國立彰化師範大學104學年度碩士班招生考試試題

系所：機電工程學系(選考乙)、車輛科技研究所(選考丁)　　科目：動力學

☆☆請在答案紙上作答☆☆　　共 2 頁，第 1 頁

每題25%，在答案卷上清楚標註題號，並須繪製該題的自由體圖及標註使用到的適當符號。

1. The vertical guide is smooth and the 5-kg collar is released from rest at *A*, as Fig. 1 shows. Determine the speed of the collar when it is at position *C*. The spring has an unstretched length of 400 mm.

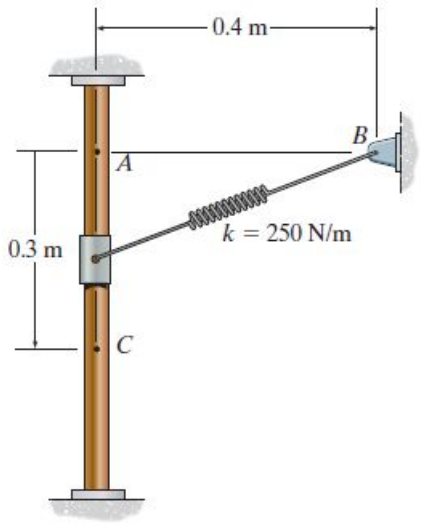

Fig. 1

2. The spool has a mass of 50 kg and a radius of gyration of k_G = 0.3 m, as shown in Fig. 2. If the coefficient of static and kinetic friction at *A* are μ_S = 0.2 and μ_K = 0.15, respectively, determine the angular acceleration of the spool if *P* = 100 N.

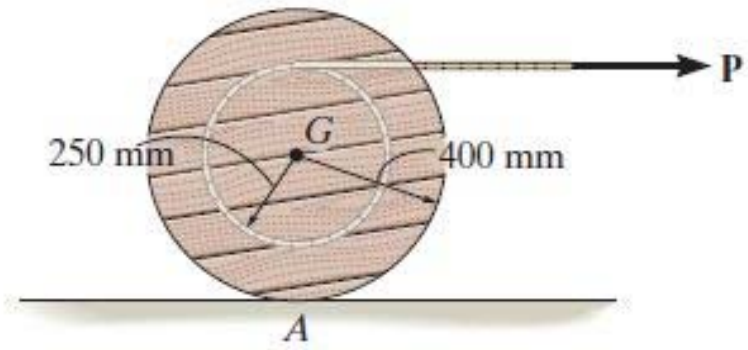

Fig. 2

3. In Fig. 3, ball C moves with a speed of 3 m/s which is increasing at a constant rate of 1.5 m/s^2, both measured relative to the circular plate and directed as shown. At the same instant the plate rotates with an angular velocity of 8 rad/s and an angular acceleration of 5 rad/s^2. Determine the velocity and acceleration of the ball at the instant.

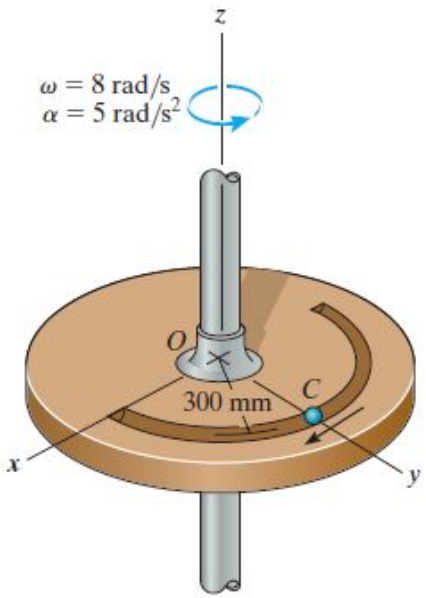

Fig. 3

4. In Fig. 4, the 60 kg pendulum has its mass center at G and a radius of gyration about point G of k_G = 300 mm. If it is released from rest when θ = 0°, determine its angular velocity at the instant θ = 90°. Spring AB has a stiffness of k = 300 N/m and is unstretched when θ = 0°.

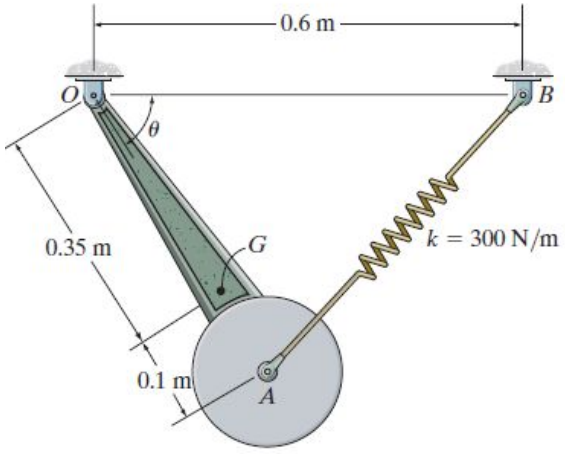

Fig. 4