

國立中央大學103學年度碩士班考試入學試題卷

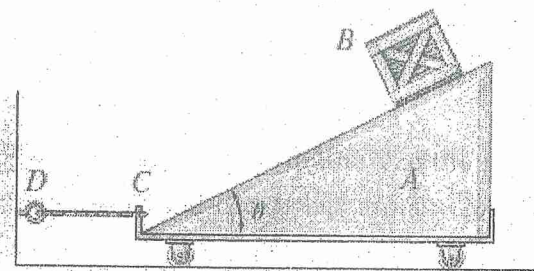
所別：機械工程學系碩士班 甲組(固力與設計)(一般生) 科目：動力學 共 2 頁 第 1 頁
 機械工程學系碩士班 丁組(系統)(一般生)
 機械工程學系光機電工程碩士班 甲組(機電系統控制)(一般生)

本科考試可使用計算器，廠牌、功能不拘

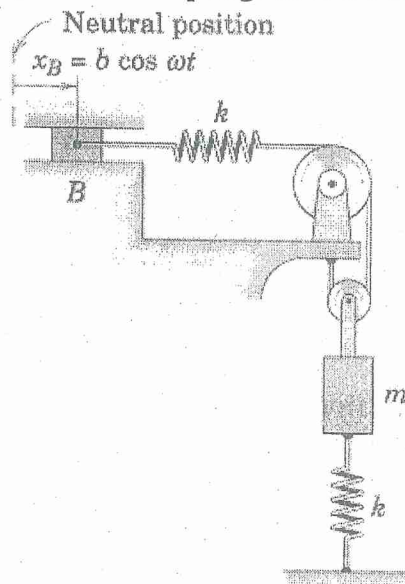
*請在試卷答案卷(卡)內作答

Please use **FREE BODY DIAGRAM** to analyze the problem if necessary.

- (25%) Block B has a mass m and cart A has a mass $2m$. The coefficient of static friction between A and B is $\mu_s = 0.25$ and that of kinetic friction is $\mu_k = 0.2$.
 - Determine the tension in cord CD needed to prevent A from moving when B is released from rest and slides down from the top of A . Let $\theta = 30^\circ$. (20%)
 - If there is no cord CD to make a connection, would it possible to let B slide down the slope without causing A to move by just modifying the μ_s and μ_k ? (Please briefly answer this question in Chinese). (5%)



- (25%) The spring attachment point B is given a horizontal motion $x_B = b \cos(\omega t)$. Determine the critical driving frequency ω_c , for which the oscillations of the mass m tend to become excessively large. Neglect the friction and mass associated with the pulleys. The two springs have the same stiffness k .



參考用

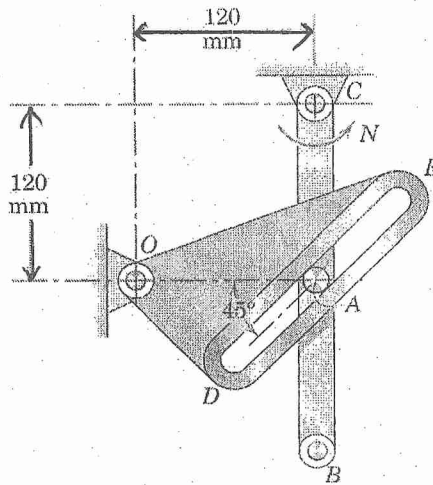
注意：背面有試題

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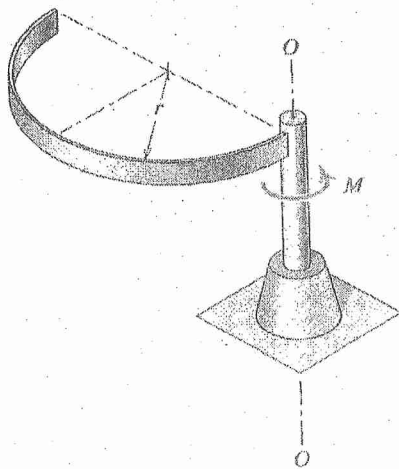
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3. (25%) Link CB is rotating counterclockwise at a constant angular velocity $\vec{N} = 4\hat{k}$ rad/sec. The pin A connects the link CB and slot member ODE . Please determine the angular velocity $\vec{\omega}$ and angular acceleration $\vec{\alpha}$ of ODE . (Note that both $\vec{\omega}$ and $\vec{\alpha}$ are vectors).



4. (25%) A semicircular ring of mass m and radius r is welded to the vertical shaft, which can rotate horizontally about the axis $O-O$. If a torque M_o is applied to the ring through the shaft, please determine the resulting angular acceleration $\vec{\alpha}$ and horizontal-plane reaction force \vec{F} in terms of given parameters assuming the ring starts from rest.



參考用

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