

國立暨南國際大學九十二學年度碩士班研究生入學考試試題

第 2 節材料力學 適用:(土木所結構組 472)

(本試題共 2 頁, 第 / 頁)

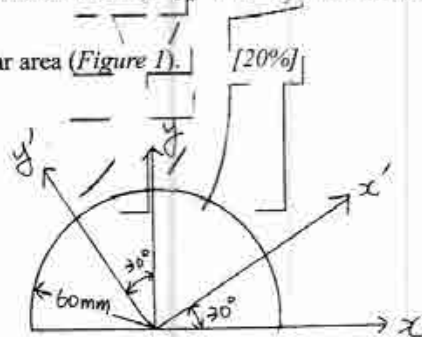
考生注意: 1. 依次序作答, 只要標明題號, 不必抄題。

2. 答案必須寫在答案卷上, 否則不予計分, 並限以藍黑色筆作答。

3. 試題隨卷繳回。(除請詳閱試場規則)

- (1) Determine the moments of inertia I_x and I_y and the product of inertia I_{xy} for the semicircular area (Figure 1). [20%]

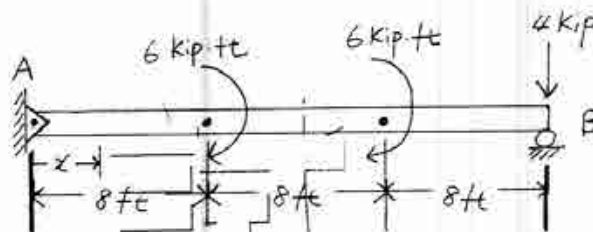
Figure 1



- (2) Determine the equation of the deflection curve for the beam shown in Figure 2.

EI is constant. [20%]

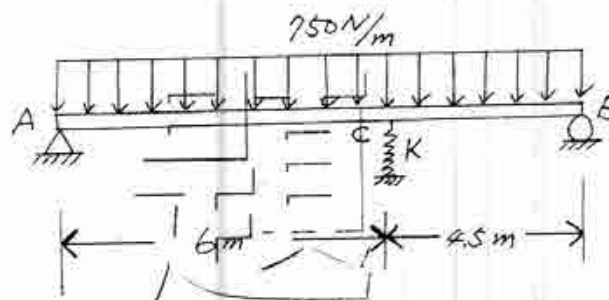
Figure 2



- (3) What is the supporting force system for the beam shown in Figure 3? (Take

$E = 2 \times 10^{11} \text{ Pa}$, $I = 1.95 \times 10^{-5} \text{ m}^4$, and $K = 3.6 \times 10^5 \text{ N/m}$) [20%]

Figure 3



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- (4) A beam fixed at one end and loaded by a force P and a couple M_0 at the other (see Figure 4). The cross sections of the beam are elliptical with major and minor axes (height and width, respectively) having the lengths shown in the Figure 4. The cross-sectional dimensions vary linearly from end A to end B. Considering only the effects of bending due to the loads P and M_0 , determine the following quantities : (a) the largest bending stress σ_A at end A ; (b) the largest bending stress σ_B at end B ; (c) the distance x to the cross section of maximum bending stress ; and (d) the magnitude σ_{max} of the maximum bending stress.

[20%]

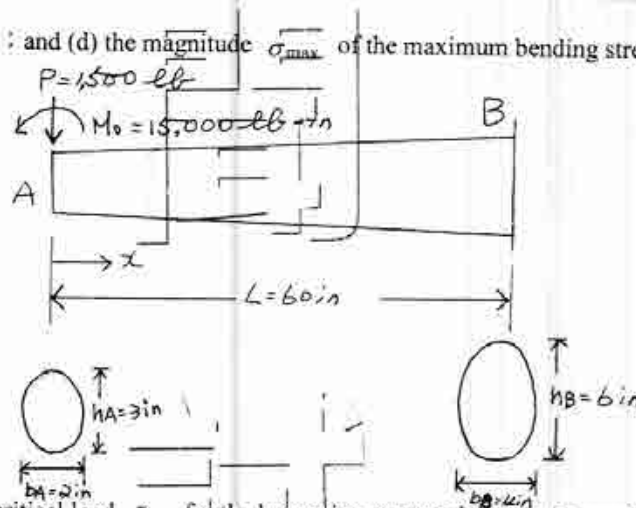


Figure 4

- (5) Determine the critical load P_{cr} for the bar-spring system shown in Figure 5.

The load P remains vertical as the bar rotates about the pin at A. The force in spring BD is proportional to the elongation of the spring, with spring constant k .

That is, $F_s = k e$, where e is the elongation of the spring. The spring is unstretched when $\theta = 0$. [20%]

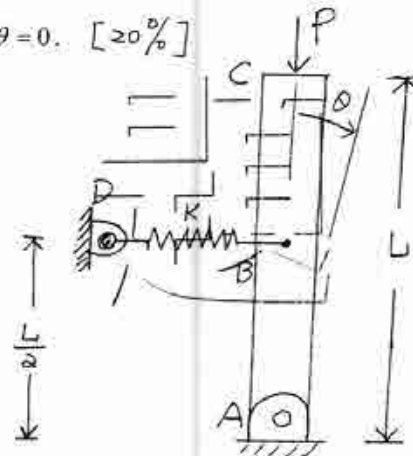


Figure 5