

Axial stiffness (A) , Coupling stiffness (B) & Flexural stiffness (D) (Mid Term exam 2017) (50 Marks) [ILO's: a3, b2, b3, d4]

comp. concrete given		
Fc' =	300	Kg/cm ²
Fyst	2400	Kg/cm ²
ε ₀₋	0.003	
ε _{cu-}	0.004	

Tension concrete given		
F _{cu} =	300	Kg/cm ²
F _t =	20	Kg/cm ²
ε ₀₋	0.003	
ε _{cr-}	0.0003	
E _t	66666.667	Kg/cm ²

Steel given		
St 37	360/520	
F _y	3600	Kg/cm ²
F _u	5200	Kg/cm ²
E _s	2000000	Kg/cm ²
ε _{y-}	0.0018	
ε _{u-}	0.054	
ε _{sh-}	0.018	

ε _{cr-}	0.0003	
ε _{a-}	0.0009	
ε _{b-}	0.003	
E _t	66666.66667	Kg/cm ²

axial strain at mid height ε₀₋ = -0.0006

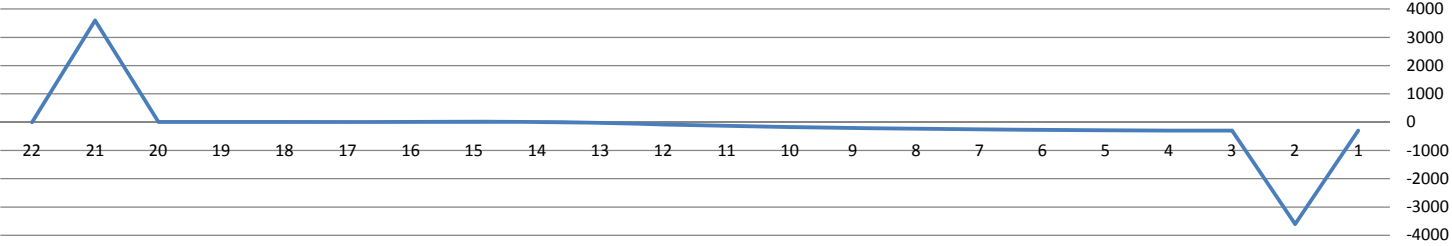
slope = -0.00006

b = 14 cm t = 95 cm

A_s = 19.63495408 cm²
A_s' = 19.63495408 cm²

layer no .	layer type	Ti (CM)	bi (CM)	zi (CM)	ε _i	status	Fi (Kg/CM2)	E secant (Kg/CM2)	A secant (cm2)	B secant (Kg.CM)	D secant (Kg.CM2)	N.F secant (Kg)	B.M secant (Kg.CM)
1	concrete	2.5	14	-46.25	-0.003375	c-comp	-295.3125	87500	3062500	-141640625	6550878906	-10335.9375	478037.1094
2	steel	2.5	7.853981632	-43.75	-0.003225	steel	-3600	1116279.07	21918088.28	-958916362	41952590840	-70685.83469	3092505.268
3	concrete	5	14	-40	-0.003000	c-comp	-300	100000	7000000	-280000000	11200000000	-21000	840000
4	concrete	5	14	-35	-0.002700	c-comp	-297	110000	7700000	-269500000	9432500000	-20790	727650
5	concrete	5	4	-30	-0.002400	c-comp	-288	120000	2400000	-72000000	2160000000	-5760	172800
6	concrete	5	4	-25	-0.002100	c-comp	-273	130000	2600000	-65000000	1625000000	-5460	136500
7	concrete	5	4	-20	-0.001800	c-comp	-252	140000	2800000	-56000000	1120000000	-5040	100800
8	concrete	5	4	-15	-0.001500	c-comp	-225	150000	3000000	-45000000	675000000	-4500	67500
9	concrete	2.5	4	-11.25	-0.001275	c-comp	-200.8125	157500	1575000	-17718750	199335937.5	-2008.125	22591.40625
10	concrete	5	4	-7.5	-0.001050	c-comp	-173.25	165000	3300000	-24750000	185625000	-3465	25987.5
11	concrete	5	4	-2.5	-0.000750	c-comp	-131.25	175000	3500000	-8750000	21875000	-2625	6562.5
12	concrete	5	4	2.5	-0.000450	c-comp	-83.25	185000	3700000	9250000	23125000	-1665	-4162.5
13	concrete	5	4	7.5	-0.000150	c-comp	-29.25	195000	3900000	29250000	219375000	-585	-4387.5
14	concrete	2.5	4	11.25	0.000075	c-ten	5	66666.66667	66666.6667	7500000	84375000	50	562.5
15	concrete	5	4	15	0.000300	c-ten	20	66666.66667	1333333.333	20000000	300000000	400	6000
16	concrete	5	4	20	0.000600	c-ten	13.33333333	22222.22222	444444.4444	888888.889	17777777.8	266.6666667	5333.333333
17	concrete	5	4	25	0.000900	c-ten	6.666666667	7407.407407	148148.1481	3703703.704	92592592.59	133.3333333	3333.333333
18	concrete	5	4	30	0.001200	c-ten	5.714285714	4761.904762	95238.09524	2857142.857	85714285.71	114.2857143	3428.571429
19	concrete	5	14	35	0.001500	c-ten	4.761904762	3174.603175	22222.2222	777777.778	27222222.2	333.3333333	11666.66667
20	concrete	5	14	40	0.001800	c-ten	3.80952381	2116.402116	148148.1481	5925925.926	237037037	266.6666667	10666.66667
21	steel	2.5	7.853981632	43.75	0.002025	steel	3600	1777777.778	34906585.03	1527163095	66813385411	70685.83469	3092505.268
22	concrete	2.5	14	46.25	0.002175	c-ten	2.619047619	1204.159825	42145.59387	1949233.716	90152059.39	91.66666667	4239.583333
									ΣA=	ΣB=	ΣD=	ΣN.F=	ΣB.M=
									104462520	-315009969.1	1.43519E+11	-81578.11012	8800119.706

Stress distribution



Strain distribution

