

# 淡江大學 98 學年度轉學生招生考試試題

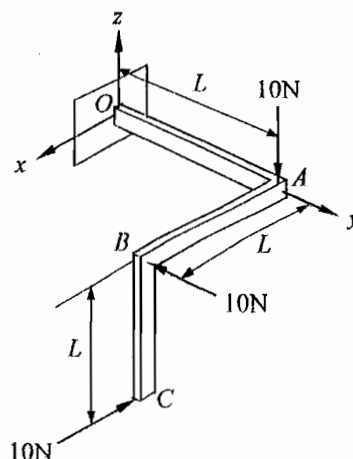
系別：機械與機電工程學系三年級

科目：工程力學(含靜力學、動力學、材料力學)

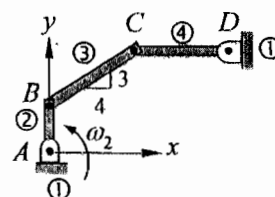
准帶項目請打「V」	
V	計算機

本試題共 4 大題， 2 頁

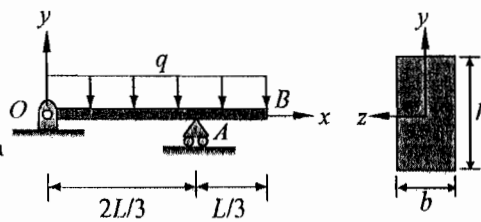
1.(25%) A cantilever beam is bent and fixed to the wall at the point  $O$ . The beam is subjected to three forces as shown in the figure. Determine the reactions at the fixed end  $O$  if the weight of the beam is neglected and  $L=500\text{mm}$ .



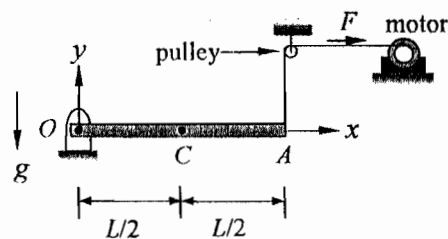
2.(25%) The four-bar linkage shown in the figure has four pin joints at  $A, B, C, D$ , and has the following link lengths:  $AB=200\text{mm}$ ,  $BC=500\text{mm}$ , and  $CD=400\text{mm}$ . At the instant shown in the figure, links ② and ④ are parallel to the  $y$  and the  $x$  axes, respectively, and link ③ makes an angle  $\tan^{-1}(3/4)$  with the  $x$  axis. Link ② is driven by a constant speed  $\omega_2=3\text{ rad/s}$ . Determine the angular velocity  $\omega_4$  and the angular acceleration  $\alpha_4$  of link ④ at this instant.



3.(25%) The beam shown in the figure is supported by a pin at  $O$  and a roller at  $A$ . The beam has a length  $L=900\text{mm}$  and is subjected to a uniform load  $q=0.2\text{N/mm}$ . The cross section of the beam, also shown in the figure, has a height  $h=100\text{mm}$  and a width  $b=30\text{mm}$ . Neglecting the weight of the beam, determine  
(a) The maximum bending moment in the beam.  
(b) The maximum bending stress in the beam.



4.(25%) A uniform slender rod has a length  $L=1200\text{mm}$  and a mass  $m=0.5\text{kg}$ . The rod is initially at rest and is supported by a pin at  $O$  and a cable at  $A$ . The cable is directed by a pulley and is connected to a motor at the other end. At an instant the motor begins to apply a force  $F=20\text{N}$  on the cable. Determine the reaction forces at  $O$  and the angular acceleration  $\alpha$  at this instant. The gravitational acceleration  $g=9.8\text{ m/s}^2$ .



本試題由淡江大學印刷

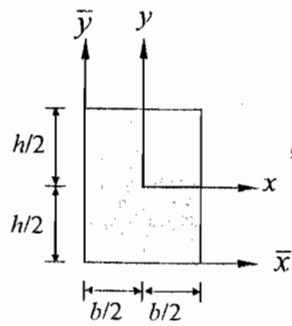
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✓	計算機

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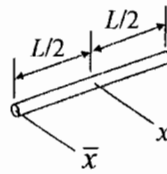
Area Moments of Inertia of a Rectangular Section



$$I_x = bh^3/12, \quad I_{\bar{x}} = bh^3/3$$

$$I_y = b^3h/12, \quad I_{\bar{y}} = b^3h/3$$

Mass Moment of Inertia of a Uniform Slender Rod



$$I_{xx} = mL^2/12, \quad I_{\bar{x}\bar{x}} = mL^2/3$$