國立中央大學九十學年度碩士班研究生入學試題卷

共<u>/</u> 頁 第<u>/</u>頁 所別: 應用地質研究所 不分組 科目: 工程力學

- 1 Determine the magnitude and direction of the friction force acting on the 100 kg block shown in Fig. 1, if first, P=500N and, second, P=100N. The coefficient of static friction is 0.2, and the coefficient of kinetic friction is 0.17. The forces are applied with the block initially at rest. $(20\%, \sin 20^\circ = 0.342, \cos 20^\circ = 0.94)$
- 2 A man raises a 10 kg joist, of length 4 m, by pulling on a rope (Fig. 2). Find the tension T in the rope and the reaction at A. (20%, sin 75° =0.97, $\cos 75^{\circ} = 0.26$
- 3 The loaded 150-kg skip is rolling down the incline at 4 m/s when a force P is applied to the cable as shown in Fig. 3 at time t=0. The force P is increased uniformly with the time until it reaches 600 N at t=4 s, after which time it remains constant at this value. Calculate (a) the time t_i at which the skip reverses its direction and (b) the velocity v of the skip at t=8 s. Treat the skip as a particle. (20%)
- 4 The two blocks shown in Fig. 4 start from rest. The horizontal plane and the pulley are frictionless, and the pulley is assumed to be of negligible mass. Determine the acceleration of each block and the tension in each cord. (20%)
- 5 A sign of dimensions 2.0 m*1.2 m is supported by a hollow circular pole having outer diameter 220 mm and inner diameter 180 mm (Fig. 5). The sign is offset 0.5 m from the centerline of the pole and its lower edge is 6.0 m above the ground. Determine the principal stresses and maximum shear stresses at points A and B at the base of the pole due to a wind pressure of 2.0 kPa against the sign. (20%)



Fig. 1

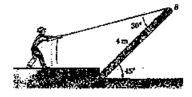


Fig. 2

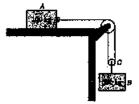


Fig. 4

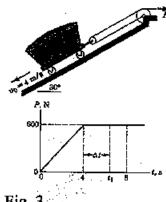


Fig. 3

