

# 國立臺北科技大學

九十三學年度土木與防災研究所入學考試

## 材料力學試題

填准考證號碼

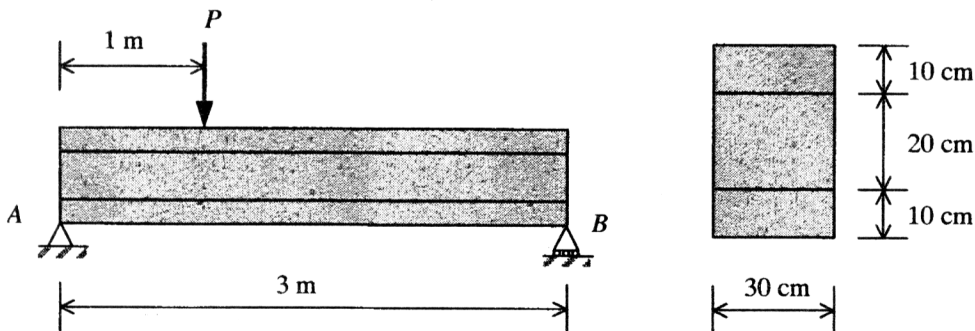
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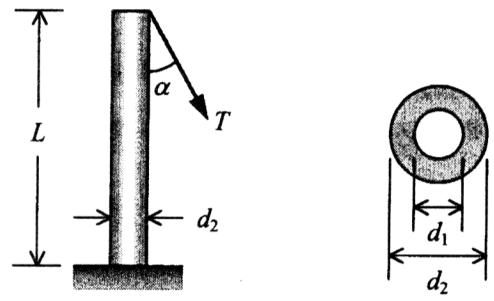
### 注意事項：

1. 本試題共三題，配分共 100 分。
2. 請按順序標明題號作答，不必抄題。
3. 全部答案均須答在答案卷之答案欄內，否則不予計分。

1. A laminated wood beam on simple supports is built up by gluing together two  $10\text{ cm} \times 30\text{ cm}$  and one  $20\text{ cm} \times 30\text{ cm}$  boards to form a solid beam  $30\text{ cm} \times 40\text{ cm}$  in cross section, as shown in the figure. The allowable shear stress in the glued joints is  $20000\text{ kg/m}^2$  and the allowable bending stress in the wood is  $70000\text{ kg/m}^2$ . If the beam is  $3\text{ m}$  long and is subjected to a concentrated load  $P$  acting at a point  $1\text{ m}$  from the left-hand support, what is the maximum permissible value of the load  $P$ ? (30%)



2. A vertical pole of aluminum is fixed at the base and pulled at the top by a cable having a tensile force  $T$ . The cable is attached at the outer surface of the pole and makes an angle  $\alpha = 30^\circ$  at the point of attachment. The pole has length  $L = 3.0$  m and a hollow circular cross section with outer diameter  $d_2 = 400$  mm and inner diameter  $d_1 = 200$  mm. Determine the allowable tensile force  $T_{\text{allow}}$  in the cable if the allowable compressive stress in the aluminum pole is 100 MPa. (25%)



3. The cross section of a slit (縱切的) rectangular tube of a constant thickness  $t$  is shown in the figure. Derive the following formula for the distance  $e$  from the centerline of the wall of the tube to the shear center  $S$ :

$$e = \frac{b(2h + 3b)}{2(h + 3b)}$$

(45%)

