國立成功大學

114學年度碩士班招生考試試題

編　號：54

系　所：機械工程學系

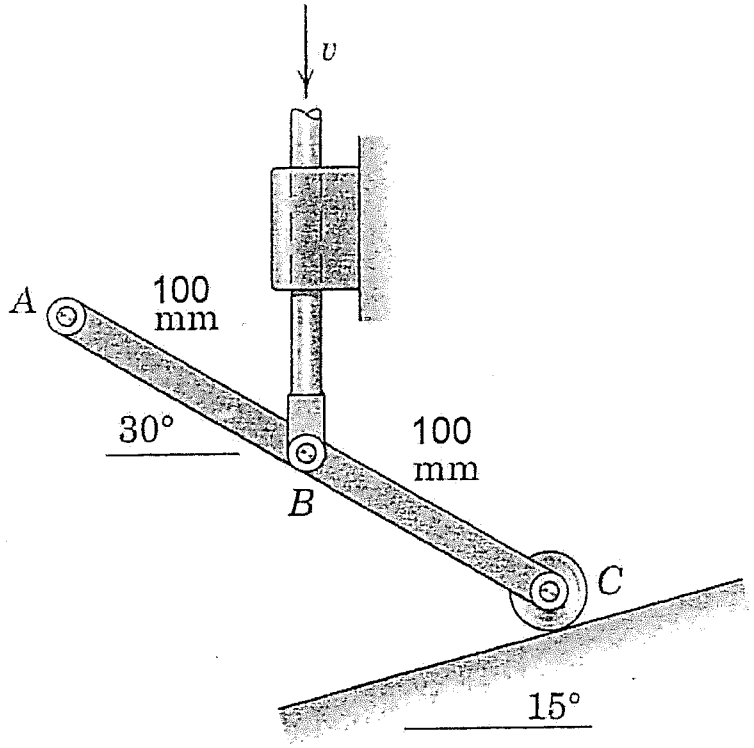
科　目：動力學

日　期：0210

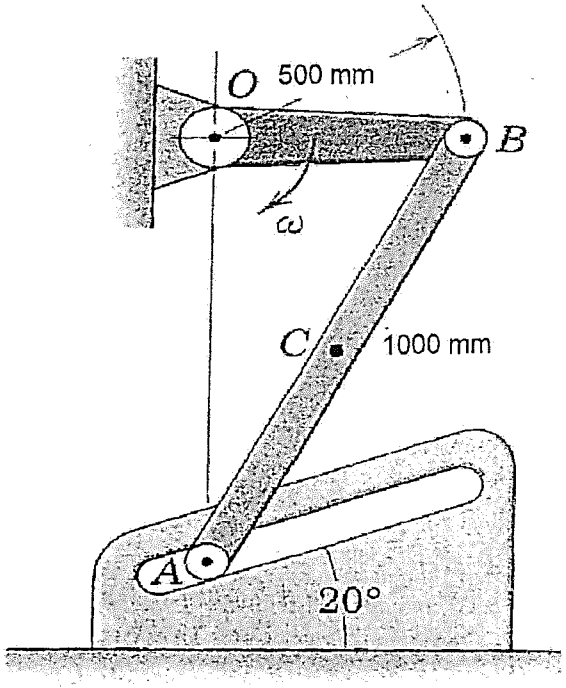
節　次：第 2 節

注　意：1.可使用計算機
2.請於答案卷(卡)作答，於試題上作答，不予計分。

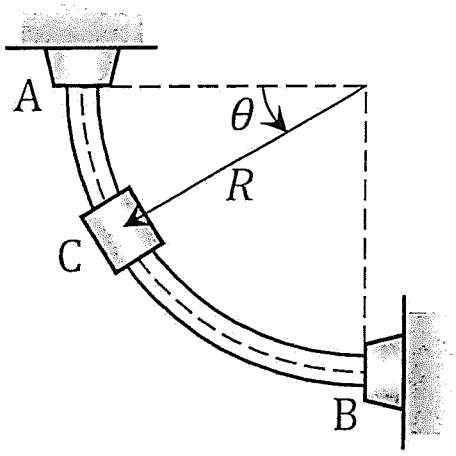
1. (20%) The elements of a switching device are shown. If the vertical control rod has a downward velocity $v = 2\ \text{m/s}$ when the device is in the position shown, determine the speed of point C and the angular velocity ω of the bar AC.



2. (20%) At the instant represented, crank OB has a clockwise angular velocity $\omega = 2\ \text{rad/s}$ and is passing the horizontal position. Determine the corresponding speed of the guide roller A in the $20°$ slot and the speed of point C midway between A and B.



3. (20%) The collar C with a mass of m starts from rest at A ($\theta = 0$) and slides with negligible friction on the rod with radius R in the vertical plane. The rod is clamped at A and B.

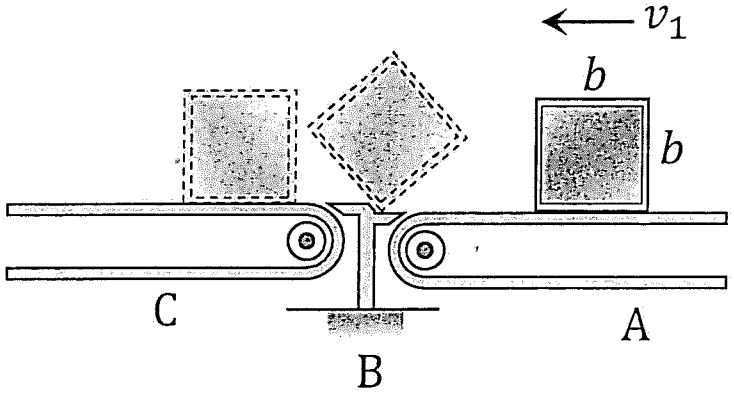


(a) Write the expression of the magnitude of velocity v for the collar C as a function of m, θ and g.

(b) Determine the magnitude of velocity for the collar and the time required as the collar reaches B if $m = 1.2$ kg and $R = 250$ mm.

Hint: $\int_0^{\pi/2} \frac{d\theta}{\sqrt{\sin\theta}} = 2.62206$

4. (20%) A rigid support B is located between two conveyors A and C. A uniform square package with side b and mass m moves horizontally on the conveyor A with a constant velocity v_1. As the package strikes B without rebound, determine the minimum value of v_1 for which the package will rotate freely about B and reach the conveyor C.



5. (20%) The 0.25-kg uniform square plate is pivoted at point O in the vertical plane. The spring of $k = 500$ N/m and the damper of $c = 15$ N·s/m are connected with the plate at A and B, respectively. Determine the natural frequency of the vibration system. Is the system underdamped, critically damped or overdamped?