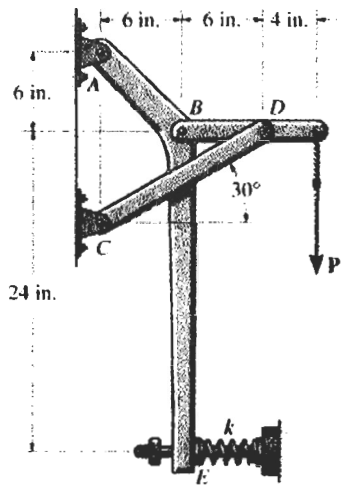
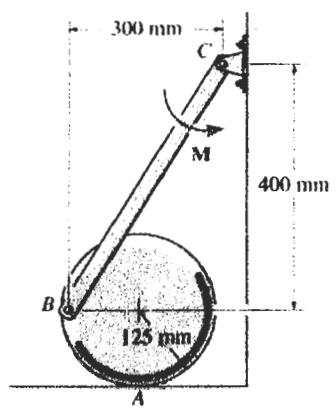
94 學年度 工程與系統科學 系 乙 組碩士班入學考試

科目 工程力學 科目代碼 3305 共 三 頁第 一 頁 *請在試卷【答案卷】內作答

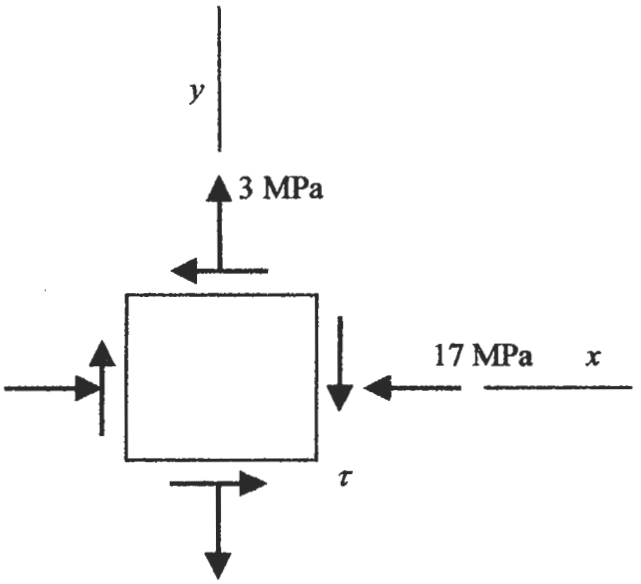
1. 如圖的機械裝置中，彈簧的彈簧常數為 $k = 800$ lb/ft。假設彈簧的壓縮量為 0.5 in. ，請問力量 P 的大小為何？(25%)



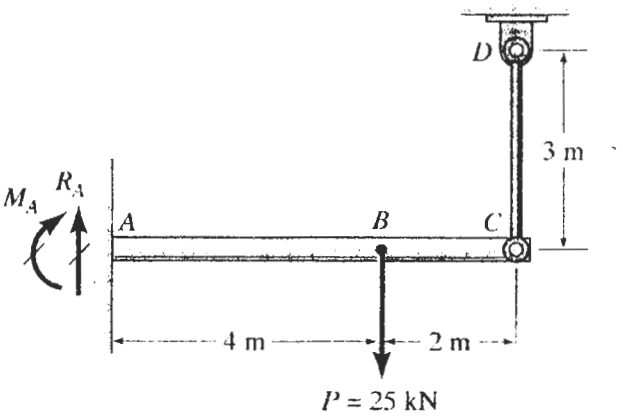
2. 有一圓盤重 45 kg，與地面接觸點 A 的淨摩擦係數是 $\mu_A = 0.2$，請問維持如圖平衡的最大力矩 M 是多少？(25%)



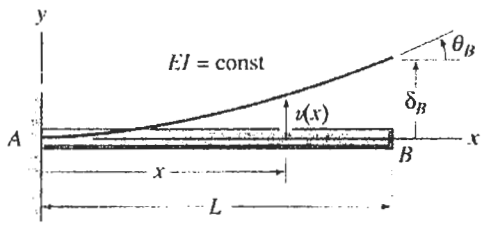
3. For the plane-stress state of an element shown below, we know that maximum in-plane shear stress is τ_{max} = 10 MPa. Determine the magnitude, τ, of the shear stress that acts in the direction shown on the x and y surfaces, and determine the in-plane principal stresses at this point. Use Mohr's circle to solve the problem. (25%)



4. The cantilever beam AC has a moment of inertia $I = 50\times10^6$ mm^4 and is supported by rod CD, whose cross-sectional area is $A = 200$ mm^2. Let $E_{beam} = E_{rod}$. A concentrated load $P = 25$ kN is applied to the beam at B. The rod CD is force-free prior to application of the load P. Determine the tension induced in rod CD. You should make use of the Table in next page. (25%)



附錄



Notation

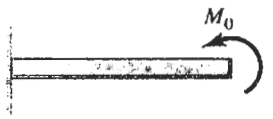
$v(x)$ = deflection in the y direction

$v'(x)$ = slope of the deflection curve

$\delta_B \equiv v(L)$ = deflection at end B

$\theta_B \equiv v'(L)$ = slope at end B

1



$$v = \frac{M_0 x^2}{2EI} \qquad v' = \frac{M_0 x}{EI}$$

$$\delta_B = \frac{M_0 L^2}{2EI} \qquad \theta_B = \frac{M_0 L}{EI}$$

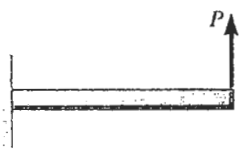
2

$$v = \frac{M_0 x^2}{2EI} \qquad v' = \frac{M_0 x}{EI} \qquad 0 \le x \le a$$

$$v = \frac{M_0 a}{2EI}(2x - a) \qquad v' = \frac{M_0 a}{EI} \qquad a \le x \le L$$

$$\delta_B = \frac{M_0 a}{2EI}(2L - a) \qquad \theta_B = \frac{M_0 a}{EI}$$

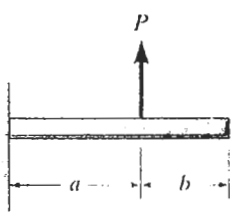
3



$$v = \frac{Px^2}{6EI}(3L - x) \qquad v' = \frac{Px}{2EI}(2L - x)$$

$$\delta_B = \frac{PL^3}{3EI} \qquad \theta_B = \frac{PL^2}{2EI}$$

4



$$v = \frac{Px^2}{6EI}(3a - x) \qquad v' = \frac{Px}{2EI}(2a - x) \qquad 0 \le x \le a$$

$$v = \frac{Pa^2}{6EI}(3x - a) \qquad v' = \frac{Pa^2}{2EI} \qquad a \le x \le L$$

$$\delta_B = \frac{Pa^2}{6EI}(3L - a) \qquad \theta_B = \frac{Pa^2}{2EI}$$