國立虎尾科技大學 102 學年度第二學期博士班資格考試題

注意事項：
（1）本試題共有 5 題，每題 20 分，合計一百分。Closed book
（2）請依序作答於答案卷上並註明題號，若未註明選答題號及超過規定題數
　　　時，謹採計作答順序較前之題目計分。
（3）可使用計算機

1. Determine the magnitude of force F as a function of time, which must be applied to the end of the cord at A to raise the hook H with a constant velocity of v = 0.4 m/s. Initially the chain is at rest on the ground. Neglect the mass of the cord and the hook. The chain has a mass of 2 kg/m.

2. The collar has a mass of 20 kg and is supported on the smooth rod. The attached springs are undeformed when d = 0.5 m. Determine the speed of the collar after the applied force F = 100 N causes it to be displaced so that d = 0.3 m. When d = 05 m the collar is at rest.

3. The wheel shown in Fig.3 weights 40 lb and has a radius of gyration k_G = 0.6 ft about its mass center G. If it is subjected to a clockwise couple moment of 15 lb✧ft and rolls from rest without slipping, determine its angular velocity with **work and energy principle** after its center G moves 0.5 ft. The spring has a stiffness k = 10 lb/ft and is initially unstretched when the couple moment is applied.

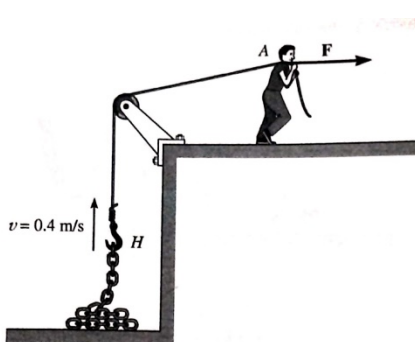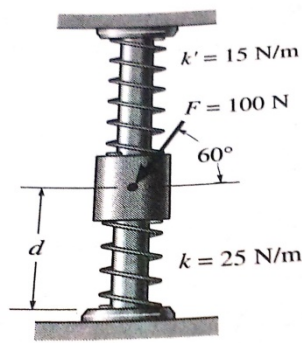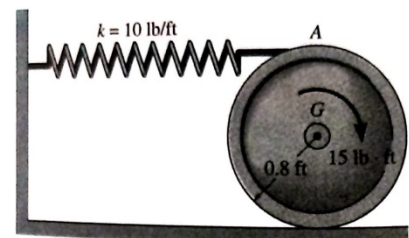Figure 1　　　　　　　Figure 2　　　　　　　Figure 3

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4. The crankshaft AB of an engine turns with a clockwise angular acceleration of 20 rad/s^2, Fig.4. Determine the acceleration of the piston at the instant AB is in the position shown. At this instant $\omega_{AB} = 10$ rad/s and $\omega_{BC} = 2.43$ rad/s.

5. Disk A, shown in Fig. 5, starts from rest and rotates with a constant angular acceleration of $\alpha_A = 2$ rad/s^2. If no slipping occurs between the disks, determine the angular velocity and angular acceleration of disk B just after A turns 10 revolutions.
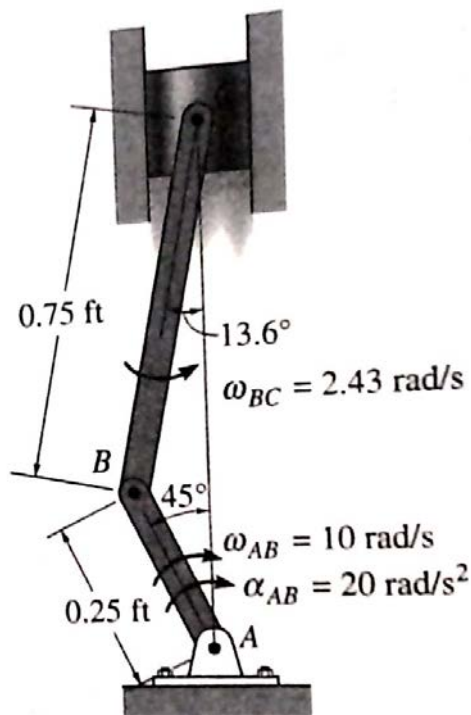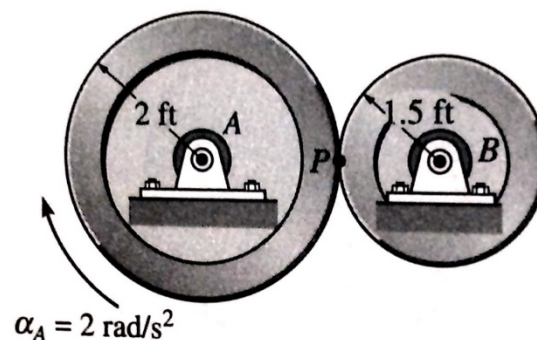

Figure 4　　　　　　　　　　Figure 5