※ 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. 專業英文

(a) 中翻英 (10%)

差速器結構通常是一種使用傘齒輪的行星齒輪機構，因為在汽車於轉彎時，外側輪子走的路徑要比內側輪子走的路徑要大，所以如果汽車想順暢和精確的轉彎，便需要一個裝置能夠轉換和允許內外側車輪以不同的速率進行旋轉，從而以不同的轉速來彌補距離的差異。

(b) 英翻中 (10%)

In engineering, redundancy is the duplication of critical components or functions of a system with the intention of increasing reliability of the system, usually in the form of a backup or fail-safe, or to improve actual system performance. Structures and machines are usually designed with redundant parts as well, ensuring that if one part fails, the entire structure will not collapse. A structure without redundancy is called fracture-critical, meaning that a single broken component can cause the failure of the entire structure or machine.

(c) 中文名詞翻成英文 (5%)

(1)力學 (2) 機構學 (3) 機械設計 (4) 熱力學 (5) 流體力學

2. An incline ABC and its coordinates are shown in the figure. A round puck with 10 kg mass is put on this incline without rotating motion. D is a point between B and C and its coordinate is (0.4, 0.9, 0). The gravity is in the negative z direction. (a) Draw the free body diagram for this puck. (5%) (b) Find the minimum coefficient of friction to prevent the puck sliding. (5%) (c) Which direction will the puck slide if the friction force is not enough? (5%) (d)If the coefficient of friction is 0.35 and a push-up force along the DA direction is applied, calculate the minimum force to move up the puck. (10%)
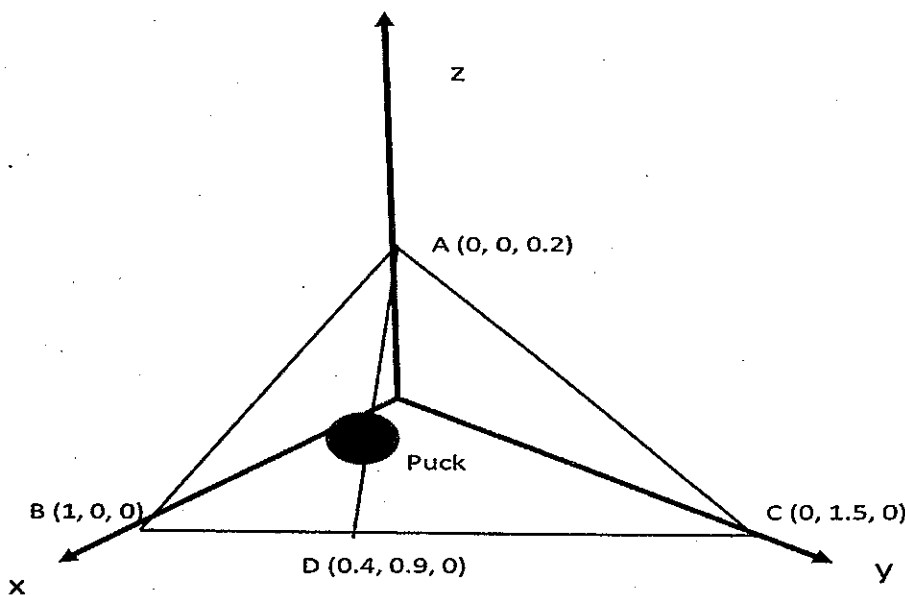

Figure. A

3. A 14 in. radius brake drum contacts a single shoe as shown in Fig. problem3 below and sustains 2000 in-lb of torque at 500 rpm. The coefficient of friction f = 0.3.

   (a) The total normal force N on the Shoe. (8%)

   (b) The required force F to apply the brake for clockwise rotation. (8%)

   (c) The dimension a required to make the brake self-locking, assume the other dimensions remain as shown.(9%)
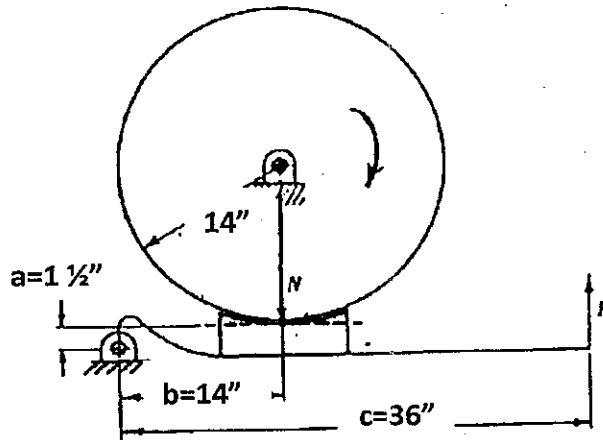

Fig. problem3

4. The total weight of a wheelbarrow filled with gravel is 120lb. If the wheelbarrow is held on an 18 degree incline in the position show in Fig. problem4, determine the magnitude and direction of a) the force exerted by the worker on each handle (13%), b) the reaction at C. (Hint. The wheel is a two-force body) (12%).
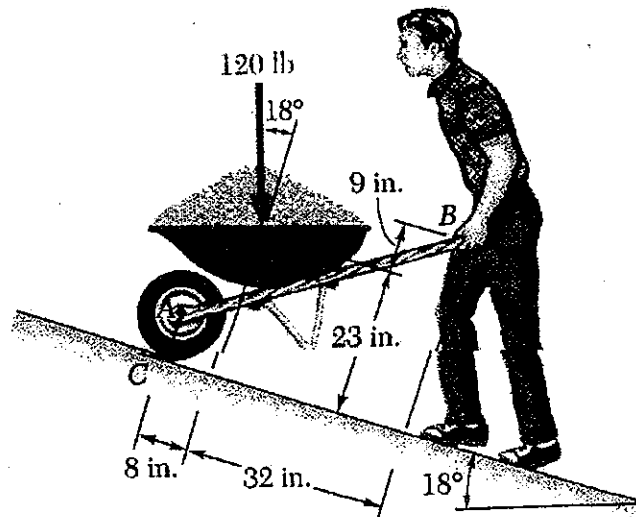

Fig. Problem4