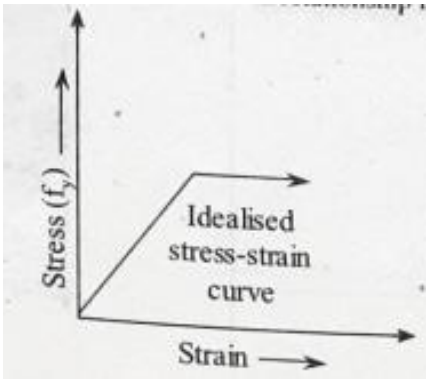
# PLASTIC THEORY

## Assumptions made in plastic analysis of structure




a. The strain hardening effect are ignored and the stress – strain relationship is expressed through two straight lines.
b. The effect of axial load on fully plastic moment capacity of the section are ignored.
c. The plane section before bending continuous to remain plane even after the bending. The shear deformation are ignored.
d. There is an identical relationship between compressive stress, compressive strain and tensile stress, tensile strain.
e. The effect of shear on a fully plastic moment capacity of the section is ignored.
f. A plastic hinge is formed at the cross section where the plastic moment is attained. This plastic hinge is allowed to undergo rotation of any magnitude, but at a fully plastic value, the bending moment remains uniform.
g. The materials is assumed to be homogeneous and isotropic in both the elastic and plastic states.
h. The resultant axial force on beam is zero
i. Total compression = total tension
j. The value of modulus of elasticity is same in both tension and compression.

k. The fibers in the lateral direction remains unaffected due to the expansion or contraction of longitudinal fibers

## Limitation of plastic analysis

The limitation of the theory of plastic analysis are as follows

a. Only the material of ductile steel can be analyzed by plastic analysis. Therefore this method is not recommended for high strength steel.
b. It is difficult to recognize the unstable plastic structure than the identical elastic structure.
c. The connection provided in the plastic structure should be strong enough to transfer the plastic moments. Thus, plastic structure requires greater provision, care and good materials when compared to elastically designed structure.
d. Theory of simple plastic analysis is not applicable to the trusses in which the structural member carry axial forces instead of the bending. Hence, special methods are required to analysis such structure.