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CHAPTER

Flanged Beam by LSM

Q.1 The temperature reinforcement in the vertical slab of a T-shaped R.C. retaining wall is
(a) not needed.
(b) provided equally on inner and front faces.
(c) provided more on inner face than on front face.
(d) provided more on front face than on inner face.

Q.2 The main reinforcement in the heel of a T-shaped R.C. retaining wall is provided on
(a) top face perpendicular to wall.
(b) bottom face perpendicular to wall.
(c) both top and bottom faces perpendicular to wall.
(d) none of these.

Q.3 A T-beam roof section has the following particulars:

Thickness of slab	= 100 mm
Width of rib	= 300 mm
Depth of beam	= 500 mm
Centre to centre distance of beams	= 3.0 m
Effective span of beams	= 6.0 m

Distance between points of contraflexure is 3.60 m. The effective width of flange of the beam is
(a) 3000 mm (b) 1900 mm
(c) 1600 mm (d) 1500 mm

Q.4 In a reinforced concrete T-beam (in which the flange is in compresion), the positon of neutral axis will
(a) within flange.
(b) within web.
(c) depend on the thickness of flange in relation to total depth and percentage of reinforcement.
(d) at the junction of flange and web.

Q.5 The width of flange of a T-beam should be less than
(a) one-third of the effective span of T-beam.
(b) distance between the centres of T-beam.
(c) width of the rib plus twelve times the thickness of web.
(d) least of all above.

Q.6 The width of flange of T-beam, which may be considered to act effectively with the rib depends on
(a) width of the rib.
(b) overall thickness of the rib.
(c) c/c distance between T-beams.
(d) all the above.

Q.7 The moment of resistance of the T-beam having following data; b_f = 1000 mm, D_f = 100 mm, b_w = 300 mm, cover = 50 mm, d = 450 mm and reinforced with 4 – 25 ϕ bars. Use M20 and Fe415.
(a) 390 kNm (b) 180 kNm
(c) 260 kNm (d) 290 kNm

Q.8 A simply supported flanged beam (isolated) of span 9 m is doubly reinforced having web width = 300 mm and flanged width = 1500 mm. Assuming M30 concrete and Fe415 steel, the effective flange width is:
(a) 1300 mm (b) 1200 mm
(c) 1100 mm (d) 1400 mm

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Answers Flanged Beam by LSM

1. (d) 2. (a) 3. (d) 4. (c) 5. (d) 6. (d) 7. (d) 8. (b)

Explanations Flanged Beam by LSM

3. (d)
The effective width, b_f of the flange of an isolated T-beam is given by,

$$b_f = b_w + \frac{l_0}{6} + 6D_f$$

$b_w = 300$ mm
$l_0 = 3600$ mm
$D_f = 100$ mm

$$\therefore \quad b_f = 300 + \frac{3600}{6} + 6 \times 100$$
$$= 300 + 600 + 600$$
$$= 1500 \text{ mm} < \text{c/c distance between beams } (= 3000 \text{ mm})$$

7. (d)
Assuming x_u is in the flange and equating total compressive and tensile forces:

$$x_u = \frac{0.87 f_y A_{st}}{0.36 b_f f_{ck}}$$
$$= \frac{0.87 \times 415 \times 1963}{0.36 \times 1000 \times 20}$$
$$= 98.44 < 100 \text{ mm}$$

So the assumption of x_u in flange is correct.
$x_{u,max}$ for balanced rectangular beam
$= 0.48d = 0.48 \times 450 = 216$ mm
$\Rightarrow$ It is under-reinforced since $x_u < x_{u,max}$

$$\therefore \quad M_u = 0.87 f_y A_{st} d \left(1 - \frac{A_{st} f_y}{f_{ck} b_f d}\right)$$

$$\therefore 0.87 \times 415 \times 1963 \times 450 \left\{1 - \frac{1963 \times 415}{20 \times 1000 \times 450}\right\}$$
$$= 290.06 \text{ kNm}$$

8. (b)
As per IS 456 : 2000,

$$\text{Effective width, } b_f = \frac{l_0}{\left(\frac{l_0}{b}\right) + 4} + b_w$$

(For isolated T-beam)

$$= \frac{9000}{\left(\frac{9000}{1500}\right) + 4} + 300$$
$$= 1200 \text{ mm}$$

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