

國立臺灣科技大學  
八十七學年度碩士班招生考試試題

所 別： 機械工程技術研究所  
學程別：

組別： 固力與設計組、製造組

科目： 材料力學

- The high-strength steel ( $E=200\text{Gpa}$ ) bar AC has a cross-sectional area of  $400\text{ mm}^2$ , the bronze ( $E=100\text{Gpa}$ ) post D has a cross-sectional area of  $2000\text{ mm}^2$ , and the bar AB and the bearing block on post D are to be considered rigid. The clearance  $\delta$  between post D and bar AB is  $0.1\text{ mm}$  before the load P is applied. If the load P is known as  $40\text{ kN}$ , Determine:

- The axial stresses in the steel and in the bronze.
- The vertical displacement of the point of application of the load P.

[25%]

- Draw complete shear and moment diagrams for the beam segment in Figure 2.

[25%]

- A  $20\text{mm}$  diameter solid circular steel shaft is bend to a quarter ring with nominal radius  $100\text{ mm}$  as shown in Figure 3. While one end is fixed to the wall, the other end is loaded by a force V in y direction, which is parallel to the wall. If the maximum normal and shearing stresses at point A and B must be limited to  $100\text{MPa}$  T and  $50\text{MPa}$ , respectively, determine the maximum permissible value for the transverse load V.

[25%]

- A cone shape water tank is full of water. The shell thickness of the tank is  $6\text{ mm}$ . Determine the axial stress and the hoop stress of the shell in a point  $300\text{ mm}$  below the water surface

[25%]

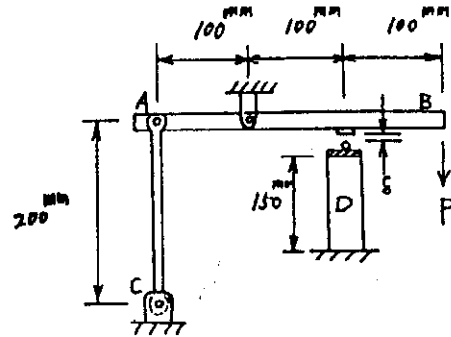


Figure 1

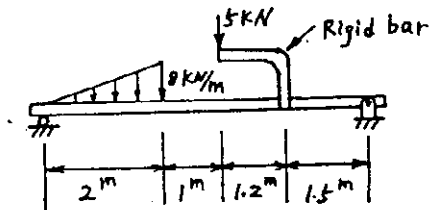


Figure 2

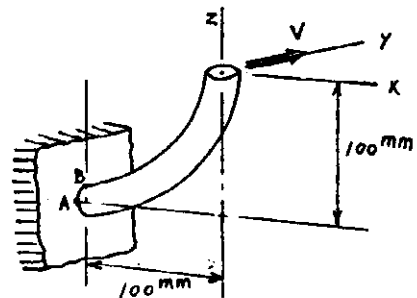


Figure 3.

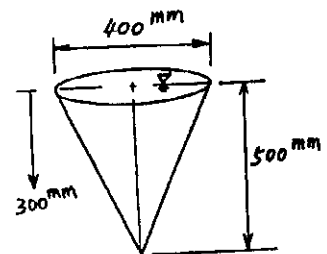


Figure 4.