DESIGN OF FLOOR SLAB

Design Data

Dimensions of the slab (c/c distance b/w supports),

Length of short span, L_x = **5.3** m

Length of long span, L_y = **5** m

f_{ck} = **25** N/mm^2

f_y = **500** N/mm^2

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

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

(l_y / l_x) = 1.00 < 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/m^2
Finishes load on slab	= **2.00**	KN/m^2
Live Load on slab	= **1.5**	KN/m^2
Total Dead load acting on the Structure	= 5.75	KN/m^2
Total live load acting on the Structure	= 1.5	KN/m^2
Factored Design Load w	= 10.88	KN/m^2

Support Condition (Type of panel according to support condition)

Two Adjacent Edges Discontinuous

Short span coefficient for (l_y / l_x) = 1,

For negative moment, a_x = 0.0470

For positive moment, a_x = 0.0350

For this support condition,

Long span coefficient,

For negative moment, a_y = 0.047

For positive moment, a_y = 0.035

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 KNm	M_u / bd^2 N/mm^2	p_t %	$A_{st, req}$ mm^2
For Short Span,				
At mid span,	10.28	0.66	0.1888	236
At supports,	13.80	0.88	0.2546	318
For Long span,				
At mid span,	10.28	0.78	0.2245	281
At supports,	13.80	1.04	0.3035	379

$A_{st,\ min}$ = (0.12/100) bD = 180 mm^2

Reinforcement details

Provide Y **10** @ **150** mm c/c at midspan & supports for short span (A_{st} pro. = 524 mm^2)

Provide Y **10** @ **150** mm c/c at midspan & supports for long span (A_{st} pro. = 524 mm^2)

Check for Deflection

Percentage of tension reinforcement = 0.42 %

f_s = 0.58 f_y ($A_{st\ req}$ / $A_{st\ pro}$) = 131

Refer Fig. 4 of IS 456,

Modification factor = **1.9**

Allowable (Span / d_{eff}) ratio = **49.4**

Effective depth required = 105 mm

< d prov.

Hence OK