編號： 75

國立成功大學 106 學年度碩士班招生考試試題

系　　所：機械工程學系

考試科目：動力學及專業英文

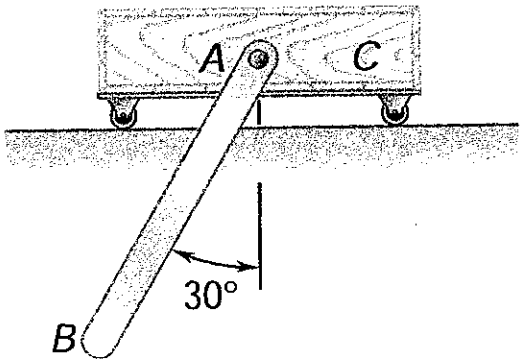
考試日期：0213，節次：2

※ 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. (15%) 請將以下中文句子翻譯成英文：
凸輪機構之機械效率受到從動件的壓力角影響，改變偏位量或增加基圓直徑可以降低壓力角。

2. (15%) A Scotch yoke mechanism is a reciprocating motion mechanism. An input crank has an end pin that is connected to a horizontally sliding yoke through a vertical slot. **(a)** Please provide a sketch of the Scotch yoke mechanism. **(b)** Determine the relative sliding acceleration of the pin with respect to the vertical slot when the crank length is 5 cm and crank angle is 60° counterclockwise from the horizontal line. The crank rotates at 10 rad/sec and 100 rad/sec^2 clockwise.

3. (20%) A uniform rod *AB*, of mass 7 kg and length 1.2 m, is attached to the 11-kg cart *C*. Knowing that the system is released from rest in the position shown and neglecting friction, determine **(a)** the angular velocity of rod *AB* as it passes through the vertical position, **(b)** the corresponding velocity of Point *B*, **(c)** the corresponding velocity of cart *C*.



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4. (25%) A 90 kg triangular plate is supported by two cables as shown in the figure below. When the plate is in the position shown, the angular velocity of the cables is 4 rad/s counterclockwise. At this instant, determine

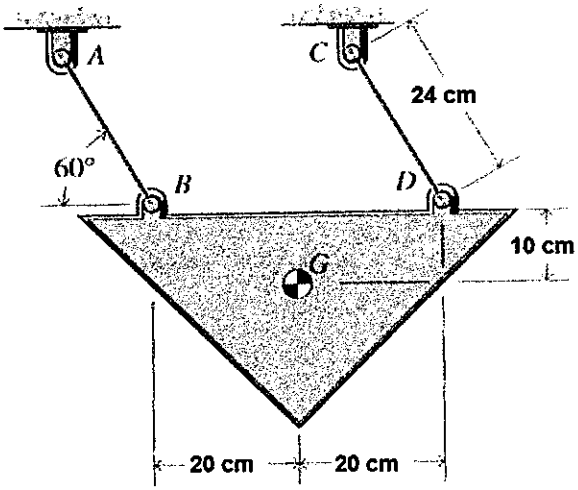
a. The normal acceleration of B relative to A.

b. The acceleration of the mass center of the plate.

c. The tension in each of the cables.

d. The tangential acceleration of B relative to A.

Note: ABDC is a parallelogram.



5. (25%) In the mechanism shown, arm AB rotates clockwise at a constant rate of 6 rev/min while the pin P moves outward along a radial slot in the rotating disk at a constant rate of 1.0 cm/s. At the instant shown, r = 3 cm, ω = 12 rev/min, and α = 0.1 rad/s^2, both clockwise. Determine

a. The absolute velocity of the pin P at this instant.

b. The Coriolis acceleration of the pin P relative to B at this instant.

c. The absolute acceleration of the pin P at this instant.