

B.Tech. Civil (Construction Management) /
B.Tech. Civil (Water Resources Engineering)

BTCLEVI/BTMEVI/BTELVI/BTECVI/BTCSVI

Term-End Examination

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December, 2013

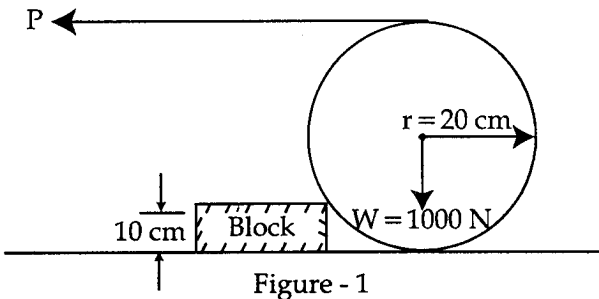
ET-202(A) : ENGINEERING MECHANICS

Time : 3 hours

Maximum Marks : 70

Note : Answer any ten questions. All questions carry equal marks. Use of scientific calculator is permitted.

1. A uniform wheel weighing 1000 N and of 40 cm diameter rests against a rectangular block 10 cm thick as shown in figure 1. The wheel is pulled by a horizontal force P applied at the end of a cord wound tightly around the circumference of the wheel. Determine the magnitude of P required to start the wheel move over the rectangular block. 7



2. A square hole is cut in a circular plate of diameter D as shown in figure 2. Show that the centroid of the remainder area is at a distance of $\left(\frac{4\pi - 3}{8\pi - 4} \times D\right)$ from the extreme left end of the horizontal diameter of the plate. 7

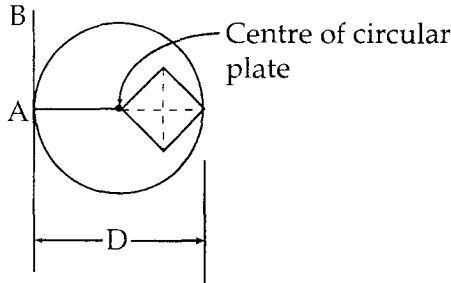


Figure - 2

3. Find force in each member of the truss shown in figure 3. 7

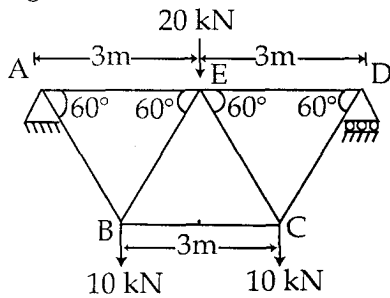


Figure - 3

4. Two blocks A and B of weights 1 kN and 2 kN respectively are in equilibrium position as shown in figure 4. 7

If coefficient of friction between the two blocks as well as the block B and the floor is 0.3, find the force P required to move the block B. Also find the force in the string.

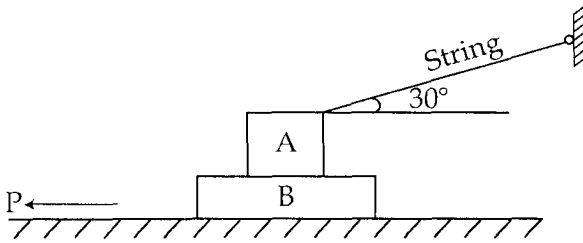


Figure - 4

5. Determine the least value of the force P to cause motion to impend right wards as shown in figure 5. Assume the co-efficient of friction under the blocks to be 0.2 and pulley to be frictionless. 7

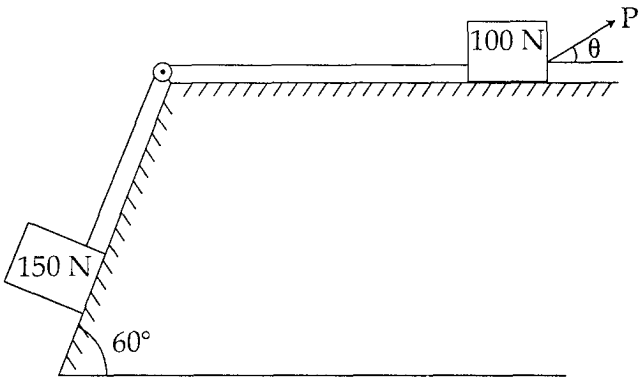


Figure - 5

6. A stone is dropped with zero velocity into a well. The sound of the splash is heard after 4 seconds. How far below the ground surface is the surface of water ? Assume the velocity of sound as 330 m/sec. 7

7. A projectile is shot with an initial velocity of 8 m/sec. If the inclination from the horizontal is 30° , find its time of flight, range, and maximum height attained. 7

8. A boy throws a ball so that it may just clear a wall 3.6 m high as shown in figure 6. The boy is at a distance of 4.8 m from the wall. The ball was found to list the ground at a distance of 3.6 m on the other side of wall. Find the least velocity with which the ball is thrown. 7

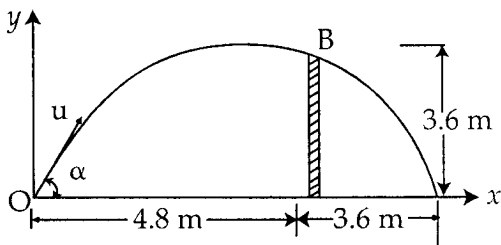


Figure 6.

9. Draw the shear force and bending moment diagram for the simply supported beam as shown in figure 7. 7

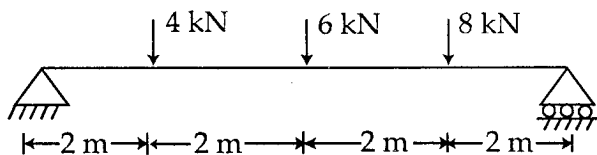


Figure 7

10. A force of 200 N acts on a body of mass 5 kg for 8 seconds. If the body is initially moving with a velocity of 40 m/sec, find; 7
- Acceleration of the body.
 - Distance travelled by the body after 5 seconds.
 - The velocity of the body after 5 seconds.

11. Compute the centre of gravity of a solid Hemi - sphere. 7
 12. Two bodies of weight 200 N and 120 N moving in opposite direction at initial velocities of 6 m/sec, and 8 m/sec, respectively, collide with each other. Find their velocities after impact when the co-efficient of restitution is 0.75. 7
 13. What do you understand by 'Simple Harmonic Motion' ? Discuss its salient features with the help of an example. 7
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