ENGINEERING MECHANICS
BAA1113

TUTORIAL 4(CO2)

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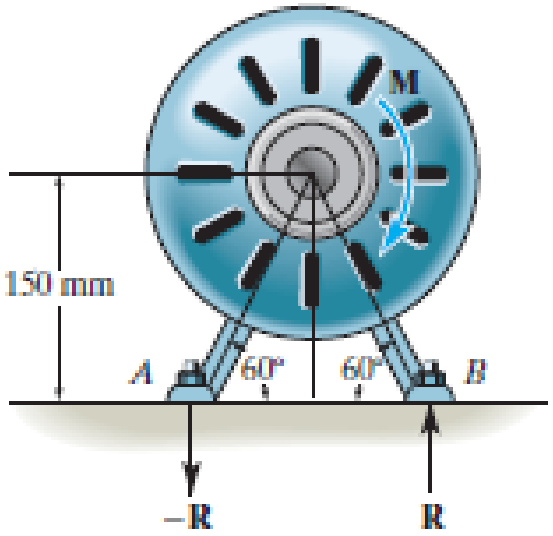
TUTORIAL 4

T13) A clockwise couple M = 5N.m is resisted by the shaft of the electric motor. Determine the magnitude of the reactive force –R and R which act at supports A and B so that the resultant of the two couples is zero



ans: R = 28.9 N

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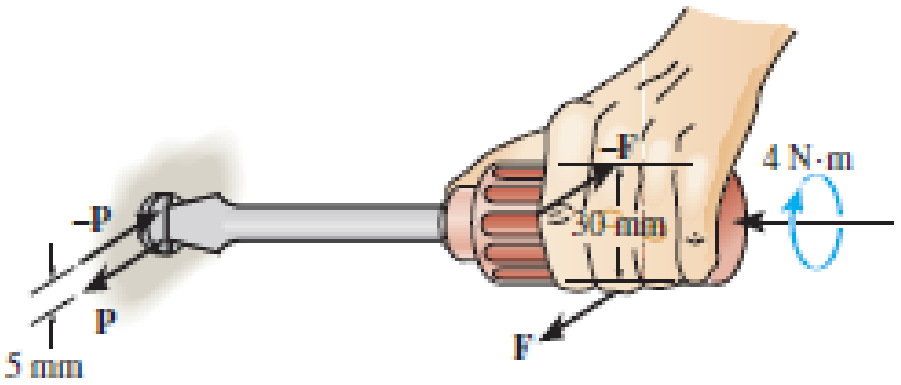
T14)A twist of 4 N.m is applied to the handle of the screwdriver. Resolve this couple moment into a pair of couple forces F exerted on the handle and P exerted on the blade



ans: F = 133 N , P = 800N

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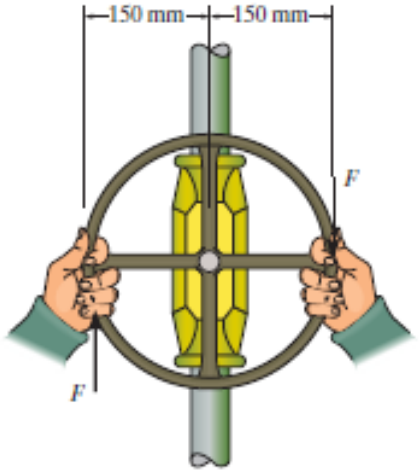
T15) The man tries to open the valve by applying the couple forces of F = 75 N to the wheel. Determine the couple moment produced.



ans: M_C = -22.5 N m = 22.5 Nm CW

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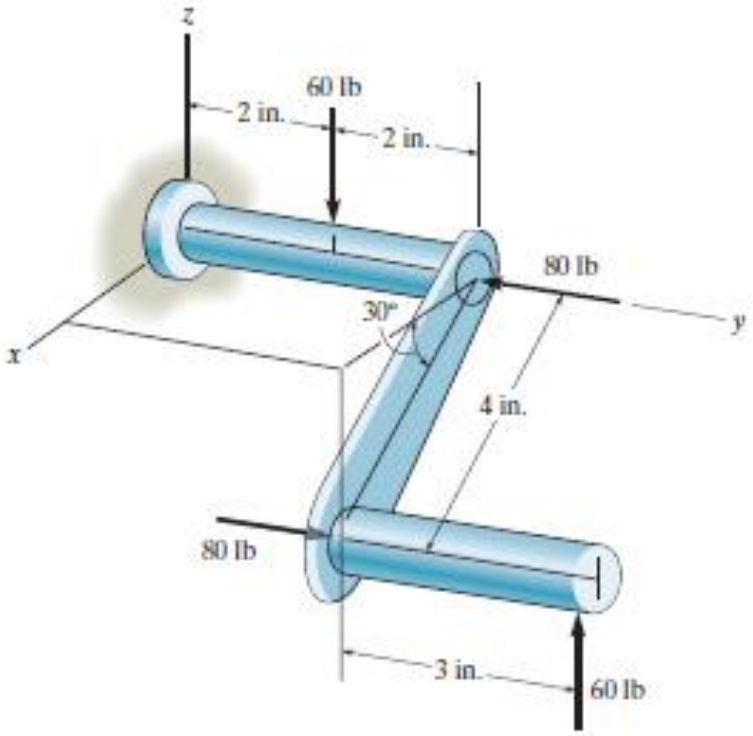
T16) Determine the resultant couple moment of the two couples that act on the assembly. Specify its magnitude and coordinate direction angles α, β, γ



$\alpha = 37°$

$\beta = 111°$

$\gamma = 61.2°$

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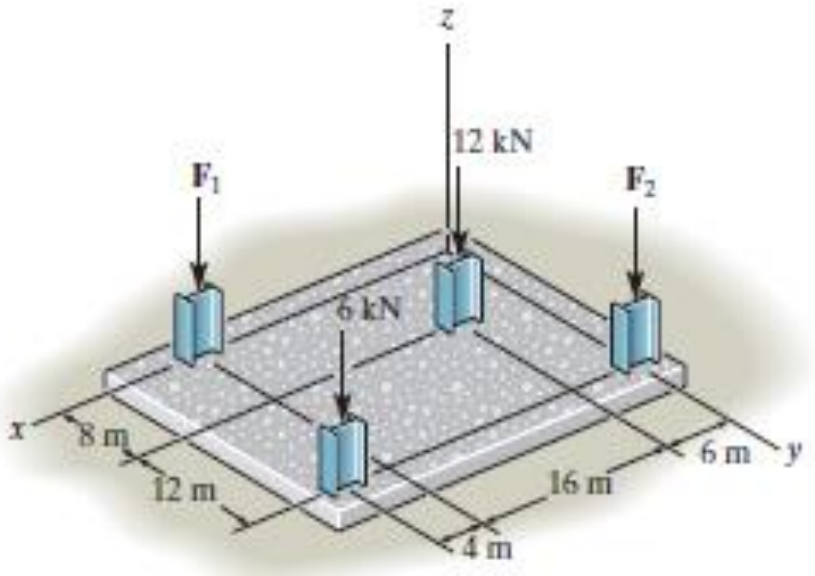
T17) The building slab is subjected to four parallel column loadings. Determine the equivalent resultant force and specify its location (x,y) on the slab. Given F1=8kN and F2 = 9kN



ans: FR= 35kN, y = 11.3 m , x = 11.5 m

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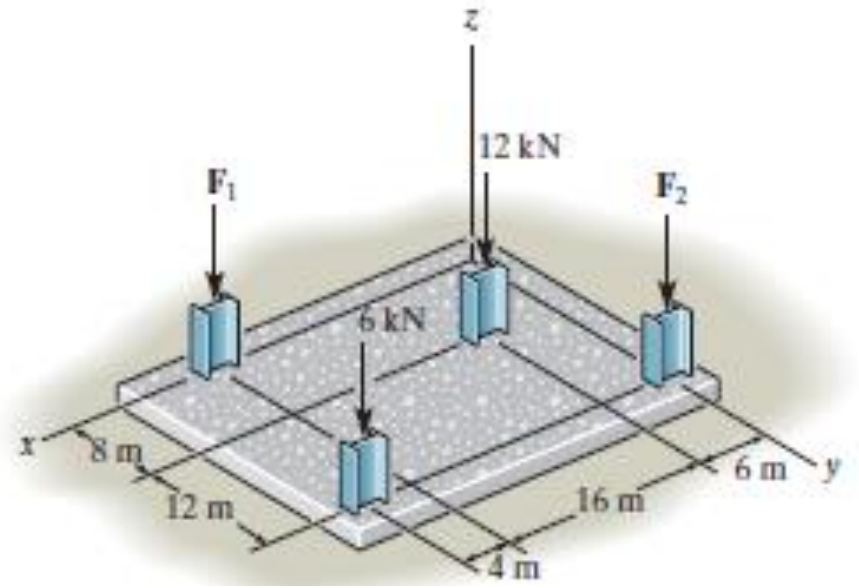
T18) The building slab is subjected to four parallel column loadings. Determine the F1 and F2 if the resultant force acts through point (12 m , 10m)



F_1 = 27.6 kN, F_2 =24 kN

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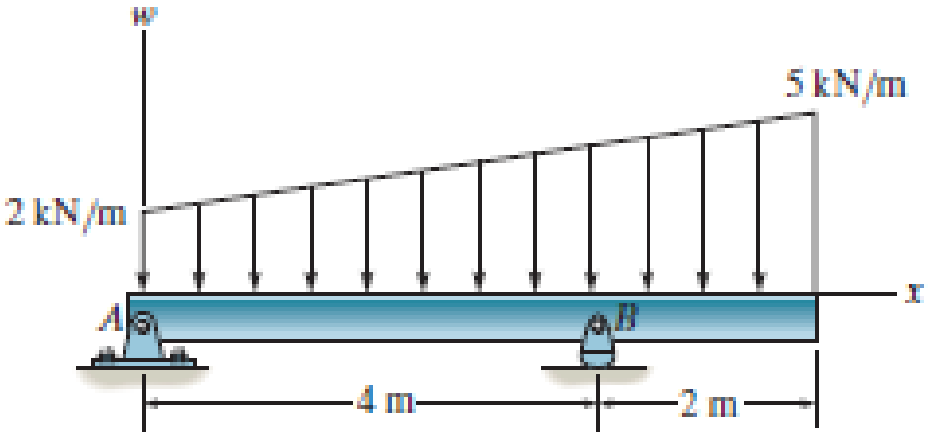
T19) The beam is loaded by distributed loading as shown. Determine the equivalent resultant force and its location on the beam, measured from point A.



ans: $F_R = 21$ kN ↓ , d = 3.43 m

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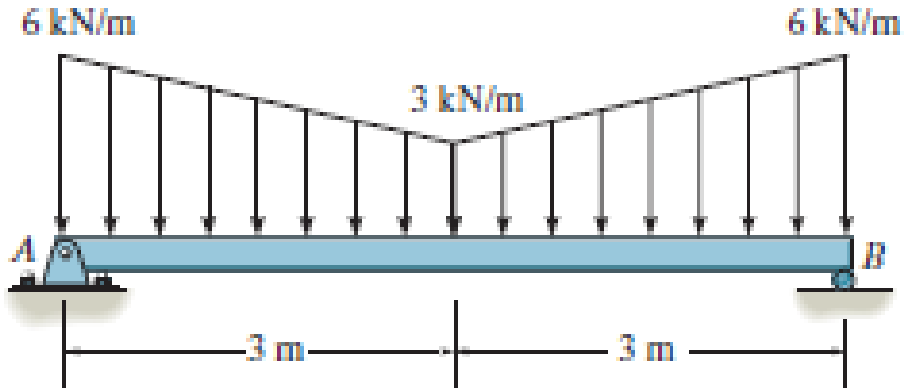
T20) The beam is loaded by distributed loading as shown. Determine the equivalent resultant force and couple moment acting at point A



ans: $F_R = 21$ kN ↓ , d = 3.43 m

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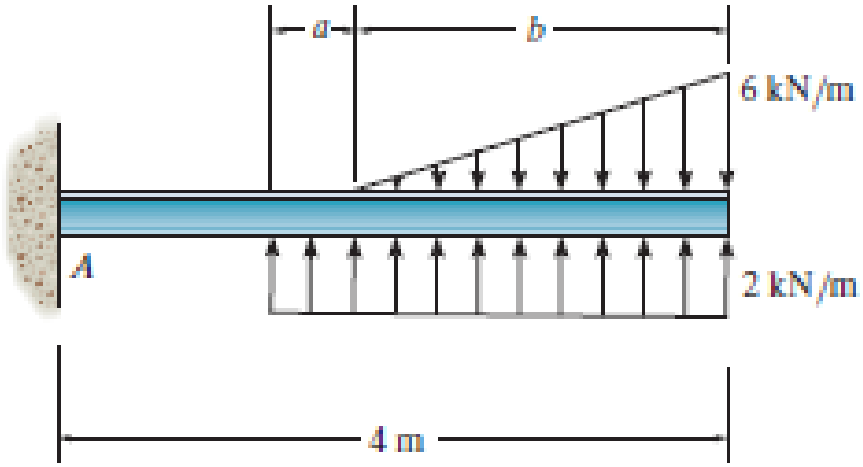
T21) The beam is loaded by distributed loading as shown. Determine the length b of the triangular load and its position a on the beam such that the equivalent resultant force is zero and the resultant couple moment is 8kNm clockwise



ans: a = 1.26 m, b = 2.53 m

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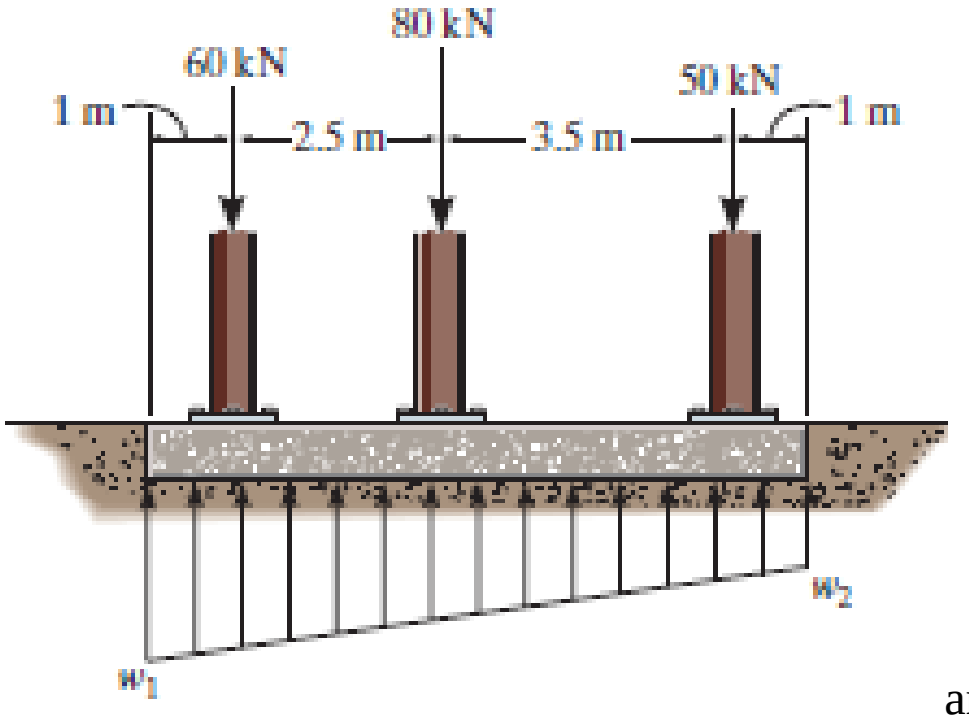
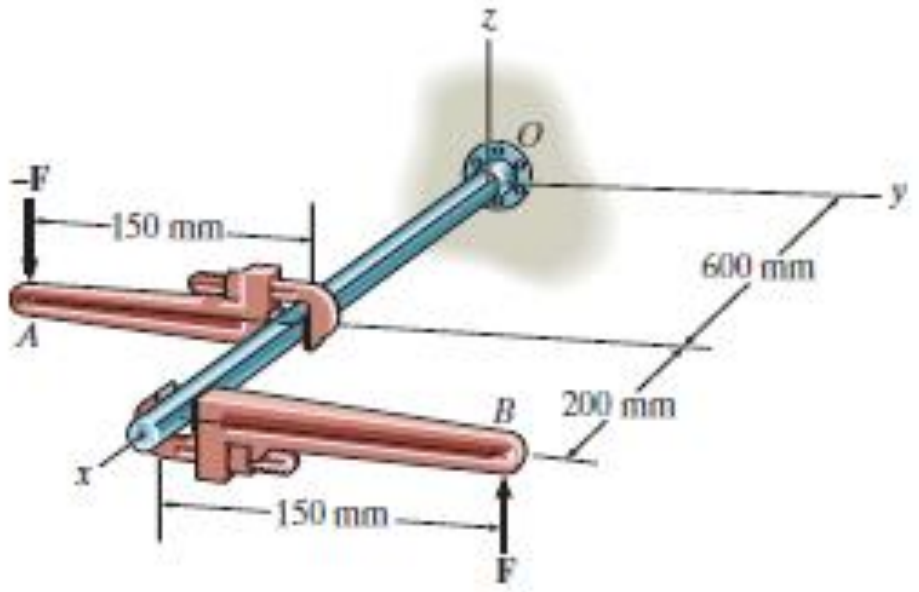
T22)If the soil exerts a trapezoidal distribution of load on the bottom of the footing, determine the intensities w_1 and w_2 of this distribution needed to support the column loadings



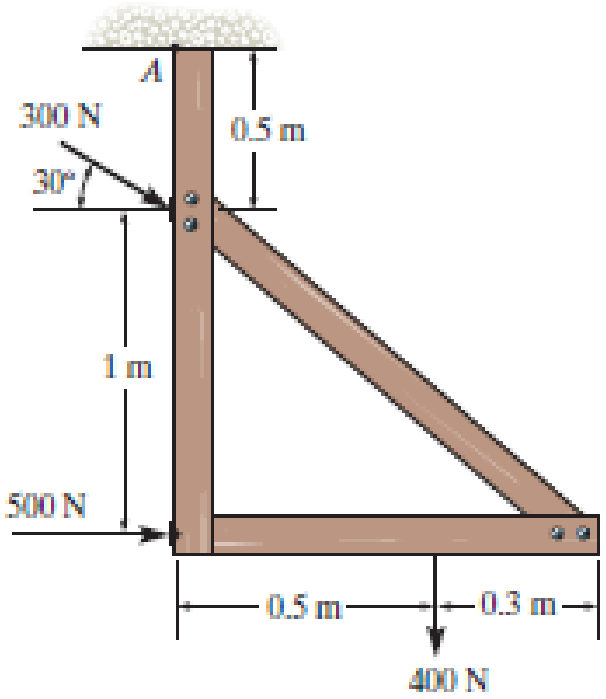
ans: w_1= 17.2 kN/m, w_2= 30.3 kN/m

T23) Express the moment of the couple acting on the pipe in Cartesian vector . Determine the magnitude of the couple moment. Given F = 152 N



ans: M_C= 45.1Nm

T24) Replace the force system acting on the frame by an equivalent resultant force and couple moment acting at point A



ans: F_R= 938 N, $\theta = 35.9$, $(M_R)_A$= 680 Nm CCW