

UNIT - 2 BEAMS & THEORY OF BENDING

SHEAR FORCE AND BENDING MOMENT DIAGRAMS

The shear force and bending moment can be calculated numerically at any particular section. But sometimes, we are interested to know the manner, in which these values vary, along the length of the beam. This can be done by plotting the shear force or the bending moment as ordinate and the position of the cross as abscissa. These diagrams are very useful, as they give a clear picture of the distribution of shear force and bending moment all along the beam.

NOTE. While drawing the shear force or bending moment diagrams, all the positive values are plotted above the base line and negative values below it.

RELATION BETWEEN LOADING, SHEAR FORCE AND BENDING MOMENT

The following relations between loading, shear force and bending moment at a point or between any two sections of a beam are important from the subject point of view:

1. If there is a point load at a section on the beam, then the shear force suddenly changes (*i.e.*, the shear force line is vertical). But the bending moment remains the same.
2. If there is no load between two points, then the shear force does not change (*i.e.*, shear force line is horizontal). But the bending moment changes linearly (*i.e.*, bending moment line is an inclined straight line).
3. If there is a uniformly distributed load between two points, then the shear force changes linearly (*i.e.*, shear force line is an inclined straight line). But the bending moment changes according to the parabolic law. (*i.e.*, bending moment line will be a parabola).
4. If there is a uniformly varying load between two points then the shear force changes according to the parabolic law (*i.e.*, shear force line will be a parabola). But the bending moment changes according to the cubic law.