Tutorial - IV <Hints>

Date: / /

Q1
Q2
Q3
Q4
} ⇒ Same as done in class

Sol^n 5 Here,

$R = 100\Omega$; $G = 2$; $R_s = 100\Omega$; Stress $= 140 MN/m^2$
$= 140 \times 10^6 N/m^2$

$Y = 200 GN/m^2$
$= 200 \times 10^9 N/m^2$

(a)

⇒ Change in the o/p voltage,

a) when no stress is applied, voltage across the strain gauge,

$$= 12 \times \frac{100}{(100+100)} = 6V$$

Also,

$$\text{Stress} = Y \times \text{Strain}$$

$$\therefore \text{Strain} = \frac{\text{Stress}}{Y} = \frac{140 \times 10^6}{200 \times 10^9} = 0.0007$$

Now,

$$\frac{\Delta R/R}{\Delta l/l} = G$$

or, $$\frac{\Delta R/R}{\text{strain}} = G$$

or, $\Delta R = R \times G \times \text{Strain}$

$= 100 \times 2 \times 0.0007$

$\therefore \Delta R = 0.14\Omega$

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b) voltage across the gauge under strain conditions,

$$= \frac{100+0.14}{(100+0.14)+100} \times 12$$

$$= 6.00419\ V$$

Hence,

change in o/p voltage $= 6.00419 - 6$

$= 0.00419\ V$

$= 4.19\ mV$

Soln-6 Here,

$G = 2$

Stress $= 1250\ kg/cm^2$

$Y = 2.1 \times 10^6\ kg/cm^2$

Stress $= Y$ Strain

$\Rightarrow$ Strain $=$ _____

$G = \frac{\Delta R/R}{\text{Strain}}$

$\frac{\Delta R}{R} =$ _____ //

Soln-7 Here,

$l = 0.1\ m$

$A = 4\ cm^2$

$Y = 207\ GN/m^2$

$R = 240\ \Omega$

$G = 2.2$

$\Delta R = 0.013\ \Omega$

$\frac{\Delta R/R}{\text{strain}} = G$

$\Rightarrow$ Strain $=$ _____

Stress $= Y$ Strain

$\Rightarrow$ Stress $=$ _____

Strain $= \frac{\Delta l}{l}$

$\Rightarrow \Delta l =$ _____

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Soln-8 Here,

$G = 2$

$Stress = 1050\ kg/cm^2$

$Y = 2 \times 10^6\ kg/cm^2$

$Stress = Y \times Strain$

$\Rightarrow Strain = \_\_\_\_$

$\frac{\Delta R}{R} = G \times Strain \times 100\ \%$

$G = 1 + 2\mu$

$\mu = \_\_\_\_$

$\Delta R = R \times G \times Strain$

$\downarrow$

30Ω

Soln-9 Same as done in class