No. of Printed Pages : 6

ET-202(A)

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

BTCLEVI/BTMEVI/BTELVI/BTECVI/BTCSVI

Term-End Examination

01109

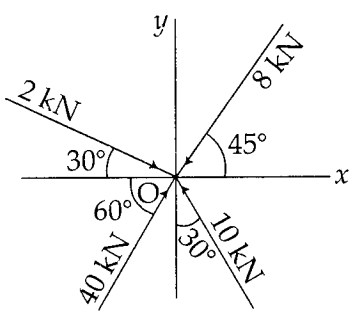
June, 2013

ET-202(A) : ENGINEERING MECHANICS

Time : 3 hours *Maximum Marks : 70*

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

1. Figure 1 shows coplaner forces acting at a point O. Determine the magnitude and direction of the resultant. 7



2. Two smooth spheres, each of radius $r = 25$ cm and weight $w = 240$N, rest in a horizontal channel having vertically walls, the distance between which is 90 cm, as shown in figure 2. Find the force exerted on the walls and the floor of the channel. 7

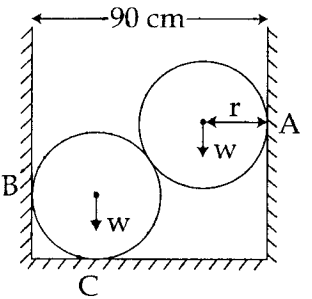


Figure 2

3. Find the forces in each member of the pin jointed truss, as shown in figure 3. 7

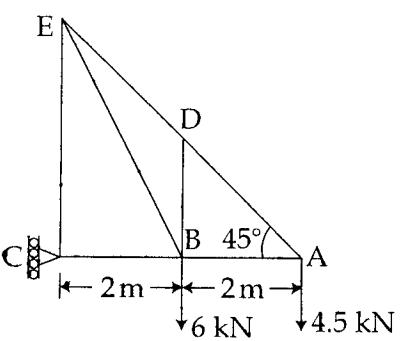


Figure 3

4. Locate the centroid of the hatched area as shown in figure 4. 7

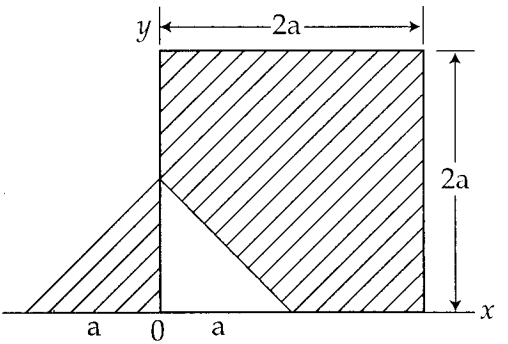


Figure 4

5. For what value of the pull P in the system shown in figure 5 the motion will impend ? Assume the pulley to be smooth and take $\mu = 0.30$ between any surfaces in contact. 7

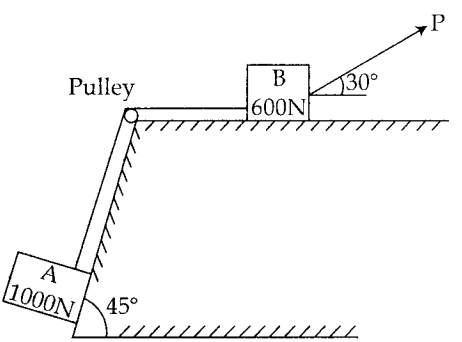


Figure 5

12. Find the position of centre of gravity of the composite body as shown in figure 9. Density of the material of hemi-sphere is twice that of cone. 7

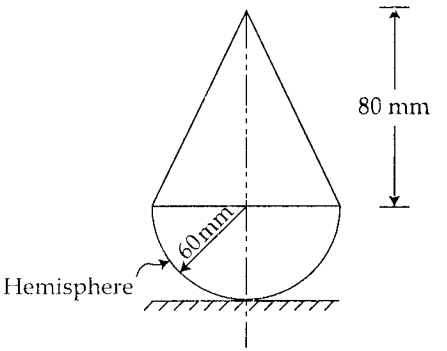


Figure 9

13. Determine the value of moment of inertia of a rectangle, of width B and depth D, about a horizontal axis XX passing through its centre as shown in Figure 10. 7

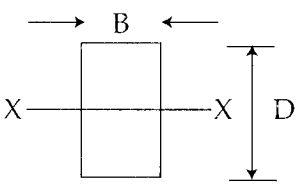


Figure 10

6. Two blocks A and B, connected by a link AB of negligible weight, are supported on rough surfaces as shown in figure 6. The co-efficients of static friction for blocks A and B are 0.4 and 0.35 respectively. If block B weighs 7.5 kN, what is the least weight of the block A for which the system is in equilibrium ? 7

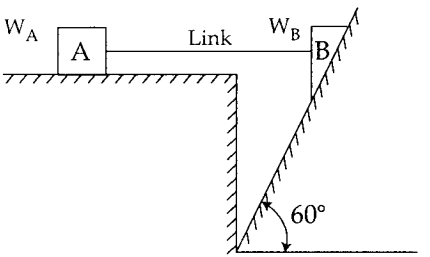


Figure 6

7. A ball is thrown vertically upwards with a velocity 9 m/sec from the edge of a cliff 15 m above the sea level as shown in figure 7. What is the highest point above sea level reached by the wall ? How long does the ball take to hit the water ? With what velocity does it hit the water ? 7

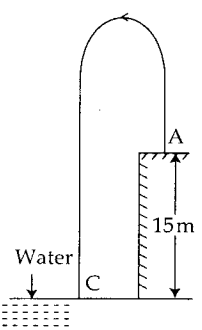


Figure 7

8. The pilot of an aeroplane flying horizontally at a height of 1000 m with a constant speed of 270 km/hr wishes to hit a target on the ground. At what distance from the target should he release the bomb in order to hit the target ? At what angle would the target appear to him from that distance ? 7

9. Provide a general relationship between the range and maximum height achieved by a projectile thrown at an angle 'α' to the horizontal. For what value of α do we get the maximum range ? Discuss briefly. 7

10. Draw shear force and bending moment diagrams for the simply supported beam as shown in figure 8. 7

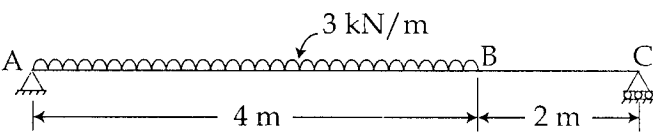


Figure 8

11. A motorist travelling at a speed of 90 kmph suddenly applies brakes and halts after skidding through 20 m. Find : 7

(a) the time required for the motor to stop.

(b) the average frictional resistance offered by the road.