1º Exame (15/6/2018) - Parte Prática

Soluções

1º Probl.

(a) $\varepsilon_{11}= 1\times10^{-4}$; $\varepsilon_{22}= 5\times10^{-4}$; $\varepsilon_{12}= -2\sqrt{3}\times10^{-4}$

(b) $\gamma_{max}= 6\times10^{-4}$; $\beta/2=18{,}4^o$ (↻)

(c) $\sigma_I = 160$ MPa; $\sigma_{II} =\sigma_{III} = 60$ MPa; $\theta/2=26{,}6^o$ (↺)

(d) $(2\tau - 110)^2 + \tau^2 = 50^2 \Rightarrow \tau = 40$ ou 48; Ex. $\tau =40$; $\sigma = 80$ MPa;$\Rightarrow$ sen $\alpha=0{,}8 \Rightarrow \alpha/2=26{,}6^o$

2º Probl.

(a) $N_{AB}= 22{,}5$ kN; $\sigma = 22{,}5$ MPa;

$N_{AD}= -37{,}5$ kN; $\sigma^1 = -25$ MPa; $\sigma^2 = -3{,}125$ MPa;

$N_{BD}= 0$; $\sigma = 0$

(b) $\delta_V{}^D= 0.52$ mm (↓)

(c) $\Delta T= -11{,}25^oC$

3º Probl.

(a_1) ($x_1=0$; $x_2= 21{,}875$cm); ($x_2=0$; $x_1= -7{,}5$cm); $\sigma^T{}_{max} = 8{,}7$ MPa; $\sigma^C{}_{max} = -3{,}8$ MPa

(a_2) ($e_2=0$; $e_1= 14$cm); ($e_1=14{,}5$; $e_2= -6{,}4$cm); ($e_1= -14{,}5$; $e_2= -6{,}4$cm)

(b) $1/R=2{,}5\times10^{-3}$ m; $\sigma^C{}_{1.max} = -84$ MPa; $\sigma^T{}_{1.max} = 21$ MPa; $\sigma^T{}_{2.max} = 54$ MPa

4º Probl.

(a) $U_0=992/EI$; $f=16/(3EI)$; $X= -186$ kNm;

$M_A= 186$ kNm; $M^{AB}{}_B= -198$ kNm; $M^{BD}{}_B= -174$ kNm; $M^{BC}{}_B= -24$ kNm

(b) $\delta_V{}^C= 226/EI$ (↑)

5º Probl.

$N= -4$kN; $V_1= 1$ kN; $V_2{}^B= 3$kN; $V_2{}^C= 0$;

$M_1{}^B= 4$kNm; $M_1{}^C= 8$kNm; $M_2{}^B= 2$kNm; $M_2{}^C= 0$; $T= 2$kNm