

國立成功大學
111學年度碩士班招生考試試題

編 號：68

系 所：機械工程學系

科 目：動力學及專業英文

日 期：0219

節 次：第 2 節

備 註：可使用計算機

※ 考生請注意：本試題可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

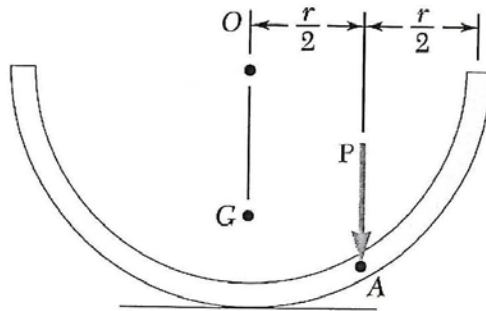
1. [25%] 請將以下中文翻譯成英文。

- (1) 若一對齒輪以等速比轉動，則相嚙合兩齒在接觸點的公法線，必恆與齒輪連心線交於一固定點。
- (2) 當轉動物體的旋轉軸通過質心且對該軸的慣性積為零時，稱為動平衡，此時軸承僅受重力。

2. [25%] A half section of a uniform thin pipe of mass m is at rest when a force \mathbf{P} is applied as shown.

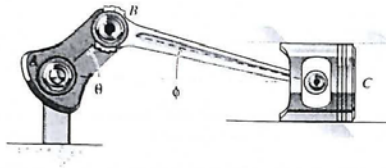
Assuming that the section rolls without sliding, analytically determine

- (a) its centroidal moment of inertia (the distance from O to G is $2r/\pi$)
- (b) its initial angular acceleration
- (c) the minimum value of the coefficient of static friction consistent with the motion



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3. [25%] A slider-crank mechanism is shown below. The lengths of crank AB and connecting rod BC are 75 mm and 175 mm, respectively, and $\theta = 70^\circ$ at the instant shown. If the crankshaft is rotating at a constant rate of $\omega_{AB} = 4800$ rev/min, determine (a) the angular velocity $\dot{\theta}$ and angular acceleration $\ddot{\theta}$ of the connecting rod; (b) the acceleration a_C of the piston.



4. [25%] The rod AB shown in the figure has a constant cross section and a mass of 10 kg. When crank C rotates, rod AB oscillates in a vertical plane. In the position shown, the rod AB's angular velocity is 10 rad/s CW and angular acceleration is 40 rad/s² CCW. Determine the force exerted on rod AB by the lightweight link DG and by the pin at support A.

