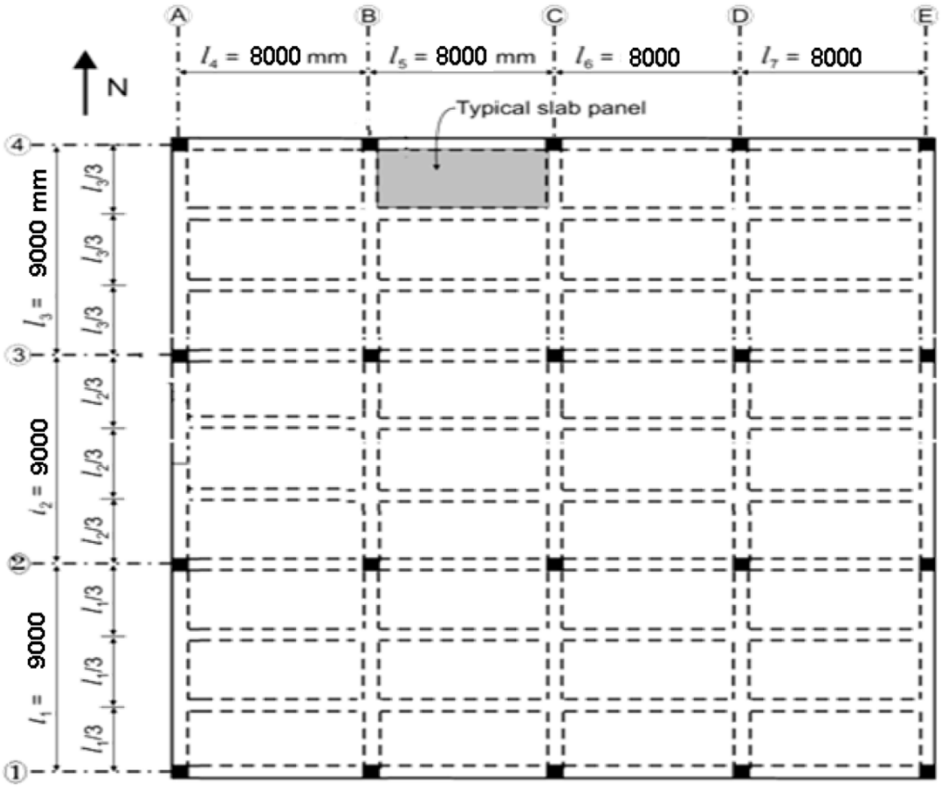
Problem 1 (30marks):

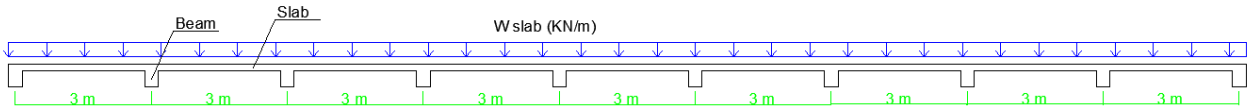


Slab = 175 mm

Beams:
b = 250 mm
h = 500 mm

Girders:
b = 400 mm
h = 600 mm

Loads for slab:



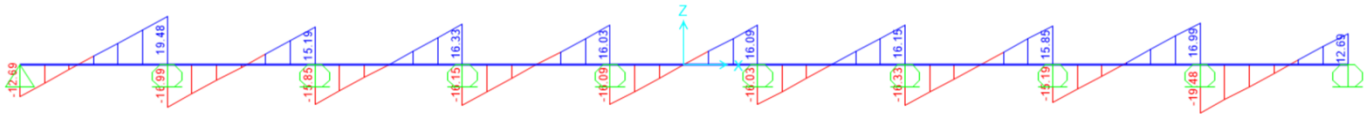
Simplified model for one way slab spanning (N-S)

W_{DL} = 5.7 KN/m

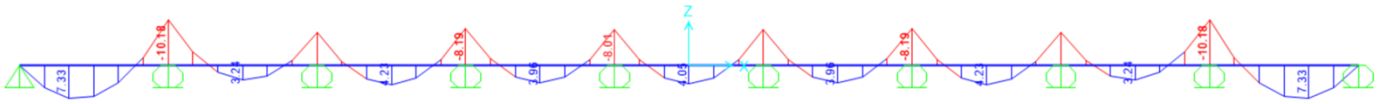
W_{LL}= 2.4 KN/m

W_{total}= 8.1 KN/m

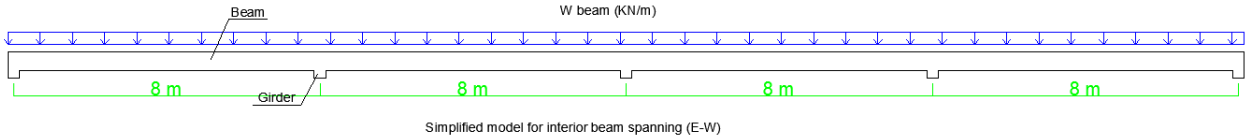
Shear diagram:



Moment diagram:



Loads for beam :



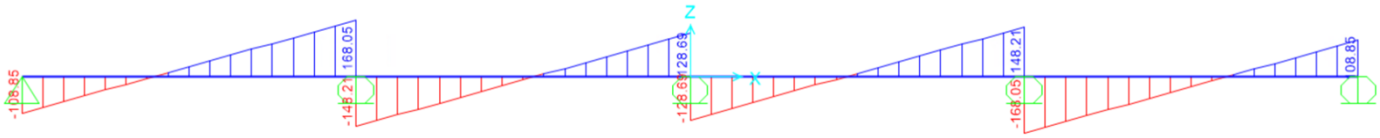
Simplified model for interior beam spanning (E-W)

$W_{DL\ (beam)}$= 19.05 KN/m

$W_{LL\ (beam)}$ = 7.2 KN/m

W_{total} = 26.25 KN/m

Shear diagram:



Moment diagram:

Depth check:

- For one-way slab:

For both end continuous: $\frac{l\mathrm{n}}{28} \leq \mathrm{h_{min}}$

$$\frac{ln}{28} = \frac{2750}{28} = 98.21\ mm < 175\ mm\ (OK)$$

For one end continuous: $\frac{l\mathrm{n}}{24} \leq \mathrm{h_{min}}$

$$\frac{ln}{24} = \frac{2750}{24} = 114.58\ mm < 175\ mm\ (OK)$$

- For beams:

For both end continuous: $\frac{l\text{n}}{21} \leq \text{h}_{\text{min}}$

$$\frac{ln}{21} = \frac{7600}{21} = 361.90\ mm < 500\ mm\ (OK)$$

For one end continuous: $\frac{l\text{n}}{18} \leq \text{h}_{\text{min}}$

$$\frac{ln}{18} = \frac{7600}{18} = 422.22\ mm < 500\ mm\ (OK)$$

Problem 2 (20 marks):

i. $M_{cr} = \mathbf{34.77\ kN.m}$

ii. $f_c\ is$ the stresses at the extreme compression fibre
$f_c = \mathbf{10.57\ MPa}$

$f_s\ is$ the stresses in the steel reinforcement
$f_s = \mathbf{117.39\ MPa}$