Group – 2

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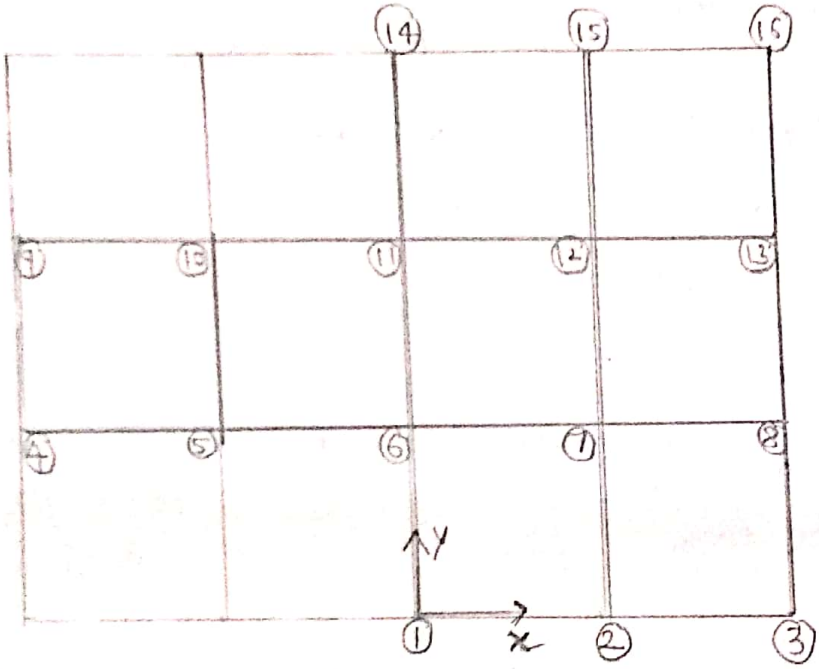
MATLAB SUPPORTING FILE

Joint Equivalent load Calculation

Joint numbering



Same way we will proceed for upper floor

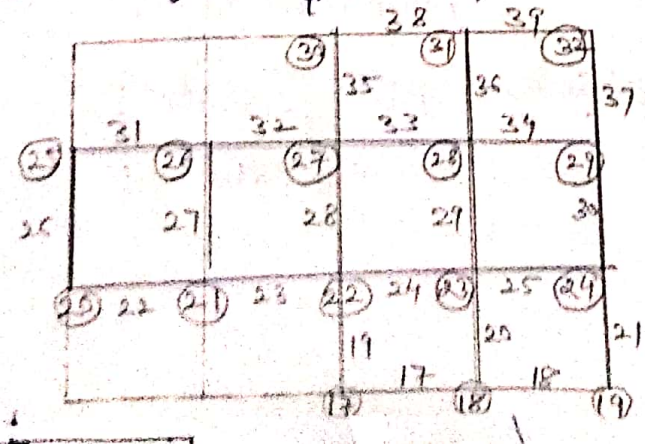
Total no. of joints = 16 × 5 = 80

Total no. of member = 156

Total no. of degree of freedom = 80 × 6 = 480

Numbering of members

Numbering start from bottom column at origin & no. all column first & then proceed to beam.



Node no. & member No. of ground floor Beam

Equivalent load for Joint

Sample for Node (17) {in figure provided}

V_1 = along x axis (Global) = 1.125 KN $\left\{ EQ_x = \frac{\text{Load}}{\text{No. of member joints}} = \frac{18}{16} = 1.125 \right.$

V_2 = along Global Y axis = 1.125 KN $EQ_y = EQ_x$

$V_3 = \frac{Wl}{2}$ (of beam 17) $+ \frac{Wl}{2}$ (of beam 19)

$= 3.37\ KN + 5.76\ KN$

$= 9.13\ KN$

$M_3 = 0$

$M_1 = +W_{19} l_{19}^2$ (along x axis) $M_2 = -\frac{W_{17} l_{17}^2}{12}$ (-ve y)

$M_1 = 2.68\ KN.m$ $= -1.69\ KN.m$

Assumption

i) No diaphragm constraint was considered

ii) Value of E, G, J, I_x, I_y & coordinates of node were taken from SAP.

Important point

Name of file containing member parameter is

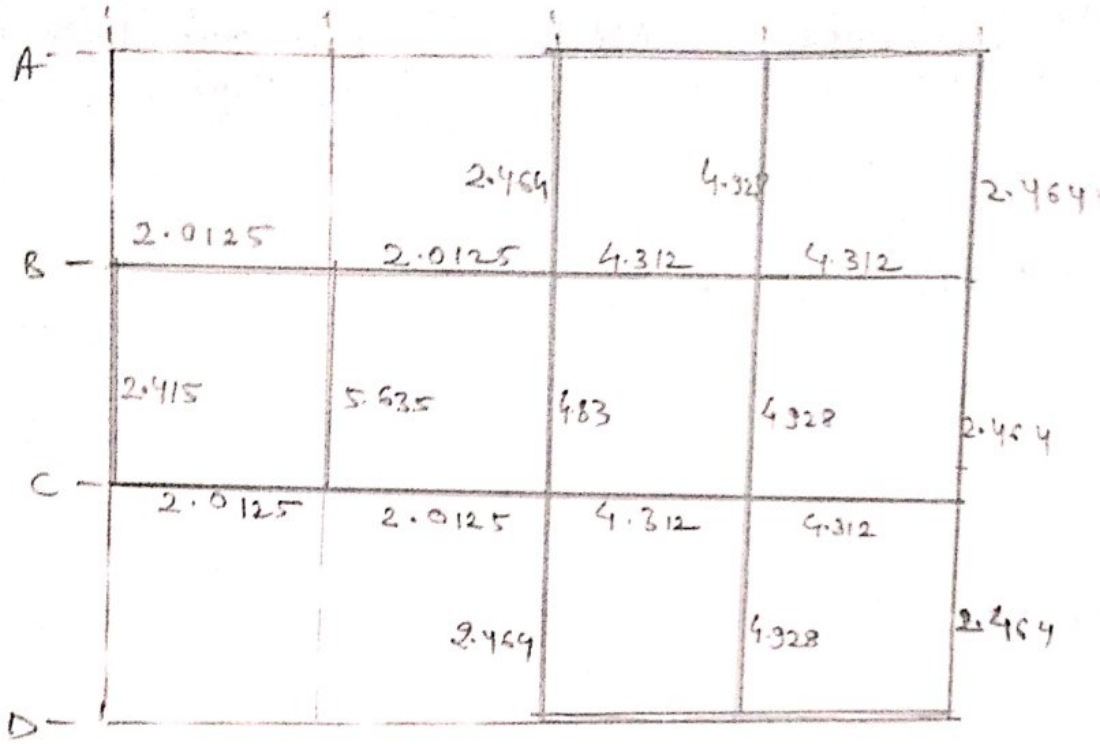
, MEMBERTABLE.xlsx ,

Name of file containing Joint parameter is

, JOINT.xlsx ,

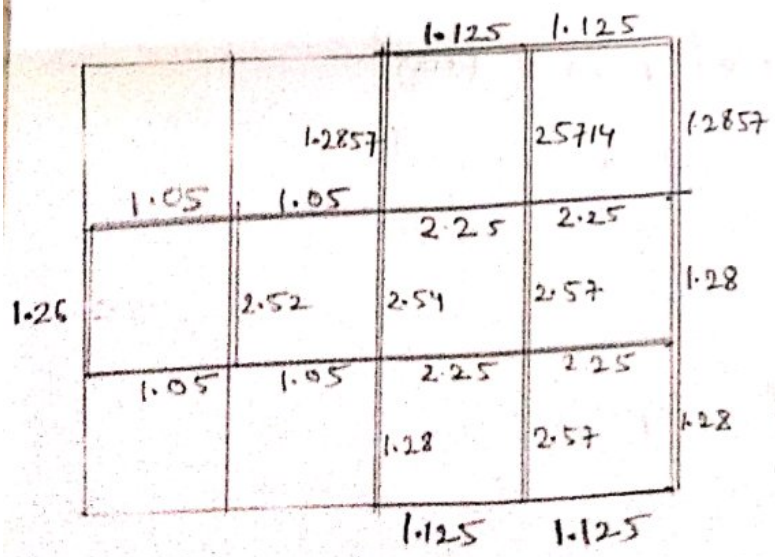
Dead load slab

All in KN/m

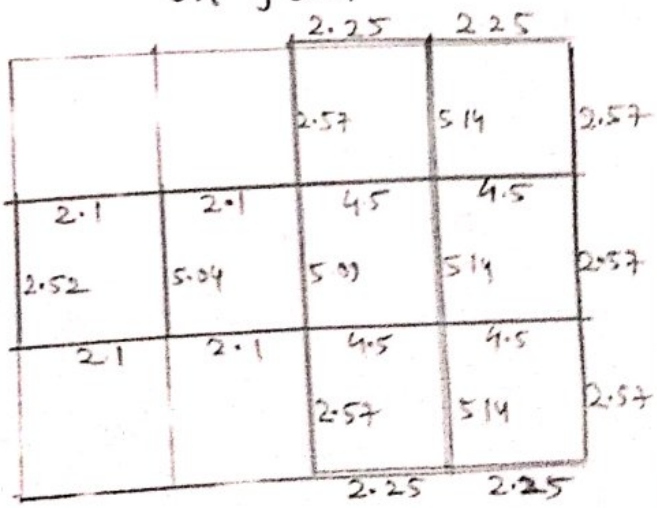


Live loads

On Roof



On floor



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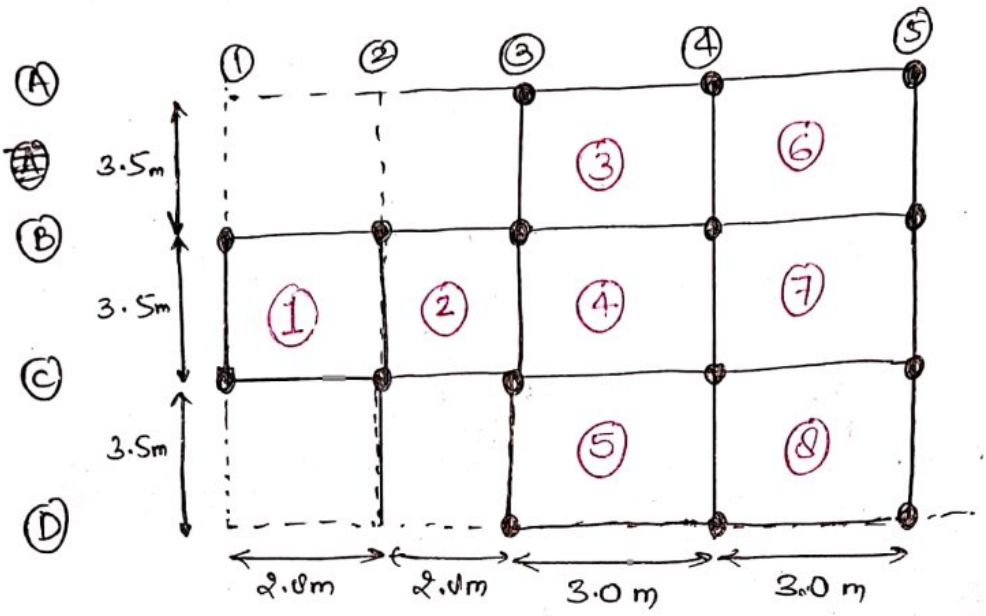
2.0125 kN/m

LOAD CALCULATIONS BY 'TRIBUTARY METHOD'



Tributary Area (T.A.) is a loaded area that contributes to the load on the member supporting that area.

eg: The area from the centre b/w 2 beams to the centre of the next two beams for the full span is the load on the centre beam.

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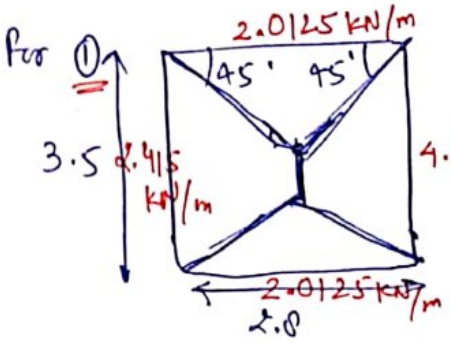


T.A. of $\Delta = \frac{1}{2} \times 2.8 \times 1.4 = 1.96\ m^2$.

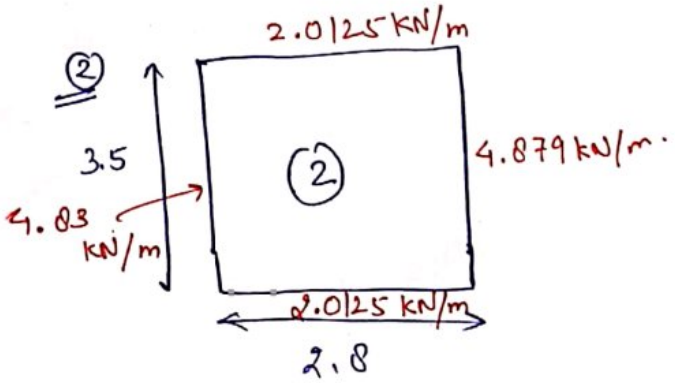
$\therefore udl = \frac{25 \times 1.96 \times 0.115}{2.8}$ → thickness of slab.

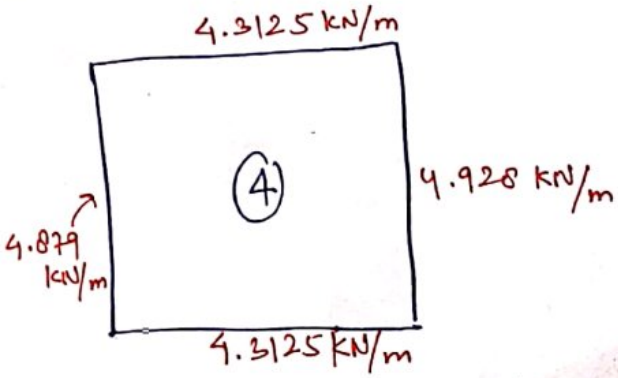
$= 2.0125\ kN/m.$

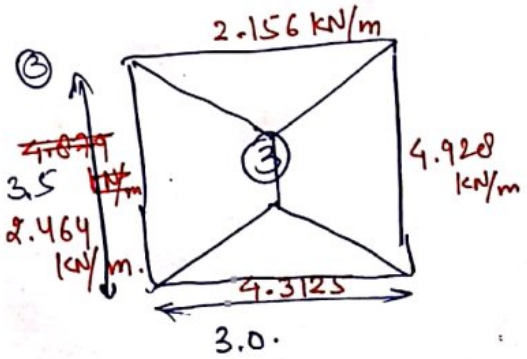
TA of trapezium $= \frac{1}{2} \times (0.7 + 3.5) \times 1.4 = 2.94.$

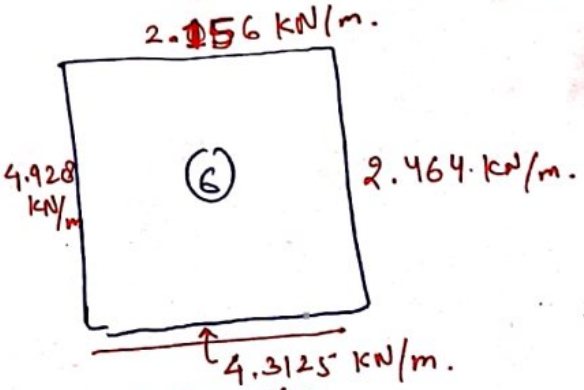
Using symmetry:

$\therefore udl = \frac{25 \times 2.94 \times 0.115}{3.5} = 2.415\ kN/m$





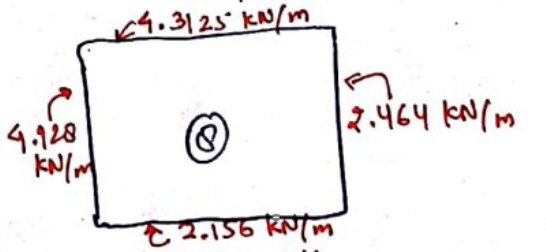


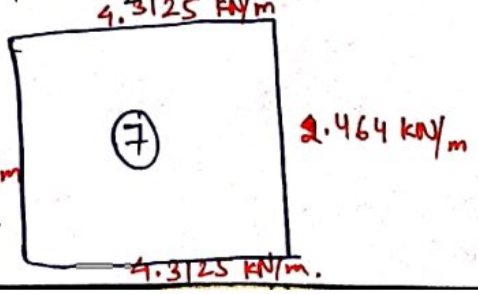


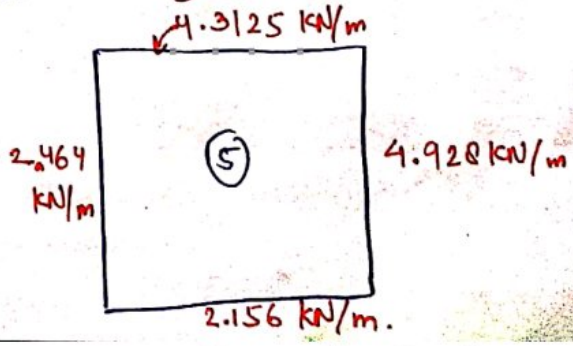
TA. $= \frac{1}{2} \times 1.5 \times 3 = 2.25$

$udl = \frac{25 \times 2.25 \times 0.115}{3} = 2.156$

T. Area of $\Delta = \frac{1}{2} \times (0.5 + 3.5) \times 1.5 = 3\ m^2.$







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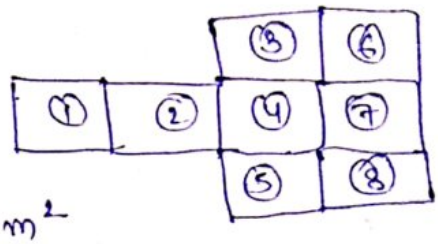
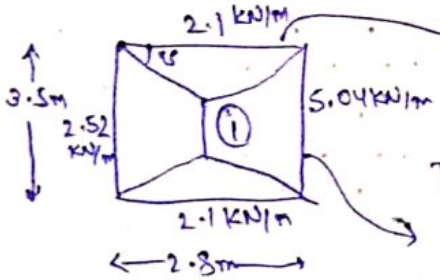
Load calculation for Live load



For every floor except the roof

For 1

TA of $\Delta = \frac{1}{2} \times 2.8 \times 1.4 = 1.96\ m^2$

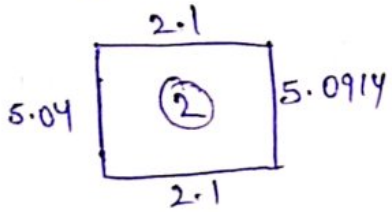


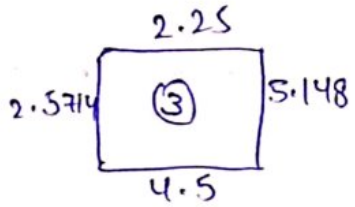
$UDL = \frac{(m^2) 1.96 \times 3\ kPa}{2.8\ (m)} = 2.1\ KN/m$

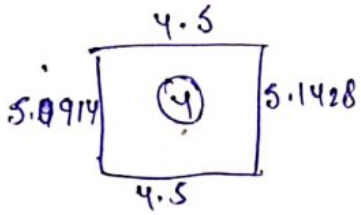
TA of ▱ $= \frac{1}{2} \times (0.7 + 3.5) \times 1.4 = 2.94\ m^2$

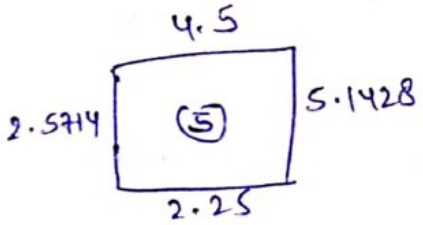
$UDL = \frac{(2 \times 2.94)\ (m^2) \times 3\ (kPa)}{3.5\ (m)} = 5.04\ KN/m$

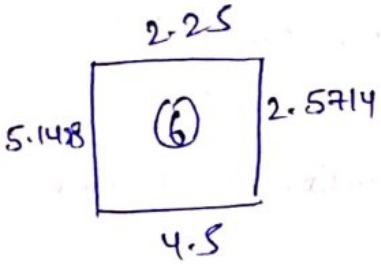
Using Symmetry

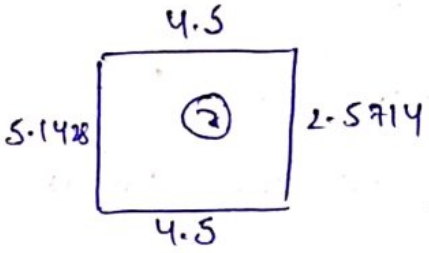


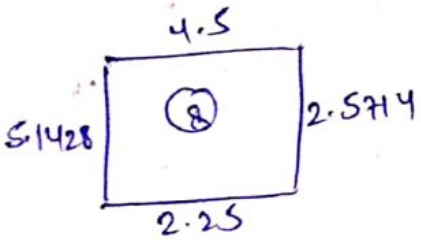












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