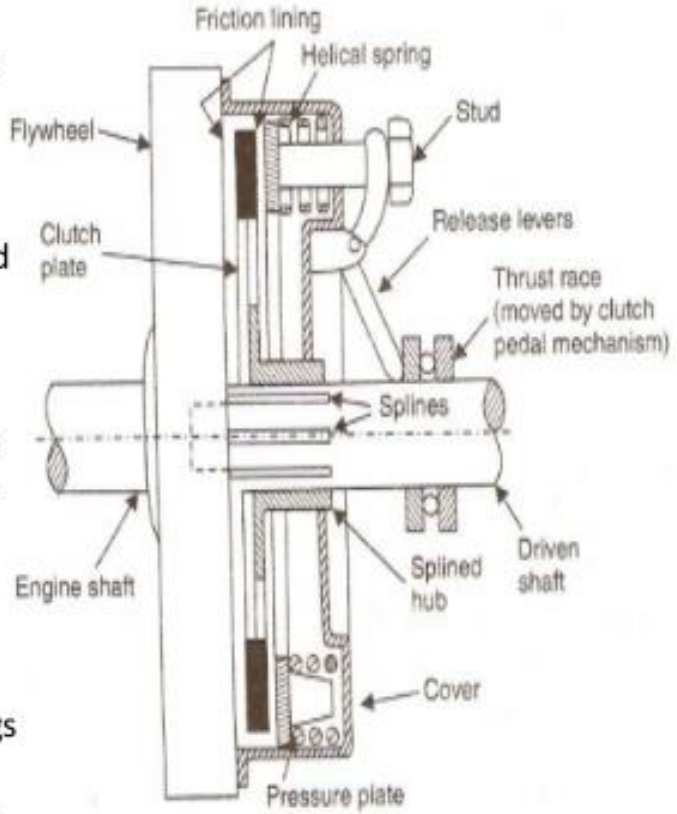
II. multi-plate clutch or (iii) cone clutch. Multi-plate clutch can be either wet or dry. A wet clutch is operated in an oil batch whereas a dry clutch does not use oil.

SINGLE PLATE CLUTCH

- A single plate is commonly used in cars and light vehicles. It has only one clutch plate which is mounted on the splines of the clutch shaft. A flywheel is mounted on the crankshaft of the engine. A pressure plate is connected to the flywheel through the bolts and clutch springs. It is free to slide on the clutch shaft with the movement of clutch pedal. When clutch is in engaged position, the clutch plate remains gripped between flywheel and pressure plate. Friction linings are provided on both the sides of clutch plate. On one side clutch plate is in touch with flywheel and on other side with pressure

Single Plate Clutch

- *Working*- The diagram shows the pressure plate pulled back by the release levers against the compression springs; so that the friction linings on the clutch plate are free of flywheel and pressure plate. The flywheel rotates without driving the clutch plate and hence the shaft.
- When the pressure of the thrust race is released the compression springs are free to move the pressure plate to the left bringing it in contact with the clutch plate.
- The pressure plate moves to the left, sliding the clutch plate on its splined hub, along the driven shaft until the friction lining touches the flywheel.
- The compression springs now cause the linings to be gripped between the pressure plate and the flywheel and the friction between the linings and flywheel and pressure plate causes the clutch plate to revolve, turning the driven shaft.

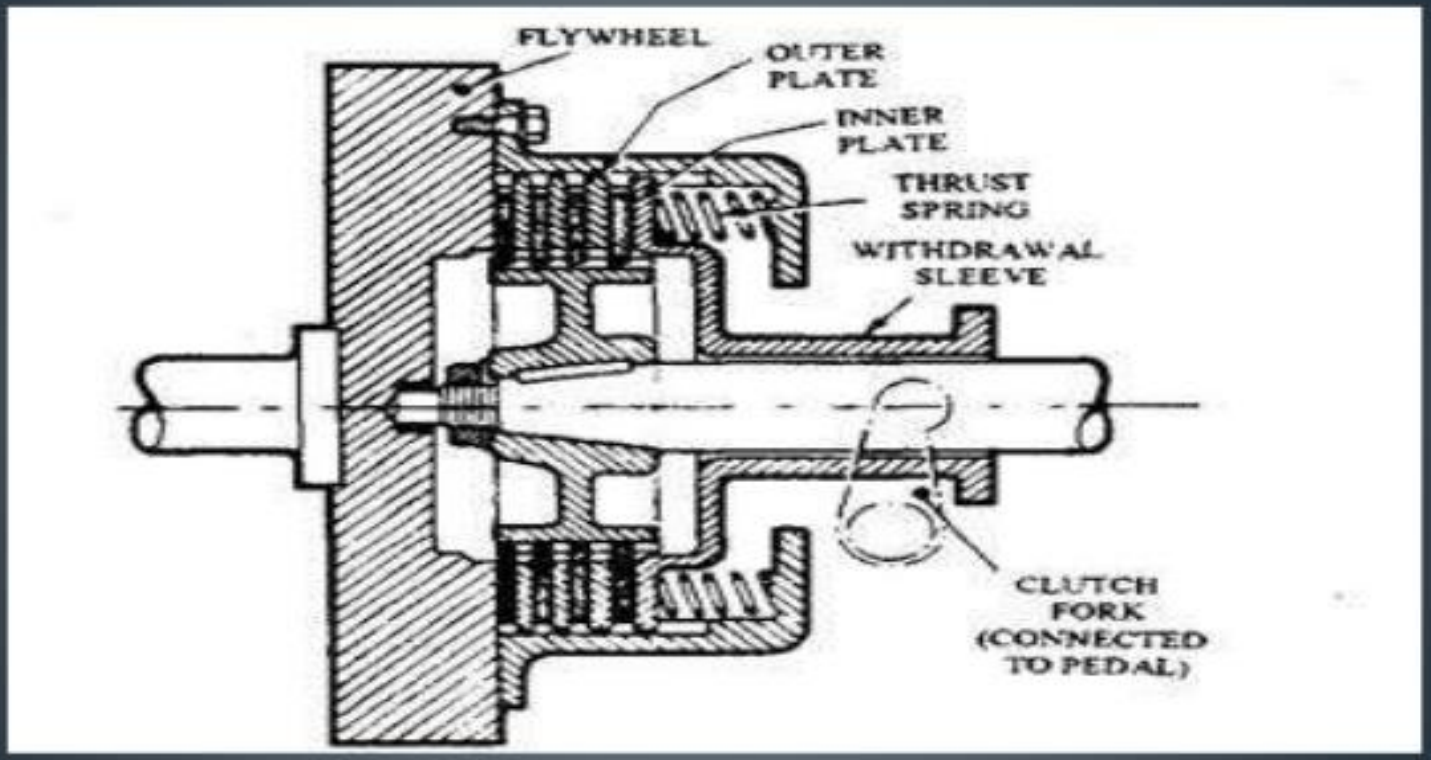


MULTIPLATE CLUTCH

- Multi-plate clutch consists of more than one clutch plates contrary to single plate clutch which consists of only one plate. Friction surfaces are made in case of multi-plate clutch. Due to increased number of friction surfaces, a multi-plate clutch can transmit large torque. Therefore, it is used in racing cars and heavy motor vehicles witch have high engine power. The clutch plates are alternatively fitted with engine shaft and the shaft of gear box. He plates are firmly held by the force of coil springs and they assembled in a drum.

Multi-plate Spring type clutch

- Illustrates the layout of a multi-plate spring type clutch, fitted on early motor cars. A cover, bolted to the flywheel, engages by means of slots with a series of lugs on the outer plates. These steel plates may be plain or fitted with cork or friction material inserts and act on inner plates, splined to a hub. Thrust springs push the plates together to form a drive.


FLYWHEEL
OUTER PLATE
INNER PLATE
THRUST SPRING
WITHDRAWAL SLEEVE
CLUTCH FORK (CONNECTED TO PEDAL)

- For the clutch disengagement, the end plate is withdrawn to compress the springs and release the other plates. In this arrangement it is difficult to ensure the disengagement of all plates. To overcome this problem the plates are either dished or fitted with small springs to push the plates apart.
  Generally wet type clutch is used in automatic gearboxes, and is operated by a piston governed by hydraulic pressure. Sintered bronze plates of partially fusing powdered bronze or compressed paper are used in many designs. The porous surface of this plate traps the oil, to provide long life and smooth operation.

ADVANTAGE

- The main purpose for a wet multi-plate clutch is increased power transmission capability in a compact size. As a side effect, multi-plate wet clutches generally have very good progressive engagement “feel”. This is why they are used as crane hoist clutches, tracked vehicle steering clutches, and heavy machine tool drives, apart from motorcycles.
- Wet clutches are designed for moderate slipping, partly due to the cooling effect of the oil, and partly due to the hydrodynamic effects present preventing shoe contact. Properly maintained, a wet clutch should last many times longer than a dry single-plate clutch under similar service conditions