1. Determine the maximum normal stress in the horizontal portion of the bracket at section a-a. The bracket has a thickness of 1 in. and a width of 0.75 in. (20 points)
2. The fiber reinforced polymer (FRP) cross section shown has been developed for use in structures where dead weight and corrosion resistance are important considerations. The moment of inertia of the shape is $I_z = 51,000,000 \text{ mm}^4$. If a vertical shear force of $V = 8 \text{ kN}$ must be supported by the shape, determine the maximum transverse shear stress in the FRP beam. (20 points)
3. A composite cross section consists of a brass strip (E = 105 GPa) securely bonded to an aluminum bar (E = 70 GPa). The cross section is used as a beam where bending occurs about the z centroidal axis. If the maximum bending stress in the aluminum bar is 75 MPa (tension), what is the maximum bending stress produce in the brass strip? (20 points)
4. The moment diagram for a beam is shown, where the moments are given in units of kN-m. The tee-shape shown ($I_z = 4,220,000 \text{ mm}^4$) is used for the beam and bending occurs about the z axis. Determine the maximum tension bending stress that will occur in the beam. Note: Clearly demonstrate that you’ve found the maximum tension stress that will occur anywhere along the beam span. (20 points)
5. Draw the shear force and bending moment diagrams for the beam shown. Indicate values for all critical points. (Reminder: the roller symbol at B implies that translation both up and down is restrained.) (20 points)