99MCt002

國立臺北科技大學九十九學年度碩士班招生考試

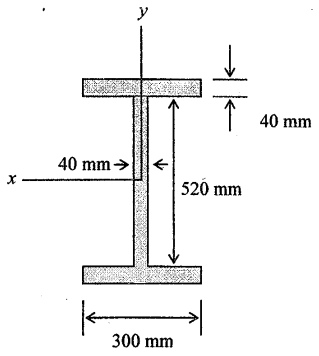
系所組別：3110 土木與防災研究所甲組

第一節　材料力學　試題

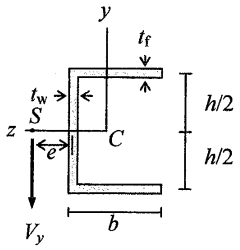
注意事項：

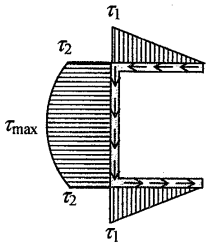
1. 本試題共 4 題，配分共 100 分。
2. 請標明大題、子題編號作答，不必抄題。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。

1. A welded steel girder having the cross section shown in the figure is fabricated of two 300 mm × 40 mm flange plates and a 520 mm × 40 mm web plate. The plates are joined by four fillet welds that run continuously for the length of the girder. Each weld has an allowable load in shear of 600 kN/m. Calculate the maximum allowable shear force V_{max} for the girder. (15%)

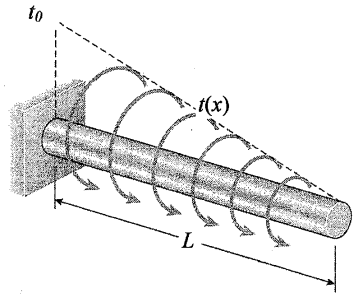


2.Consider the channel section shown below. Assume the beam is bent about the z axis as the neutral axis and the resultant shear force V_y acts parallel to the y axis. Calculate the maximum shear stress τ_1 in the flange, the minimum and maximum shear stresses in the web τ_2 and τ_{max}, and the distance from the centerline of the web to the shear center e. (30%)



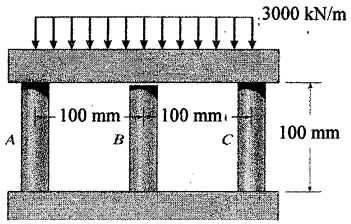


3. Derive a formula for the strain energy U of the cantilever bar shown in the figure. The bar has circular cross sections and length L. It is subjected to a distributed torque of intensity $t(x)$ per unit distance. The intensity varies linearly from $t = 0$ at the free end to a maximum value $t(x) = t_0$ at the support. (25%)



4. The center post B of the assembly has an original length of 99 mm, whereas posts A and C have a length of 100 mm. These posts have a same modulus of elasticity E = 70 GPa, and the cross-sectional area of posts A, B, and C are 200 mm^2, 240 mm^2, and 200 mm^2, respectively.
   a. If the caps on the top and bottom can be considered rigid, determine the average normal stress in each post. **(20%)**
   b. If the yield stress of the these posts is 1.4 GPa, how much more load (in kN/m) can be added to this assembly before posts A and B start yielding? **(10%)**

注意：背面尚有試題


3000 kN/m
100 mm
100 mm
100 mm
A
B
C