編號： 74

國立成功大學 105 學年度碩士班招生考試試題

系　　所：機械工程學系

考試科目：靜力學及專業英文

考試日期：0227，節次：1

※ 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) 請將寫出下列縮寫(abbreviations)的完整英文 (8%)

(1) CG 重心

(2) ICE 內燃機

(3) IC 積體電路

(4) FEA 有限元分析

(5) CAM 電腦輔助製造

(6) MBD 多體動力學

(7) ISO 國際標準化組織

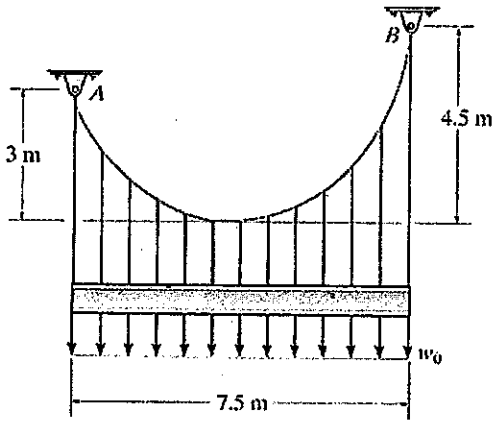
(8) SAE 車輛工程師學會

(b) Please define *stable equilibrium*, *neutral equilibrium*, and *unstable equilibrium* for a system in English (9%)

(c) 請將下列英文翻譯成中文 (8%)

The determination of power capacity is more complicated for a worm gearset than for other gear types. A wider variation in procedures is employed for estimating bending and surface strengths. Furthermore, worm gear capacity is often limited not by fatigue strength but by heat dissipation or cooling capacity. The heat dissipation capacity of the housing or casing often affects the power capacity of a worm gearset in continuous operation Lubricant temperature commonly should not exceed about 200°F. The basic relationship between temperature rise and rate of heat dissipation can be obtained by a typical heat transfer formula.

2. A flexible cable as shown carries a uniform distributed load along the horizontal. (a) Please prove the cable will be parabolic in shape. (b) If the maximum tension which the cable can sustain is 30kN, determine the maximum distributed load along the horizontal. (c) What is the length of the cable? (d) Find the lower point of the cable from support A. (25%)



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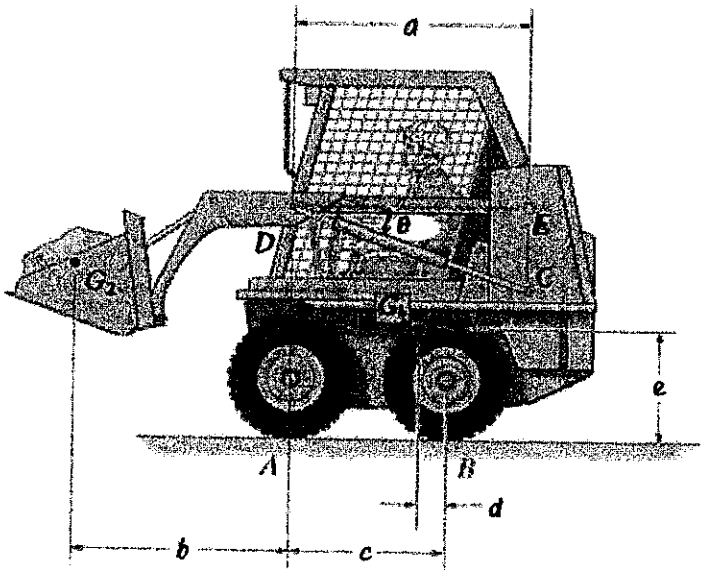
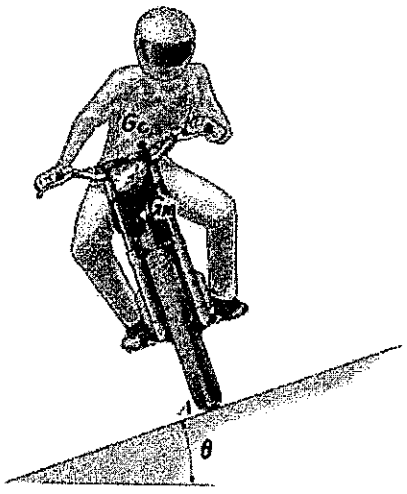
3. The skid steer loader has a mass $M_1 = 1.18 \times 10^3$ kg, and in the position shown the center of mass is at G_1. If there is a stone of mass $M_2 = 300$ kg in the bucket, with center of mass at G_2 determine the reactions of each pair of wheels A and B on the ground and the force in the hydraulic cylinder CD and at the pin E. There is a similar linkage on each side of the loader.
($a = 1.25$ m, $b = 1.5$ m, $c = 0.75$ m, $d = 0.15$ m, $e = 0.5$ m, $\theta = 30$ deg.) (20%)



4. The motorcyclist travels with constant velocity along a straight, horizontal, banked road. If he aligns his motorcycle so that the tires are perpendicular to the road at A, determine the friction force at A. The man has a mass $M_C = 60$ kg and a mass center at G_C, and the motorcycle has a mass $M_m = 120$ kg and a mass center at G_m. If the coefficient of static friction at A is $\mu_A = 0.4$, will the motorcycle slip?
($\theta = 20$ deg, $g = 9.81$ m/s^2) (15%)



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5. The punch press consists of the ram R, connecting rod AB, and a flywheel. If a torque $M = 50$ N· m is applied to the flywheel, determine the force **F** applied at the ram to hold in the position $\theta = 60$ deg by using the principle of virtual work. ($r = 0.1$ m, $a = 0.4$ m.) (15%)