國立成功大學

112學年度碩士班招生考試試題

編　號：68

系　所：機械工程學系

科　目：靜力學及專業英文

日　期：0206

節　次：第 1 節

備　註：可使用計算機

編號： 68

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※ 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。

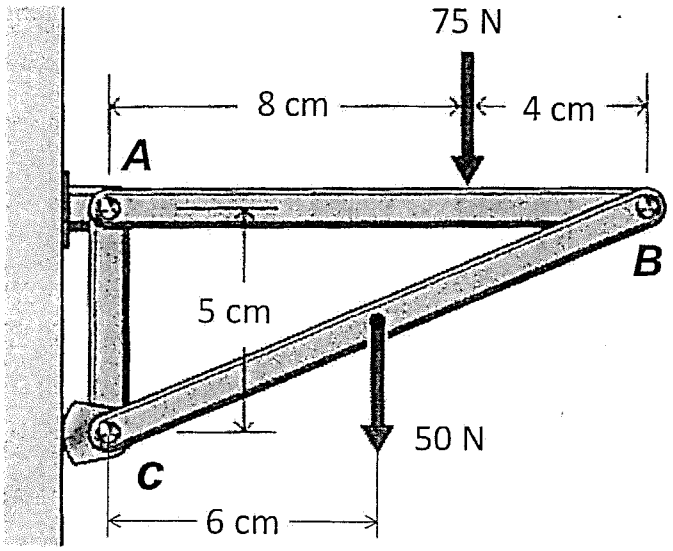
1. (25%) 請將以下中文翻譯成英文。

(1) 軸向、彎曲和扭轉負載的應力集中係數不同。

(2) 疲勞破壞可能在遠低於降伏點的應力水平發生。

(3) 當一個零件在橫截面上不均勻降伏時，在移除外部負載後，殘留應力仍保留在該橫截面。

2. (25%) Find all forces acting on all three members (members *AB*, *BC*, and *AC*) of the frame. Draw separate free-body diagrams of each member.



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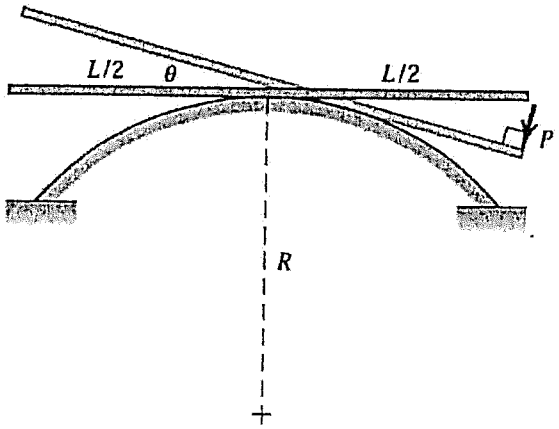
3. (25%) The uniform slender rod of mass m and length L is initially at rest in a centered horizontal position on the fixed circular surface of radius R = 0.8L. (a) Prove the rod is in stable equilibrium at this initial position. (b) A force P normal to the bar is gradually applied to its end until the bar begins to slip at the angle θ. Determine the coefficient of static friction when applying a force. (c) If the coefficient of static friction is 0.12, estimate the starting angle θ to slip. (Hinted: tan $\theta \approx \theta$ when θ is small.)



4. (25%) A differential band brake as shown is used to stop a torque of 4800 N-m. The diameter of the brake drum is 600 mm and the angle of wrap ϕ is 250°. The coefficient of friction for the brake lining μ_s is 0.369. (a) Show $\frac{P_1}{P_2} = e^{\mu_s \phi}$. (b) Determine the force P_1 and P_2. (c) In the lever, a=120mm, c=640mm, and s is unknown. Find the value of s when a force F of 250N is applied. (d) Based on the above results, what minimum value of coefficient of friction would make the brake self-locked.