國立臺北科技大學九十七學年度碩士班招生考試

系所組別：1120 機電整合研究所乙組

第二節　工程力學　試題

填 准 考 證 號 碼

注意事項：

1. 本試題共 4 題，配分共 100 分。
2. 請標明大題、子題編號作答，不必抄題。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。

一、A standard toggle press is shown in Fig. 1. If links AB = BC = 200 mm, CE = 300 mm, BD = 260 mm, and all links are assumed to have negligible weight as compared with the force exerted by the plunger. The cylinder is in the horizontal position and line AC is perpendicular to the horizontal. At the position shown, ∠ABD = ∠CBD = 60^0, determine its mechanical advantage (force of the plunger divided by the force of cylinder). Neglect the frictions. (20%)

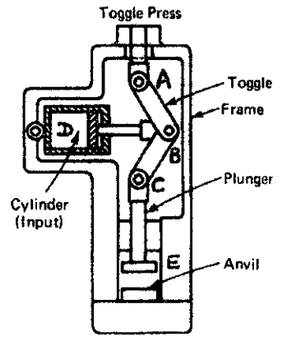

Fig. 1

二、As shown in Fig. 2, assume the link ADE is in the horizontal position and temporarily fixed. At the instant shown, if the hydraulic actuator AB is extending by a constant rate of 1 ft/s, determine the angular velocity and angular acceleration of the scoop. Note that link CE is perpendicular to the link ADE as shown. (30%)

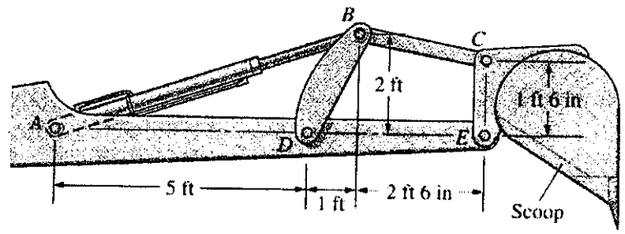

Fig. 2

三、The assembly (shown in Fig. 3) consists of a 10-kg uniform circular disk and a 10-kg slender bar which is pin-connected to the disk. If the system is released from rest, determine the angular acceleration of the disk. The coefficients of static and kinetic friction between the disk and the inclined plane are $\mu_s = 0.58$ and $\mu_k = 0.40$, respectively. Neglect the friction at B. (25%)

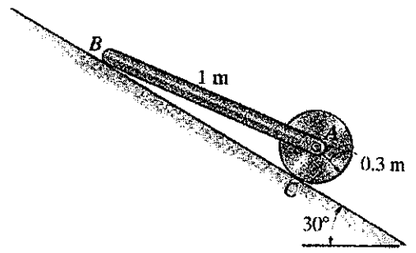

Fig. 3

四、As shown in Fig.4, the 12-kg uniform circular disk has an angular velocity of ω = 25 rad/s. If the brake ABC is applied such that the magnitude of force **P** varies with time as shown, determine the time needed to stop the disk. The coefficient of kinetic friction at B is $\mu_k = 0.45$ and the brake ABC has negligible mass. (25%)

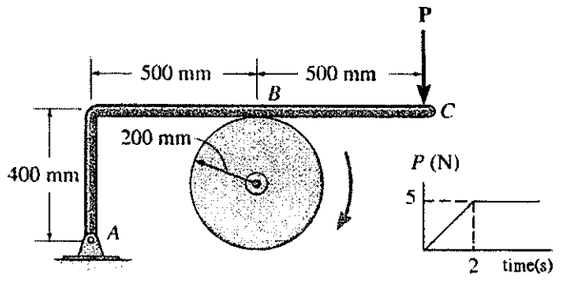

Fig. 4

me3-1