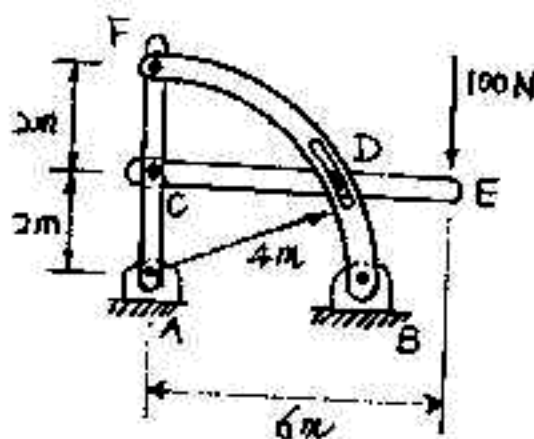


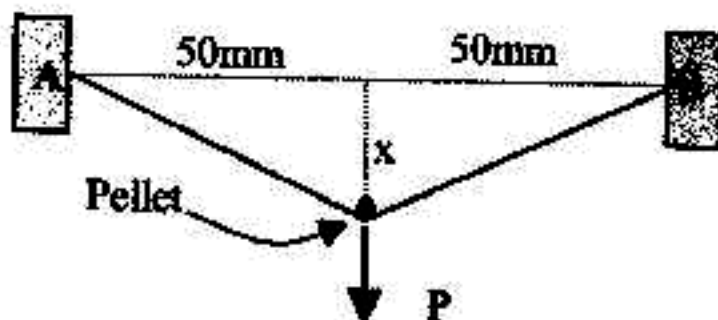
八十八學年度 動力機械 系(所) 丙、丁 組碩士班研究生招生考試

科目 應用力學 科號 1402 共 3 頁第 1 頁 *請在試卷【答案卷】內作答

1. The frame shown supports a 100N load at point E. Determine the reactions at supports A and B. (20%)



2. The system shown in the sketch represents a sling shot formed by tying a rubber band between points A and B. When the rubber band is deformed from its rest position (dashed line) it develops a tensile force that is proportional to its elongation; that is $F=k\Delta$, where Δ is the elongation of the rubber band and k is the spring constant. Assuming that the rubber band has no tension when in the undeformed position, determine the force P required to hold the pellet in static equilibrium as a function of the distance x . (15%)



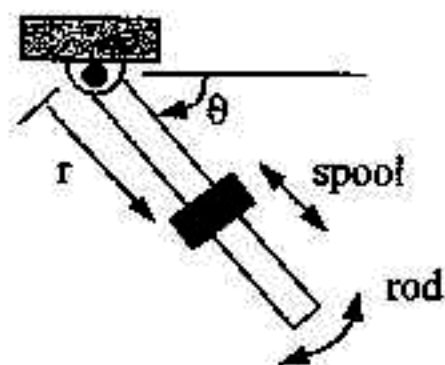
八十八學年度 動力機械 系(所) 丙, 丁 組碩士班研究生招生考試

自 應用力學 科號 1402 共 3 頁第 2 頁 *請在試卷【答案卷】內作答

3.

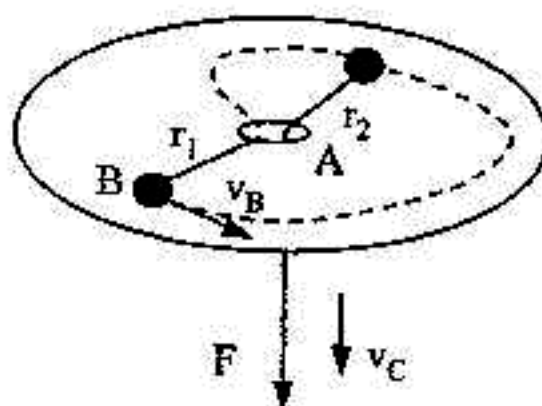
A 0.2 Kg spool slides down along a smooth rod as shown in figure. The rod has a constant angular rate of rotation of $\dot{\theta} = 2$ rad/sec in the vertical plane. (20%)

- (a) What is "degree of freedom"?
- (b) How many degree of freedom for the spool shown in the figure?
- (c) Find the equations of motion for the spool.
- (d) If the spool has the initial conditions: $r = 0$ and $\dot{r} = 0$, and the rod is initially at $\theta = 0$, determine r at the instant $\theta = \pi/4$ rad.



4.

A ball has a mass of $m = 0.5$ Kg and is attached to a cord which passes through a hole A in a smooth table. When the ball is $r_1 = 400$ mm from the hole, it is rotating around the hole in a circle such that its speed is $v_B = 1.5$ m/s. If, by applying the force F , the cord is then pulled downward through the hole, with a constant speed of $v_C = 2$ m/s, (a) determine the speed of the ball at the instant it is $r_2 = 200$ mm from the hole. (b) How much work is done by the force F in shortening the cord? (15%)

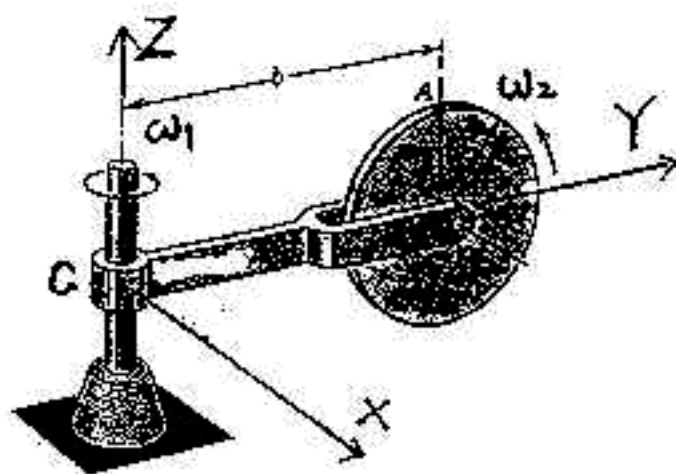


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15.

The circular disk with radius r is pinned to the end O of the arm CO of length b located in the plane of the disk. The arm rotates about a vertical axis through C at a constant rate ω_1 , and the disk rotates about O at the constant rate ω_2 . Determine (a) the velocity of point A, (b) the acceleration of point A, (c) the angular acceleration of the disk. (15%)



6.

As shown in Figure, a sphere with mass 2kg moving to the right with a velocity 6m/s strikes a 6kg slender bar which is 5m long and is moving with a mass-center velocity of 2m/s to the left. The bar has no initial angular velocity. The coefficient of restitution is 0.4, and the objects are on a smooth horizontal plane. Determine (a) the velocity of the sphere, (b) the angular velocity of the bar, immediately after the impact. (15%)

