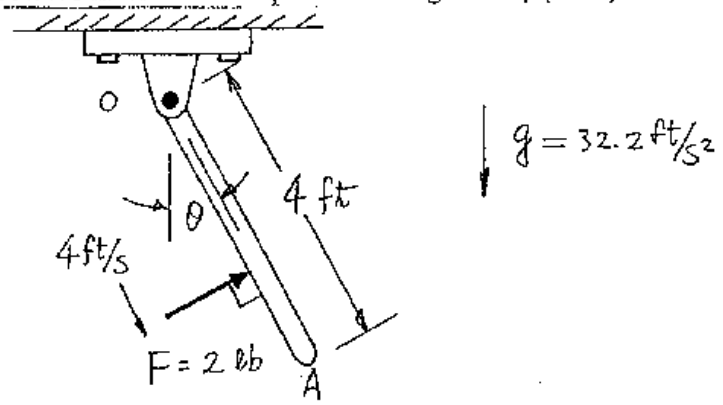
國立中央大學八十八學年度碩士班研究生入學試題卷

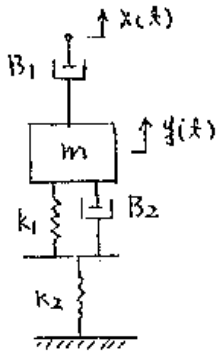
所別: 機械工程研究所 丁組 科目: 丁動力學 共 1 頁 第 1 頁

1. A force F = 2 lb. is applied perpendicular to the axis of the 5-lb rod and moves from O to A at a constant rate of 4 ft/s. If the rod is at rest when $\theta = 0°$ and F is at O when t = 0, determine the rod's angular velocity at the instant the force is at A. How far has the rod rotated when this occurs? (The rod rotates in the *vertical* plane to the ground.) (25%)

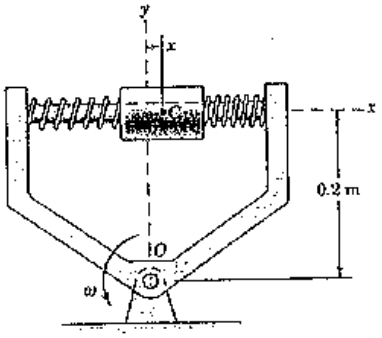


參考用

2. A system is shown below, where the input is x(t) and the output is y(t). (25%)
   (1) Derive the equations of motion for the system.
   (2) What is the order of this system?
   (3) Find the transfer function between the input x(t) and the output y(t).
   (4) If we want to reduce this system to a 2nd order system, show us how to get the reduced form?



3. The spring-mounted collar oscillates on the shaft according to x = 0.04sin(π t), where x is in meters and t is in seconds. Simultaneously, the frame rotates about the bearing at O with an angular velocity ω = 2sin(π t/2) rad/sec. Determine the acceleration of the center C of the collar when t = 3 sec. (25%)



4. The 1-kg mass A is dropped 3 m onto the 3-kg mass B initially at rest on two springs, each with k = 50 N/m. (The mass B is not connected to the springs.) If e = 0.5 between A and B, find the maximum deflection of the springs due to the impact. Also find the maximum displacement of B above its original position after impact. (25%)