

國立臺北科技大學九十七學年度碩士班招生考試

系所組別：3110 土木與防災研究所甲組

第一節 材料力學 試題

填准考證號碼

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第一頁 共一頁

注意事項：

1. 本試題共四題，配分共 100 分。
2. 請標明大題、子題編號作答，不必抄題。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。

一、 As can be seen in Fig. 1, both two ends of the axial member are fixed. Answer the following questions.

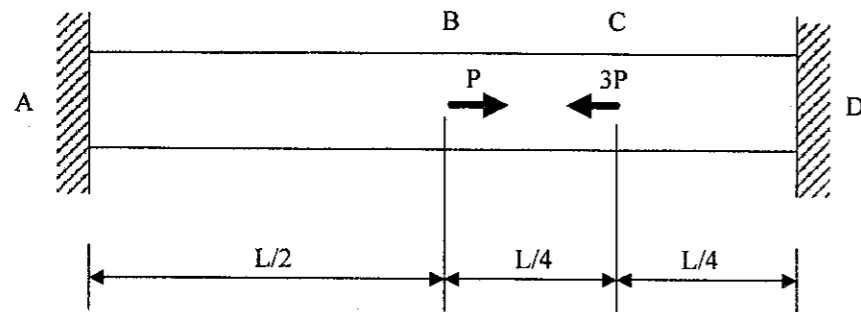


Fig. 1

1. Determine the reactions for the elastic member with a constant axial rigidity EA . In which, E is the Young's modulus and A is the cross sectional area. (10%)
2. Determine the reactions for the member with a constant cross sectional area A and the constitutive law of $\sigma = \sqrt{\epsilon}$. In which, σ is stress and ϵ is strain. (15%)

二、 The straight column as shown in Fig. 2 has a constant flexural rigidity EI . Point A is a fixed support and point B is a hinge support. Suppose that the column's length is L , derive the critical buckling load P_{cr} of the column. (25%)

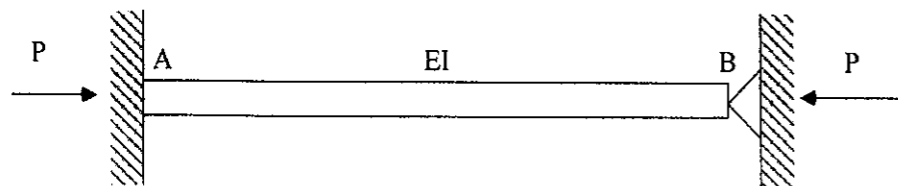


Fig. 2

三、 Knowing that the distribution of bending stress for a rectangular beam with the elastic Young's modulus $E = 200GPa$ can be expressed in Fig. 3, solve the following problems.

1. Determine the causing external bending moment. (10%)
2. Determine the distribution of residual bending stress when the external bending moment, obtained from the above problem, is unloaded. (15%)

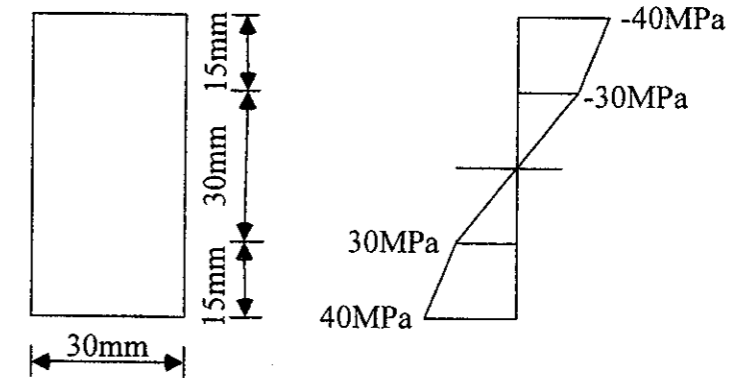


Fig. 3

四、 As can be seen in Fig. 4, a simply supported beam with span of 10m is subjected to a uniform loading $w = 2t/m$. If the width of the beam is $b = 0.5m$, give the answers to the following questions.

1. Determine the stress state $(\sigma_x, \sigma_y, \tau_{xy})$ at point C. (13%)
2. Determine the principal stresses $(\sigma_{p1}, \sigma_{p2})$ and principal direction θ_p at point C. (12%)

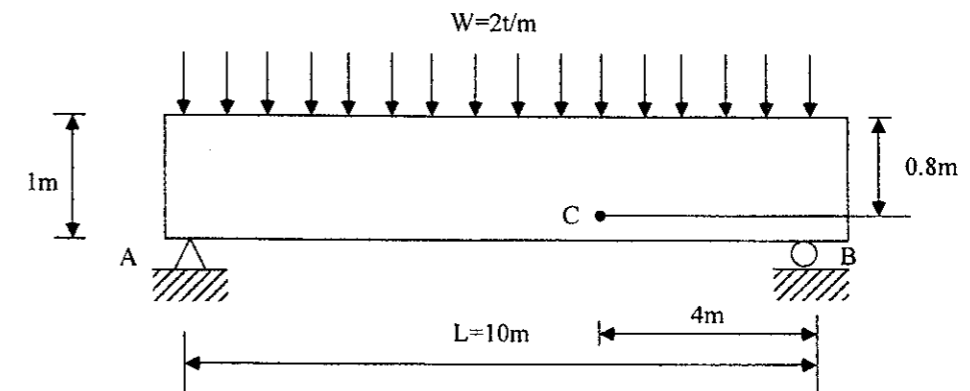


Fig. 4