

Department of Mechanical Engineering (NITC)
ZZ1001D ENGINEERING MECHANICS

S1ME

Time: One Hour

Tutorial Test 3-Set 2

Maximum Marks: 20

1. The pressure p_0 at the corner O of the rectangular plate shown in Fig. 1 is 75 Pa and increases linearly in the y-direction by 10 Pa/m. In the x-direction, it increases parabolically starting with zero slope so that in 30 m the pressure has changed from 75 Pa to 750 Pa. Determine the simplest resultant pressure force for this distribution on the plate. Give the coordinates of the centre of pressure, relative to O.
2. Calculate the distance h_c measured from the base to the centroid of the volume of the frustum of the right-circular cone shown in Fig. 2.

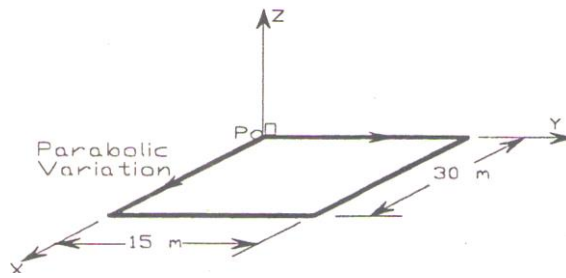


Figure 1

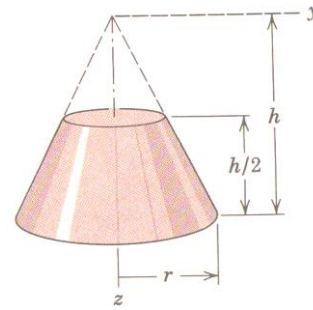


Figure 2

-----P.T.O-----

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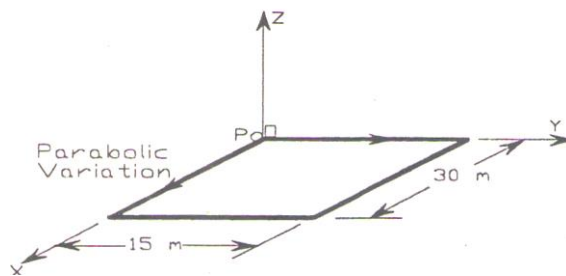


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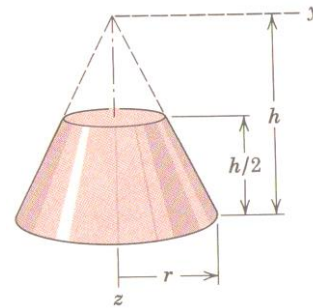


Figure 2

-----P.T.O-----

3. The beam is subjected to the two forces shown. Express each force in Cartesian vector form and determines the magnitude and coordinate direction angles of the resultant force Fig 3.
4. The hemisphere of radius r is made from a stack of very thin plates such that the density varies with height, density $= kz$, where k is a constant. Determine its mass and the distance \bar{z} to the centre of mass G ..Fig. 4?

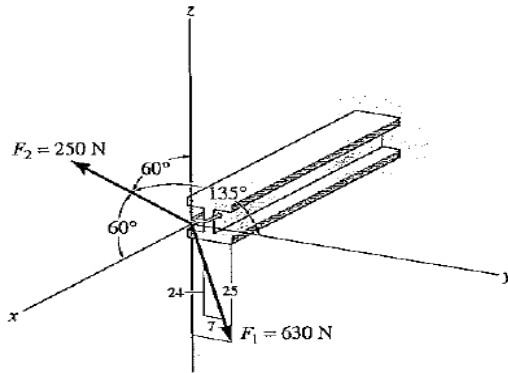


Figure 3

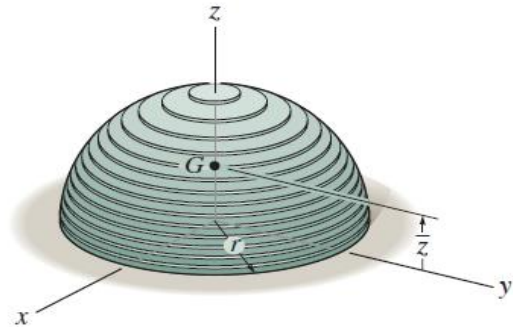


Figure 4

3. The beam is subjected to the two forces shown. Express each force in Cartesian vector form and determines the magnitude and coordinate direction angles of the resultant force Fig 3.
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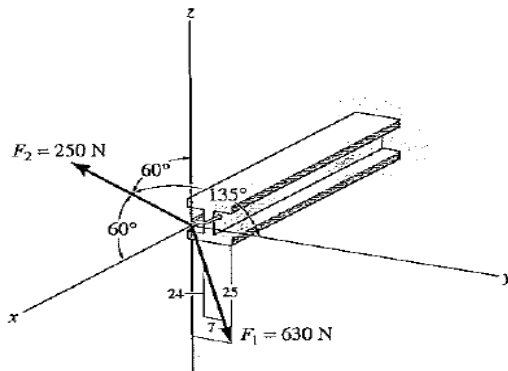


Figure 3

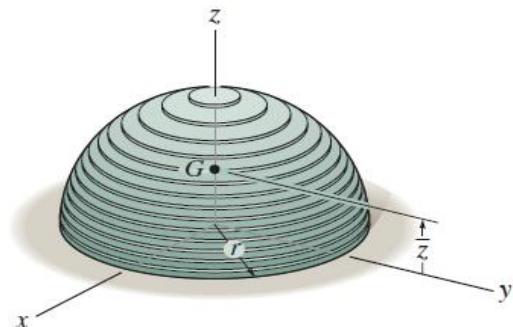


Figure 4