A LECTURE NOTE
ON
TH 2- STRENGTH OF MATERIAL
SEMESTER -3

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Formulas:

Chapter - 01

1. Stress (σ) = $\frac{\text{force } (P)}{\text{Area } (A)}$ = N/m^2, N/mm^2

2. Strain (ε) = $\frac{\text{change in length } (\delta l)}{\text{Original length } l}$ = Unitless

3. Hookes law/Young's Modulus (E)/Modulus of Elasticity:

$$E = \frac{\text{Stress}}{\text{Strain}} \quad (N/mm^2)$$

4. Modulus of Rigidity / plastic modulus (C, G, N):

$$C/G/N = \frac{\text{Shear stress } (\tau)}{\text{Shear strain } (\phi)} \quad (N/mm^2)$$

5. Bulk modulus (K) = $\frac{\text{Direct stress } (\sigma)}{\text{Volumetric strain } (\varepsilon_v)}$

6. Poisson's Ratio (μ or $1/m$) = $\frac{\text{lateral strain } (\delta d/d)}{\text{linear strain } (\delta l/l)}$ = Unitless

7. Thermal stress (σ_t) = $\alpha t E$

Temprature strain = $\frac{\delta l}{l} = \alpha t - \frac{\beta}{1}$

8. Strain energy (U) = $\frac{\sigma^2}{2E} \times V$

9. Modulus of resilence = $\frac{\sigma_{max}^2}{2E}$

10. $E = \frac{9KC}{3K + C}$