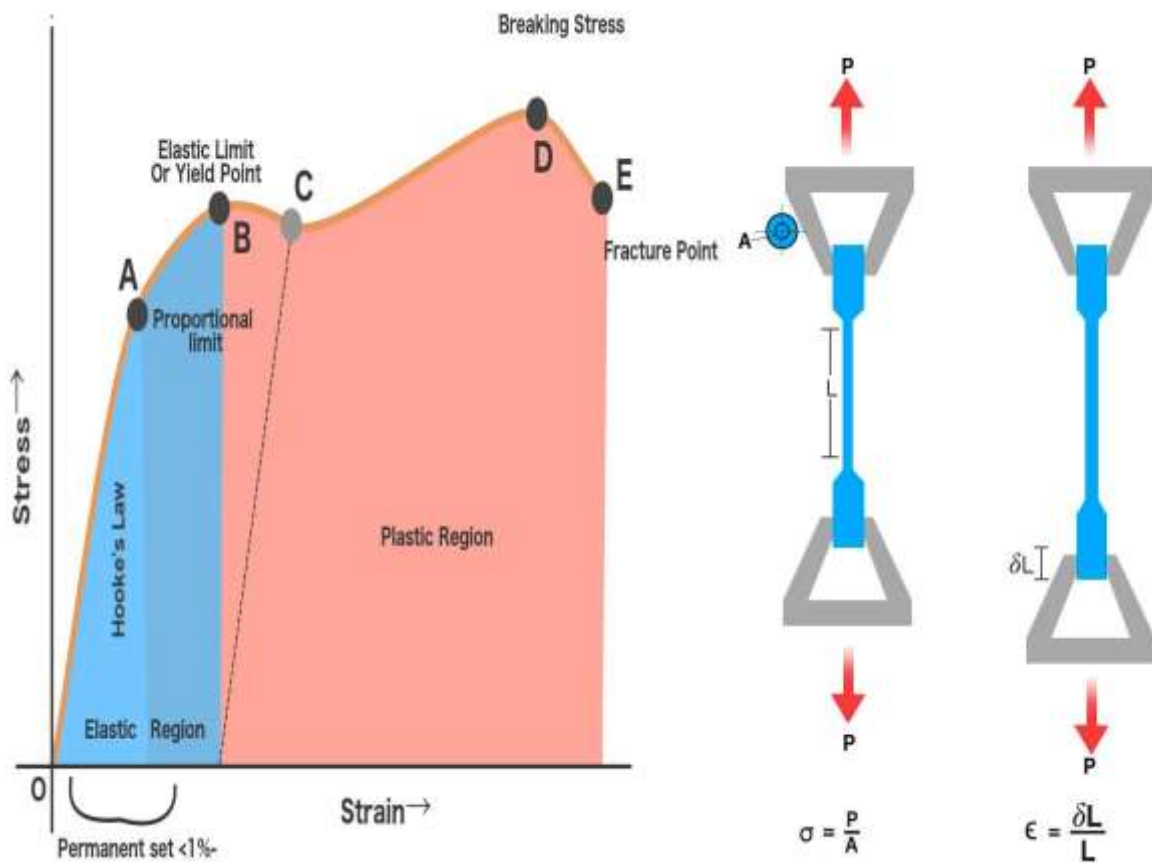


Mechanical Properties Of Material

Stress-Strain –Curve

Ductile Material:-



0—1 elastic region

A-elastic limit

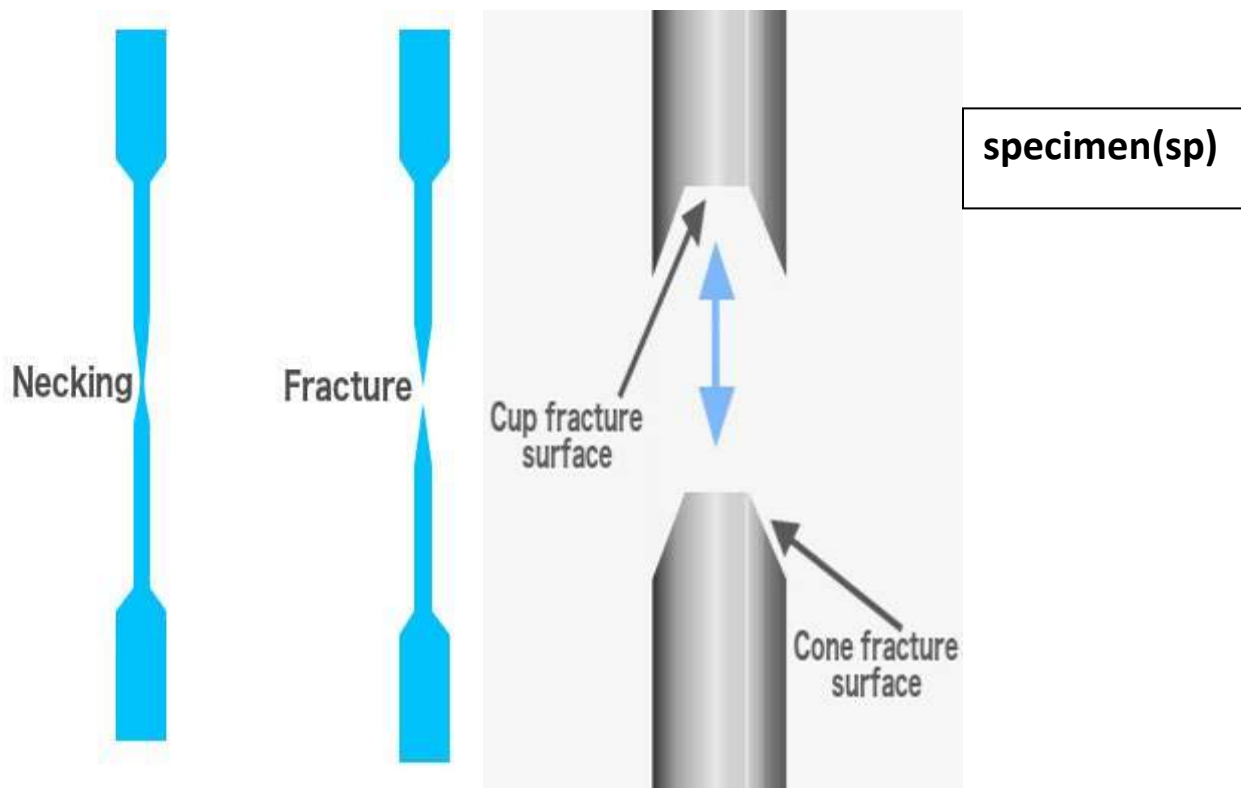
C-yield point

D-point of max load(point of instability)

E-necking & fracture. Specimen(sp)

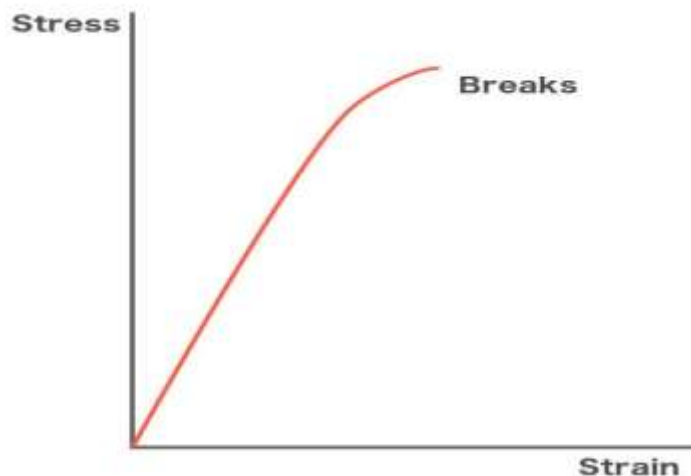
$$\sigma = \frac{F}{A^2} \text{-----(1)}$$

$$\epsilon = \frac{\Delta L}{L} \text{-----(2)}$$



Necking&Fracture (Cup&ConeFracture)

Brittle Materials:-



Ex1; A steel wire (4mm) diameter length and (12m). Extend 5mm) under a load (4.6Xkg)

Find the stress & strain.

Sol:- $d=4\text{mm}$ $L=12 \times 1000=12000\text{mm}$

$$L=4.5\text{kg} \text{-----} 4.6 \times 10^3$$
$$\sigma = F/A \text{-----}^{(2)}$$

$$A = \pi d^2 = 22.7 \times (4)^2 =$$

$$\sigma = 4.6 \times 10^3 / 22.4 \times (4)^2 = 123.77 \text{kg/mm}^2$$

$$\text{Strain} = \Delta L/L = 5/12000 = 0.001436.$$

EX2:- A steel wire (6mm)diameter and (8m)length

Extend (5mm) under a load of (3.6KN).

Calculated the stress and strain

Soul :-

$$D=6\text{mm} \quad L=8 \times 1000\text{mm} \quad F=3.6 \times 10^3 \text{ N}$$

$$\text{Stress} = \text{load/Area} = 3.6 \times 10^3 \times 4 / \pi (6)^2 = 11.8 \text{N/mm}^2.$$

$$\epsilon = \Delta L/L = 5/8000 = 62 \times 10^{-4}.$$

EX3 :-

Acoil chain required to carry max load (50Kn).Find

The diameter of the coil .IF the tensile stress(75N/mm^2).

SOL;

$$A = \pi d^2/4 = 0.7854d^2$$

$$\text{Stress} = F/A \quad 50 \times 10^3 / 0.7854 \times d^2$$

$$d = 29.13\text{mm} = 30\text{mm}$$

Ex4 :-A rubber for machine is carry load (15KN)and
to compress (15mm)under this load .if the stress in
the rubber is (280KN/m^2) **FIND-**

1-diamter and the length of rubber(used $E=1\text{N/m}^2$).

Sol:-

$$\sigma = F/A$$

$$280 \times 10^3 = 15 \times 10^4 \times 4 / \pi d^2 \times d^2$$

$$d = 0.150 \text{ mm} \quad = 15 \text{ mm}$$

$$\epsilon = \Delta L / L \quad 1 = 280 \times 10^3 \times 1 / 0.0005$$

$$L = 18 \text{ mm}$$
