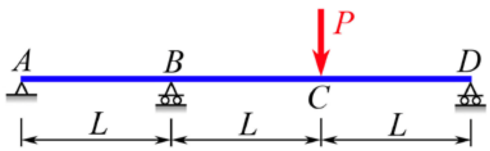
UNIVERSITY OF ARKANSAS

MEEG 3013 **Name:** ______________________

(Underline your **last name**.)

Test III ( ) **ID #:** ______________________

1. (30%) The beam shown has a constant flexural rigidity *EI*. Using *moment-area theorems*, determine (*a*) the reaction forces **A**, **B**, and **D** at the three supports, (*b*) the slope θ_C and deflection y_C at *C*.



Figs. P1 and P2

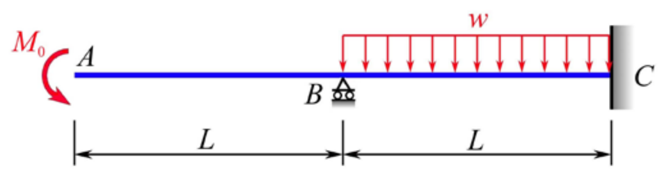


Fig. P3

2. (30%) Using *conjugate beam method*, solve Problem 1.

3. (20%) The beam *ABC* of length 2*L* has a constant flexural rigidity *EI* and carries a moment $\mathbf{M}_0$ at *A* and a distributed load with intensity *w* in the segment *BC* as shown, where $\mathbf{M}_0 = 5wL^2$ ↺. *Circle on this test sheet* the nearest item for each of the following:

A. ⑤ The reaction at *B* of the beam is

(a) $\frac{51wL}{8}\uparrow$. (b) $\frac{57wL}{8}\uparrow$. (c) $\frac{63wL}{8}\uparrow$. (d) $\frac{69wL}{8}\uparrow$. (e) $\frac{75wL}{8}\uparrow$. (f) $\frac{81wL}{8}\uparrow$. (g) $\frac{87wL}{8}\uparrow$.

B. ⑤ The deflection at *A* of the beam is

(a) $-\frac{125wL^4}{48EI}$. (b) $-\frac{143wL^4}{48EI}$. (c) $-\frac{161wL^4}{48EI}$. (d) $-\frac{179wL^4}{48EI}$. (e) $-\frac{197wL^4}{48EI}$. (f) $-\frac{215wL^4}{48EI}$. (g) $-\frac{233wL^4}{48EI}$.

C. ⑤ The slope at *A* of the beam is

(a) $\frac{419wL^3}{48EI}$. (b) $\frac{389wL^3}{48EI}$. (c) $\frac{359wL^3}{48EI}$. (d) $\frac{329wL^3}{48EI}$. (e) $\frac{299wL^3}{48EI}$. (f) $\frac{269wL^3}{48EI}$. (g) $-\frac{239wL^3}{48EI}$.

D. ⑤ The slope at *B* of the beam is

(a) $-\frac{77wL^3}{48EI}$. (b) $\frac{71wL^3}{48EI}$. (c) $\frac{65wL^3}{48EI}$. (d) $\frac{59wL^3}{48EI}$. (e) $\frac{53wL^3}{48EI}$. (f) $\frac{47wL^3}{48EI}$. (g) $\frac{41wL^3}{48EI}$.

4. (20%) Non-numerical problem.

A. ⑩ Let *C* and *D* be two points of a beam *AB* having a length *L* and a constant flexural rigidity *EI*, where *D* is to the right of *C*. Assume that this beam is simply supported at *A* and *B* and a concentrated force **P** acts at the midpoint of the beam. (*a*) **Draw** the deflected beam and $\theta_{D/C}$, $t_{D/C}$, and $t_{C/D}$; (*b*) **describe** how to compute $\theta_{D/C}$ and $t_{D/C}$ according to the **moment-area theorems**.

B. ⑩ Describe the **ten rules** that guide one in using the **conjugate beam method**.