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| 3-68 A countershaft carrying two V-belt pulleys is shown in the figure. Pulley *A* receives power from a motor through a belt with the belt tensions shown. The power is transmitted through the shaft and delivered to the belt on pulley *B.* Assume the belt tension on the loose side at *B* is 15 per- cent of the tension on the tight side.     1. (*a*)  Determine the tensions in the belt on pulley *B*, assuming the shaft is running at a constant speed.        1. (*b*)  Find the magnitudes of the bearing reaction forces, assuming the bearings act as simple supports.        1. (*c*)  Draw shear-force and bending-moment diagrams for the shaft. If needed, make one set for the horizontal plane and another set for the vertical plane.      1. (*d*)  At the point of maximum bending moment, determine the bending stress and the torsional shear stress.      1. (*e*)  At the point of maximum bending moment, determine the principal stresses and the maximum shear stress. |  |

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| 3-122 The steel eyebolt shown in the figure is loaded with a force *F* 5 300 N. The bolt is formed from wire of diameter *d* 5 6 mm to a radius *Ri* 5 10 mm in the eye and at the shank. Estimate the stresses at the inner and outer surfaces at section *A–A*. |  |

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| 3-138 An aluminum alloy cylindrical roller with diameter 1.25 in and length 2 in rolls on the inside of a cast-iron ring having an inside radius of 6 in, which is 2 in thick. Find the maximum contact force *F* that can be used if the shear stress is not to exceed 4000 psi. |  |