淡江大學 97 學年度轉學生招生考試試題

4-1

系別：機械與機電工程學系三年級　　科目：工程力學(含靜力學、動力學、材料力學)

可否使用計算機			
可	√	否	

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1. The object in Fig. 1 has a built-in support and is subjected to two forces and a couple. What are the reactions at the support? (15%)

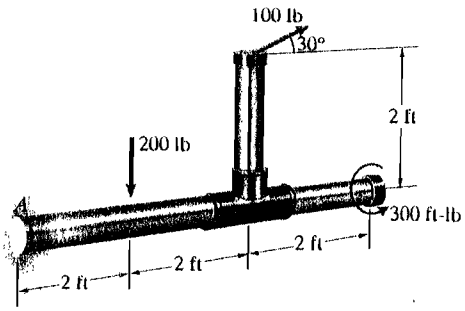

Fig. 1

2. The truss in Fig. 2 supports a 100 kN load. The horizontal members are each 1 m in length. Determine the axial force in member CJ, and state whether it is in tension or compression. (15%)

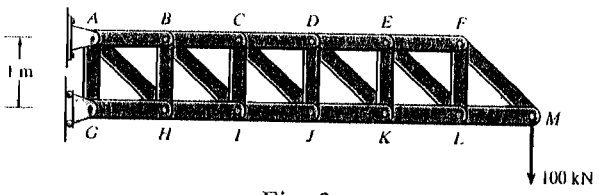

Fig. 2

3. The two crates in Fig. 3 are released from rest. Their masses are $m_A = 40\,\text{kg}$ and $m_B = 30\,\text{kg}$, and the kinetic coefficient of friction between crate A and the inclined surface is $\mu_k = 0.15$. What is the magnitude of their velocity when they have moved 400 mm? (15%)

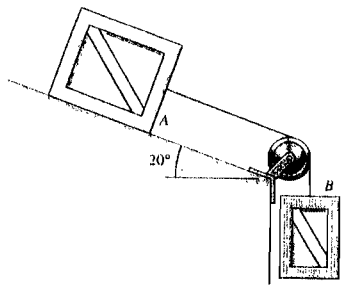

Fig. 3

4. Bar AB in Fig. 4 rotates with a clockwise angular velocity of 10 rad/s. Determine the angular velocity of bar BC and the velocity of point C. (15%)

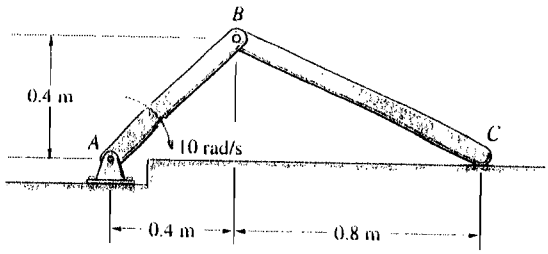

Fig. 4

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可否使用計算機			
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5. A hollow, circular, steel column ($E = 210\,\text{GPa}$) is subjected to a compressive load P, as shown in Fig. 5. The column has length $L = 2.5\,\text{m}$ and outside diameter $d = 200\,\text{mm}$. The load $P = 500\,\text{kN}$.

   If the allowable compressive stress is $55\,\text{MPa}$ and the allowable shortening of the column is $0.60\,\text{mm}$, what is the required wall thickness $t_{\min}$? (20%)

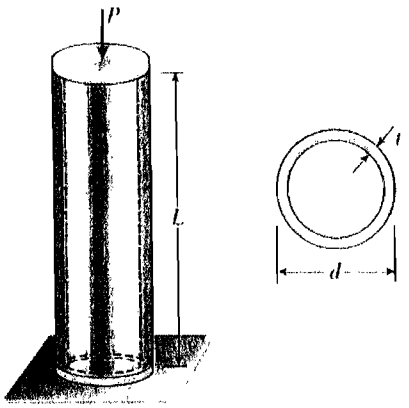

Fig. 5

6. Determine the equation of the deflection curve for a cantilever beam AB subjected to a uniform load of intensity q (Fig. 6a). Also, determine the angle of rotation θ_B and the deflection δ_B at the free end (Fig. 6b). (*Note*: The beam has length L and constant flexural rigidity EI.) (20%)

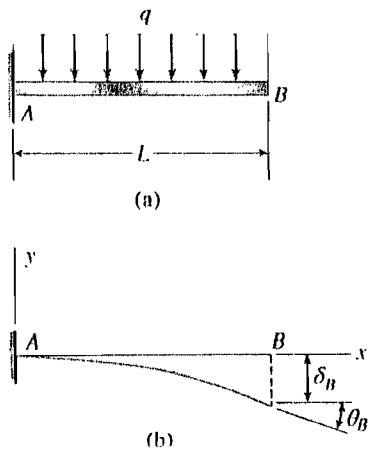

Fig. 6