

**Practice Problem Set 6: Engineering Mechanics (NMEC101)**

**Answers**

1.  $I_{yy} = \frac{47}{60} ab^3$

2. (a)  $I_{xx} = \frac{\pi ab^3}{8}$ , (b)  $I_{yy} = \frac{\pi ba^3}{8}$

3.  $I_{xx} = \frac{15}{91} ab^3$

4.  $(I_{xx})_C = 26.6 \times 10^6 \text{ mm}^4$  (centroidal axis parallel to side AB)  
 $(I_{yy})_C = 2.65 \times 10^6 \text{ mm}^4$  (centroidal axis perpendicular to side AB)

5. (a)  $I_{xx} = \frac{\pi a^4}{8}$ ,  $I_{yy} = \frac{\pi a^4}{2}$ ,  $I_{xy} = \frac{a^4}{2}$

(b)  $\theta_p = 20.16^\circ, 110.16^\circ$ ,  $I_{max} = 1.755 a^4$ ,  $I_{min} = 0.209 a^4$

(c) For  $45^\circ$  anticlockwise rotation  $(I_{xx}') = 0.482 a^4$ ,  $(I_{yy}') = 1.482 a^4$ ,  $(I_{xy}')$   
 $= -0.589 a^4$

For  $30^\circ$  clockwise rotation  $(I_{xx}') = 1.12 a^4$ ,  $(I_{yy}') = 0.483 a^4$ ,  $(I_{xy}') = 0.76 a^4$

6.  $\theta_p = 12.06^\circ, 102.06^\circ$ ,  $I_{max} = 8064120.68 \text{ mm}^4$ ,  $I_{min} = 365199.32 \text{ mm}^4$