M R

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فيزياء	استاتيكا
دوائر كهربية	الكـــترونيات
ميكانيكا الانشائات	هيدروليكا

مدرس خصوصي

اونلاين حضوري

يحصل الطالب علي

- مقاطع فيديوهات لشرح المقرر بشكل وافي
- ملخص للمادة Pdf للمذكرة والمراجعة
- محاضرات مباشرة علي برنامج زووم
- لمناقشة الأجزاء الغير مفهومة
- تواصل مستمر مع معلم المادة

للتواصل

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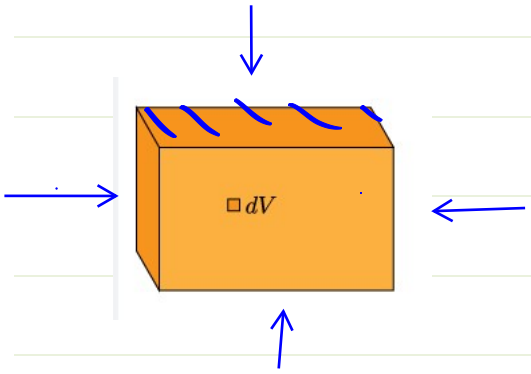
بسم الله الرحمن الرحيم

Structural Mechanics

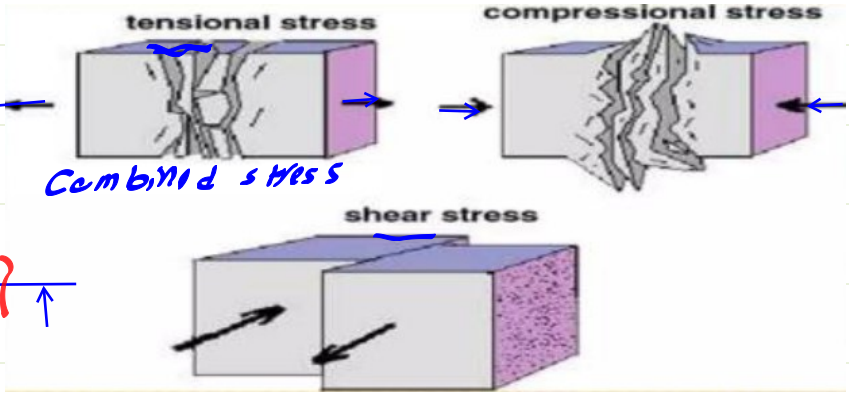
Outlines

1) Stress
1.1) Terminologies related to stress
1.2) Types of stress
2) Strain
2.1) Terminologies related to strain
2.2) Types of strain
3) Relation Between Stress and Strain
4) Stress and strain Diagram

$\sigma = \frac{f}{A} = \frac{N}{m^2} = Pa$

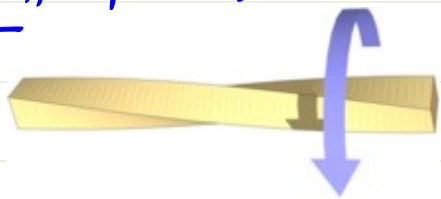


normal stress



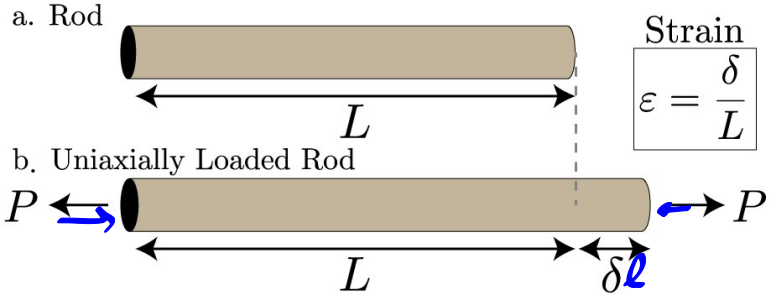
Combined stress

for tional stress



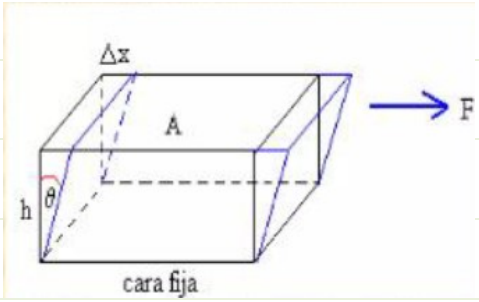
strain

$\epsilon = \frac{\Delta \ell}{\ell}$



TYPES OF STRAIN

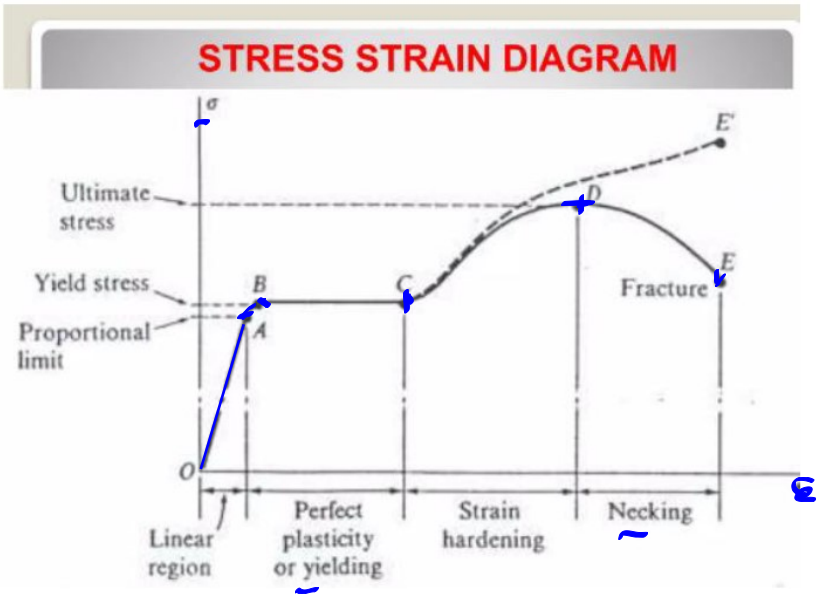
1. Tensile Strain $\frac{\Delta l}{l}$
2. Compression Strain
3. Volumetric Strain $\frac{\Delta V}{V}$
4. Shear Strain



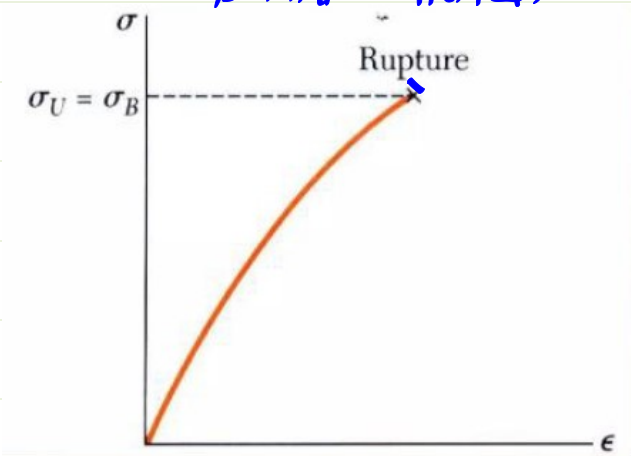
$\tan\theta = \theta$

$E = \frac{\text{Stress}}{\text{Strain}}$ modulus of elasticity young's modulus

$E = 210 \times 10^9\ N/m^2$

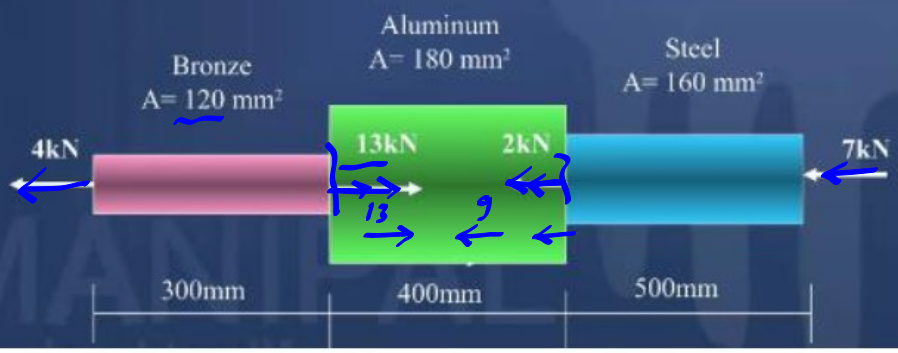


Brittle materials



Example 1

A composite bar consists of an aluminum section rigidly fastened between a bronze section and a steel section as shown in figure. Axial loads are applied at the positions indicated. Determine the stress in each section.

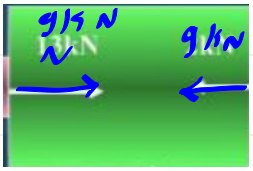


$mm^2 \rightarrow m^2$ $(10^{-3})^2$

$mm^2 = 10^{-6} m^2$

$$\text{Stress}_b = \frac{F}{A} = \frac{4000}{120 \times 10^{-6}} = 33.33 \times 10^6 \ N/m^2 = 33.33 \ MPa$$

$$= 33.33 \ N/mm^2 = 33.33 \ MPa \quad \text{Tension}$$



$$\sigma_{Al} = \frac{9000}{180 mm^2} = 50 \ N/mm^2 = 50 \ GPa \quad \text{Compression}$$

$$\sigma_{Steel} = \frac{7000}{160 mm^2} = 43.75 \ N/mm^2 = \ GPa$$

Compression