A

MECH 321 **Equation Sheet**

$U_r = \frac{\sigma_y^2}{2E}$ $\varepsilon_T = \ln\left(\frac{l_i}{l_o}\right)$ $\varepsilon_{eng} = \left(\frac{l_i - l_o}{l_o}\right) = \frac{\Delta l}{l_o}$ $\sigma_T = k\varepsilon_T^n$ (uniform plastic) $\sigma_T = \sigma(1+\varepsilon)$

$\varepsilon_T = \ln(1+\varepsilon)$ $\tau = \frac{M_T r}{J}$ $\gamma = \frac{r\theta}{L}$ $\sigma_r = \sigma_o + kd^{-1/2}$ $\tau_r = \sigma \cos\lambda \cos\phi$

$\rho_c = V_f \rho_f + (1-V_f)\rho_m$ $L_c = \frac{\sigma_f d}{2\tau_c}$ $E_{c1} = E_f \nu_f + E_m \nu_m$

$E_{c2} = \frac{E_f E_m}{E_f(1-\nu_f) + E_m \nu_f}$ $\sigma_{c2} \approx \frac{\sigma_m}{2}$ $\sigma_{cl}^* = \sigma_m^{'}(1-V_f) + \sigma_f^* V_f$

$\sigma_{cd}^* = \sigma_f^* V_f \left(1 - \frac{\ell_c}{2\ell}\right) + \sigma_m^{'}(1-V_f)$ $\sigma_{cd'}^* = \frac{\ell \tau_c}{d} V_f + \sigma_m^{'}(1-V_f)$

$\sigma_{\max} = 2\sigma_o \left(\frac{a}{\rho}\right)^{1/2}$ $k_t = \frac{\sigma_{\max}}{\sigma_o}$ $\sigma_c = \sqrt{\frac{2E\gamma_s}{\pi a}}$ (brittle) $B \geq 2.5\left[\frac{K_{1c}}{\sigma_y}\right]^2$

$\sigma_c = \sqrt{\frac{2E(\gamma_s + \gamma_p)}{\pi a}}$ (plastic) $G_c = \frac{K_{1c}^2}{E}$ $K_{IC} = Y\sigma\sqrt{\pi a}$