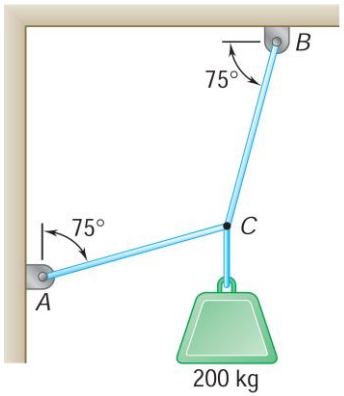
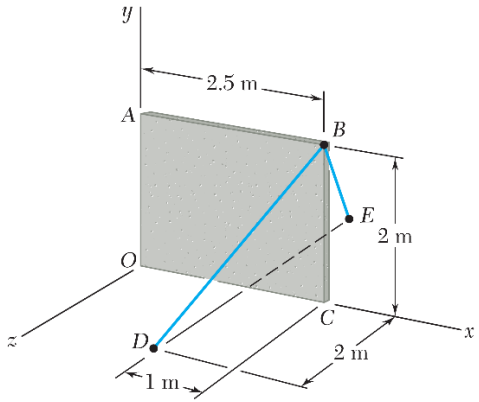
ENGINEERING MECHANICS (ME101) – TUTORIAL 1, 10 Jan 2020

Q1 – Two cables are tied together at C and are loaded as shown. Determine the tension (a) in cable AC, (b) in cable BC.



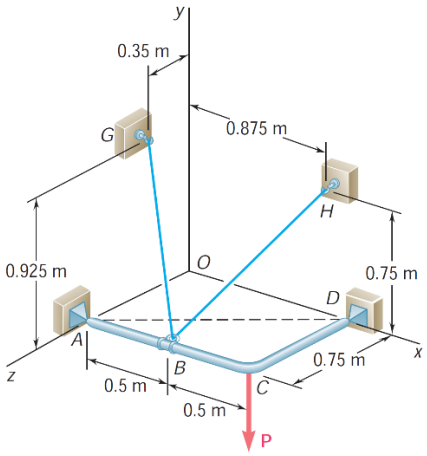
Q1



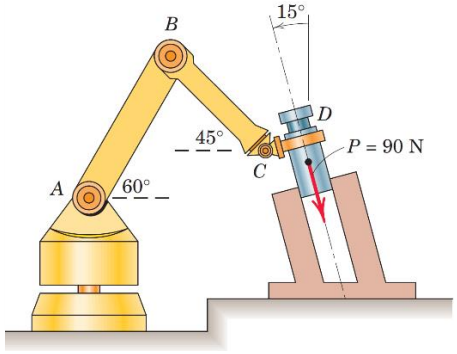
Q2

Q2 – A precast concrete wall section is temporarily held by two cables as shown. Knowing that the tension in cable BD is 900 N, determine the moment about point O of the force exerted by the cable at B.

Q3 – The frame ACD is hinged at A and D and is supported by a cable that passes through a ring at B and is attached to hooks at G and H. Knowing that the tension in the cable is 450 N, determine the moment about the diagonal AD of the force exerted on the frame by portion BH of the cable.

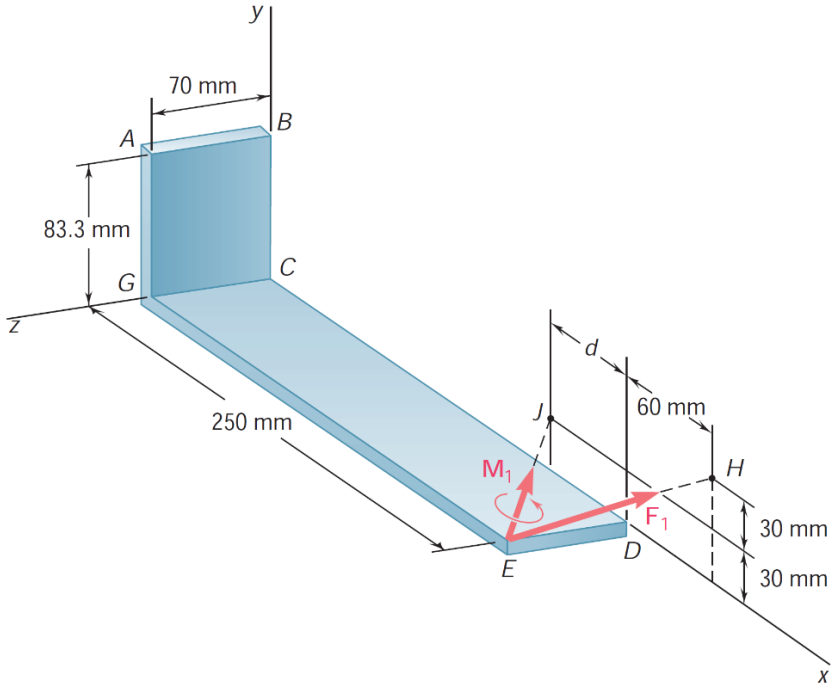


Q3



Q4

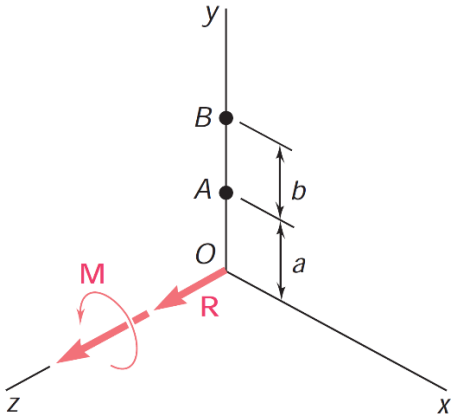
Q4 – In the design of the robot to insert the small cylindrical part into a close fitting circular hole, the robot arm must exert a 90 *N* force P on the part parallel to the axis of the hole as shown. Determine the components of the force which the part exerts on the robot along axes (*a*) parallel and perpendicular to the arm AB, and (*b*) parallel and perpendicular to the arm BC.



Q5

Q5 – A 77-N force F_1 and a 31-N-m couple M_1 are applied to corner E of the bent plate shown. If F_1 and M_1 are to be replaced with an equivalent force-couple system (F_2, M_2) at corner B and if $(M_2)_z = 0$, determine (a) the distance d, (b) F_2 and M_2.

Q6 – Replace the wrench shown with an equivalent system consisting of two forces perpendicular to the y axis and applied respectively at A and B.



Q6