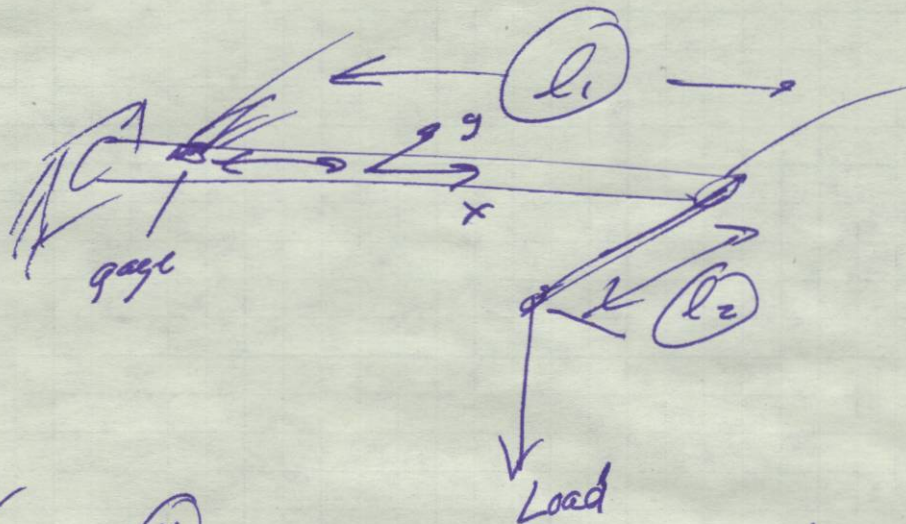




Exp.
Data.

Load, g	N	ϵ_a	ϵ_b	τ_s	$\gamma (2\epsilon_b - \epsilon_a - \epsilon_c)$
0	.				.
~~2~~	.				.
~~5~~	.				.
~~10~~	.				.

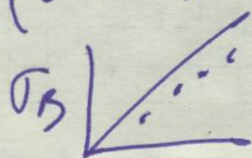
$$\epsilon_{x \text{ exp}} = \frac{\sigma_x}{E} \leftarrow \sigma_{\text{bending}}$$

$$\tau_{\text{exp}} = \frac{\tau}{G} \leftarrow \text{Shear stress}$$

Step 1
Theory

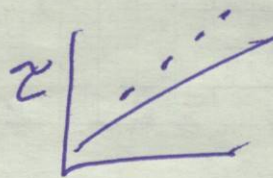
$$\sigma_{\text{exp}} = E \epsilon_x$$

$$\sigma_b = \frac{M \cdot r}{I} = \frac{\text{Load}(x) \cdot l_1 \cdot D/2}{\frac{\pi}{64}(D_o^4 - D_i^4)}$$



$$\tau_{\text{exp}} = G \gamma$$

$$\tau_{\text{th}} = \frac{T \cdot r}{J} = \frac{(\text{Load} \cdot l_2) \cdot D_o/2}{\frac{\pi}{32}(D_o^4 - D_i^4)}$$



$$\epsilon_x = \epsilon_a \quad \epsilon_y = \epsilon_c \quad \gamma =$$

Step 2

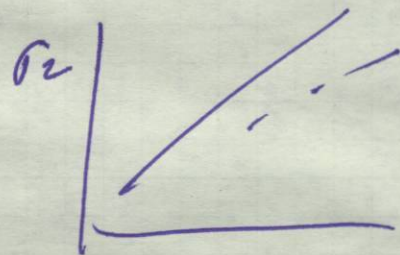
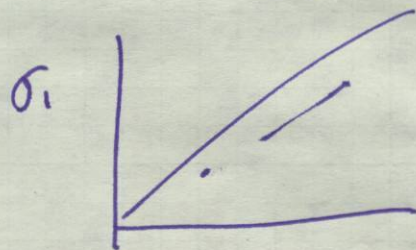
$$\epsilon_{1,2} = \underline{\hspace{10cm}}$$

$$\sigma_1 = \frac{E}{1-\nu^2} (\epsilon_1 + \nu \epsilon_2)$$

$$\sigma_2 = \frac{E}{1-\nu^2} (\epsilon_2 + \nu \epsilon_1)$$

Theory

$$\sigma_{1,2} = \frac{\sigma_x}{2} \pm \sqrt{\left(\frac{\sigma_x}{2}\right)^2 + \tau_{xy}^2}$$



~~$$\epsilon_{1,2} = \frac{\sigma_{BTH}}{E}$$~~

$$\epsilon_x = \frac{\sigma_{BTH}}{E}$$

$$\gamma_{th} = \frac{\tau_{th}}{G}$$

$$\epsilon_y = -\frac{\nu}{E} \sigma_{BTH}$$

$$\epsilon_{1,2} = \underline{\hspace{10cm}}$$

ϵ_1

ϵ_2