DESIGN OF FLOOR SLAB

Design Data

Dimensions of the slab (c/c distance b/w supports), f_{ck} = **25** N/mm²

Length of short span, L_x = **4.00** m f_y = **500** N/mm²

Length of long span, L_y = **5.30** m

Width of the supporting beam, = **230** mm

Clear cover to main reinforcement = **20** mm

Assume dia. of reinforcement steel = **10** mm

Calculations

Assume the thickness of slab as **150** mm ; Effective depth, d = 125 mm

Effective span, l_x = 4 m (or) 3.895 m whichever is less; d = 3.895 m

l_y = 5.3 m (or) 5.195 m whichever is less; d = 5.195 m

(l_y / l_x) = 1.33 < 2 ; Here, (l_y / l_x) is less than 2, Hence design the slab as two way slab

Load Calculations

Dead Load of slab = 0.15 x 25 = 3.75 KN/m²

Finishes load on slab = **2.00** KN/m²

Live Load on slab = **1.5** KN/m²

Total Dead load acting on the Structure = 5.75 KN/m²

Total live load acting on the Structure = 1.5 KN/m²

Factored Design Load w = 10.88 KN/m²

Support Condition   (Type of panel according to support condition)

One Short Edge Discontinuous   For this support condition,

Short span coefficient for (l_y / l_x) = 1.33,   Long span coefficient,

For negative moment, a_x = 0.0522   For negative moment, a_y = 0.037

For positive moment, a_x = 0.0396   For positive moment, a_y = 0.028

Moment Calculation

Max. BM per unit width, M_x = $a_x w l_x^2$ & M_y = $a_y w l_x^2$

	M_u	M_u / bd^2	p_t	$A_{st, req}$
	KNm	N/mm²	%	mm²
For Short Span,				
At mid span,	6.54	0.42	0.1187	148
At supports,	8.62	0.55	0.1565	196
For Long span,				
At mid span,	4.62	0.35	0.0986	123
At supports,	6.11	0.46	0.1303	163

$A_{st, min}$ = (0.12/100) bD = 180 mm²

Reinforcement details

Provide Y **8** @ **150** mm c/c at midspan &

supports for short span   (A_{st} pro. = 335 mm²)

Provide Y **8** @ **150** mm c/c at midspan &

supports for long span   (A_{st} pro. = 335 mm²)

Check for Deflection

Percentage of tension reinforcement = 0.27 %

f_s = 0.58 f_y ($A_{st req} / A_{st pro}$) = 128

Refer Fig. 4 of IS 456,

Modification factor = **1.41**

Allowable (Span / d_{eff}) ratio = **36.7**

Effective depth required = 106 mm

< d prov.

Hence OK