ME 323: Mechanics of Materials **Homework 6**

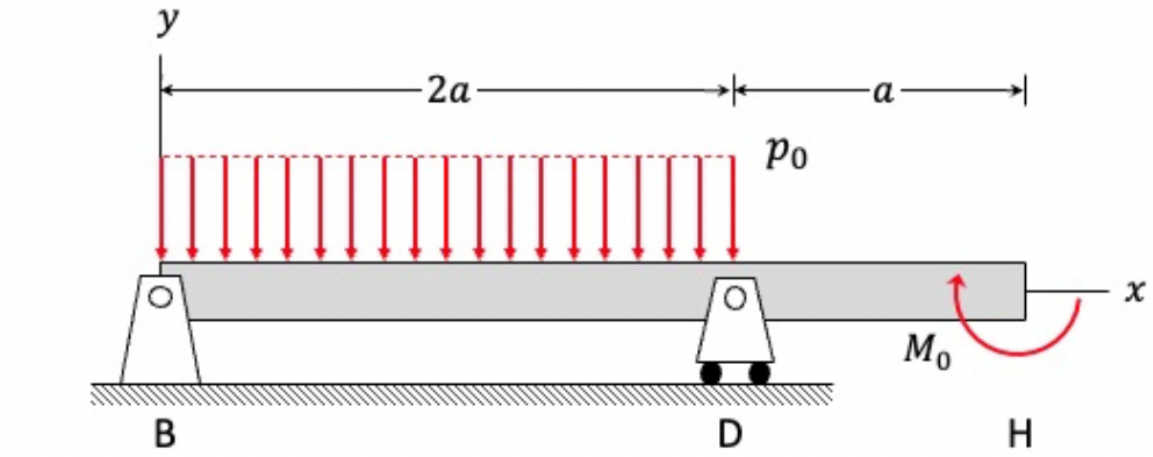
Spring 2026 **Due: March 6, 2026**

Problem 1 (10 points):

The simply-supported beam whose cross-section has a second area moment of I and is made up of a material with a Young's modulus of E shown below experiences a constant line load of p_0 along section BD and a concentrated couple M_0 at end H.

1. Draw the free body diagram (FBD) of the beam. Based on this FBD, write down the equilibrium equations for the beam.
2. State whether the beam is determinate or indeterminate. Solve for the reactions.
3. Using the second order integration approach, determine the deflection of the beam $v(x)$ over the range of $0 \leq x \leq 3a$. Clearly identify the segments along the beam for which the different segments of the deflection curve is valid.
4. Determine the rotation (slope) of the beam deflection curve at support D.

Leave your answers in terms of, at most: E, I, a, p_0 and M_0.

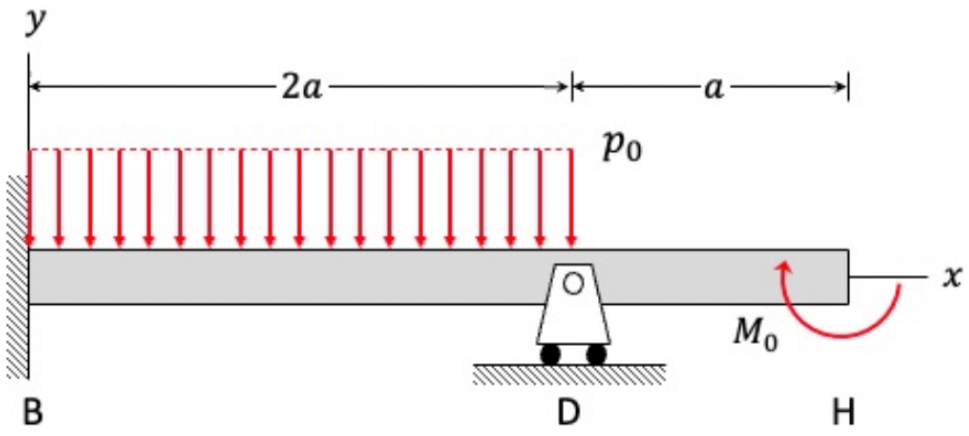


Problem 2 (10 points):

The propped cantilevered beam whose cross-section has a second area moment of I and is made up of a material with a Young's modulus of E shown below experiences a constant line load of p_0 along section BD and a concentrated couple M_0 at end H.

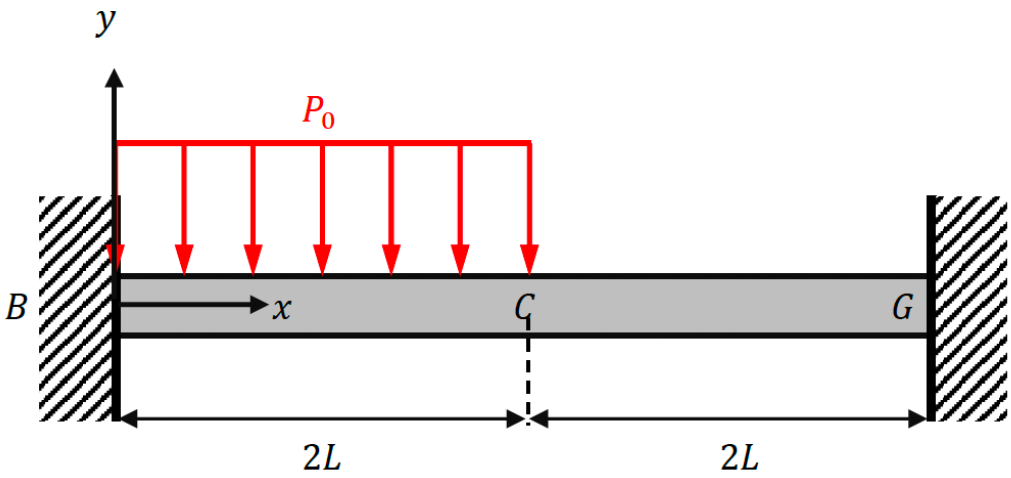
1. Draw the free body diagram (FBD) of the beam. Based on this FBD, write down the equilibrium equations for the beam.
2. State whether the beam is determinate or indeterminate.
3. Using the 2nd order integration approach, determine the reactions acting on the beam at B and D.
4. Determine the rotation (slope) of the beam deflection curve at support D and the deflection of the beam at H.

Leave your answers in terms of, at most: E, I, a, p_0 and M_0.



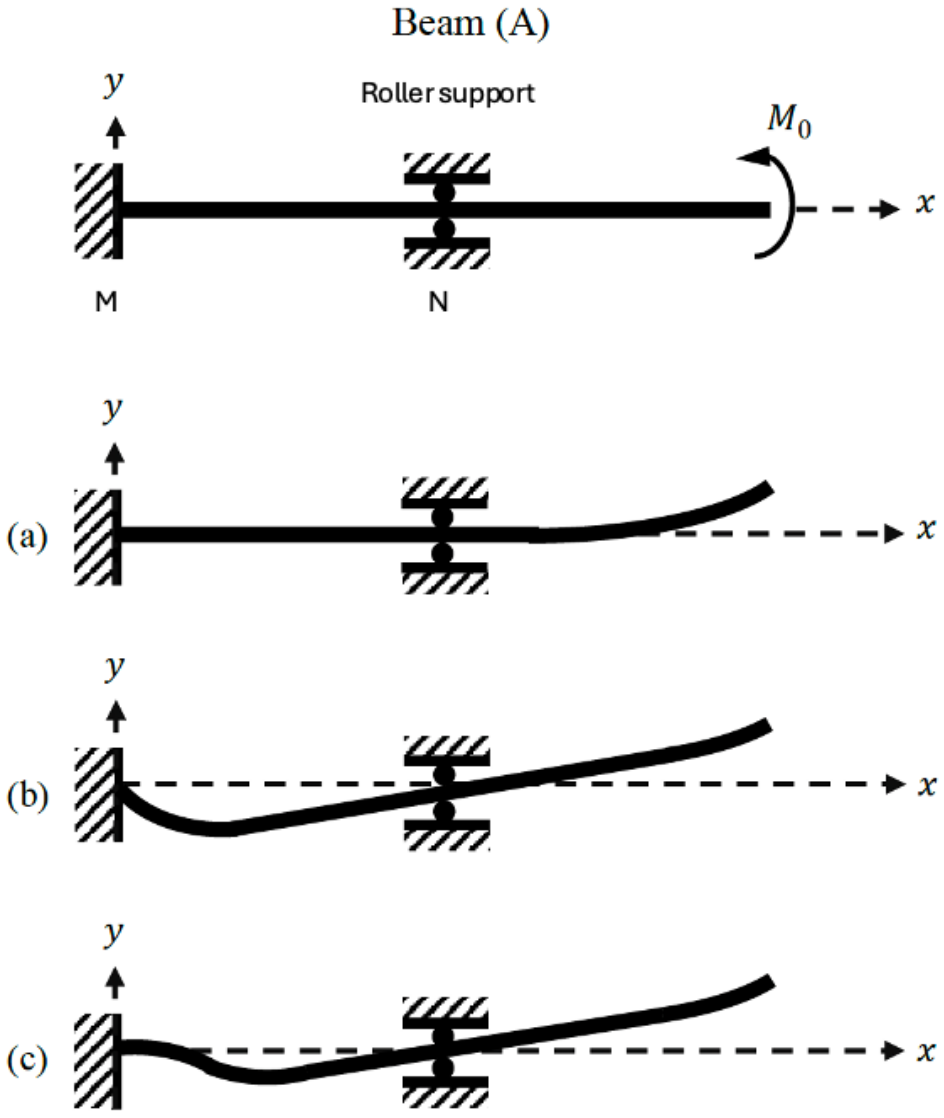
Problem 3 (10 points):

The beam shown below has Young's modulus E and cross-sectional second area moment *I*. Determine the reaction forces and moments at ends B and G using the second-order integration method.

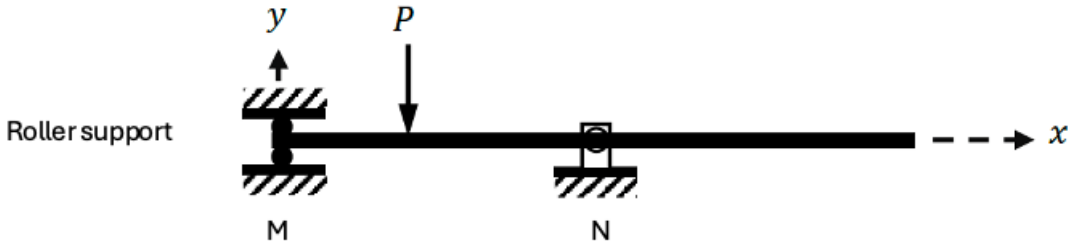


Problem 4 (2.5 + 2.5 points)

Identify the schematic that represents the deflection curve of the following beams. Beam A is fixed at end M and supported by rollers at end N, whereas Beam B is supported by rollers at end M and a hinged support at end N. (each 2.5 points):

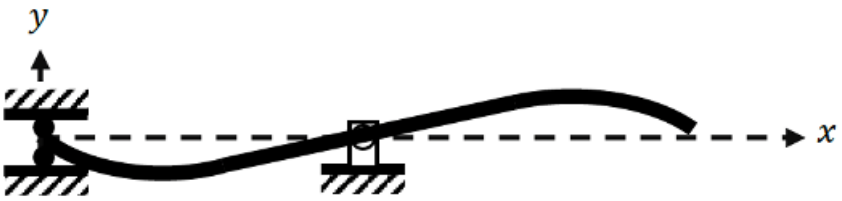


Beam (B)



(a)

(b)



(c)