

國立彰化師範大學 101 學年度碩士班招生考試試題

系所： 機電工程學系

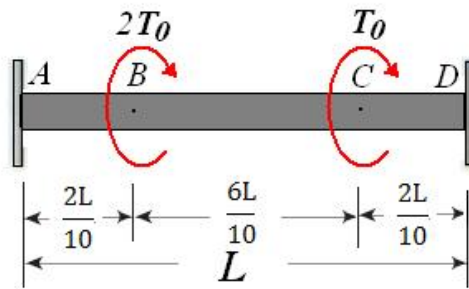
組別： 甲組

科目： 材料力學

☆☆請在答案卷上作答☆☆

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1. A solid circular bar ABCD with fixed supports is acted upon by torques T_0 and $2T_0$ at the locations as shown in Fig. 1. Calculate the maximum angle of twist Φ_{max} of the bar, given $T_0 = 400 \text{ N} \cdot \text{m}$, elasticity of the material $E = 184 \text{ Gpa}$, Poisson's ratio $\nu = 0.3$, $L = 2 \text{ m}$, diameter of the bar $d = 40 \text{ mm}$. (30%)



2. A pinned-end steel strut ($E = 210 \text{ GPa}$) with length $L = 2 \text{ m}$ is constructed of circular tubing with outside diameter $d = 40 \text{ mm}$. The strut must resist an axial load $P = 15 \text{ kN}$ with a **safety factor** = 2 with respect to the critical load. Find the required thickness t of the tube. (30%)
3. A cantilever beam AB supporting a triangularly distributed load of maximum intensity q_0 is shown in Fig. 2.
- (1) Draw the shear-force and bending-moment diagrams. (Write down the details of calculation. Not only draw the diagrams.) (20%)
 - (2) Derive the equation of the deflection curve and then obtain formulas for the deflection δ_B and angle of rotation θ_B at the free end. (Note: Use the second-order differential equation of deflection curve.) (20%)

