

## M20 Concept Question 1

Strain gauges are applied to a block of linear elastic isotropic material with Young's modulus  $E = 100 \text{ GPa}$  and Poisson's ratio  $\nu = 0.1$ . The block is loaded and strains:

$$\varepsilon_x = 100 \mu\varepsilon, \varepsilon_y = -1000\mu\varepsilon, \varepsilon_z = 100\mu\varepsilon$$

are recorded. The applied loading most simply/accurately corresponds to:

1.  $\sigma_x = 10 \text{ MPa}, \sigma_y = -100 \text{ MPa}, \sigma_z = 10 \text{ MPa},$
2.  $\sigma_x = -10 \text{ MPa}, \sigma_y = +100 \text{ MPa}, \sigma_z = -10 \text{ MPa},$
3.  $\sigma_x = 0, \sigma_y = +100 \text{ MPa}, \sigma_z = 0,$   
$$\sigma_x = (\lambda + 2\mu)\varepsilon_x + \lambda\varepsilon_y + \lambda\varepsilon_z,$$
4.  $\sigma_y = (\lambda + 2\mu)\varepsilon_y + \lambda\varepsilon_x + \lambda\varepsilon_z,$   
$$\sigma_z = (\lambda + 2\mu)\varepsilon_z + \lambda\varepsilon_x + \lambda\varepsilon_y$$
5.  $\sigma_x = 0, \sigma_y = -100 \text{ MPa}, \sigma_z = 0,$
6. Some other expression
7. DNK/DNU

## M20 Concept Question 2

Strain gauges are applied to a block of linear elastic isotropic material with Young's modulus  $E = 100 \text{ GPa}$  and Poisson's ratio  $\nu = 0.1$ . The block is loaded and strains:

$$\varepsilon_x = 0 \quad \varepsilon_y = 0, \quad \varepsilon_z = -1000\mu\varepsilon,$$

are recorded. Which of the following is a true statement :

1.  $\sigma_x = 0, \sigma_y = 0, \sigma_z = -100 \text{ MPa},$
2.  $\sigma_x = 0, \sigma_y = 0, \sigma_z = -100 \text{ MPa},$
3.  $\sigma_x = 0, \sigma_y = 0, \sigma_z = -100 \text{ MPa},$
4. The material properties were incorrectly stated
5.  $\sigma_x = 0, \sigma_y = 0, \sigma_z = -100 \text{ MPa},$
6. None of the statements above are true
7. DNK/DNU