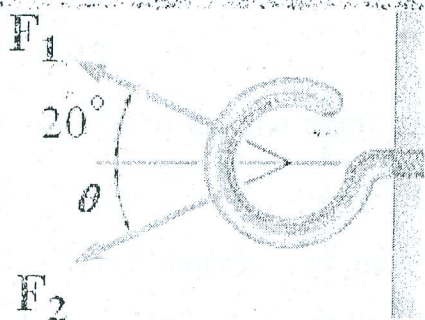




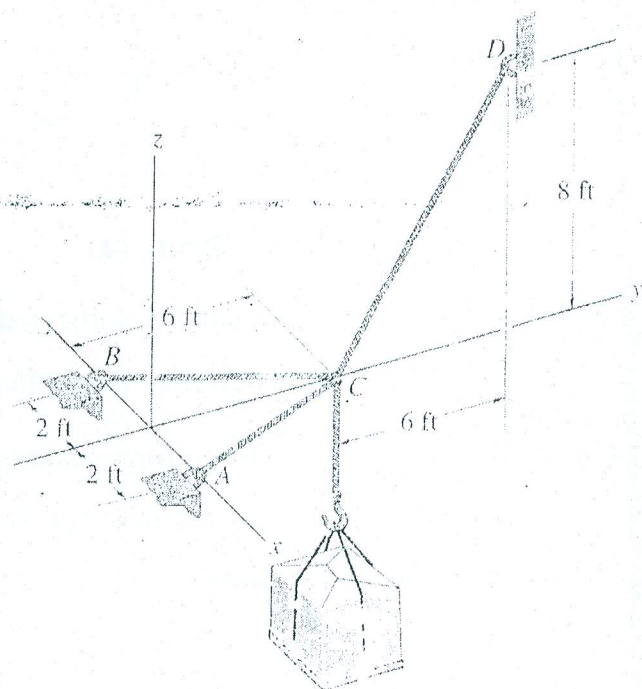
Exam Guidelines: This Exam contains 7 questions in 2 pages. Start every question in a new page.

- (1) [7 pt.] The hook shown in Figure is subjected to two forces, F_1 and F_2 . If it is required that the resultant force have a magnitude of 500 N and be directed horizontally to the left, determine (a) the magnitudes of F_1 and F_2 provided $\theta = 30^\circ$, and (b) the magnitudes of F_1 and F_2 if F_2 is to be a minimum.

- (2) [7 pt.] Determine the force in each cable needed to support the 500 lb load.

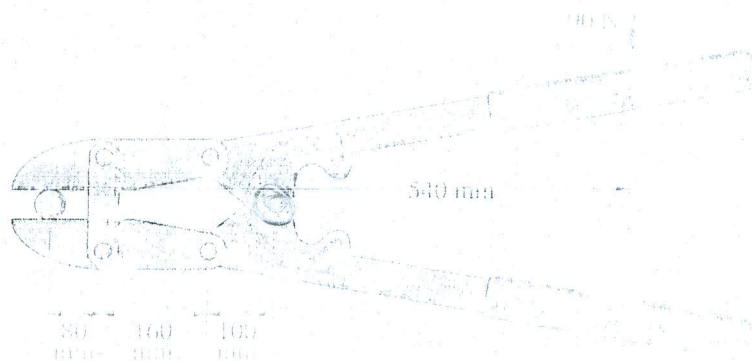


Prob. (1)



Prob. (2)

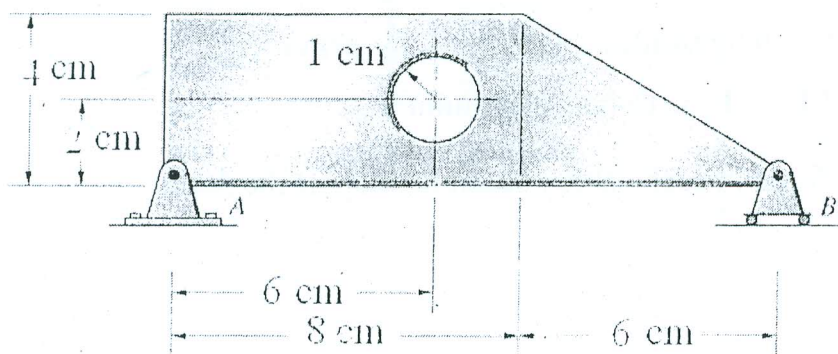
- (3) [7 pt.] Determine the force exerted on the bolt cutters and the magnitude of the force the members exert on each other at the pin connection J .



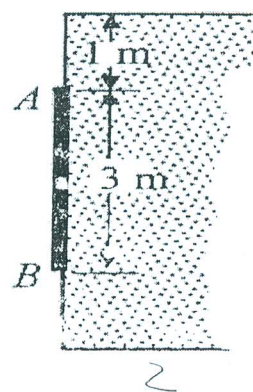
Prob. (3)

(4) [7 pt.] The homogeneous plate weighs 400 N. Determine the reactions at the supports A and B .

(5) [7 pt.] Determine the resultant force due to water ($\gamma = 9.81 \text{ kN/m}^3$) acting on the 2 m by 3 m rectangular area AB shown in Figure.



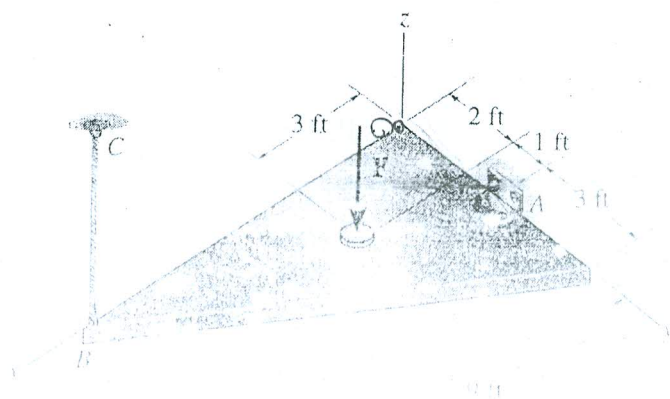
Prob. (4)



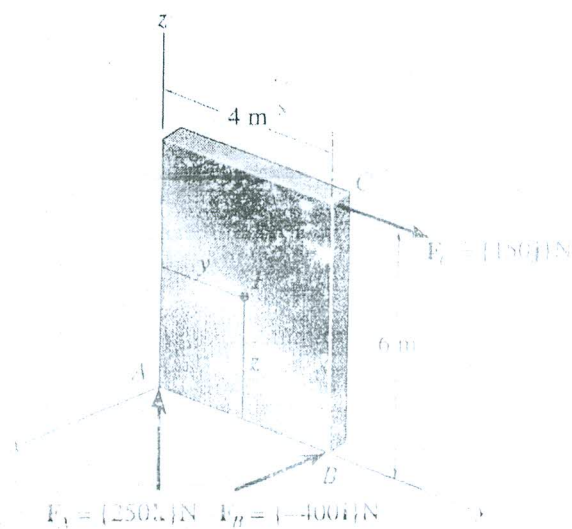
Prob. (5)

(6) [7 pt.] If the cable can be subjected to a maximum tension of 300 lb, determine the maximum force F which may be applied to the plate.

(7) [10 pt.] Replace the three forces acting on the plate by a wrench. Specify the magnitude of the force and couple moment for the wrench and the point $P(0, y, z)$ where its line of action intersects the plate.



Prob. (6)



Prob. (7)

With all best wishes

Dr. Walid Elbesheesly