B.E. Sem-VIII CIVIL

Design & Drawing of Reinforced Concrete Structures

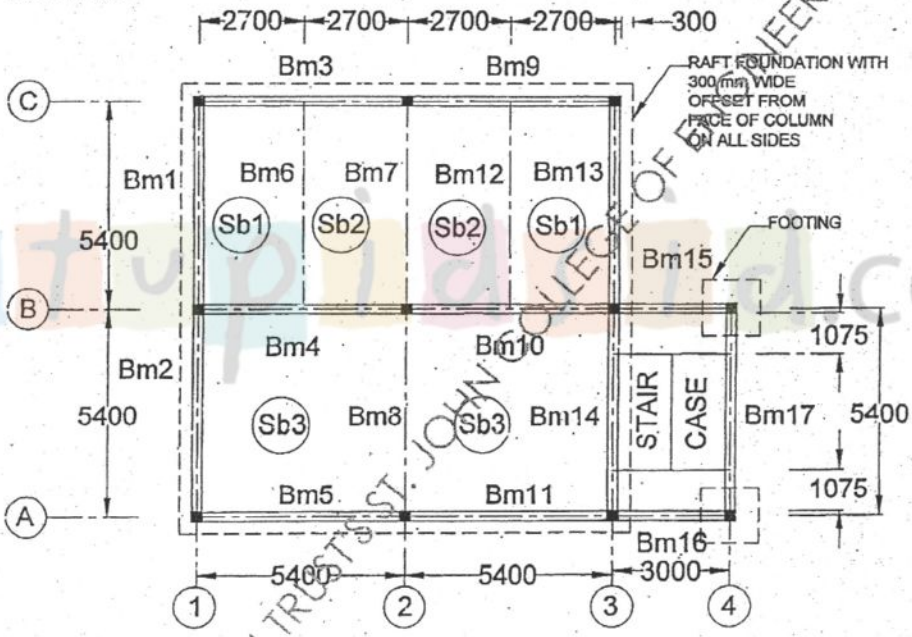
QP Code : 8131

(4 Hours) **[Total Marks : 100**

26 MAY 2015

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 a office building. The design live load is 4 KN/m^2 and floor finish load is 1.5 KN/m^2. All external beams and beam Bm4 and Bm10 are supporting 230 mm thick brick wall. Floor to floor height is 3.2 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 Sb_1 - Sb_2 15

(b) Beam Bm_7 - Bm_8 25

Draw to the scale suitable sketches showing designed reinforcement.

<<<OR>>>

1. (a) Design by approximate method a rectangular R.C.C water tank 6.0 m x 4.0 m in plan and 3.3 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. 32

(b) Explain with sketches various type of joints for water tanks. 08

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2 Design a doglegged staircase for a office building as shonw in figure given in Q. No. 1. Also show arrangmant of flights giving details. Draw reinforcement details for both flights. Use M 20 grade concrete and Fe 415 steel. 20

3 A reinforced concrete canilever retaining wall is supporting a backfill of height 4.2 m above ground level with, Density of soil = 16.5 kN/m^3, Angle of repose = 30^0 , S. B. C. of soil = 195 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 renforcement. Use M 25 grade concrete and Fe 500 steel. 20

4 (a) Design a circular water tank using IS code method for the capacity of 350 m^3 Depth of water in tank is limited to 4.0 m including free board. The connection between wall and base slab is rigid. Use M 25 grade concrete and Fe 500 steel. 15

(b) 1. Explain when following types of foundation are preferred- 05

1. Isolate footing
2. Combined footing
3. Raft foundation

2. Explain with neat sketch difference in the behavior of cantilever and countrfort type retaining walls. 20

5 Design and draw with the data given in Q. No.1 Raft foundation as shown in figure by dotted line supporting the columns with working loads as given below. Net bearing capacity = 65 kN/m^2

A1, A3, C1 & C3	= 800 kN
B1,A2,B3 & C2	=1000 kN
B2	=1600 kN

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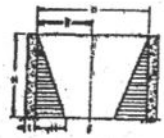
Table 1

TABLE 1 TENSION IN CIRCULAR RING WALL, FIXED BASE, FREE TOP AND SUBJECT TO TRIANGULAR 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	+0·189	+0·160	+0·130	+0·096	+0·063	+0·034	+0·010
1·2	+0·283	+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	+0·025
2·0	+0·234	+0·251	+0·273	+0·285	+0·285	+0·274	+0·232	+0·172	+0·105	+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	+0·405	+0·429	+0·409	+0·334	+0·210	+0·075
5·0	+0·025	+0·137	+0·245	+0·346	+0·428	+0·477	+0·469	+0·388	+0·259	+0·092
6·0	+0·018	+0·119	+0·234	+0·344	+0·441	+0·504	+0·514	+0·417	+0·301	+0·112
8·0	−0·001	+0·104	+0·218	+0·335	+0·443	+0·554	+0·575	+0·530	+0·381	+0·151
10·0	−0·001	+0·098	+0·208	+0·323	+0·437	+0·542	+0·608	+0·589	+0·440	+0·179
12·0	−0·005	+0·097	+0·202	+0·312	+0·429	+0·543	+0·628	+0·633	+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.

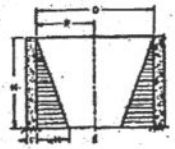
NOTE 2 — Positive sign indicates tension.

Table 2

T[illegible] MOMENTS 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.

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Table 3

TABLE 22 SHEAR AT BASE OF CYLINDRICAL WALL

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

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

$\frac{H^2}{Dt}$	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.

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