編號： 70

國立成功大學 109 學年度碩士班招生考試試題

系　　所：機械工程學系

考試科目：材料力學

考試日期：0210，節次：1

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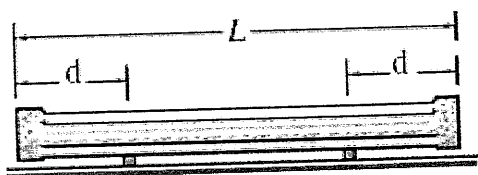※ 考生請注意：本試題可使用計算機。　請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

1. 解釋或定義下列詞語
   (a) Stress, (b) Stress concentration, (c) How to determine the stress at a point on a body experimentally？ (15%)

2. The 45° strain rosette is mounted near the tooth of the wrench. The following readings are obtained for each gauge: $\varepsilon_a = 80(10^{-6})$, $\varepsilon_b = 52(10^{-6})$, and $\varepsilon_c = -45(10^{-6})$. Determine (a) the in-plane principal strains and their orientation, (b) the maximum in-plane shear strain. (15%)
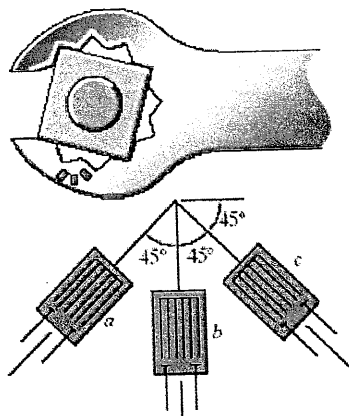


Problem 2

3. The steel column is supported by two rollers as shown below. If the column has a uniform weight of w (force/length), determine the equal placement d of the supports from the ends so that the absolute maximum bending moment in the column is as small as possible. Also, draw the moment diagram for the column if L=1 m, w=1 KN/m. (20%)



Problem 3

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4.　(a) Explain the terminology of "shear center" (or called flexural center) of an open thin-walled beam member. (5%)

　　(b) As shown in Fig. 4, determine the location $e$ of the shear center O for the tube having a slit along its length. (15%)

5. Determine the reaction at support $B$ of the beam, as shown in Fig. 5. Take $E = 200$ GPa and $I = 65 \times 10^6$ mm$^4$. (15%)

6. The steel bar $AB$ has a rectangular cross section 20 mm × 30 mm along $x$ and $y$ axes, respectively. If this bar is pin connected at its ends, as shown in Fig. 6, determine the maximum allowable intensity $w$ (N/m) of the distributed load that can be applied to $BC$ without causing $AB$ to buckle or yield. Take $E_{st} = 200$ GPa and $\sigma_Y = 360$ MPa. (15%)
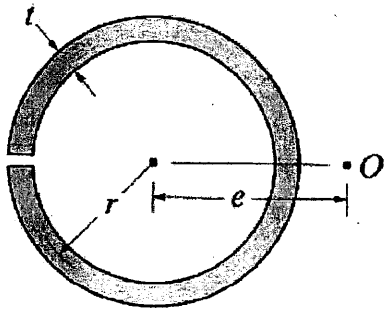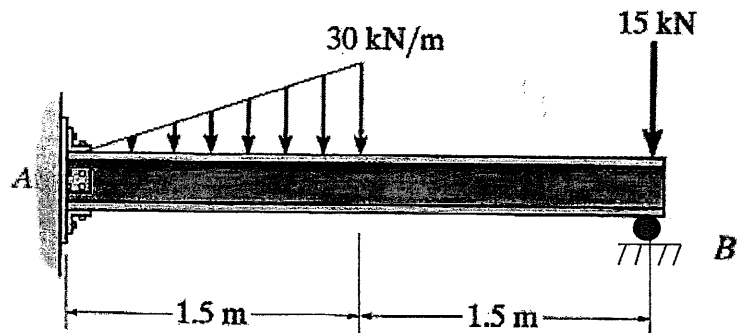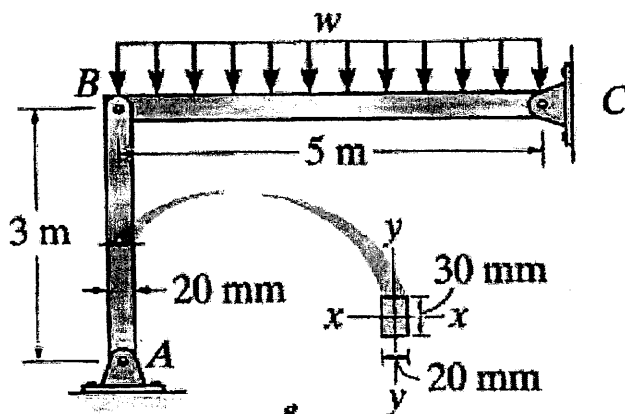


Fig. 4



Fig. 5



Fig. 6