

AAE 340 – Dynamics and Vibrations

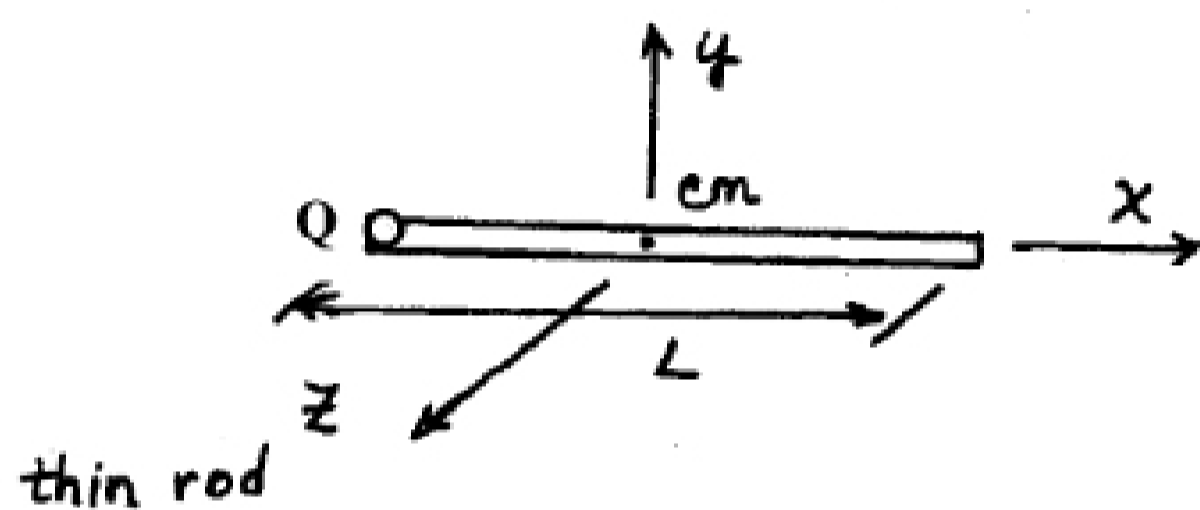
Exam III

Solutions

Please read the problems carefully.
Write clearly and use diagrams when necessary.

Note: A table of inertias is included.

MASS MOMENTS OF INERTIA OF COMMON SHAPES



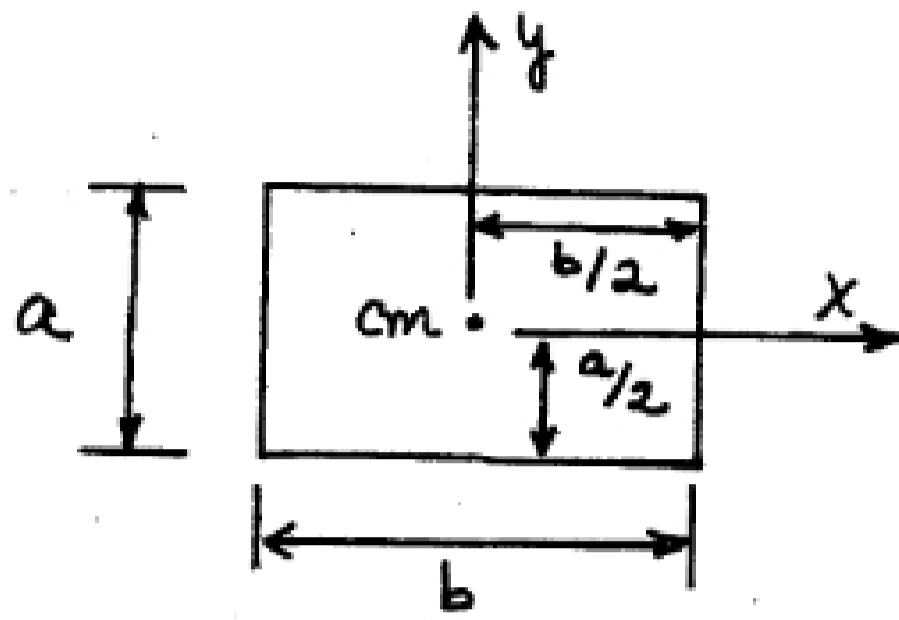
$$I_{xx}^{cm} \approx 0$$

$$I_{yy}^{cm} = I_{zz}^{cm} = K$$

$$I_{xy}^{cm} = I_{xz}^{cm} = I_{yz}^{cm} = 0$$

$$I_{xx}^O \approx 0, I_{yy}^O = I_{zz}^O = I$$

Just use the symbols I and K for simplicity!



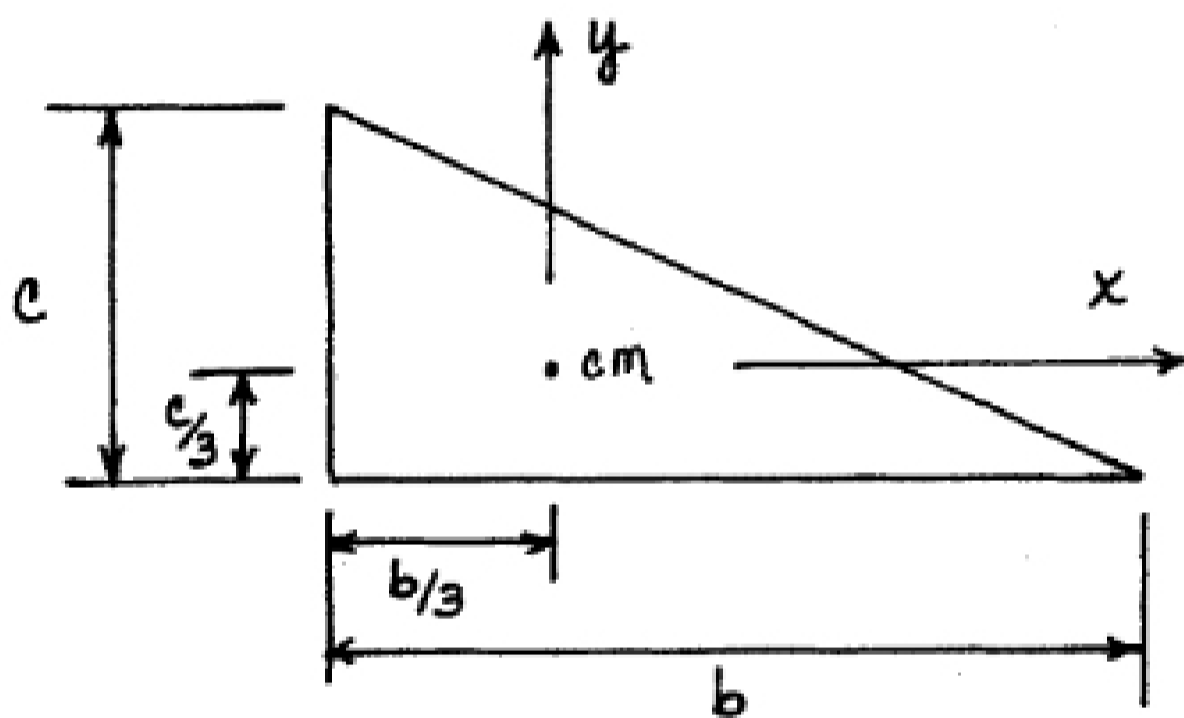
thin rectangular plate

$$I_{xx}^{cm} = \frac{ma^2}{12}$$

$$I_{yy}^{cm} = \frac{mb^2}{12}$$

$$I_{zz}^{cm} = \frac{m}{12}(a^2 + b^2)$$

$$I_{xy}^{cm} = I_{xz}^{cm} = I_{yz}^{cm} = 0$$



$$I_{xx}^{cm} = \frac{mc^2}{18}$$

$$I_{yy}^{cm} = \frac{mb^2}{18}$$

$$I_{zz}^{cm} = \frac{m}{18}(b^2 + c^2)$$

$$I_{xy}^{cm} = +\frac{mbe}{36} \quad I_{xz}^{cm} = I_{yz}^{cm} = 0$$