

- *17-25 Find the reaction forces at the arm pivot in the global XY system for the brake of Problem 17-15.
- 17-26 Find the reaction forces at the arm pivot in the global XY system for the brake of Problem 17-16.
- †17-27 A clutch is needed for an electric motor that transmits 20 kW at 1 100 rpm. The clutch will attach directly to the motor housing faceplate and is to have the same housing diameter as the motor, which is 125 mm. The minimum radial clearance between the housing OD and the clutch disk OD is 5 mm. The clutch output shaft will have the same diameter as the motor shaft, which is 15 mm. Design a multiple disk clutch for this application. State all assumptions and design choices. Specify the clutch material, outside disk radius, inside disk radius, and the required actuation force.
- 17-28 A clutch is needed for an electric motor that transmits 25 hp at 800 rpm. The clutch will attach directly to the motor housing faceplate and is to have the same housing diameter as the motor, which is 5.5 in. The minimum radial clearance between the housing OD and the clutch disk OD is 0.25 in. The clutch output shaft will have the same diameter as the motor shaft, which is 0.625 in. Design a multiple disk clutch for this application. State all assumptions and design choices. Specify the clutch material, outside disk radius, inside disk radius, and the required actuation force.
- *17-29 Find the torque that a dual-pad, caliper disc brake with pad angle of 60 deg can transmit if the outside and inside lining diameters are 160 mm and 90 mm, respectively, and the applied axial force is 3 kN. Assume uniform wear and $\mu = 0.35$. Is the pressure on the lining acceptable? What lining materials would be suitable?
- 17-30 Repeat Problem 17-29 assuming uniform pressure.
- *17-31 Design a dual-pad caliper disc brake to provide a braking force of 240 N at the periphery of a 750-mm-dia wheel that is rotating at 670 rpm. Use an inside radius to outside radius ratio of 0.577. Assume uniform wear. State all assumptions and design choices. Specify the brake material, outside pad radius, inside pad radius, pad angle, and the required actuation force.
- 17-32 Repeat Problem 17-31 assuming uniform pressure.
- 17-33 An ultra-light solar racecar weighs 500 lb with driver. It has two 20-in-dia bicycle wheels in front that are to have dual-pad caliper disk brakes on each wheel. The brakes must be capable of bringing the car to a stop in a distance of 150 feet from a speed of 45 mph. Neglecting aerodynamic and rolling resistance forces, design dual-pad caliper disc brakes for the car. Use an inside radius to outside radius ratio of 0.577. Assume uniform wear. State all assumptions and design choices. Specify the brake material, outside pad radius, inside pad radius, pad angle, and the required actuation force.
- 17-34 Repeat Problem 17-33 assuming uniform pressure.

* Answers to these problems are provided in Appendix D.

† Problem numbers in *italics* are design problems.