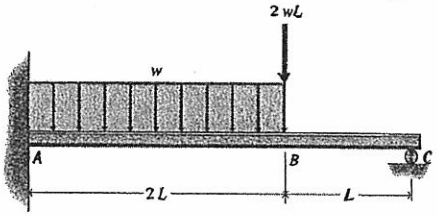
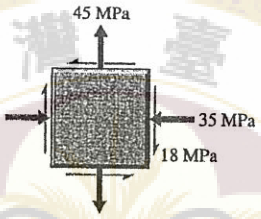
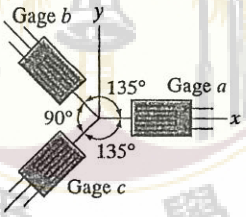
Problem 1 (25%)
A beam is loaded and supported as shown. Determine the reactions at supports A and C.



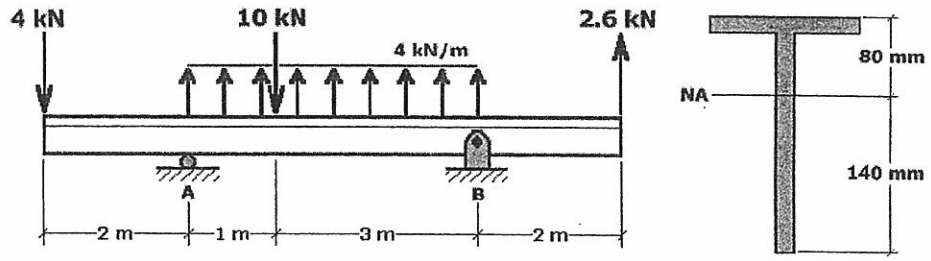
Problem 2 (25%)
The stresses shown act at a point on the free surface of a stressed body. Determine, and show on properly oriented and labeled sketches, the principal stresses and maximum in-plane shear stress at the point.



Problem 3 (25%)
At a point on the surface of a steel machine component, the strain rosette measured the following strains. $\varepsilon_a = 7.0\times10^{-4}$, $\varepsilon_b = 5.6\times10^{-4}$, and $\varepsilon_c = -2.8\times10^{-4}$. Letting E = 210 GPa and $\nu = 0.3$, determine the stress components σ_x, σ_y, and τ_{xy} at the rosette location.



Problem 4 (25%)
A T-shaped steel cross section is used for the beam shown below. The moment of inertia for the T shape is $I = 2.4\times10^7$ mm^4 and the dimensions to the centroid of the shape are shown on the sketch. Determine the maximum tensile and compressive stresses acting at any point in the T shape throughout the entire span of the beam.



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