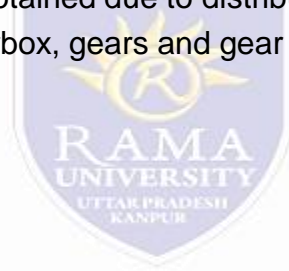


# Lecture

## Automobile engineering

- For obtaining low speed, the clutch is disengaged and brake is applied on drum 8. It is done with the-help.of a gear change lever.
- This action locks the gear 4 by decreasing the speed of gear 2. Hence, the output shaft is reduced.
- For obtaining reverse speed, the clutch is disengaged and brake is applied on drum 10. It locks the gear 6 by reversing the direction of rotation of 2 with respect to the input shaft.
- Thus, the speed of 2 is also reduced.
- Advantages of epicyclic gearbox:
  - 1. The planetary gears are in constant mesh. Hence, dog clutches or sliding gears are not used.
  - 2. External contracting hand brackets or multi-plate clutches of relatively small dimensions are used for changing the gears.
  - 3. It is a more compact unit because the planetary gear operates within a ring gear with its external surface of cylindrical form.
  - 4. It is distributed over several gear wheels instead of having the load on only one pair of gears.
  - 5. A greater area of gear tooth contact can be obtained due to distribution of loads.
  - 6. In comparison to the three or four speed gearbox, gears and gear housings of this gearbox can be made smaller in overall dimensions.



# Lecture

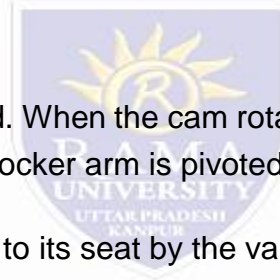
## Automobile engineering

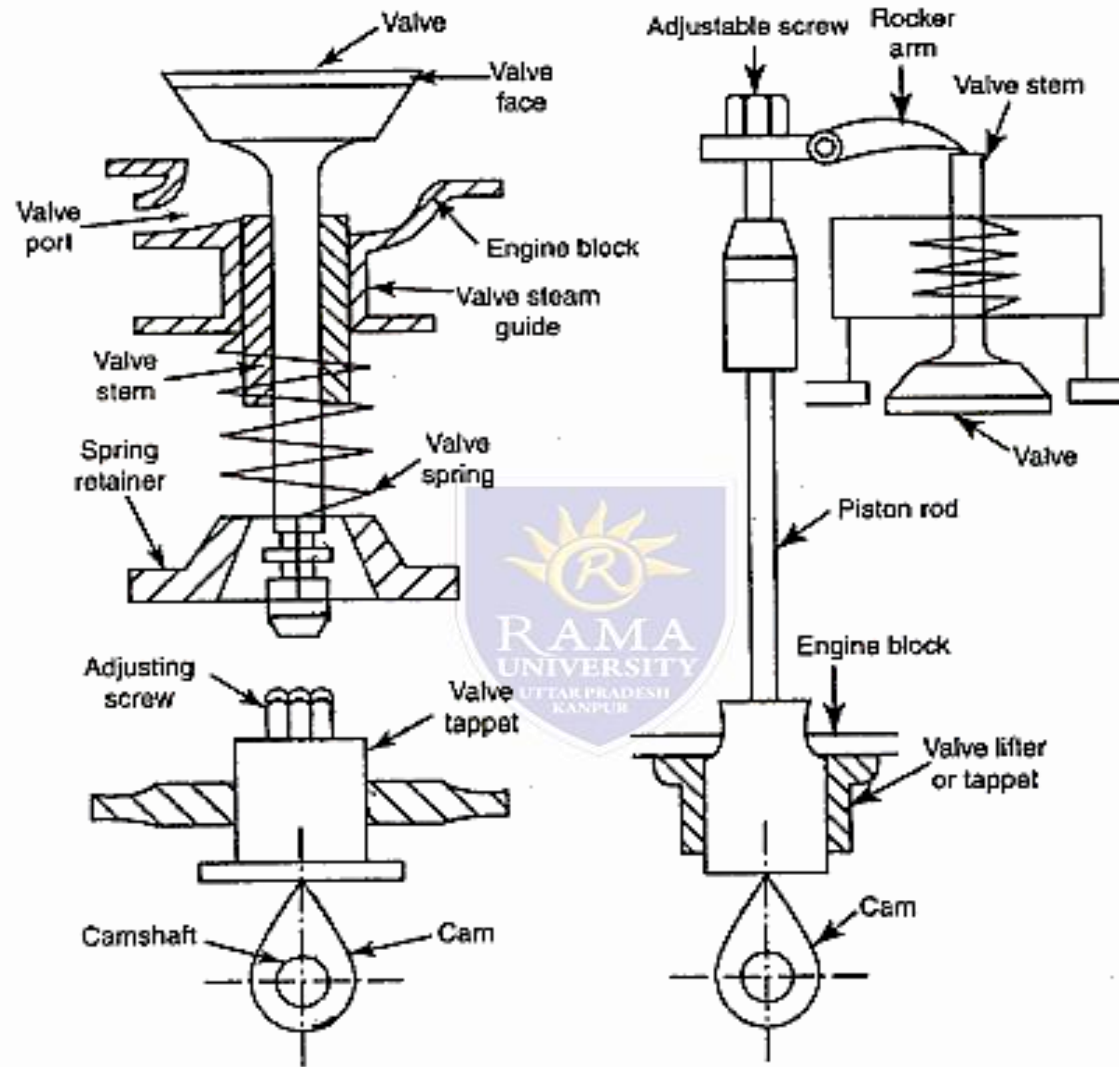
- Automatic Gearbox
- Various speeds are obtained automatically in gearboxes are known as automatic gearbox. Generally, the driver selects the car condition such as neutral, forward or reverse.
- The selection, timing and engagement of gear for the required gear speed are selected automatically when the accelerator is pressed or depressed. Automatic gearbox does not require gear change lever and clutch pedal. Since, both clutch and transmission are a combined unit which works automatically.
- The automatic gearbox is operated in two ways namely
  - 1. Hydromantic transmission, and
  - 2. Torque converter transmission.
- In the case of hydromantic transmission gearbox, the planetary gear sets are connected in such a way that power may be transmitted through them.
- A centrifugal governor in the transmission chooses the: proper gear according to the speed and throttle position. The gear shifting from one gear to another gear is done through hydraulically operated pistons by actuating springs.
- These springs control the brake bands on the planetary gear sets and clutches within the planetary unit.
- The various shifts are achieved by the throttle and centrifugal governor.
- Torque converter transmission system employs fluid coupling, torque converter and epicyclic gear arrangement.
- If all different devices are combined into one unit, they will do their duties jointly without any interruptions. Now-a-days, automatic transmissions are popular with various names prescribed by the manufacturers.
- They may differ in construction slightly. Somebody employ only fluid coupling with the planetary transmission. But others may include a torque converter with fluid coupling and planetary transmission as per their requirements

# Lecture

## Automobile engineering

- Valve Mechanisms
- The valves are actuated by cams mounted on a cam shaft. The different types of valve operating mechanisms are as follows.
- (i) side valve mechanism
- (ii) overhead valve mechanism
- (iii) overhead inlet and side exhaust valve mechanisms.
- (i) Side valve mechanism:
  - This mechanism is shown in Figure 1.51.
  - The cam mounted on the camshaft operates the valve tappet during its rotation.
  - The valve tappet is pushed up.
  - The valve tappet pushes the valve from its seat against the spring force.
  - Thus, the valve is opened. When the cam is not in action, the valve returns to its seat by the valve spring and spring retainer.
- ii) Overhead valve mechanism:
  - Figure 1.52 shows overhead valve mechanism..
  - Here, the valves are located in the cylinder head. When the cam rotates, the valve lifter pushes the push rod upwards.
  - The push rod moves the rocker arm. Since the rocker arm is pivoted at its centre, it pushes the valve off its seat against the spring force. Thus, the valve is opened.
  - When the cam is not in action, the valve returns to its seat by the valve spring and spring retainer.





**Figure 1.51 Side valve mechanism valve**

**Figure 1.52 Overhead mechanism**

# Lecture

## Automobile engineering

- (iii) Overhead inlet and side exhaust valve mechanism:
- In this system, inlet valve is located in the cylinder head whereas the exhaust valve is located in the cylinder block.
- The inlet valve is actuated by overhead valve mechanism. The exhaust valve is actuated by a side valve mechanism.

### DIFFERENT PARTS OF I.C. ENGINES

Here follows the detail of the various parts of an internal combustion engine.

A cross-section of an air-cooled I.C. engine with principal parts is shown in Fig. 2.5.

#### A. Parts common to both petrol and diesel engine :

- |  |                   |
|--|-------------------|
| 1. Cylinder                                | 2. Cylinder head  |
| 3. Piston                                  | 4. Piston rings   |
| 5. Gudgeon pin                             | 6. Connecting rod |
| 7. Crankshaft                              | 8. Crank          |
| 9. Engine bearing                          | 10. Crankcase     |
| 11. Flywheel                               | 12. Governor      |
| 13. Valves and valve operating mechanisms. |                   |

#### B. Parts for petrol engines only :

- |                |                |
|----------------|----------------|
| 1. Spark plugs | 2. Carburettor |
| 3. Fuel pump.  |                |

