Stress / strain

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Importance of M.S :-

1. I.I has very high ductility.
2. The tensile strength and compressive strength is approximatly same.

σ_y (tension) = 250 MPa
σ_y (compression) = 262 MPa

3. The youngh modules of M.S in tension and compression is same.
4. The coefficient of thermal expension is equal to con
5. The weldiability of M.S is very good.
6. relatively less costly

Stress :- Stress is the internal resistance offered by the body against deformation.
Stress will develop if strain is resestive.

Note that: If strain is free to occure in any direction then stress will not occure in that direction.

Classification of stress :-

Stress = $\frac{f}{A}$ | $\sigma = \frac{P}{A}$ | Force per unit area | $\frac{N}{m^2}$ | $\frac{N}{mm^2}$

Stress

Normal stress

Tangential / Shear stress

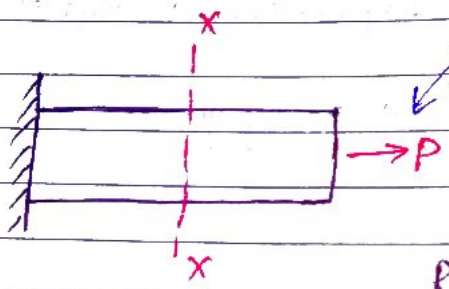
① Direct Normal Stress (Due to axial Force) — Axial stresses

② Bending Stress (Due to B.M)

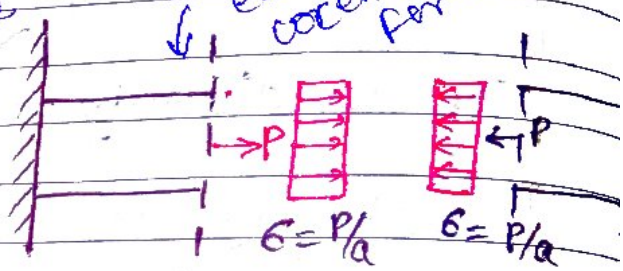
Direct Shear Stress (Due to S.F)

Torsional Shear Stress (Due to torque)

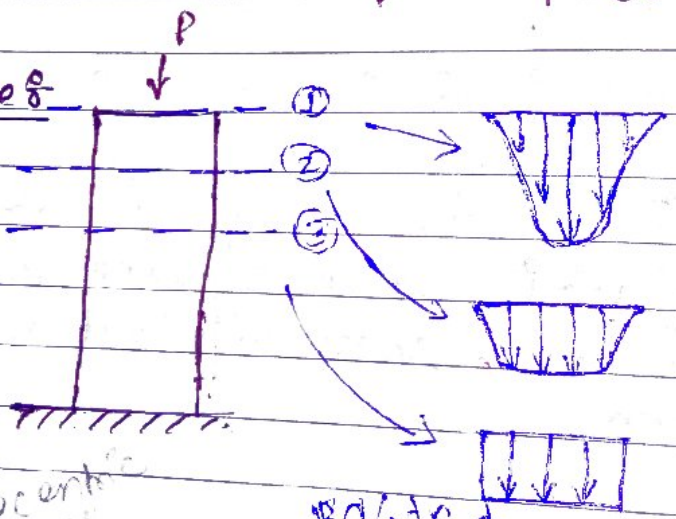
① eccentric force



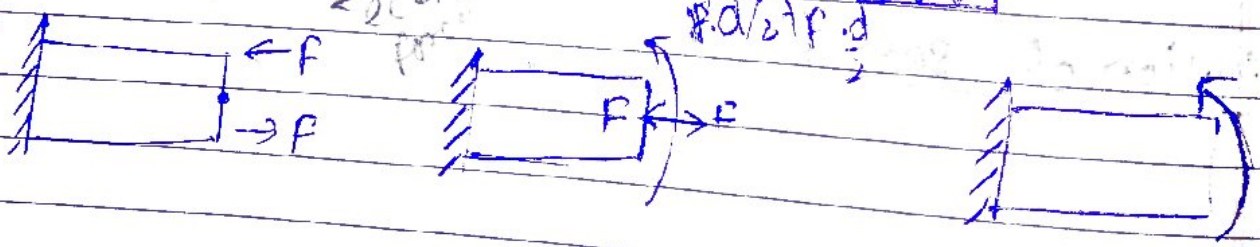
If due to essential eccentric force



St. Venant's Principle



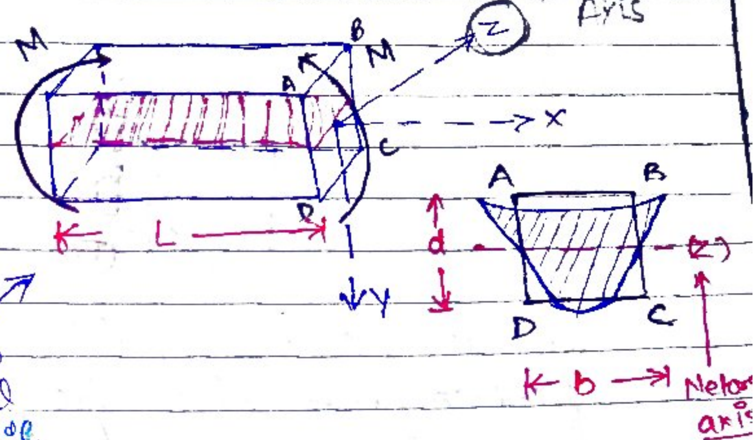
②



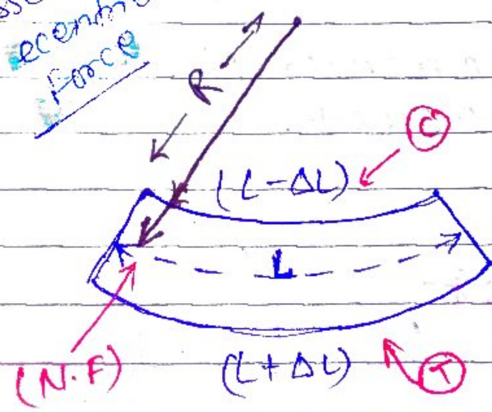
Since the bending moment is developed due to equal and opposite ecentric axial force therefore the bending stress will be along the axis of bar (longitudinal direction). Hence it is also called normal stress.

Its axis ke about moment lgega wo Netural axis hoga

Generally tensile stresses are +ve and compressive stress are −ve.



Due to essential ecentric force



Koi jaruri ni hai ki Netural plane/axis bottom me ho ...

Neutral Axis: It is the axis about which the cross section of beam is in pure rotation.

or

It is the axis about which moment is applied.

Due to bending moment bending stress develop in longitudinal direction (axial direction), which is varying from zero at N.A to maximum at top and bottom surface linearly and is given by at a distance y from N.A.

$$\frac{f}{y} = \frac{M}{I} = \frac{E}{R}$$

Strain $\epsilon = \frac{\delta}{L}$

Where

f = Bending stress at dist y from N.A.

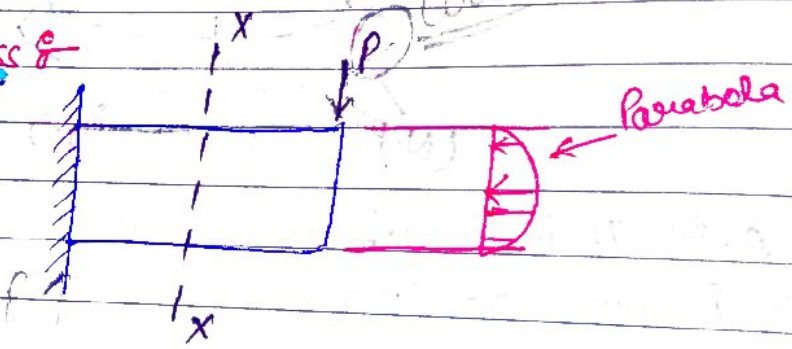
I = Area m.I

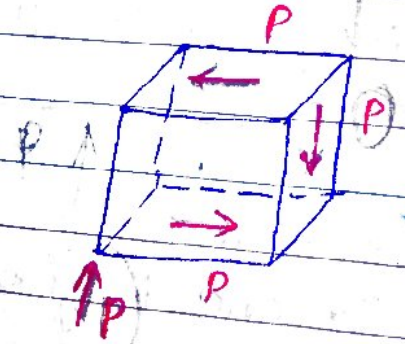
R = Radius of curvature.

Due to the bending if the crosssection before bending is rectangular then after bending it become trapezoidal

The area moment of Inertia represent the resistance against moment.

Direct Shear stress



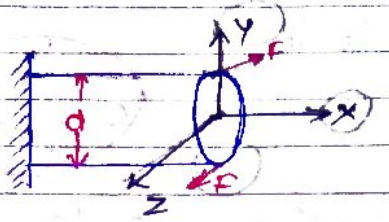


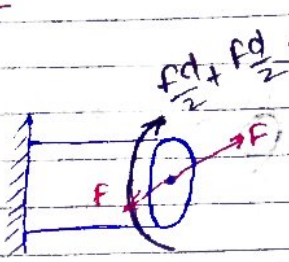
$$q = \frac{SA\bar{Y}}{I \cdot b}$$

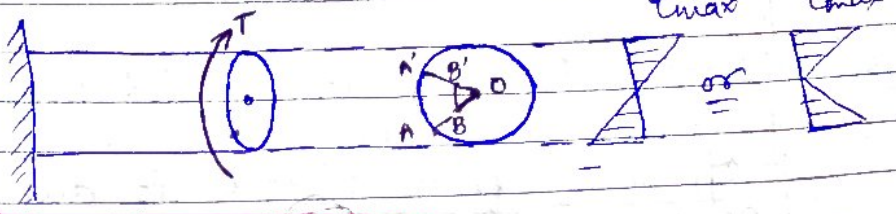
q = Shear stress due to S.F.

The shear stress minimum of 2-D.

TORSION SHEAR STRESS :-







$$\frac{\tau}{\gamma} = \frac{T}{I_p} = \frac{G\theta}{L}$$

τ = Shear stress due to torque at radius 'r' from centroidal axis

I_p = polar M.I.

TENSION TEST RESULT OF MILD STEEL :- # Boital →