※ 考生請注意：本試題 ☑可 □不可 使用計算機

1 專業英文 For each of the following terms, please write down its <u>English name</u> **and** describe its <u>meaning in English</u>. (25%)
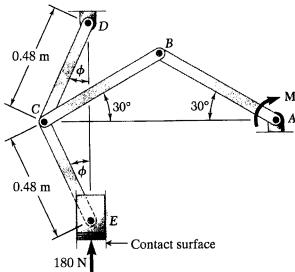
    (1) 虛功原理 (7%)

    (2) 靜不定 (6%)

    (3) 三力構件 (6%)

    (4) 機械利益 (6%)

2. The double-toggle mechanism shown is used in a punching machine. It is known that links AB and BC are each of length 0.6 m and $\phi = 20°$ The coefficient of static friction is 0.5 between the slider E and its contact surface. Neglect the weight of the links and the slider. Determine <u>the largest couple **M** for which equilibrium can be maintained</u>, **and** <u>the smallest couple **M** for which equilibrium can be maintained</u>. (25%)
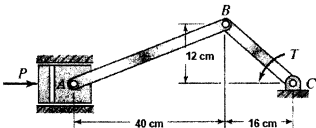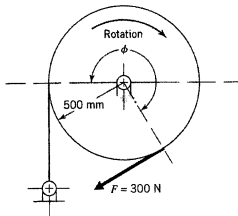

Problem 2

※ 考生請注意：本試題 ☑可 □不可 使用計算機

3. The piston, connecting rod, and crank of an engine system are shown in figure. A force P = 4 N acts as indicated in the figure. Calculate
   (1) The torque T required to hold the system in equilibrium. (15%)
   (2) The normal force in the rod AB. (10%)

Problem 3

4. A simple band brake operated by an air cylinder that applies a force F of 300 N. The drum radius is 500 mm. The band is 30 mm wide and lined with a woven material that provides a coefficient of friction of 0.45.
   (1) What angle of wrap, φ, is necessary to obtain a brake torque of 800 N · m? (15%)
   (2) What is the corresponding maximum lining pressure? (10%)

Problem 4