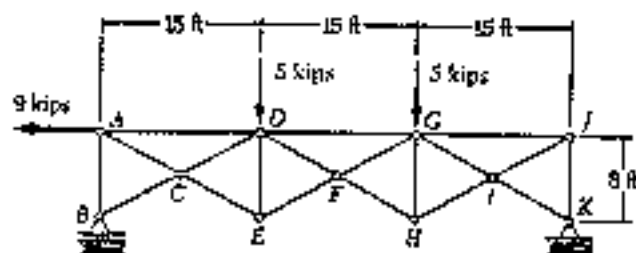
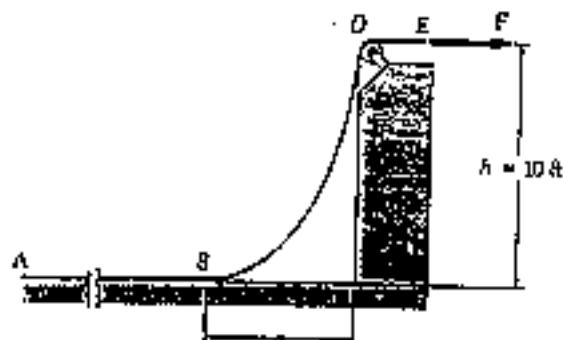


工程力學

(10%) 1. Determine the force in members AD, CD, and CE of the truss shown.



(20%) 2. To the left of point B the long cable ABDE rests on the rough horizontal surface shown. Knowing that the cable weighs 1.8 lb/ft, determine the force F required when $a = 9$ ft. (20%)

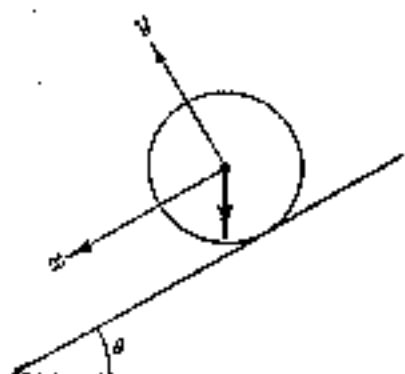


(30%) 3. Define the following in terms of Engineering Mechanics

- (1) Newton's Law
- (2) Inertial System
- (3) Perigee and Apogee
- (4) Particle and rigid body
- (5) Mass Center and Principal axes of inertia
- (6) Natural frequency

(20%) 4. A homogeneous sphere and a homogeneous cylinder roll, without slipping, from rest at the top of an inclined plane to the bottom. The moments of inertia for the sphere and the cylinder are $\frac{2}{5}(W_s/g)r_s^2$ and $\frac{1}{2}(W_c/g)r_c^2$, respectively. The subscripts s and c refer to the sphere and the cylinder respectively. W_s and W_c are the weights; r_s and r_c are the radii of the sphere and the cylinder, respectively. g is gravity.

- (1) Which reaches the bottom first? Calculate the acceleration.
- (2) If the sphere and the cylinder are to have rolling with slipping motion. Which reaches the bottom first? Justify your answer by calculating the acceleration.



(20%) 5. The 0.8-m arm OA for a remote-control mechanism is pivoted about the horizontal x -axis of the clevis, and the entire assembly rotates about the x -axis with a constant speed $N=60$ rev/min. Simultaneously the arm is being raised at the rate $\dot{\beta}=4$ rad/s and $\ddot{\beta}=1$ rad/s².

- (1) For the position where $\beta=30^\circ$ determine the angular velocity and the angular acceleration of OA.
- (2) If a collar B is traveling outward to point A at the velocity 0.1 m/sec measured relative to the arm OA. At the instant when OB=0.1 m. Find the velocity and acceleration of the collar in the inertial reference frame.

