PLASTIC MOMENT OF RESISTANCE

Plastic moment

The moment of resistance of a beam or any structure when thee plastic hinges are formed is known as the plastic moment or plastic moment of resistance

$$\text{Plastic moment, } Mp = Fy / Zp$$

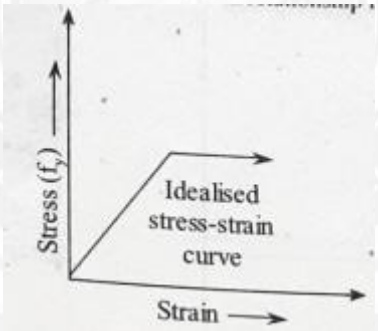
Where,

Fy – Yield stress

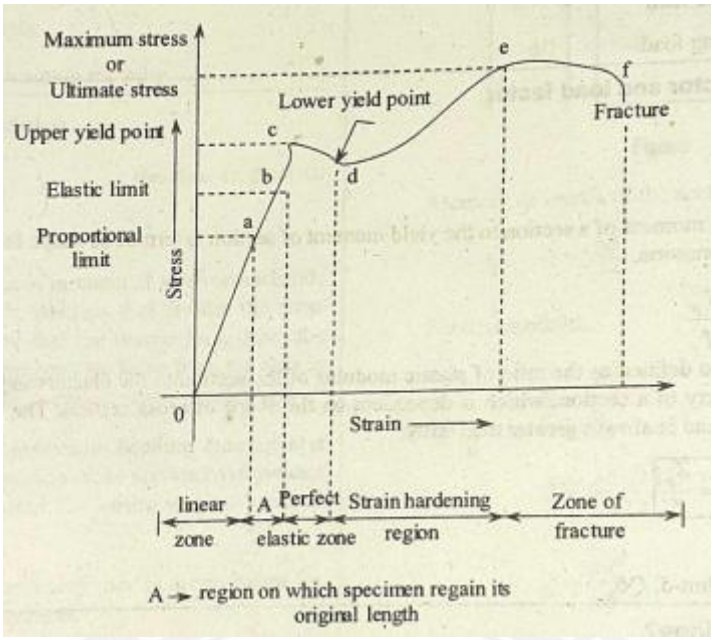
Zp – Plastic sectional modulus

Stress-strain curve for mild steel

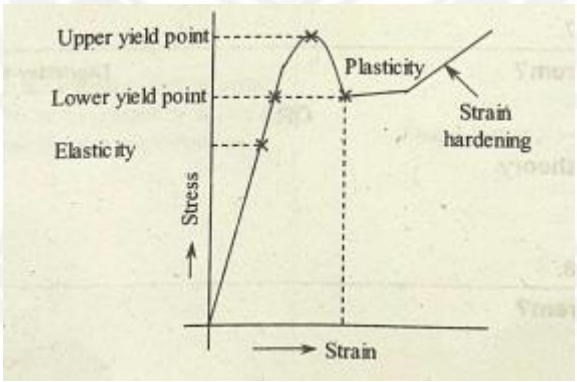
The stress - strain curve of the mild steel specimen of typical form and their corresponding elements are explained below, with the help of the graph.



As the strain in the specimen increases, the stress will also increase with linear variation till the proportional limit(within the linear region). Beyond this point, the stress reaches a point at which the specimen can regain its original length. When stress in increased above this perfectly elastic stage, it reaches a point called the upper yield point (c) from which it falls to lower yield point. The strain in the specimen keeps on increasing at a constant rate when the stress drops from c to d. Beyond those point the stress increase rapidly within strain hardening range and reaches the maximum or ultimate's stress. Further increase in stress results in fracture. The behavior of stress-strain curve can be understood easily by the following stress- strain scale.



The upper yield stress varies with strain as it depends upon the rate of application of the load and its method. Due to this reason the fully plastic moment remains un-effected. While designing the steel member by plastic methods, the elastic limit and the lower yield point is assumed to be numerically identical. The achieved values indicate that elastic deformation is only about 1/12th of the strain starting point of the strain hardening zone reaching to the value of 1/200 of the strain at maximum strain of 0.25.



According to the elastic theory, the stress - strain relationship is assumed to linear. depending upon this theory, the structure fails when the stress at any point reaches the yield stress. By neglecting the strain idealized by two straight lines as shown in fig. Shear deformation is neglected so that the plane section before and after the bending remains plane and compressive stress and the compressive strain are directly proportional to the tensile stress and tensile strain. Bending moment is assumed as constant even after the application of fully plastic moment.