
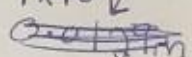


Using the graphs you have produced determine the following parameters: Young's modulus, yield stress, tensile strength and percentage elongation. You may wish to annotate the graphs to show how your values were determined -

6 marks

Extension (mm)	Force (KN)	Stress $\rho_a$	Strain $\rho_{out}$
0	0	0	0
0.55	1	<del>1.2</del> $1.2 \times 10^8$	0.043
0.75	2	$2.52 \times 10^8$	0.058
0.85	3	$3.78 \times 10^8$	0.066
1.00	4	$5.04 \times 10^8$	0.078
1.25	6	$7.56 \times 10^8$	0.097
1.5 (Max)	7.1	$8.94 \times 10^8$	0.116

$7.94 \times 10^{-6} \text{ m}^2$   
  
 $1 \times 10^{-6}$   
 Area =  $7.94 \text{ mm}^2$   
 Original length =  $12.9 \text{ mm}$   


By comparing with values given in any materials book make comments on the accuracy of the tensile test method for determining these parameters. What errors may have arisen during your experiment?

4 marks

$$\text{Stress} = \frac{\text{Force}}{\text{Area}}$$

$$\text{Strain} = \frac{\text{Extension}}{\text{Original length}}$$

### Exercise 2: THE ELASTIC BENDING OF A CANTILEVER BEAM

- They are two beams to be tested, (narrow width and a square with similar cross section). Measure the width and thickness THREE times using the digital Vernier.
- Position the hanger 500mm (0.5 m) from the fixed end and place the digital indicator above or below, then zero the scale.
- Add weights in the increments shown and record the values. Then remove the loads in similar manner recording these.
- Mean the results.
- Repeat with the other beam.

Beam dimensions: mm

Beam dimensions mm	Thickness mm	Width mm	Thickness Square	
500	4.76	25.39	11.23	1
500	4.75	25.31	11.27	2
500	4.74	25.35	11.29	3

Load N	Deflection $\downarrow$ mm	Deflection $\uparrow$ mm	Mean mm	Load N	Deflection $\downarrow$ mm	Deflection $\uparrow$ mm	Mean mm
0	0	0.01	0.005	0	0	0	0
5	0.85	0.85	0.85	2	1.81	1.92	1.865
10	1.72	1.74	1.73	4	3.63	3.85	3.74
15	2.60	2.61	2.605	6	5.58	5.57	5.575
20	3.46	3.46	3.46	8	7.31	7.40	7.355
				10	9.11	9.21	9.16
				12	9.48	9.48	9.48

$\downarrow$   
 $\frac{\text{Grand mean DEFT} \uparrow + \text{Def} \downarrow}{2}$