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| 63 The figure shows a shaft mounted in bearings at *A* and *D* and having pulleys at *B* and *C*. The forces shown acting on the pulley surfaces represent the belt tensions. The shaft is to be made of AISI 1035 CD steel. Using a conservative failure theory with a design factor of 2, determine the minimum shaft diameter to avoid yielding.  5-63.1 What is the magnitude of the reaction force at A in the y direction? (expressed in lbf)  123 lbf xz  5-63.2 What is the applied Torque? (expressed in lbf-in)  Sum nets to 1  1000 lbf\*in  5-63.3 What is the maximum Bending moment? (expressed in lbf-in)  Take the moment 6 from d in the xy plain and pytagen theorem yo  2111  5-63.4 What is the minimum shaft diameter to avoid yielding with a safety factor of 2? (expressed in inches)  0.892199 |  |

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| 73) A solid steel shaft has a gear with ASTM grade 20 cast-iron hub (*E =* 14.5 Mpsi) shrink-fitted to it.  The shaft diameter is 2.001 +/- 0.0004 in. The specifications for the gear hub are | 5-73.1 What is the Midrange radial interference? (express in inches)  5-73.2a What is the Young's Modulus for carbon steel? (express in ksi)  5-73.2b What is the Poisson ratio for carbon steel?  5-73.2c What is the Young's Modulus for this cast iron? (express in ksi)  5-73.2d What is the Poisson ratio for this cast iron?  5-73.3 Using Modified Mohr theory, what is the factor of safety against fracture due to the shrink fit? |

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| 5-84) A plate 100 mm wide, 200 mm long, and 12 mm thick is loaded in tension in the direction of the length. The plate contains a crack as shown in Fig. 5–26 with the crack length of 16 mm. The material is steel with *KIc* 5 80 MPa ? 1m, and *Sy* 5 950 MPa. Determine the maximum possible load that can be applied before the plate (*a*) yields, and (*b*) has uncontrollable crack growth. | 5-84.1 Ignoring the stress concentration at the tip of the crack, what load will cause yielding? (express in kN)  5-84.2 What is the LaTeX: \betaβ value from figure 5-26?  Hint: answer is to three digits of precision, ie X.XX  Further hint: Try steps of 0.05 if you are walking through the values.  5-84.3 What force will result in uncontrolled crack growth? (expressed in kN) |