

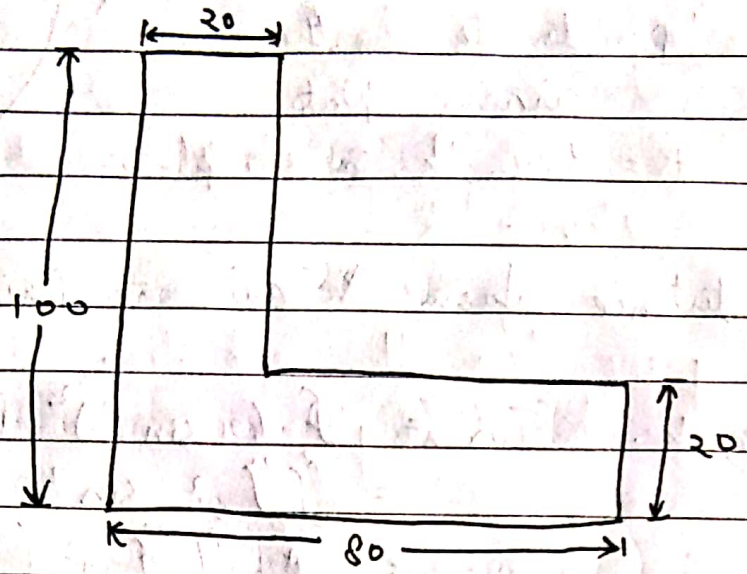
Sec-2-ans-1 \Rightarrow Given :-

$$\bar{x} = 25 \text{ mm}$$

$$\bar{y} = 35 \text{ mm}$$

$$I_{xx} = 290.67 \times 10^4 \text{ mm}^4$$

$$I_{yy} = 162.67 \times 10^4 \text{ mm}^4$$



- To calculate the mass and ~~mass~~ min. moment of inertia, we need to find the product of inertia.
- The composite section can be considered to be made up of two rectangles.
- The centroidal coordinates of the two rectangles can be determined as $(40, 10)$ & $(10, (20 + 80/2 = 60))$, the coordinates being with respect to lower left corner.
- The calculations are summarized below :-

S.No.	$(I_{xy}) \text{ mm}^4$	$A_i (\bar{x}_i - \bar{x})(\bar{y}_i - \bar{y}) \text{ mm}^4$
1	0	$1600 (40 - 25)(10 - 35)$ $= -600000$

2	0	$1600 (10-25) (40-35)$ $= -600000$
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3	0	-1200000
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$$\therefore I_{xy} = \sum (I_{xy})_i + \sum A_i (\bar{x}_i - \bar{x}) (\bar{y}_i - \bar{y})$$

$$= -1200000$$

$$I_{xy} = -120 \times 10^4 \text{ mm}^4$$

• WKT, $R = \sqrt{\left(\frac{I_{xx} - I_{yy}}{2}\right)^2 + (I_{xy})^2}$

$$= \sqrt{\left(\frac{290.67 - 162.67}{2}\right)^2 \times 10^8 + (-120 \times 10^4)^2}$$

$$R = 136 \times 10^4 \text{ mm}^4$$

• Also, $I_{ave} = \frac{I_{xx} + I_{yy}}{2} = 226.67 \times 10^4 \text{ mm}^4$

$$I_{max} = I_{ave} + R$$

$$= (226.67 + 136) \times 10^4$$

$$I_{max} = 362.67 \times 10^4 \text{ mm}^4 \quad \underline{\underline{\text{Ans}}}$$

$$I_{min} = I_{ave} - R = (226.67 - 136) \times 10^4$$

$$I_{min} = 90.67 \times 10^4 \text{ mm}^4 \quad \underline{\underline{\text{Ans}}}$$