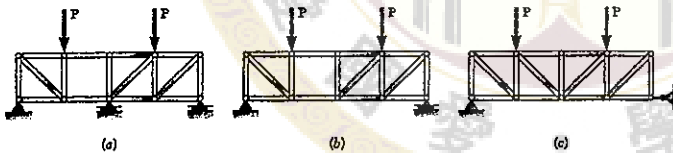


A. Define and describe the following terms: (4 points each, 20 points total)

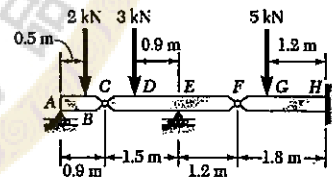
1. Statically indeterminacy
2. Angle of friction
3. Product of inertia
4. Angular momentum
5. Instantaneous center of rotation

B. Calculation problems (refer to the figures on bottom for the corresponding problems)

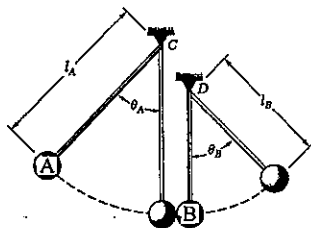
6. Classify each of the structures shown as completely, partially, or improperly constrained; if completely constrained, further classify as determinate or indeterminate. (All members can act both in tension and in compression.) (15 points)
7. Using the method of virtual work, determine separately the force and couple representing the reaction at H . (15 points)
8. A small sphere A attached to a cord AC is released from rest in the position shown and hits an identical sphere B hanging from a vertical cord BD . If the maximum angle θ_B formed by cord BD with the vertical in the subsequent motion of sphere B is to be equal to the angle θ_A , determine the required value of the ratio l_B / l_A of the lengths of the two cords in terms of the coefficient of restitution e between the two spheres. (15 points)
9. Rod AB can slide freely along the floor and the inclined plane. Denoting by v_A the velocity of Point A , derive an expression for (a) the angular velocity of the rod, (b) the velocity of end B . (15 points)
10. Sphere A of mass m and radius r rolls without slipping with a velocity \bar{v}_1 on a horizontal surface when it hits squarely an identical sphere B that is at rest. Denoting by μ_k the coefficient of kinetic friction between the spheres and the surface, neglecting friction between the spheres, and assuming perfectly elastic impact, determine (a) the linear and angular velocities of each sphere immediately after the impact, (b) the velocity of each sphere after it has started rolling uniformly. (Hint: for sphere, moment of inertia $\bar{I} = 2mr^2/5$) (20 points)



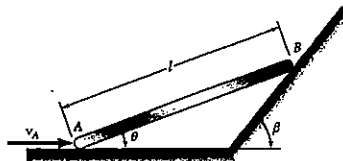
Problem 6



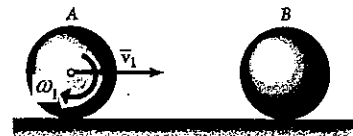
Problem 7



Problem 8



Problem 9



Problem 10

試題隨卷繳回