

國立中正大學

112 學年度碩士班招生考試

試題

[第 1 節]

科目名稱	動力學
系所組別	機械工程學系-甲組

—作答注意事項—

※作答前請先核對「試題」、「試卷」與「准考證」之系所組別、科目名稱是否相符。

1. 預備鈴響時即可入場，但至考試開始鈴響前，不得翻閱試題，並不得書寫、畫記、作答。
2. 考試開始鈴響時，即可開始作答；考試結束鈴響畢，應即停止作答。
3. 入場後於考試開始 40 分鐘內不得離場。
4. 全部答題均須在試卷（答案卷）作答區內完成。
5. 試卷作答限用藍色或黑色筆（含鉛筆）書寫。
6. 試題須隨試卷繳還。

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本科目共 2 頁 第 1 頁

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1. (20%) A 2 kg pendulum bob moves in the vertical plane, as shown in Figure 1. The gravity is 9.8 m/s^2 .
- (a) If the ball has a speed $v = 4 \text{ m/s}$ at the instant of the lowest point ($\theta = 0$), determine the tension in the cord at this instant. (10%)
- (b) Determine the angle θ to which the ball swings and momentarily stops. (10%).

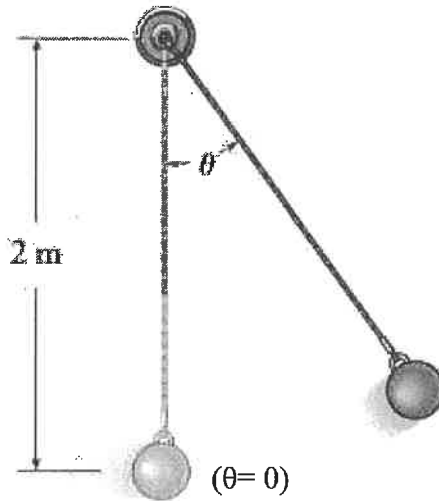


Figure 1

2. (30%) At the instant shown, bar AB has counterclockwise angular velocity of 20 rad/s and a clockwise angular acceleration of 100 rad/s^2 .
- (a) what are the angular velocity of bar BC and CD? (10%)
- (b) what are the angular acceleration of bar BC and CD? (15%)
- (c) what are the velocity and acceleration of point E? (5%)

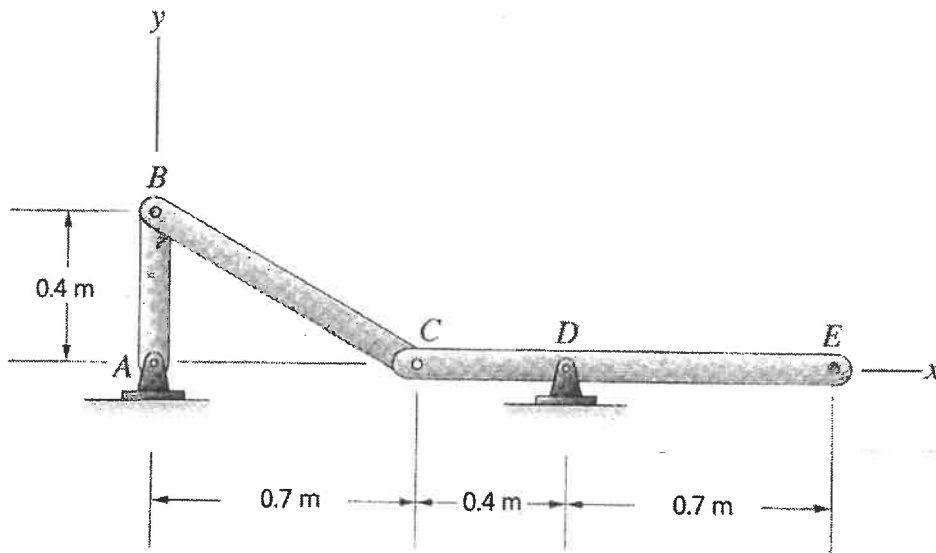


Figure 2

3. (25%) The slender rod ($I_G = mL^2/12$) has a mass $m = 50$ kg and length $L = 100$ m. If it is released from rest from the position $\theta = 30$ degree, determine its angular acceleration and the horizontal and vertical components of reaction at the pin O.

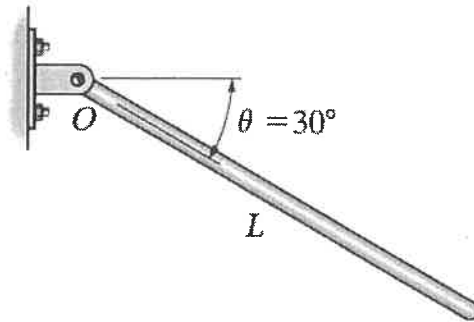


Figure 3

4. (25%) The assembly consists of two 8 kg slender bars ($I_G = mL^2/12$ for each bar) which are pin connected to the two 10 kg disks ($I_G = mr^2/2$ for each disk). If the bars are released from rest when $\theta = 60$ degree, determine the velocity of the disk C and the angular velocity of bar AB at the instant $\theta = 30$ degree. Assume the disks roll without slipping.

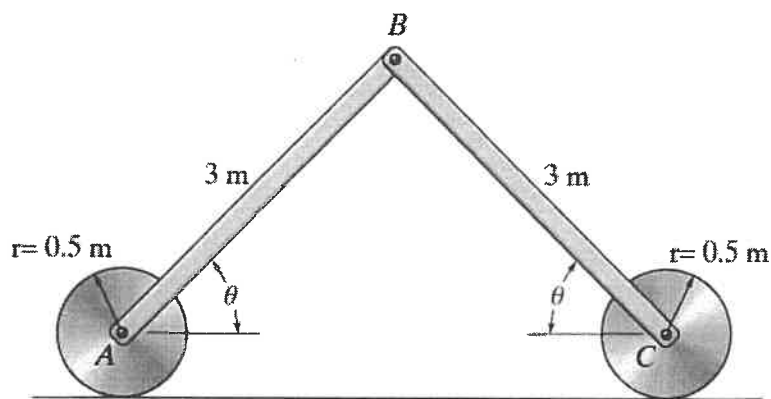


Figure 4