

Code No: 9A01101

R09

I Year B.Tech(R09) Supplementary Examinations, December 2010.

ENGINEERING MECHANICS

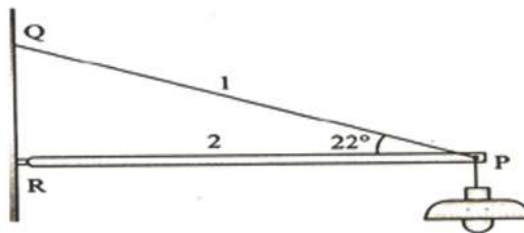
(Common to Aeronautical Engineering, Biotechnology, Civil Engineering and Mechanical Engineering)

Time: 3 hours

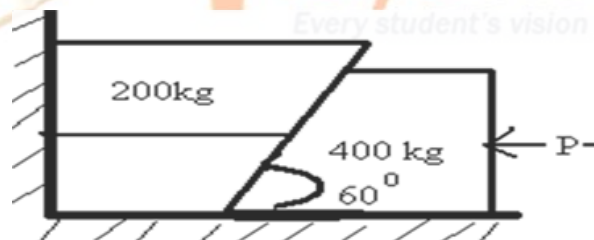
Max Marks: 70

Answer any FIVE questions
All questions carry equal marks

1. An electric light fixture is held with the arrangement shown in figure. If the weight of the fixture is 20kg and the hinge is an ideal one, determine the axial forces in the bar and the string.



2. What is the difference between a truss and frame? write down the basic assumptions for frame analysis. And discuss two methods for analyzing the frame for different forces.
3. Find the minimum value of horizontal force P applied to the lower block shown in figure to hold the system in equilibrium and co-efficient of friction is 0.25 at the floor and 0.30 at the wall and 0.20 is between the blocks.



4. (a) Determine the centroid of the quarter circle whose radius is R.
(b) Determine centroid of semicircle whose radius is R.
5. Derive the expression for mass moment of inertia of a homogeneous sphere of radius 'r' and mass density 'w', with reference to its diameter.
6. An enemy ship was located at a distance of 25 km in north - west direction by a warship. If the enemy ship is moving with a velocity of 18 kmph N 30° E, in which direction the warship must move with a velocity of 36 kmph to strike at its earliest. Assume the fire range of warship is 5 km. When is the shell to be fired?
7. A solid cylinder of weight 'w' and radius 'r' rolls, down an inclined plane which makes an angle θ with the horizontal axis. Determine the minimum coefficient of friction and the acceleration of the mass center for rolling, without slipping.
8. A vertical shaft 100 mm in diameter and 1 m in length has its end fixed to the ceiling. At the other end, it carries a disc of mass 500 kg having a radius of gyration of 450 mm. The modulus of rigidity for the material of shaft is 80 GPa. Determine the frequency of torsional vibrations.
