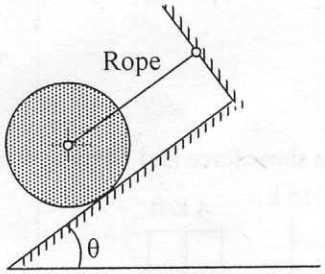
**Section-B**

# University of Asia Pacific
## Department of Civil Engineering
## Final Examination Fall 2012
## Program: B.Sc. Engineering (Civil)

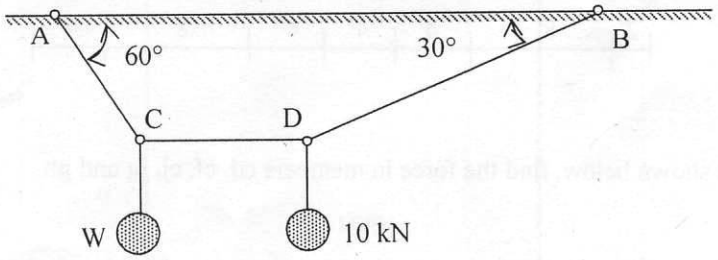
Course Code: CE 101 | Course Title: Engineering Mechanics I
Full Marks: 100 (=10×10) | Time: 3 Hours

***There are fourteen (14) questions. Answer any ten (10)***

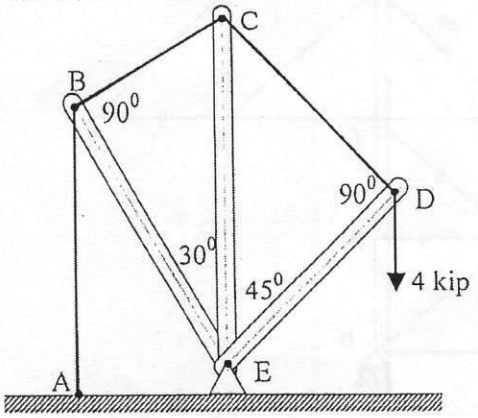
**1.** A 500 lb. cylinder rest on a smooth inclined plane. For a tension in the rope of 250 lb. find the inclination of the plane and the plane reaction.



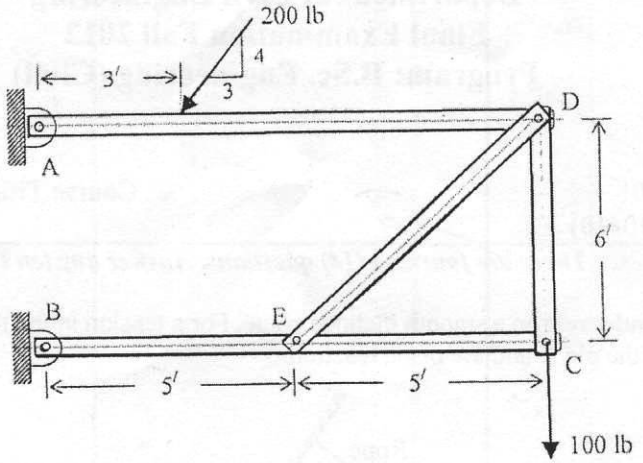

**2.** A chord supported at A and B carries a load of 10 kN at D and a load W at C. Find the value of W so that CD remains horizontal.



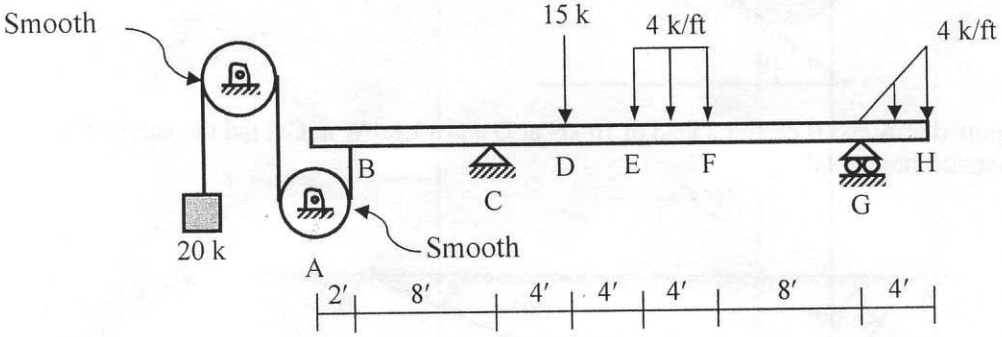

**3.** Determine tension in the cables AB, BC & CD.



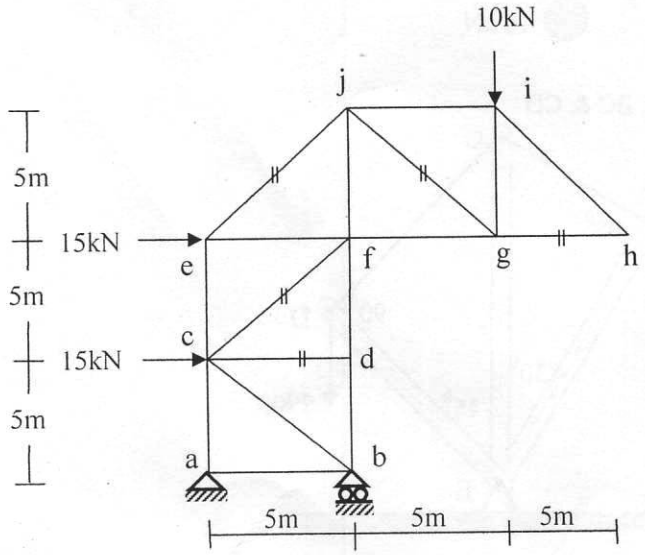
4. Determine support reactions at A & B and all other internal pins. Identify two-force members and determine the forces in those members. Assume all the members of the framework are weightless.



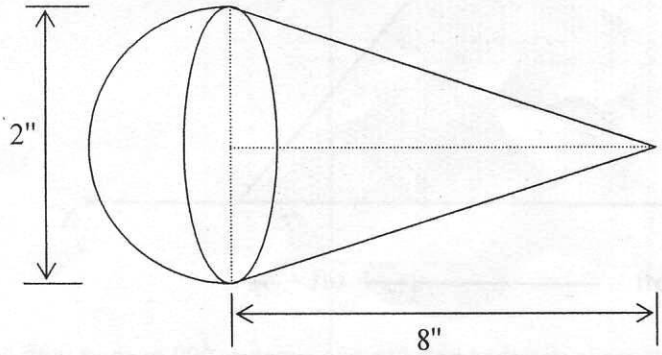

5. For the beam shown below, calculate
(i) the reactions at C and G, (ii) the shear force and bending moment at F.



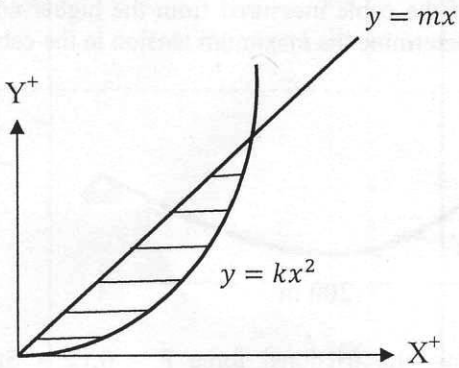

6. For the truss shown below, find the force in members cd, cf, ej, jg and gh.



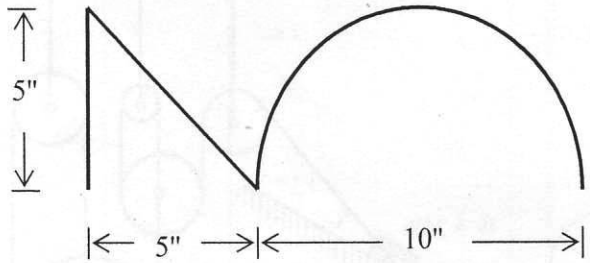
7. A hemisphere is attached to a right circular cone as shown below. Determine the location of centroid.




8. Refer to the following figure, find the co-ordinates of the centroid of the area bounded by $y = mx$ and $y = kx^2$.

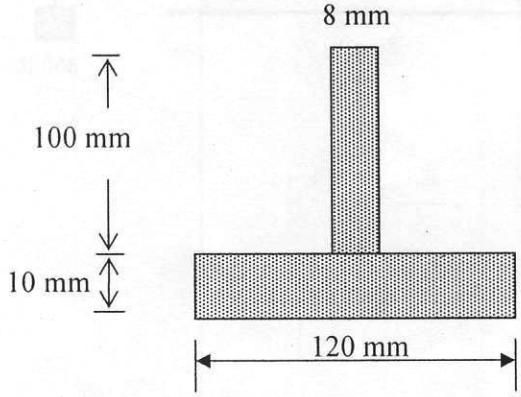



9. Determine the location of centroid of line shown below.

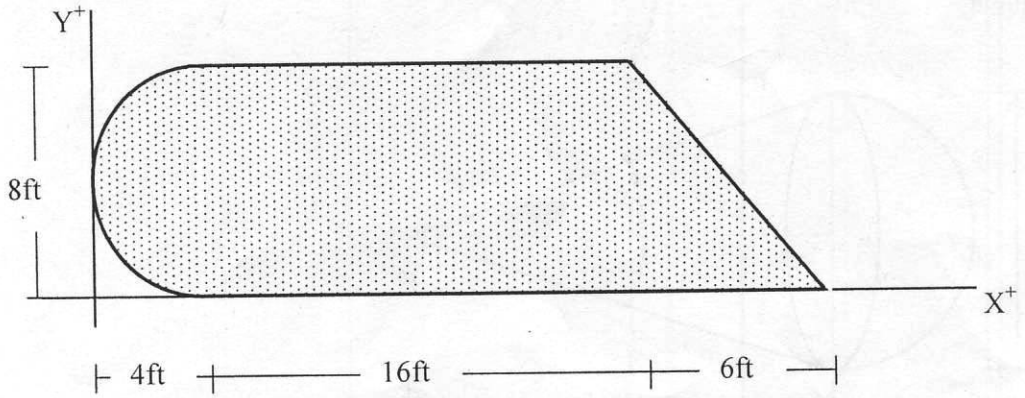



10. Write down the theorems of Pappus and Guldinus and prove it.

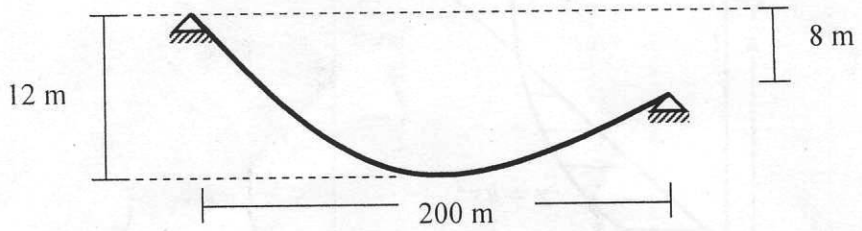
11. Calculate the moment of inertia of the inverted T-section about its centroidal axes ($I_{Xc}$ & $I_{Yc}$).



**12.** Calculate the moment of inertia of the following section about the X axis and Y axis.




**13.** A cable of uniform cross-sectional area is stretched between two supports 200 m apart with one end 8 m above the other as shown in figure below. The cable is loaded with a uniformly distributed load of 20 kN/m and the sag of the cable measured from the higher end is 12 m. Find the horizontal tension in the cable. Also determine the maximum tension in the cable.




**14.** In the figure shown below, the frictional force F = 0.15 × Surface Reaction. Calculate the magnitudes of surface reaction, frictional force and resultant. Weight of Block =30 lb.