

**ME 35a Final Exam
Due 3 pm, Dec 14, 2007
3 hrs, one sitting
Take home**

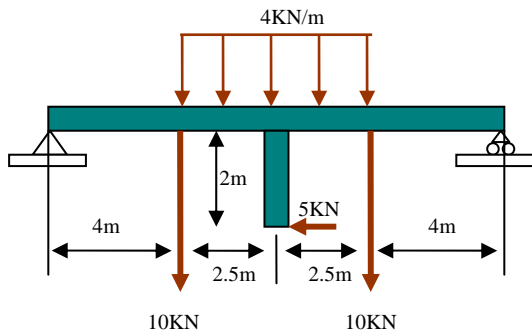
Return exams to Cheryl Geer in Thomas 119.

Policy:

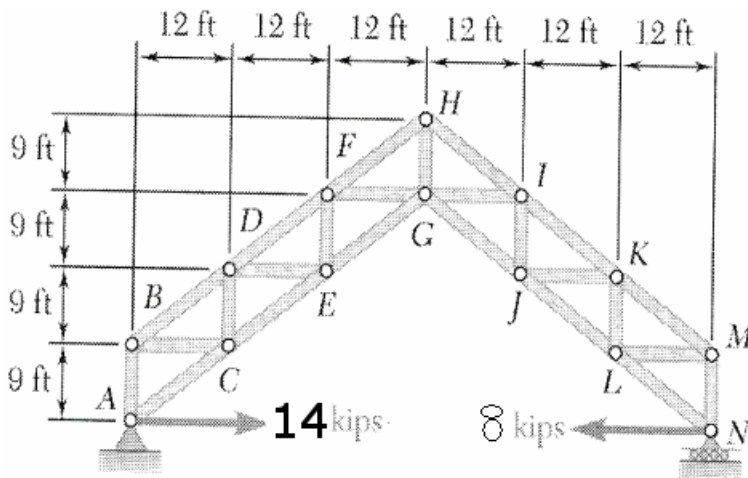
- i.) This exam is open class textbook (Beer & Johnston), you may use your class notes and homework assignments. However, other resources like books, internet, etcetera, are not allowed**
- ii.) Calculators and symbolic algebra programs (such as Matlab, Maple, Mathematica) are allowed.**
- iii.) This exam should be taken in one sitting of a maximum length of 3 hours.**
- iv.) Draw clear diagrams, free-body diagrams and figures for your answers and calculations.**
- v.) Write coherently and succinctly the principles that you are applying. Points will be subtracted if your line of thought cannot be derived from your answer.**

All problems have equal weight.

Problem 1) For the beam and loading shown, (a) draw the shear and bending moment diagrams, (b) determine the maximum absolute values of the shear and bending moment.

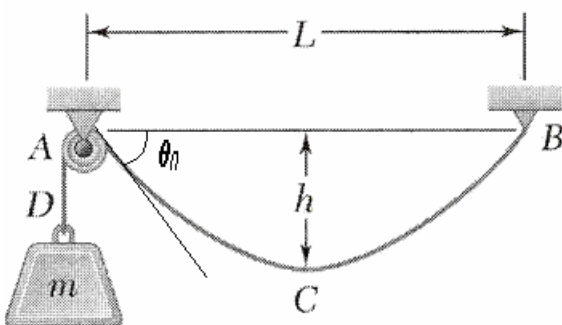


Problem 2) A roof truss is loaded as shown. Determine the force in members CE, DE, and EF.

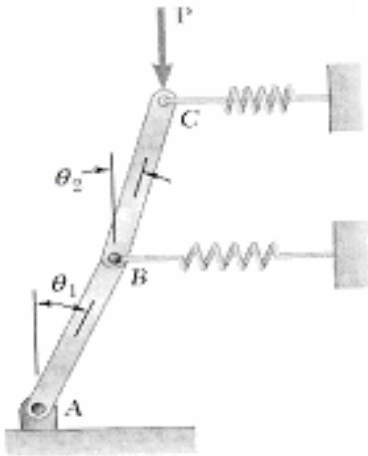


Problem 3) A counterweight D of mass m is attached to a cable that passes over a drum at A and attaches to a support at B . Knowing the span of the cable, L , the weight per unit length of the cable, w kg/m, the slope of the cable at A , θ_0 , and the coefficient of static friction between the cable and the drum, μ , determine the sag, h , of the cable.

Notes: 1-Neglect the weight of cable from A to D . 2- There is friction between the cable and the drum.



Problem 4) Bars AB and BC each of length l and of negligible weight are attached to two springs each of constant k . The springs are undeformed and the system is in equilibrium when $\theta_1 = \theta_2 = 0$. Determine the range of values of P for which the equilibrium position is stable.



Problem 5) The masses of blocks A and C are 2.4 kg, and 6 kg, respectively. Knowing that $\mu_s = 0.5$ between block A and the incline, and $\mu_s = 0.3$ between block C and the horizontal surface, determine the range of values of the mass of block B for which the blocks are in equilibrium.

