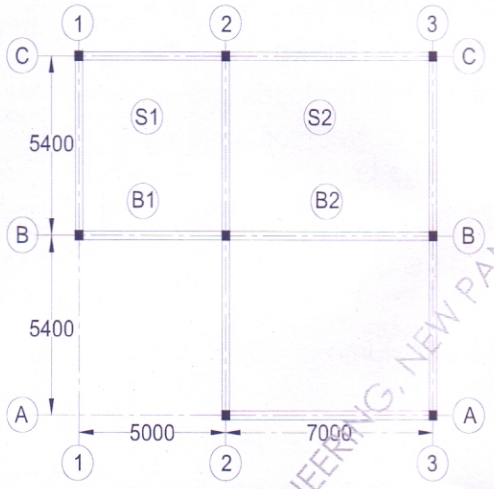
CE/BE/Sem-VIII CBSGS

12/05/16

Sub :- DDRCS

N.B (1) Question **No.1** is **compulsory**.
(2) Attempt any **three** questions out of remaining questions.
(3) Use of IS 456 is **permitted.**

1 Figure below shows a typical framing plan for an office building. The design live load is 3 KN/m^2 and floor finish load is 1.0 KN/m^2. All beams are supporting 230 mm thick brick wall. Floor to floor height is 3.6 m. Grade of concrete M 20 and steel Fe 415. All columns are 300 mm x 300 mm. in size. Design and draw suitable sketches showing designed reinforcement for,



(a) Slab S_1 - S_2 16
(b) Beam B1-B2 16

>>>>>> **OR** <<<<<<

1. (a) Design by approximate method a rectangular R.C.C water tank with open top, 6.0 m x 3.5 m in plan and 4 m in height. Tank is resting on firm ground. Design side walls and base slab. Grade of concrete is M 25 and steel is Fe 415. Check the design for safe stresses. Draw plan @ 1.0 m above base showing reinforcement. Also draw necessary sections showing reinforcement detail. 25
(b) Explain with sketches various type of joints for water tanks. 07

2 Design a doglegged staircase for an office building with dimension of room 3.9 x 5.3 m, floor to floor height is 3.6 m. The first flight starts from plinth beam to mid landing beam and second flight starts from mid landing beam to floor beam of upper storey. Also show arrangement of flights giving details. Draw reinforcement details for both flights. Use M 20 grade concrete and Fe 415 steel. 16

3 A reinforced concrete canilever retaining wall is supporting a backfill of height 4.8 m above ground level with, Density of soil = 17 kN/m^3, Angle of repose = 30^0 , S. B. C. of soil = 200 kN/m^2 and coefficient of friction between concrete and soil = 0.45. Design stem and toe of wall and show all stability checks. Draw reinforcement details of toe and stem showing curtailment of reinforcement. Use M 25 grade concrete and Fe 500 steel. 16

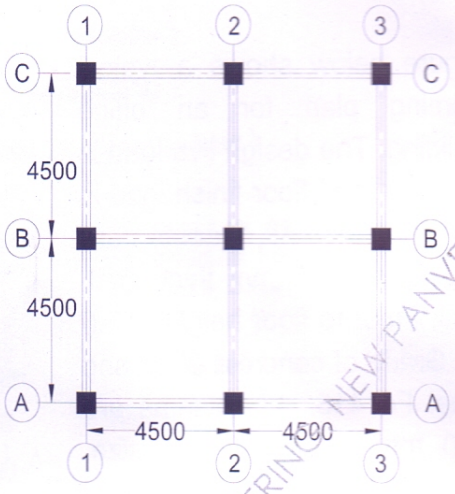
[TURN OVER

4 (a) Design a circular water tank using IS code method for the capacity of 320 m^3 12
Depth of water in tank is limited to 3.8 m including free board. The connection between wall and base slab is rigid. Use M 25 grade concrete and Fe 500 steel.

(b) Explain with neat sketch difference in the behavior of cantilever and counterfort type retaining walls. 04

5 Design the raft foundation for the layout of the columns of a building as shown in the diagram. Working loads are as given below. Net soil bearing capacity = 82 kN/m^2 16

A1, A3, C1 & C3 = 750 kN
B1,A2,B3 & C2 =1250 kN
B2 =200 kN
Size of all column is 460 X 460 mm.



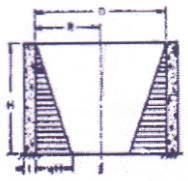
--------X--------

Table 1

TABLE 9 TENSION IN CIRCULAR RING WALL, FIXED BASE, FREE TOP AND SUBJECT TO ——— LAR LOAD

(Clause 3.1.1)

T = Coefficient × wHR kg/m



$\frac{H^2}{Dt}$	Coefficients at Point									
	0·0H	0·1H	0·2H	0·3H	0·4H	0·5H	0·6H	0·7H	0·8H	0·9H
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
0·4	+0·149	+0·134	+0·120	+0·101	+0·082	+0·066	+0·049	+0·029	+0·014	+0·004
0·8	+0·263	+0·239	+0·215	+0·109	+0·160	+0·130	+0·096	+0·063	+0·034	+0·010
1·2	+0·285	+0·271	+0·254	+0·234	+0·209	+0·180	+0·142	+0·099	+0·054	+0·016
1·6	+0·265	+0·268	+0·268	+0·266	+0·250	+0·226	+0·185	+0·134	+0·075	+0·023
2·0	+0·234	+0·251	+0·273	+0·285	+0·285	+0·274	+0·232	+0·172	+0·104	+0·031
3·0	+0·134	+0·203	+0·267	+0·322	+0·357	+0·362	+0·330	+0·262	+0·157	+0·052
4·0	+0·067	+0·164	+0·256	+0·339	+0·403	+0·429	+0·409	+0·334	+0·210	+0·073
5·0	+0·025	+0·137	+0·245	+0·346	+0·428	+0·477	+0·469	+0·398	+0·259	+0·092
6·0	+0·018	+0·119	+0·234	+0·344	+0·441	+0·504	+0·514	+0·447	+0·301	+0·112
8·0	−0·001	+0·104	+0·218	+0·335	+0·443	+0·534	+0·575	+0·530	+0·381	+0·151
10·0	−0·001	+0·098	+0·208	+0·323	+0·437	+0·542	+0·608	+0·582	+0·440	+0·179
12·0	−0·005	+0·097	+0·202	+0·312	+0·429	+0·543	+0·628	+0·632	+0·494	+0·211
14·0	−0·002	+0·098	+0·200	+0·306	+0·420	+0·539	+0·639	+0·666	+0·541	+0·241
16·0	0·000	+0·099	+0·199	+0·304	+0·412	+0·531	+0·641	+0·687	+0·582	+0·265

NOTE 1 — w = Density of the liquid.

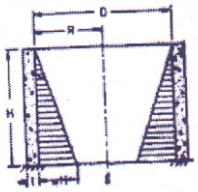
NOTE 2 — Positive sign indicates tension.

Table 2

T____ IOMENTS IN CYLINDRICAL WALL, FIXED BASE, FREE TOP AND SUBJECT TO TRIANGULAR LOAD

(Clause 3.1.1)

Moment = Coefficient × wH^3 kgm/m



$\frac{H^2}{Dt}$	Coefficients at Point									
	0·1H	0·2H	0·3H	0·4H	0·5H	0·6H	0·7H	0·8H	0·9H	1·0H
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
0·4	+0·0005	+0·0014	+0·0021	+0·0007	−0·0042	−0·0150	−0·0302	−0·0529	−0·0816	−0·1205
0·8	+0·0011	+0·0037	+0·0063	+0·0080	+0·0070	+0·0023	−0·0068	−0·0024	−0·0465	−0·0795
1·2	+0·0012	+0·0042	+0·0077	+0·0103	+0·0112	+0·0090	+0·0022	−0·0108	−0·0311	−0·0602
1·6	+0·0011	+0·0041	+0·0075	+0·0107	+0·0121	+0·0111	+0·0058	−0·0051	−0·0232	−0·0505
2·0	+0·0010	+0·0035	+0·0068	+0·0099	+0·0120	+0·0115	+0·0075	−0·0021	−0·0185	−0·0436
3·0	+0·0006	+0·0024	+0·0047	+0·0071	+0·0090	+0·0097	+0·0077	+0·0012	−0·0119	−0·0333
4·0	+0·0003	+0·0015	+0·0028	+0·0047	+0·0066	+0·0077	+0·0069	+0·0023	−0·0080	−0·0268
5·0	+0·0002	+0·0008	+0·0016	+0·0029	+0·0046	+0·0059	+0·0059	+0·0028	−0·0058	−0·0222
6·0	+0·0001	+0·0003	+0·0008	+0·0019	+0·0032	+0·0046	+0·0051	+0·0029	−0·0041	−0·0187
8·0	0·0000	+0·0001	+0·0002	+0·0008	+0·0016	+0·0028	+0·0038	+0·0029	−0·0022	−0·0146
10·0	0·0000	0·0000	+0·0001	+0·0004	+0·0007	+0·0019	+0·0029	+0·0028	−0·0012	−0·0122
12·0	0·0000	−0·0001	+0·0001	+0·0002	+0·0003	+0·0013	+0·0023	+0·0026	−0·0005	−0·0104
14·0	0·0000	0·0000	0·0000	0·0000	+0·0001	+0·0008	+0·0019	+0·0023	−0·0001	−0·0090
16·0	0·0000	0·0000	−0·0001	−0·0002	−0·0001	+0·0004	+0·0013	+0·0019	+0·0001	−0·0079

NOTE 1 — w = Density of the liquid.

NOTE 2 — Positive sign indicates tension on the outside.

TABLE 11 SHEAR AT BASE OF CYLINDRICAL WALL

(*Clauses* 3.1.1, 3.1.2 *and* 3.1.3)

$$v = \text{Coefficient} \times \begin{cases} wH^2 \text{ kg (triangular)} \\ pH \text{ kg (rectangular)} \\ M/H \text{ kg (moment at base)} \end{cases}$$

$\frac{H^2}{Dt}$	Triangular Load Fixed Base	Rectangular Load Fixed Base	Triangular or Rectangular Load Hinged Base	Moment at Edge
0·4	+0·436	+0·755	+0·245	−1·58
0·8	+0·374	+0·552	+0·234	−1·75
1·2	+0·339	+0·460	+0·220	−2·00
1·6	+0·317	+0·407	+0·204	−2·28
2·0	+0·299	+0·370	+0·189	−2·57
3·0	+0·262	+0·310	+0·158	−3·18
4·0	+0·236	+0·271	+0·137	−3·68
5·0	+0·213	+0·243	+0·121	−4·10
6·0	+0·197	+0·222	+0·110	−4·49
8·0	+0·174	+0·193	+0·096	−5·18
10·0	+0·158	+0·172	+0·087	−5·81
12·0	+0·145	+0·158	+0·079	−6·38
14·0	+0·135	+0·147	+0·073	−6·88
16·0	+0·127	+0·137	+0·068	−7·36

NOTE 1 — w = Density of the liquid.

NOTE 2 — Positive sign indicates shear acting inward.