CE302 Term Project

Group - 13

Supplementary Calculations for part-(d).

→ Substitute frame method is used to calculate the member end bending moments.

→ Since the cross sectional properties don't vary across the stories, neither does the distribution factor.

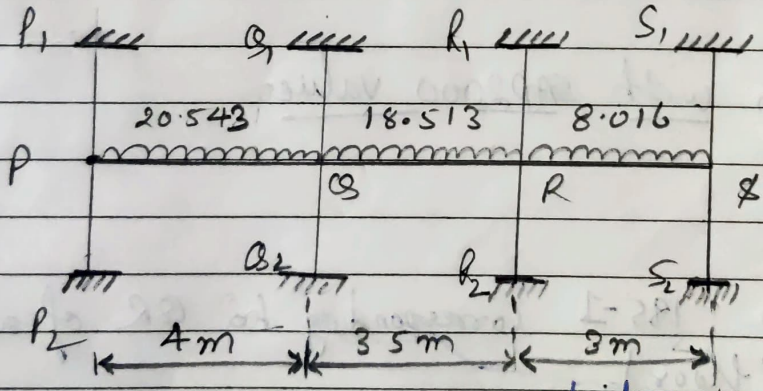
→ Since all ~~stories~~ floors have the same dimensions and loadings, any one of them can be analysed

→ The roof has different loading conditions & needs to be analysed separately.

→ In this approximate method of analysis, sideway due to asymmetric loading is ignored.

→ Analysis is done for frame along gridline (C) as per the model (& gridline 3 as per the question) for load combination 1.5 (DL+LL).

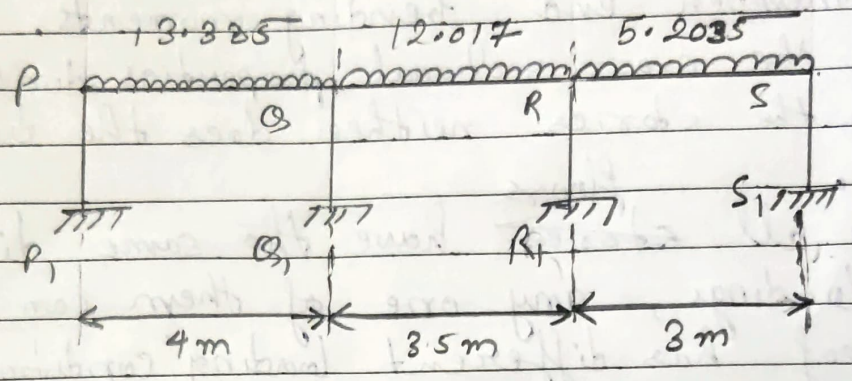
Substitute frame for floors:



* All loading units in KN/m.

* The UDL values are 1.5(DL+LL) combinations. Individual loadings for DL & LL are listed in part (a) calculation sheet.

Substitute frame for roof:



* All UDL units – kN/m
* Values of 1.5 (DL + LL) are shown. Individual DL & LL values in calculation sheet of part (a).

* The moment distribution table & distribution factor calculation is in the excel sheet.

Comparision with SAP2000 values:

Beams

Member 195-1 corresponding to QR of substitute frame (floor).

	SAP2000	Hand calculated
M_{QR}	-20.0171	-23.03
M_{RQ}	-24.1782	15.00

Member 201-1 corresponding to RS in substitute frame (floor)

	SAP2000	Hand calculated
M_{RS}	-3.846	-9.687
M_{SR}	-13.6511	2.939

Column

Member 257-1 corresponding to PP_2 (floor)

	SAP2000	Hand calculated
M_{PP_2}	7.383	10.177
M_{P_2P}	-7.791	-10.177

Member 24-1 corresponding to PP_1 in roof substitute frame

	SAP 2000	Hand calculated
~~M_{PP_2}~~		
M_{PP_1}	14.257	10.375

⇒ The disparity in the values is due to the approximate nature of substitute frame method and also that sidesway is ignored.