# 淡江大學九十二學年度轉學生招生考試試題

系別：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「○」否則打「×」 | |
|---|---|
| ○ | 簡單型計算機 |



1.(25%)

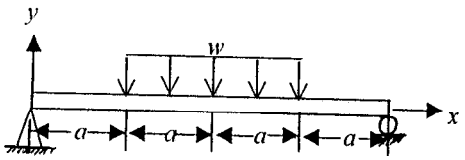



Fig. (1a)

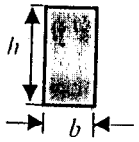



Fig. (1b)

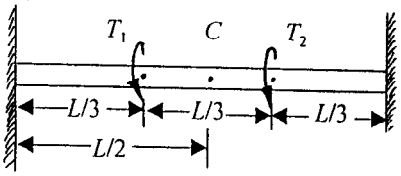
A simply supported beam is subjected to a uniform load $w$, as shown in figure (1a). The beam has a rectangular cross section with a width $b$ and a depth $h$, as figure (1b) shows.

a) Plot shear force $S(x)$ as a function of $x$.

b) Plot bending moment $M(x)$ as a function of $x$.

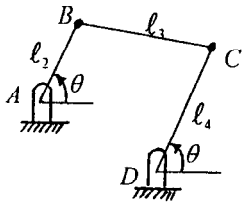
c) Determine the maximum normal stress in this beam.

2.(25%)




A circular shaft is fixed at both ends and is subjected to torques $T_1$ and $T_2$. Determine the torque at the center point $C$ if $T_2=4T_1$.

3.(25%)

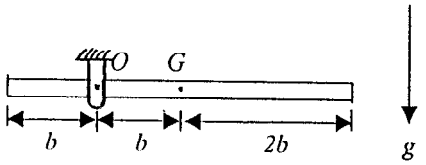



The mechanism shown in the figure has 4 pin (revolute) joints at $A$, $B$, $C$, and $D$. Link lengths are $\ell_2$=150mm, $\ell_3$=200mm, and $\ell_4$=240mm. At the instant shown in the figure, $\theta$=60°, and link $AB$ rotates with a speed $\omega_{AB}$=2 rad/s (counterclockwise).

a) Locate the instantaneous center of zero velocity for link $BC$.

b) Determine angular velocity $\omega_{CD}$ of link $CD$.

4.(25%)




At the instant shown in the figure, a uniform slender rod is released from rest. The rod has a mass of $m$=0.6kg, a dimension $b$=100mm, and center of mass is at $G$. ($g$=9.81m/s$^2$)

a) Draw free body diagram of this rod.

b) Determine reaction forces at $O$ at this instant.

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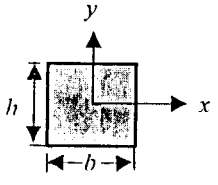
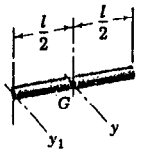
Area moment of inertia:




$I_x=bh^3/12$

Mass moment of inertia:




| | |
|---|---|
| Uniform Slender Rod | $I_{yy}=\frac{1}{12}ml^2$ |
| | $I_{y_1y_1}=\frac{1}{3}ml^2$ |