

FAQs

1. A beam 360mm x 500mm effective size carries a factored moment of 175 kNm. If concrete M20 and steel Fe500 are used, find the area of steel required.

To find $M_{u,lim}$

$$M_{u,lim} = 0.133f_{ck}bd^2$$

$$M_{u,lim} = 199.50 \text{ kNm}$$

Here $M_u < M_{u,lim}$; hence it is under reinforced section.

To find A_{st}

$$M_u = 0.87f_y A_{st}(d - 0.416x_u)$$

$$\text{Where } x_u = 0.87f_y A_{st} / 0.36f_{ck}b$$

$$= 0.20 A_{st}$$

$$\text{Now } A_{st} = 958.32 \text{ mm}^2$$

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2. A beam 230mm x 650mm effective size carries a factored moment of 195 kNm. Find the area of steel required, if concrete M20 and steel Fe415 are used.

To find $M_{u,lim}$

$$M_{u,lim} = 0.138f_{ck}bd^2$$

$$M_{u,lim} = 268.203 \text{ kNm}$$

Here $M_u < M_{u,lim}$; hence it is under reinforced section.

To find A_{st}

$$M_u = 0.87f_y A_{st}(d - 0.416x_u)$$

$$\text{Where } x_u = 0.87f_y A_{st} / 0.36f_{ck}b$$

$$= 0.218 A_{st}$$

$$\text{Now } A_{st} = 960.05 \text{ mm}^2$$