

國立臺北科技大學 106 學年度碩士班招生考試

系所組別：3111 土木工程系土木與防災碩士班甲組

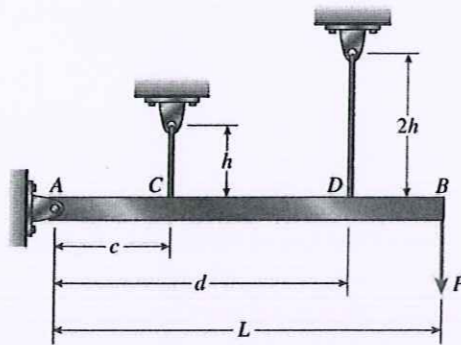
第一節 材料力學 試題 (選考)

第一頁 共一頁

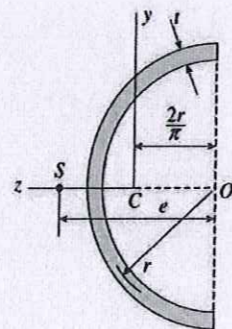
注意事項：

1. 本試題共四題，每 25 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。

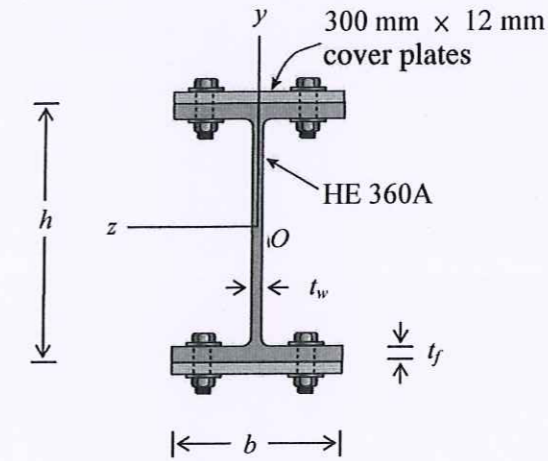
1. A rigid bar AB of length $L = 3.2$ m is hinged to a support at A and supported by two vertical wires attached at points C and D , as shown in the figure. Both wires have the same cross-sectional area ($A = 20$ mm²) and are made of the same material. The wire at C has length $h = 0.8$ m and the wire at D has length twice that amount. The horizontal distances are $c = 1.0$ m and $d = 2.4$ m. Determine the tensile stresses σ_C and σ_D in the wires due to the load $P = 485$ N acting at end B of the bar. (25%)



2. A thin-walled semicircular cross section of radius r and thickness t is shown in the figure. Determine the distance e from the center O of the semicircle to the shear center S . (25%)



3. A steel beam is built up from a HE 360A wide-flange beam ($b = 300$ mm, $h = 350$ mm, $t_w = 10$ mm, $t_f = 17.5$ mm, and $I = 330,900,000$ mm⁴ for HE 360A) and two 300 mm \times 12 mm cover plates. The allowable load in shear on each bolt is 12.0 kN. What is the required bolt spacing s in the longitudinal direction if the shear force $V = 200$ kN? (25%)



4. The simple beam ACB shown in the figure is subjected to a triangular load of maximum intensity 2.0 kN/m.
 - a. Draw the shear force and bending-moment diagrams for this beam. (20%)
 - b. Calculate the maximum bending stress σ_{max} if the beam has a rectangular cross section with width $b = 200$ mm and height $h = 400$ mm. (5%)

