FAQs

1. **Determine the reinforcement required for a T-beam to resist a M_u of 360kNm with the following data. Width of flange = 1500mm; Depth of flange = 100mm; Width of rib = 300mm; Effective depth = 500mm; Materials = M20 and Fe415.**

To compute D_f/d and b_f/b_w

$D_f/d = 0.20$

$b_f/b_w = 5.0$

To compute $\boldsymbol{\psi_w}$

Calculated $\psi_w = M_u / f_{ck} b_w d^2$

$= 0.24$

To obtain $\boldsymbol{\psi_w}$ from Table flexure 7.6 of Roorkee's Design Handbook for the values of

$D_f/d = 0.20$

$b_f/b_w = 5.0$

Obtained $\psi_w = 0.334$

To compare Calculated ψ_w with Obtained ψ_w

Here Calculated ψ_w < Obtained ψ_w

$0.24 < 0.334$

It confirms neutral axis lies within the flange.

Design as rectangular section of size b_f x d

To compute $\boldsymbol{\psi}$

$\boldsymbol{\Psi} = \psi_w \times b_f / b_w$

$= 0.048$

To compute **k**

$\mathbf{k = \Psi \times f_{ck}}$

$\mathbf{= 0.96}$

To obtain p_t

Obtain p_t from Table 2.1 B for the corresponding value of k = 0.96

$p_t = 0.282$

To find A_{st}

$A_{st} = p_t b_f d / 100$

$= 2115 \text{ mm}^2$

2. Determine the reinforcement required for a T-beam to resist a M_u of 600kNm with the following data. Width of flange = 1500mm; Depth of flange = 100mm; Width of rib = 300mm; Effective depth = 500mm; Materials = M20 and Fe415.

To compute D_f/d and b_f/b_w

$D_f/d = 0.20$

$b_f/b_w = 5.0$

To compute $\boldsymbol{\psi_w}$

Calculated $\psi_w = M_u / f_{ck} b_w d^2$

$= 0.4$

To obtain $\boldsymbol{\psi_w}$ from Table flexure 7.6 of Roorkee's Design Handbook for the values of

$D_f/d = 0.20$

$b_f/b_w = 5.0$

Obtained $\psi_w = 0.334$

To compare Calculated ψ_w with Obtained ψ_w

Here Calculated $\psi_w >$ Obtained ψ_w

$0.4 > 0.334$

it confirms neutral axis lies outside the flange.

Design as flanged section

Obtain ψ_w for $\xi = \xi_{lim} = 0.479$ from the Table flexure 6.4

$\psi_w = 0.464$

Here Calculated $\psi_w <$ Obtained ψ_w for $\xi = \xi_{lim} = 0.479$

It is designed as singly reinforced flanged section

Obtain ω_w for $\psi_w = 0.4$

$\omega_w = 0.511$

To compute A_{st}

$A_{st} = \omega_w \times b_w \, d \, f_{ck} / f_y$

$= 3694 \text{ mm}^2$