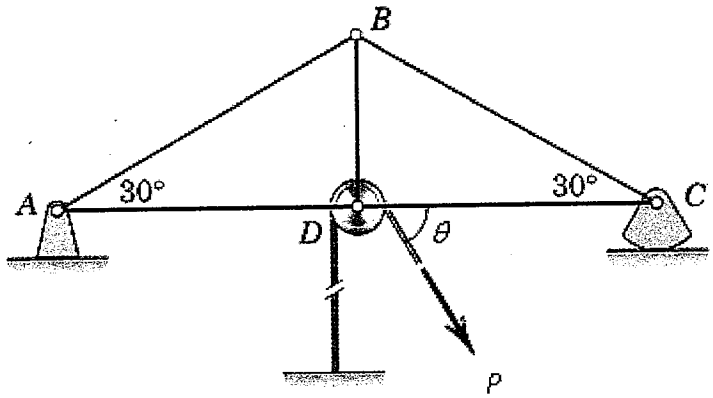
國立交通大學 107 學年度碩士班考試入學試題

科目：應用力學(3032)　　考試日期:107 年 2 月 2 日 第 3 節

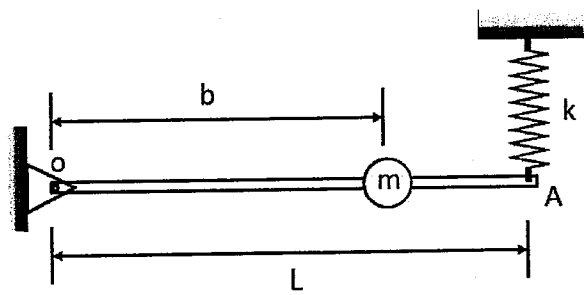
系所班別：機械工程學系　　組別：機械系丙組　　第 1 頁,共 2 頁

【可使用計算機】＊作答前請先核對試題、答案卷(試卷)與准考證之所組別與考科是否相符！！

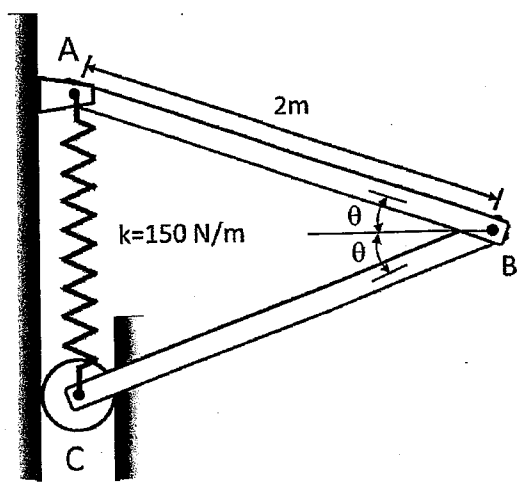
1. The truss structure *ABCD* is supported at points *A* and *C* and is loaded by a force *P* through a pulley at point *D*, as shown in the figure below. Suppose the angle θ varies in the range of 0 and 90°. Assume that the all of the truss members are made the same isotropic material with Young's modulus *E*, Poisson's ration ν and have the same circular cross sections with a diameter *d*.
   (a) Determine the maximum member force in the structure. (10%)
   (b) Indicate the member and the angle θ in which the maximum member force occurs. (10%)



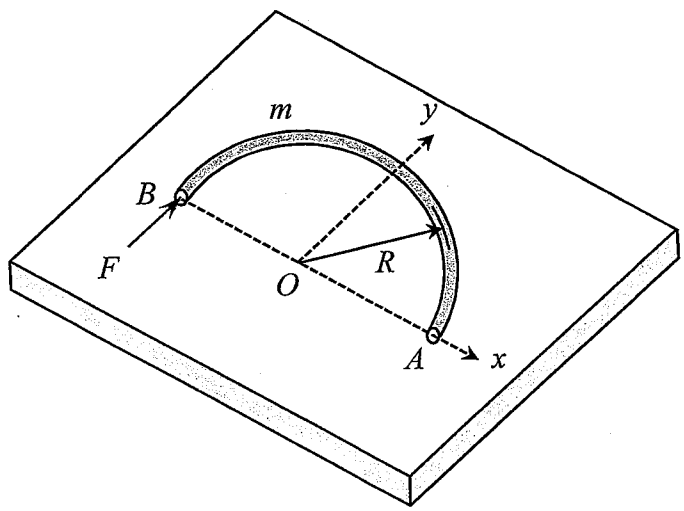
2. A small sphere of mass *m* is mounted on the light rod pivoted at *O* and supported at end *A* by the vertical spring of stiffness *k*. End *A* is displaced a small distance below the horizontal equilibrium position and released. Please calculate the natural frequency of the vibration. Damping is negligible. (20%)



3. The spring has an unstretched length of 0.2 m. Determine the mass *m* of each uniform bar if the angle $\theta = 20°$ for equilibrium. (20%)



4. The uniform semicircular ring of mass m is at rest on the smooth horizontal surface when the force F is applied parallel to the y-axis at end B. Determine the coordinates of zero linear acceleration point in the horizontal surface which the ring initially rotates about. (20%)



5. The uniform rod has a length L and mass m. It is originally at rest while being supported at A and B by cords as shown. Determine the initial angular acceleration of the rod and tension in cord A if the horizontally oriented cord B suddenly breaks. (20%)