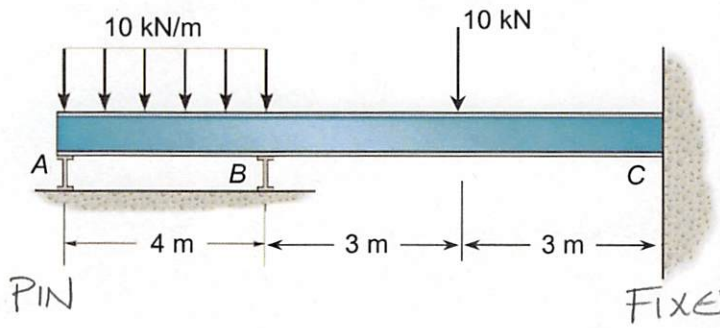
CIVL 4122 Quiz #4 F25 Name: _____

Determine the moments at *B* and *C*. Assume *A* and *B* are rollers, *C* is fixed, and *EI* is constant.



$$FEM_{BA} = \frac{WL^2}{8} = \frac{10kN/m(4m)^2}{8}$$

$$= 20kNm$$

$$FEM_{BC} = \pm\frac{PL}{8} = \frac{10kN(6m)}{8}$$

$$= \pm 7.5kNm$$

SECTION AB – 1 EQN

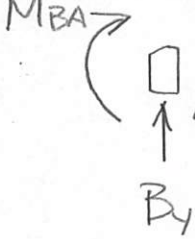
$$M_{BA} = \frac{3EI}{L_{AB}}\left[\theta_B\right] + 20kNm \quad (1)$$

SECTION BC – 2 EQNS

$$M_{BC} = \frac{2EI}{L_{BC}}\left[2\theta_B\right] - 7.5kNm \quad (2)$$

$$M_{CB} = \frac{2EI}{L_{BC}}\left[\theta_B\right] + 7.5kNm \quad (3)$$

JOINT B



$$\circlearrowleft +\sum M_B = 0$$

$$M_{BC} = M_{BA} + M_{BC} \quad (4)$$

$$(4)\ M_{BA} + M_{BC} = 0 = \frac{3EI}{4m}\left[\theta_B\right] + 20kNm + \frac{2EI}{6m}\left[2\theta_B\right] - 7.5kNm$$

$$\frac{17EI}{12}\theta_B = -12.5kNm \qquad \theta_B = -\frac{8.82kNm^2}{EI}$$

$$M_{BA} = \frac{3EI}{4m}\left[-\frac{8.82kNm^2}{EI}\right] + 20kNm = \underline{\underline{13.38kNm}}$$

$$M_{BC} = \frac{2EI}{6m}\left[2\left(-\frac{8.82kNm^2}{EI}\right)\right] - 7.5kNm = \underline{\underline{-13.38kNm}}$$

$$M_{CB} = \frac{2EI}{6m}\left[-\frac{8.82kNm^2}{EI}\right] + 7.5kNm = \underline{\underline{4.55kNm}}$$