IV unit (9) Design of GEAR Box:-

We know that machine tools like lathe, milling machines etc, require a wide range of spindle speeds. Thus the provision of variable spindle speed is necessary in order to meet different requirements. The various methods used for obtaining different speeds of machine tool spindle are as follows.

i) By using a gear box mechanism
ii) By using a cone pulley arrangement
iii) By using a variable speed electric motor
iv) By hraulic operation

Requirements of a Speed Gear boxes:-

A speed gear box should have the following requirements;

* It should provide the designed series of spindle speeds.
* It should transmit the required amount of power to the spindle
* It should provide smooth silent operation of the transmission
* It should have simple construction
* Mechanism of speed gear boxes should be easily accessible so that it is easier to carry out preventive maintenance

Methods for changing speed in gear boxes:-

* The two important methods widely used are :-

i) Sliding mesh gear box

ii) Constant mesh gear box

Structural formula :-

Let, n => number of speeds available at the spindle.

$P_1, P_2, P_3 \ldots$ = stage numbers in the gear box.

$x_1, x_2, x_3 \ldots$ => characteristic of the stage.

Then, the structural formula is given as :,

$$n = P_1(x_1) \cdot P_2(x_2) \cdot P_3(x_3) \cdot P_4(x_4).$$

1st stage 2nd stage 3rd stage 4th stage.

$$x_1 = 1; \quad x_2 = P_1; \quad x_3 = P_1 \cdot P_2;$$

$$x_4 = P_1 \cdot P_2 \cdot P_3.$$