

SARDAR PATEL COLLEGE OF ENGINEERING

(An Autonomous Institution Affiliated to University of Mumbai)

Subject : Design and drawing of Reinforced concrete structures

CLASS: BE (CIVIL) / SEM.VIII

Total Marks : 100

Date: 27 /04/2015

Duration : 4 Hour

- Figures to the right indicate full marks.
- Assume suitable data if necessary and state the same clearly.
- Solve any **Five** questions.
- Use of IS: 456 is permitted.

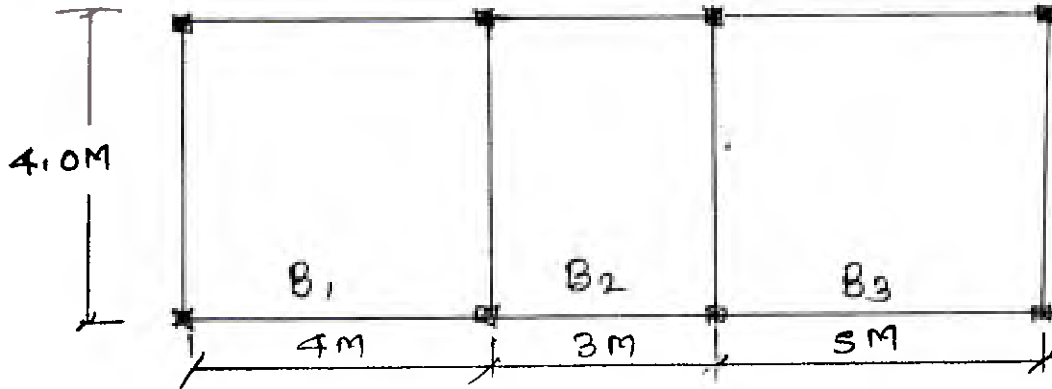
Master

- Q. 1 Write short notes on: (20)
- Steps for calculating forces of Underground rectangular water tank
 - Explain the codal provisions for achieving water tightness in case of water tank design.
 - Difference between one way and two way slab.
 - Explain need for raft and various types of raft footings.
- Q. 2 For a residential building design a dog legged staircase for floor to floor height of 3.2 Met. Width of staircase block 3.5 met and length of staircase block 5.5 met. Live load on slab = 4.0 Kn/m^2 , floor finish = 1.0 Kn/m^2 . Draw staircase block in plan with proper dimensions. Design flight from mid landing to landing and draw reinforcement. Grade of concrete M 20. Grade of steel Fe 415 (20)
- Q. 3 Design a cantilever retaining wall of height 3.75 M above ground level with level back fill with following properties: (20)
- Angle of shearing resistance $\theta = 30^\circ$, SBC of soil at depth of 1.25 met = 200 Kn/m^2
Unit weight of soil = 18 Kn/m^3 , Angle of friction between soil and concrete = 0.5
Perform all stability checks. **Design heel only**. Grade of concrete M 20. Grade of steel Fe 415. Draw reinforcement details.
- Q. 4 Design Circular tank with fixed base resting on ground for capacity of 250 m^3 and height of tank restricted to 4.5 met. Grade of concrete M 20. Grade of steel Fe 415 (20)
- Q. 5 Design a rectangular water tank 4.5 m x 6.0 m in plan and tank height as 3.0 m resting on ground and open at top using IS code method of design. Perform all design checks and draw reinforcement details. Grade of concrete M 20. Grade of steel Fe 415. (20)

BE (CIVIL) Sem-VIII, 27/11/15

Design & Drawing of Reinforce concrete ~~system~~ structure

- Q.6 Design beams marked as B1-B2-B3 (Fig 1) and subjected to load of 230 mm thk (20) wall of height 3.0M. Assume thickness of slab as 120mm, floor finish on slab = 1.0 Kn/m², Live load on slab = 4.0 Kn/m² Draw Section showing reinforcement detailing. Grade of concrete M 20. Grade of steel Fe 415



- Q.7 For the symmetrically loaded raft shown below calculate reactions on raft beams R1, (20) R2, R3, R4. Perform check for load equilibrium and design for beam B1-B2-B3 along with raft slab. Load on column C1 = 1750KN, C2 = 2500 KN, C3 = 3500 KN. SBC at a depth of 3.0 m is 250 KN/M². Additional load at plinth level 10 KN/M². Unit weight of soil = 18 Kn/m³ and for PCC 24 Kn/m³.

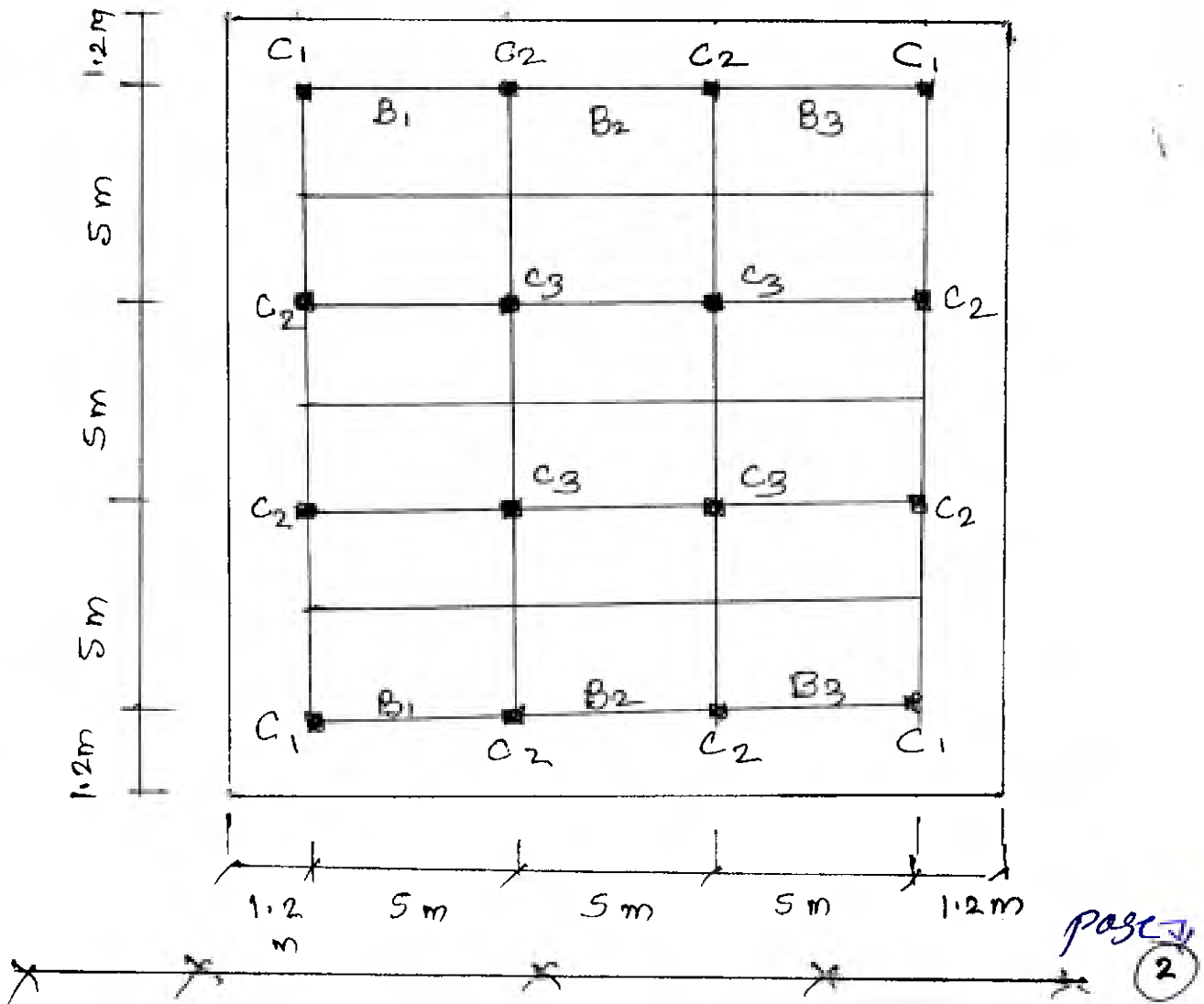


TABLE 3 MOMENT COEFFICIENTS FOR INDIVIDUAL WALL PANEL, TOP FREE, BOTTOM AND VERTICAL EDGES FIXED

(Clauses 2.1, 2.1.1, 2.2 and 2.2.2)

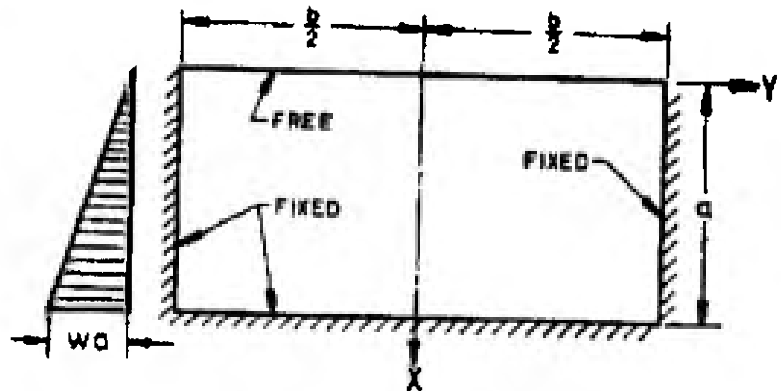
a = height of the wall

b = width of the wall

w = density of the liquid

Horizontal moment = $M_x wa^3$

Vertical moment = $M_y wa^3$



b/a	x/a	$y = 0$		$y = b/4$		$y = b/2$	
		M_x	M_y	M_x	M_y	M_x	M_y
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
3.00	0	0	+0.025	0	+0.014	0	-0.082
	1/4	+0.010	+0.019	+0.007	+0.013	-0.014	-0.071
	1/2	+0.005	+0.010	+0.008	+0.010	-0.011	-0.055
	3/4	-0.033	-0.004	-0.018	-0.000	-0.006	-0.028
	1	-0.126	-0.025	-0.092	-0.018	0	0
2.50	0	0	+0.027	0	+0.013	0	-0.074
	1/4	+0.012	+0.022	+0.007	+0.013	-0.013	-0.066
	1/2	+0.011	+0.014	+0.008	+0.010	-0.011	-0.053
	3/4	-0.021	-0.001	-0.010	-0.001	-0.005	-0.027
	1	-0.108	-0.022	-0.077	-0.015	0	0
2.00	0	0	+0.027	0	+0.009	0	-0.060
	1/4	+0.013	+0.023	+0.006	+0.010	-0.012	-0.059
	1/2	+0.015	+0.016	+0.010	+0.010	-0.100	-0.049
	3/4	-0.008	+0.003	-0.002	+0.003	-0.005	-0.027
	1	-0.086	-0.017	-0.059	-0.012	0	0

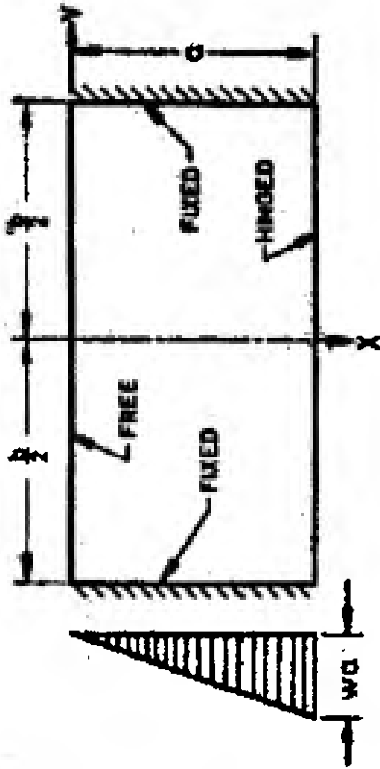
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TABLE 3 MOMENT COEFFICIENTS FOR INDIVIDUAL WALL PANEL, TOP FREE, BOTTOM AND VERTICAL EDGES FIXED-Contd

b/a	x/a	y = 0		y = b/4		y = b/2	
		M _x	M _y	M _x	M _y	M _x	M _y
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1.75	0	0	+0.025	0	+0.007	0	-0.050
	1/4	+0.012	+0.022	+0.005	+0.008	-0.010	-0.052
	1/2	+0.016	+0.016	+0.010	+0.009	-0.009	-0.046
	3/4	-0.002	-0.005	+0.001	-0.004	-0.005	-0.027
	1	-0.074	-0.015	-0.050	-0.010	0	0
1.50	0	0	+0.021	0	+0.005	0	-0.040
	1/4	+0.008	+0.020	+0.004	+0.007	-0.009	-0.044
	1/2	+0.016	+0.016	+0.010	+0.008	-0.008	-0.042
	3/4	-0.003	-0.006	+0.003	-0.004	-0.005	-0.026
	1	-0.060	-0.012	-0.041	-0.008	0	0
1.25	0	0	+0.015	0	+0.003	0	-0.029
	1/4	+0.005	+0.015	+0.002	+0.005	-0.007	-0.034
	1/2	+0.014	+0.015	+0.008	+0.007	-0.007	-0.037
	3/4	+0.006	+0.007	+0.005	+0.005	-0.005	-0.024
	1	-0.047	-0.009	-0.031	-0.006	0	0
1.0	0	0	+0.009	0	+0.002	0	-0.018
	1/4	+0.002	+0.011	+0.000	+0.003	-0.005	-0.023
	1/2	+0.009	+0.013	+0.005	+0.005	-0.006	-0.029
	3/4	+0.008	-0.008	+0.005	+0.004	-0.004	-0.020
	1	-0.035	-0.007	-0.022	-0.005	0	0
0.75	0	0	+0.004	0	+0.001	0	-0.007
	1/4	+0.001	+0.008	+0.000	+0.002	-0.002	-0.011
	1/2	+0.005	+0.010	+0.002	+0.003	-0.003	-0.017
	3/4	+0.007	+0.007	+0.003	+0.003	-0.003	-0.013
	1	-0.024	-0.005	-0.015	-0.003	0	0
0.50	0	0	+0.001	0	+0.000	0	-0.002
	1/4	+0.000	+0.005	+0.000	+0.001	-0.001	-0.004
	1/2	+0.002	+0.006	+0.001	+0.001	-0.002	-0.009
	3/4	+0.004	+0.006	+0.001	+0.001	-0.001	-0.007
	1	-0.015	-0.003	-0.008	-0.002	0	0

TABLE 3 SHEAR AT EDGES OF WALL PANEL FREE AT TOP AND HINGED AT BOTTOM*

(Classes 2.3.2, 2.3.4, 2.3.4.1, 2.3.5 and 2.3.6)



	1	2	3
(1)	(2)	(4)	(5)
Mid-point of bottom edge	+0.141 $w a^2$	+0.38 $w a^2$ †	+0.45 $w a^2$ †
Corner of bottom edge	-0.258 $w a^2$	-0.589 $w a^2$	-0.590 $w a^2$
Top of fixed side edge	$w a^2$	+0.100 $w a^2$	+0.165 $w a^2$
Mid-point of fixed side edge	+0.128 $w a^2$	+0.375 $w a^2$	+0.406 $w a^2$
Lower third-point of side edge	+0.174 $w a^2$	+0.406 $w a^2$	+0.416 $w a^2$
Lower quarter-point of side edge	+0.192 $w a^2$	+0.390 $w a^2$	+0.398 $w a^2$
Total at bottom edge	0.048 $w a^2 b$	0.204 $w a^2 b$	0.286 $w a^2 b$
Total at one fixed side edge	0.226 $w a^2 b$	0.148 $w a^2 b$	0.107 $w a^2 b$
Total at all four edges	0.500 $w a^2 b$	0.500 $w a^2 b$	0.500 $w a^2 b$

NOTE 1 — w = Density of the liquid.

NOTE 2 — Data are derived by modifying values computed for walls hinged at top and bottom.

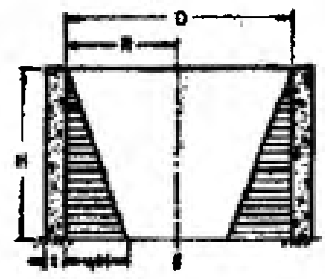
* Negative sign indicates that reaction acts in direction of load.

† This value could not be estimated accurately beyond two decimal places.

BEC (CIVIL), Sem-VIII, Sem-27/4/15
 Design & Drawing of Reinforced Concrete Structure.

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

(Clause 3.1.1)



$T = \text{Coefficient} \times wHR \text{ kg/m}$

$\frac{H^2}{D}$	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	+0.268	+0.239	+0.215	+0.109	+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	+0.023
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	+0.589	+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.

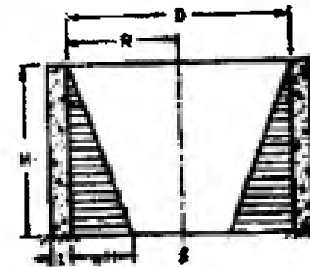
IS : 3370 (Part IV) -1967

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TABLE 10 MOMENTS IN CYLINDRICAL WALL, FIXED BASE, FREE TOP AND SUBJECT TO TRIANGULAR LOAD

(Clause 3.1.1)

Moment = Coefficient $\times wH^3$ kgm/m



COEFFICIENTS AT POINT

$\frac{H^2}{D}$	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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BE (Civil), Sem - VIII, 27/4/15
 Design & Drawing of Reinforced Concrete Structure
 IS : 3370 (Part IV) - 1967

TABLE 11 SHEAR AT BASE OF CYLINDRICAL WALL

(Clauses 3.1.1, 3.1.2 and 3.1.3)

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

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

BE (CIVIL), Sem - VIII, 15/6/15, Re-exam
Design & Drawing of Reinforced Concrete Structure.

Bharatiya Vidya Bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(An Autonomous Institution Affiliated to University of Mumbai)

Subject : Design and drawing of Reinforced concrete structures

CLASS: BE (CIVIL) SEM VIII

Total Marks : 100

Date: 15/06/2015

Duration : 4 Hour

- Figures to the right indicate full marks.
- Assume suitable data if necessary and state the same clearly.
- Solve any Five questions.
- Use of IS: 456 is permitted.

Master

- Q. 1 Write short notes on: (20)
- Types of joints in water tank
 - Need for raft foundation and different types of raft foundation..
 - Difference between one way and two way slab.
 - Difference between cantilever and counter fort type retaining wall.
- Q. 2 Design a cantilever retaining wall of height 3.5 M above ground level with level back (20)
fill with following properties:
Angle of shearing resistance $\theta = 30^\circ$, SBC of soil at depth of 1.5 met = 200 Kn/m²
Unit weight of soil = 18 Kn/m³, Angle of friction between soil and concrete = 0.5
Perform all stability checks. Design Stem only. Grade of concrete M 20. Grade of steel Fe 415
- Q. 3 For a residential building design a dog legged staircase for floor to floor height of 3.2 (20)
Met. Width of staircase block 3.3 met and length of staircase block 5.4 met. Live
load on slab = 4.0 Kn/m², floor finish = 1.0 Kn/m². Draw staircase block in plan with
proper dimensions. Design only one flight from mid landing to floor landing and
draw reinforcement in detail. Grade of concrete M 20. Grade of steel Fe 415
- Q. 4 Design a rectangular water tank 4.0 m x 6.0 m in plan and tank height as 3.2 m using (20)
approximate method of design. Grade of concrete M 20. Grade of steel Fe 415. *
- Q. 5 Design Circular tank with fixed base resting on ground for capacity of 410 m³ and (20)
height of tank restricted to 6.0 met. Grade of concrete M 20. Grade of steel Fe 415
- Q. 6 Design continuous one way slab marked as S1 and S2 (Fig 1) and subjected to Live (20)
load on slab = 4.0 Kn/m², floor finish = 1.0 Kn/m². Draw Section showing
reinforcement detailing. Grade of concrete M 20. Grade of steel Fe 415
- Q. 7 For the symmetrically loaded raft shown in Fig.2 below calculate reactions on raft (20)
beams R1, R2, R3, R4 . Perform check for load equilibrium and design for beam
B1-B2-B3 along with raft slab. Load on column C1 = 1750KN, C2 = 2000 KN, C3 =

BE (CIVIL), Sem-VIII, 15/6/15, Re-edam
 Design & Drawing of Reinforced concrete structure

3000 KN. SBC at a depth of 3.0 m is 250 KN/M^2 . Additional load at plinth level-10 KN/M^2 . Unit weight of soil = 18 KN/m^3 and for PCC 24 KN/m^3 .

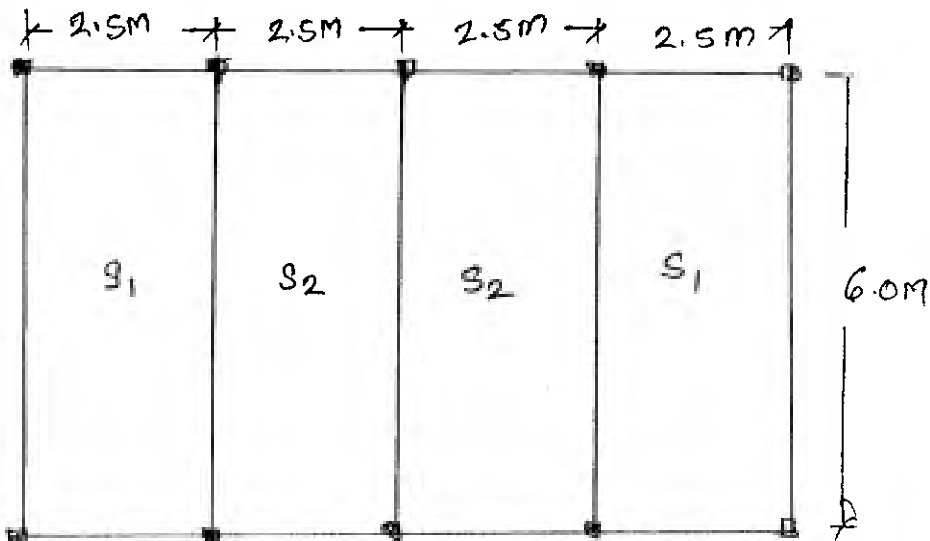


FIGURE 1

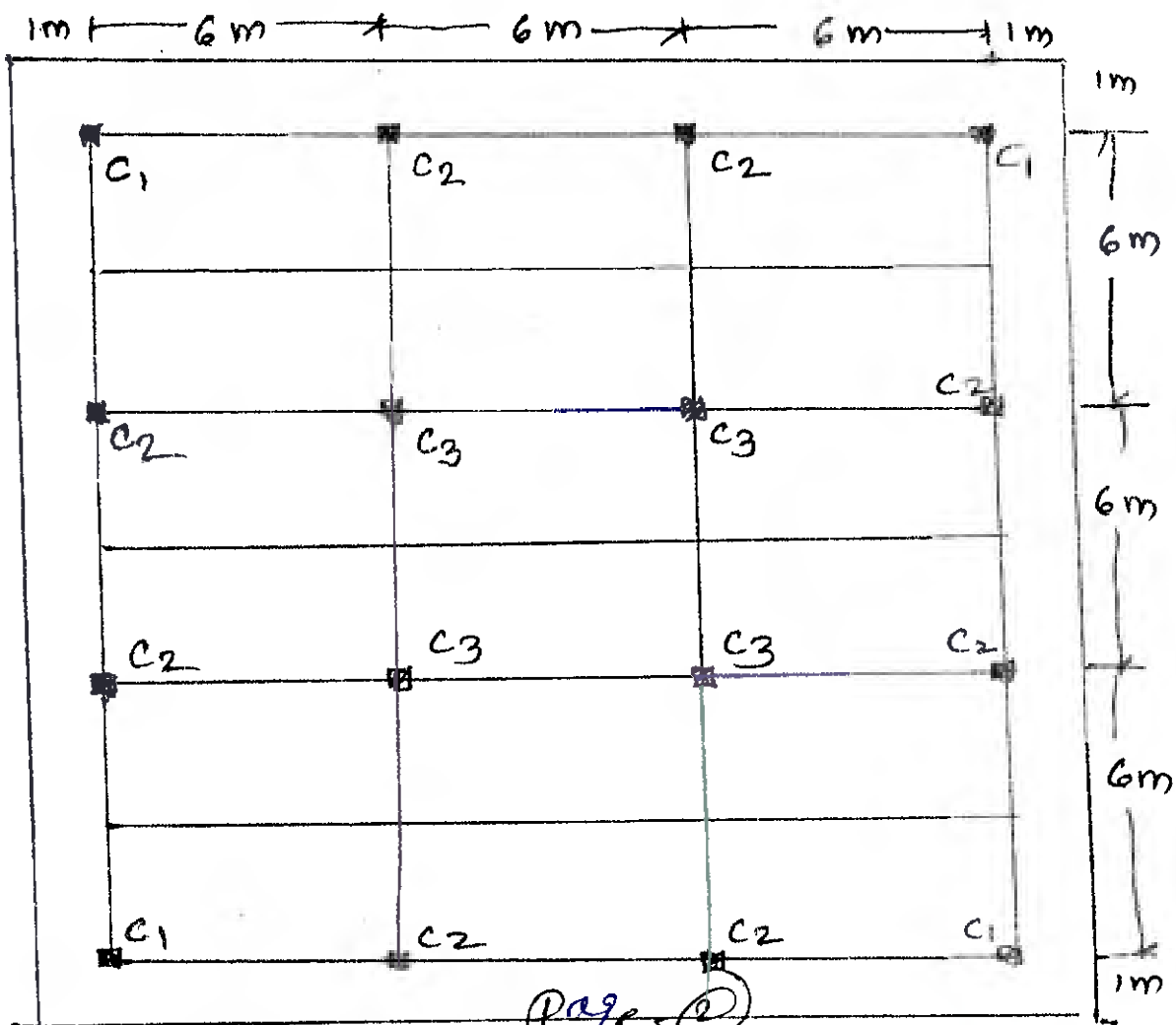
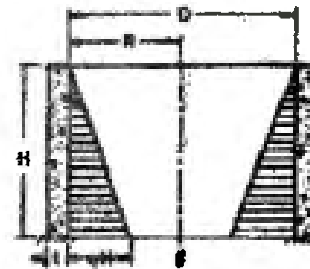


FIGURE 2

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

(Clause 9.1.1)



$T = \text{Coefficient} \times wHR \text{ kg/m}$

$\frac{H^2}{D}$	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	+0.199	+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	+0.023
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	+0.023	+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	+0.589	+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.

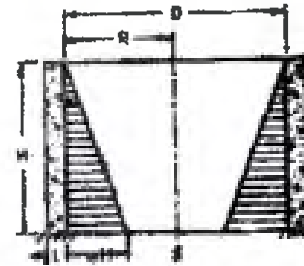
NOTE 2 — Positive sign indicates tension.

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Page 3

BE (CIVIL), Sem. VIII, 15/6/15, Kr. Exam
Design & Drawing of Reinforced Concrete Structure.
IS : 3370 (Part IV) -1967

TABLE 10 MOMENTS IN CYLINDRICAL WALL, FIXED BASE, FREE TOP AND SUBJECT TO TRIANGULAR LOAD

(Class 3.1.1)



Moment = Coefficient $\times wH^3$ kgm/m

$\frac{H^2}{D}$	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 11 SHEAR AT BASE OF CYLINDRICAL WALL

(Clauses 3.1.1, 3.1.2 and 3.1.3)

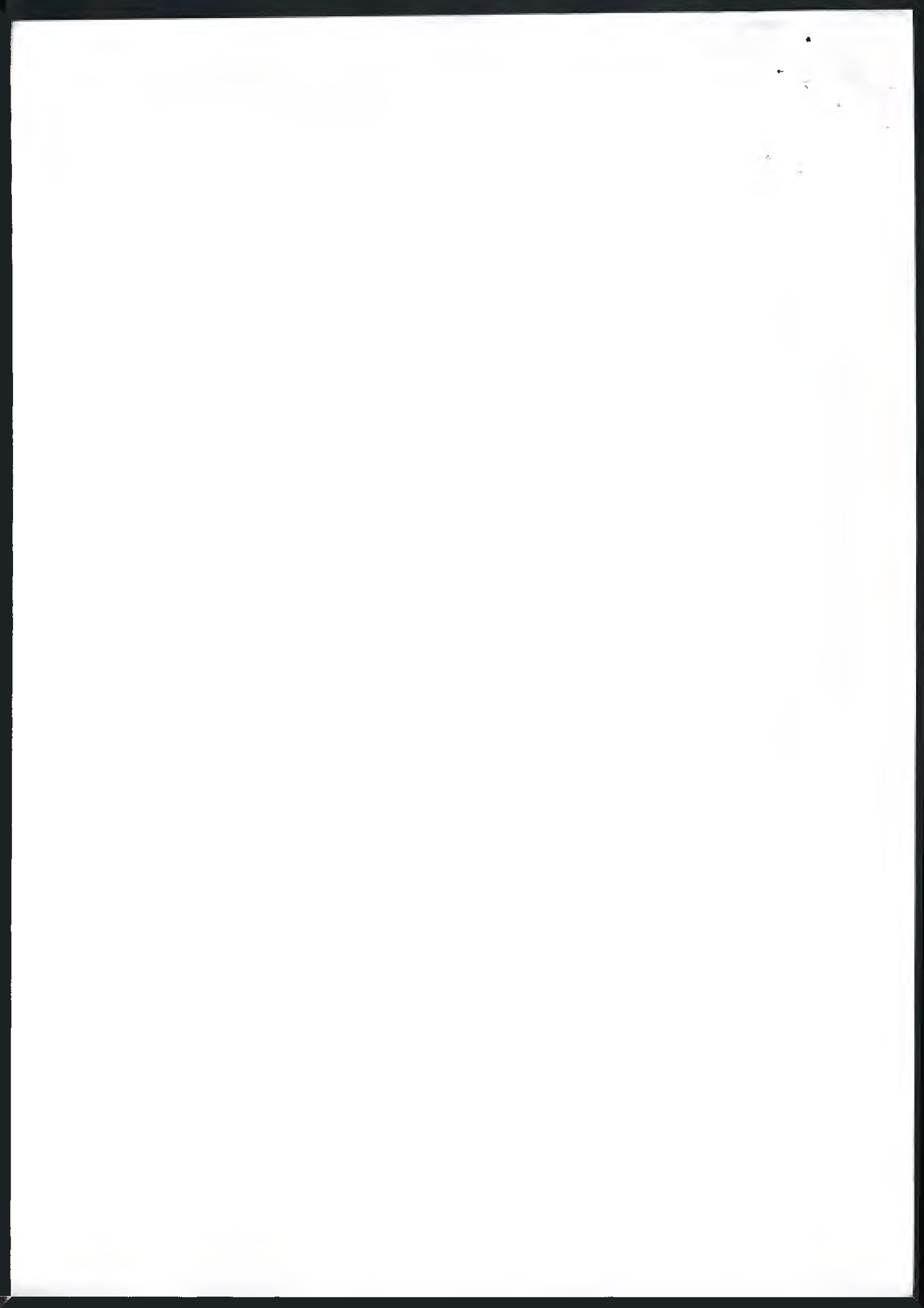
$$v = \text{Coefficient} \times \begin{cases} wH^2 \text{ kg (triangular)} \\ \rho H \text{ kg (rectangular)} \\ M/H \text{ kg (moment at base)} \end{cases}$$

$\frac{H^2}{D^2}$	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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BE (CIVIL), Sem- VIII,

Lib

29-4-15

Quantity Survey, Estimation & Valuation.

Bharatiya Vidya Bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(An Autonomous Institution Affiliated to University of Mumbai)

Class/Sem: B.E. (Civil)/Sem-VIII.

Date: 29th April 2015

Total Marks: 100

Duration: 4 Hours

Subject: Quantity Survey, Estimation and Valuation

1. Q1 compulsory
2. Answers to all sub questions should be grouped together.
3. Illustrate answer with neat sketches wherever required.
4. Make suitable assumptions where necessary and state them clearly.
5. Figure to right indicate full marks.

Master

Q1) Figure 1 Shows plan and sectional detail of load bearing structure. Prepare a measurement sheet for following work. (20M)

- a) Earthwork in excavation including backfill
- b) (1:3:6) Lime concrete in foundation
- c) First class brick work in (1:4) cement mortar up to plinth level
- d) 12mm internal plastering (1:6) cement mortar

ATTEMPT ANY FOUR OUT OF SIX.

Q2 a) State different types of estimate and distinguish between revised estimate and supplementary estimate. (5M)

Q2b) Explain the following terms contingencies and work establishment charges. (5M)

Q2c) Prepare a preliminary estimate of a primary school building for 300 students in order to assess the amount of fund based on the following particulars. (10M)

- i) Carpet area per student 1.10sq.m
- ii) Area of corridor, verandah and lavatories etc – 20% of the plinth area
- iii) Area of walls = 10% of plinth area
- iv) Consider plinth area rate = 7500 per sq. m
- v) Cost of water supply = 5% of the building cost
- vi) Cost of sanitation = 6% of the building cost
- vii) Cost of electrification = 12 % of the building cost
- viii) Cost of approach road = 2% of the building cost
- ix) Contingency & work establishment charges 3% & 2% respectively.

Q3a) Define contract and explain in brief essentials of contract. (10M)

Q3b) Explain the following terms Earnest money and liquidated damages (5M)

Q3c) Explain with an example balance and unbalance tender (5M)

Page-1

P.T.O

B.E.Civil, sem-VIII, 29/4/15

Quantity Survey, Estimation & Valuation

Q4a) Perform a rate analysis for 1st class brick work in superstructure with (1:3) cement mortar. The task work of labour is as follow (5M)

LABOUR	WORK PER DAY
head mason	20cum
mason	1.25cum
mazdoor	0.7cum
Bisti	5cum

Q4b) Calculate material required for executing item b of Question no.1 (5M)

Q4c) Write general specification for modern road. (10M)

Q5a) A semicircular retaining wall of inner radius 10m is to be constructed as given in figure no. 2. Calculate the quantity of cement concrete required and Prepare a bar bending schedule for the retaining wall (Show the calculations) (15M)

Q5b) Prepare an abstract sheet for retaining wall in above question. (5M)

Q6a) A metalled road is to be constructed with 7m carriage way. Calculate the quantity of earthwork and area of turfing for the given chainage by mean area method. The cross section of the carriage way is given in figure no. 3. (10M)

Chainage meters	0	100	200	300	400	500	600	700	800	900	1000	
R.L	213.25	213.50	214	213.95	214.75	215.45	216.25	217.30	216.85	216.75	216.65	
Formation	213.75	upward gradient 1 in 200						Downward gradient 1 in 400				
Side slope	In banking 2:1, In cutting 1:1											

Q6b) Prepare a measurement sheet for the following item in Question no. 6a (10M)

- i) Quantity of earthwork
- ii) 100mm thick consolidated stone boulder
- iii) 75mm thick consolidated stone metal 40mm gauge
- iv) 25mm thick premix carpet

Quantity Survey, Estimation & Valuation

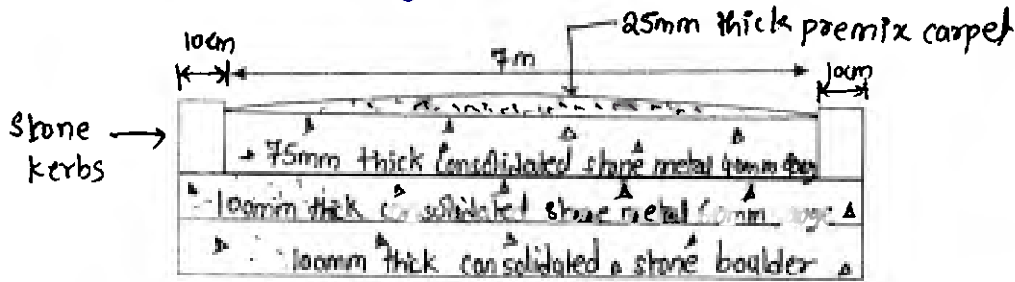
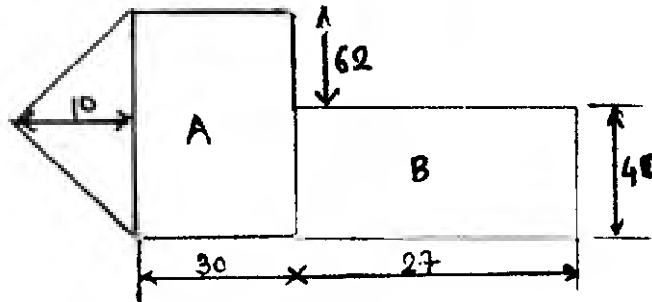


Figure no.3

- Q7 a) The annual rent received from a property is Rs. 4.8 lakhs. The future life of the building is estimated to be 12 years. However, if certain structural repairs are carried out at a cost of Rs. 3 lakhs, the estimated life will increase by 13 years. Assuming rate of interest for sinking fund as 5% and rate of interest in scheduled bank as 9%. determine if repairs are recommended or not. (10M)
- b) A plot of land A, measuring 3570m² has been sold for Rs. 25 crores. An adjoining plot B has been sold at Rs. 1900 per m² having frontage of 27 m and depth as 40 m. Analyse plot A by belting method and neglect effect of price A due to its greater area. Calculate the value of second belt. (5M)

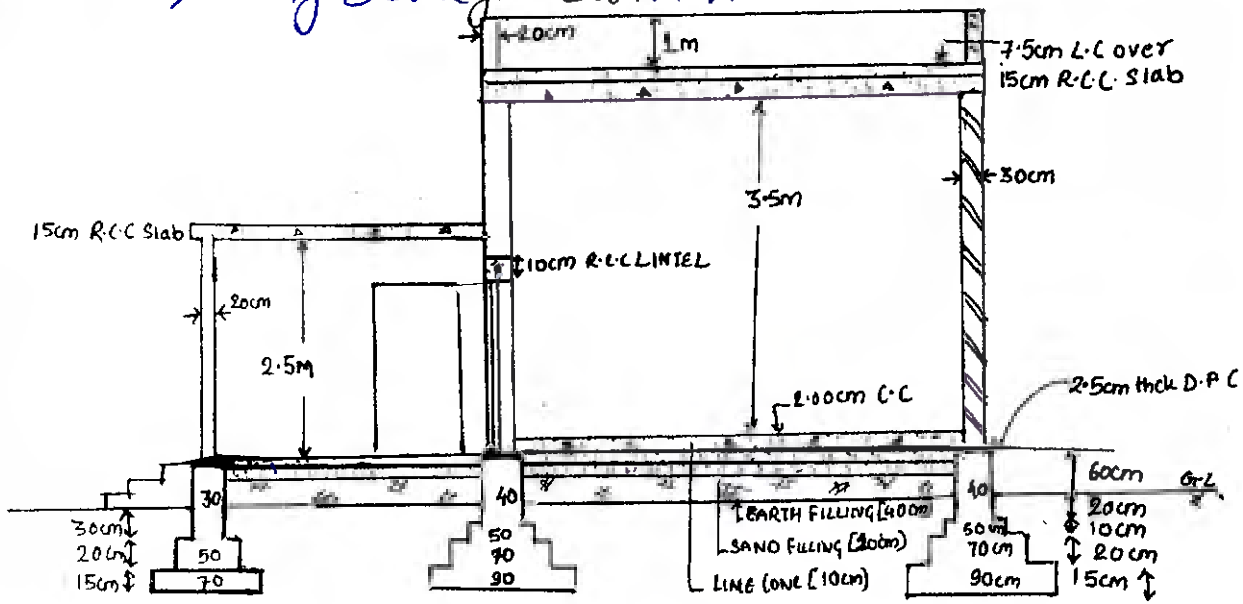


- c) A leasehold property produces a net income of Rs. 60,000/- per annum for 40 years. Assuming that owner requires 8% interest on his capital and sinking fund is at 5%. determine the present value. If sinking fund is also taken at 8% calculate the value. (5M)

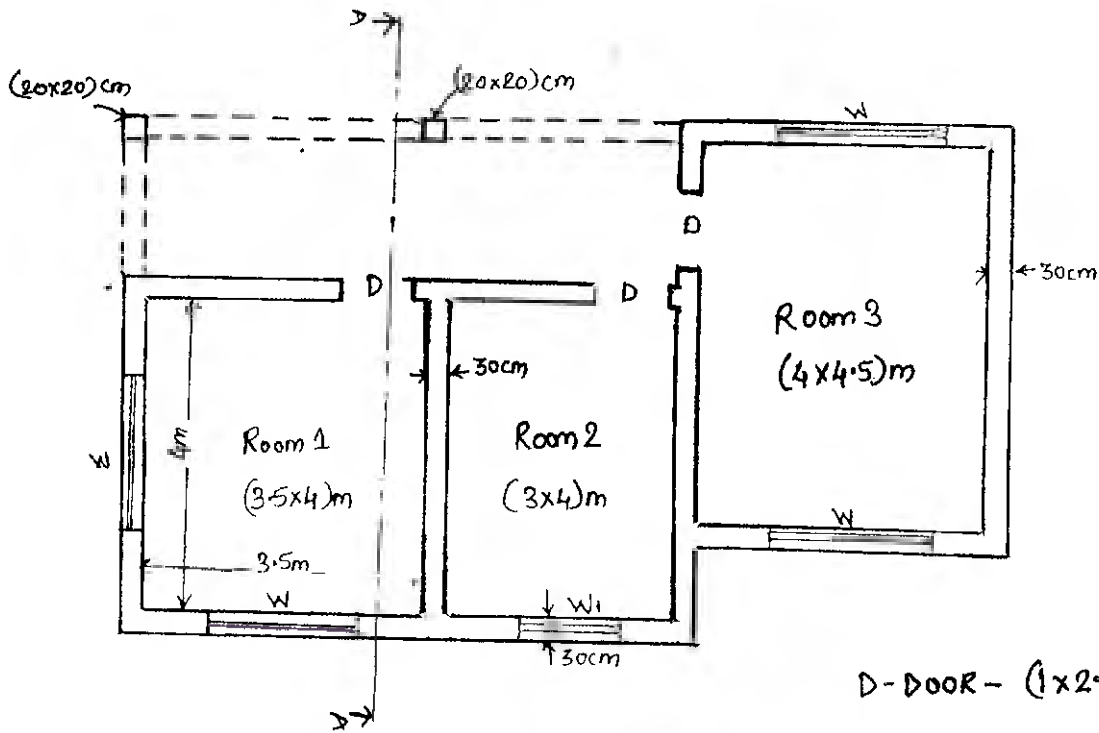
FIGURE - 1

BEC (CIVIL), Sem - VIII, 29/4/15

Quantity Survey, Estimation & Valuation



SECTION A-A



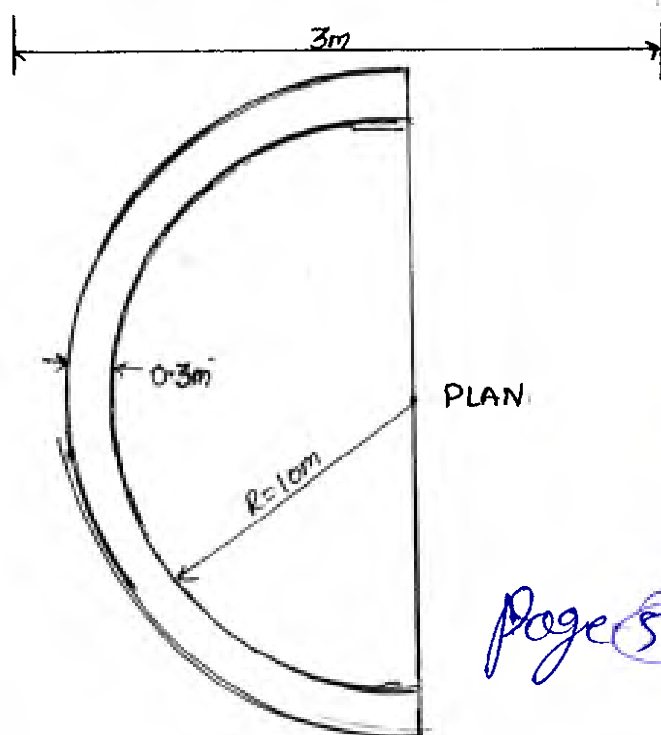
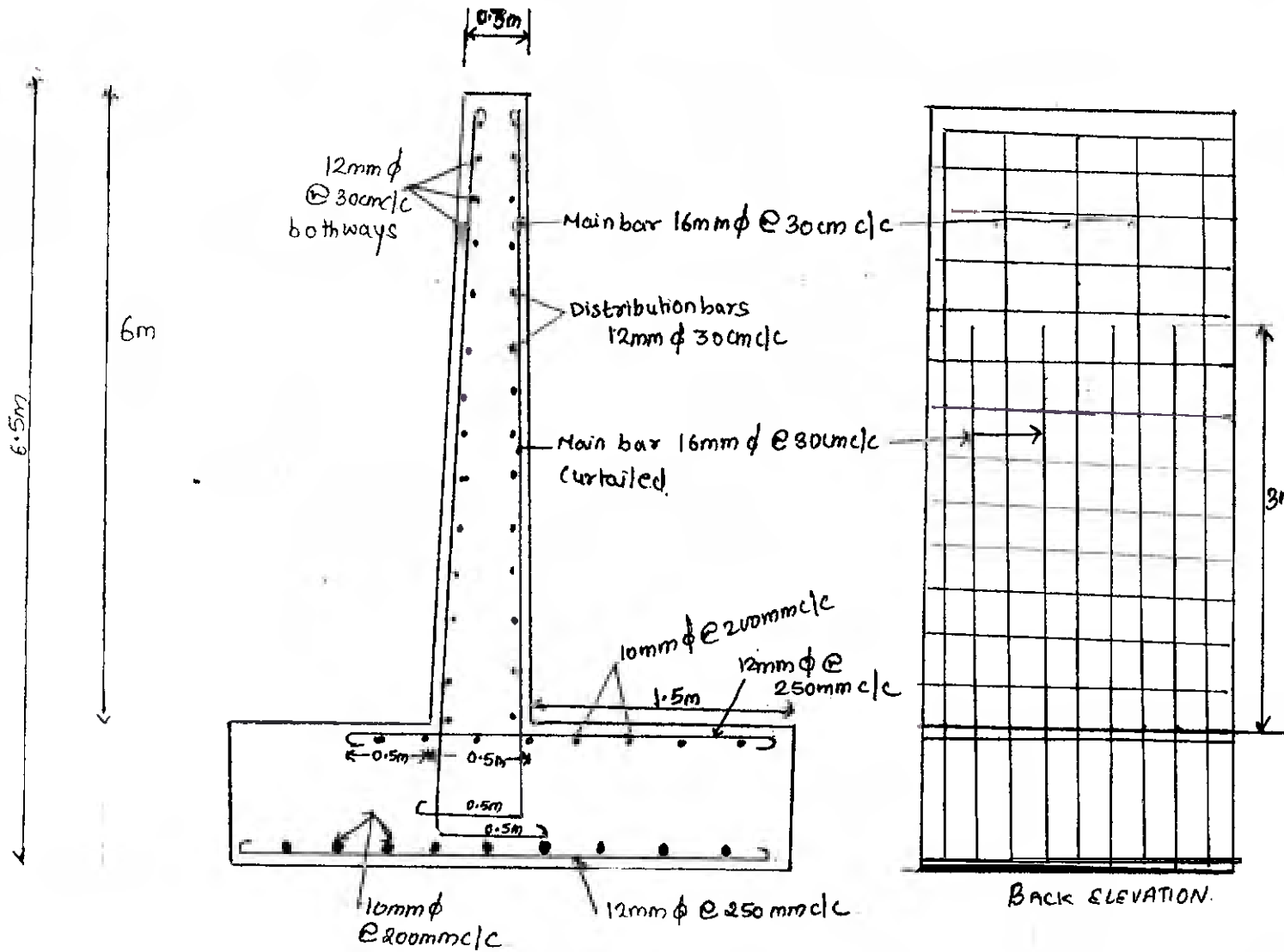
PLAN

D - DOOR - (1x2.1)m
 W - WINDOW - (1x1.5)m
 W₁ - (0.8x1.5)m

FIGURE - 2

BE (CIVIL), Sem - VIII, 20/4/15

Quantity Survey, Estimation & Valuation.



Side cover of base and wall = 5cm

Bottom cover of base = 6cm

Top cover of base = 5cm

Top cover of wall = 4cm

TABLE - 4 (Cont.) Present Value of Re. 1 per annum allowing interest on Capital @ 7 1/2% and 8% And for Redemption of Capital at

Year	7 1/2%							8%						
	3%	3 1/2%	4%	4 1/2%	5%	5 1/2%	7 1/2%	3%	3 1/2%	4%	4 1/2%	5%	5 1/2%	8%
1	0.930	0.930	0.930	0.930	0.930	0.930	0.930	0.926	0.926	0.926	0.926	0.926	0.926	0.926
2	1.762	1.766	1.769	1.773	1.777	1.781	1.796	1.746	1.750	1.754	1.757	1.761	1.765	1.783
3	2.509	2.519	2.529	2.540	2.550	2.560	2.601	2.478	2.488	2.498	2.508	2.518	2.527	2.577
4	3.184	3.203	3.221	3.239	3.257	3.276	3.349	3.135	3.152	3.170	3.187	3.205	3.223	3.312
5	3.797	3.824	3.852	3.879	3.907	3.934	4.046	3.726	3.753	3.779	3.805	3.832	3.858	3.993
6	4.355	4.392	4.429	4.462	4.504	4.542	4.694	4.263	4.298	4.333	4.369	4.405	4.441	4.623
7	4.866	4.913	4.960	5.007	5.055	5.103	5.297	4.750	4.795	4.840	4.885	4.930	4.976	5.206
8	5.335	5.392	5.449	5.506	5.564	5.622	5.857	5.196	5.250	5.304	5.359	5.414	5.469	5.747
9	5.766	5.833	5.900	5.967	6.035	6.104	6.379	5.604	5.667	5.731	5.795	5.859	5.923	6.247
10	6.164	6.241	6.317	6.331	6.172	6.550	6.864	5.980	6.052	6.124	6.197	6.269	6.342	6.710
11	6.533	6.618	6.705	6.791	6.878	6.965	7.315	6.326	6.406	6.487	6.568	6.649	6.731	7.139
12	6.875	6.969	7.065	7.160	7.256	7.351	7.735	6.646	6.735	6.824	6.912	7.002	7.091	7.536
13	7.193	7.296	7.400	7.503	7.607	7.711	8.126	6.943	7.039	7.136	7.232	7.328	7.425	7.904
14	7.489	7.600	7.712	7.824	7.935	8.046	8.489	7.219	7.322	7.426	7.529	7.632	7.735	8.244
15	7.766	7.885	8.004	8.123	8.241	8.359	8.827	7.476	7.586	7.696	7.806	7.915	8.024	8.559
16	8.025	8.151	8.277	8.402	8.527	8.652	9.142	7.715	7.832	7.948	8.064	8.179	8.293	8.851
17	8.268	8.400	8.533	8.664	8.795	8.925	9.434	7.939	8.062	8.183	8.304	8.425	8.544	9.122
18	8.496	8.634	8.772	8.910	9.046	9.181	9.706	8.149	8.277	8.404	8.530	8.655	8.778	9.372
19	8.710	8.854	8.998	9.140	9.281	9.421	9.959	8.346	8.479	8.610	8.741	8.870	8.997	9.604
20	8.911	9.061	9.210	9.357	9.502	9.645	10.194	8.531	8.668	8.804	8.938	9.071	9.201	9.818
21	9.102	9.256	9.409	9.560	9.709	9.856	10.413	8.705	8.847	8.986	9.124	9.260	9.393	10.017
22	9.281	9.440	9.597	9.752	9.904	10.053	10.617	8.869	9.015	9.158	9.298	9.437	9.572	10.201
23	9.451	9.614	9.774	9.932	10.087	10.239	10.807	9.024	9.173	9.319	9.462	9.603	9.740	10.371
24	9.611	9.778	9.942	10.102	10.259	10.413	10.983	9.170	9.322	9.471	9.617	9.759	9.897	10.529
25	9.763	9.933	10.100	10.263	10.422	10.577	11.147	9.309	9.463	9.614	9.762	9.906	10.045	10.675
26	9.907	10.080	10.249	10.414	10.575	10.730	11.299	9.439	9.596	9.750	9.899	10.044	10.184	10.810
27	10.044	10.219	10.391	10.557	10.719	10.875	11.441	9.564	9.723	9.878	10.028	10.174	10.314	10.935
28	10.174	10.352	10.525	10.693	10.855	11.011	11.573	9.681	9.842	9.999	10.150	10.296	10.437	11.051
29	10.297	10.477	10.652	10.821	10.983	11.140	11.696	9.793	9.956	10.113	10.265	10.412	10.552	11.158
30	10.415	10.596	10.772	10.942	11.105	11.261	11.810	9.899	10.063	10.222	10.374	10.521	10.660	11.258
31	10.526	10.710	10.887	11.057	11.219	11.374	11.917	10.000	10.165	10.325	10.477	10.623	10.762	11.350
32	10.633	10.818	10.995	11.165	11.328	11.482	12.015	10.096	10.263	10.422	10.575	10.720	10.858	11.435
33	10.735	10.920	11.098	11.268	11.430	11.583	12.107	10.188	10.355	10.515	10.667	10.812	10.949	11.514
34	10.832	11.018	11.196	11.366	11.527	11.678	12.193	10.275	10.443	10.603	10.755	10.899	11.034	11.587
35	10.924	11.111	11.290	11.459	11.618	11.768	12.273	10.358	10.526	10.686	10.838	10.980	11.114	11.655
36	11.013	11.200	11.378	11.547	11.705	11.853	12.347	10.438	10.606	10.766	10.916	11.058	11.190	11.717
37	11.097	11.285	11.463	11.630	11.787	11.933	12.415	10.514	10.682	10.841	10.991	11.131	11.261	11.775
38	11.178	11.366	11.543	11.709	11.865	12.009	12.479	10.587	10.755	10.913	11.062	11.200	11.329	11.829
39	11.256	11.443	11.620	11.785	11.938	12.080	12.539	10.656	10.824	10.982	11.129	11.266	11.392	11.879
40	11.330	11.517	11.693	11.856	12.008	12.148	12.594	10.722	10.890	11.047	11.193	11.328	11.452	11.925
41	11.401	11.588	11.762	11.924	12.074	12.211	12.646	10.786	10.953	11.109	11.253	11.387	11.509	11.967
42	11.469	11.655	11.829	11.989	12.137	12.272	12.694	10.847	11.013	11.168	11.311	11.442	11.562	12.007
43	11.534	11.720	11.892	12.051	12.196	12.328	12.739	10.905	11.071	11.225	11.366	11.495	11.613	12.043
44	11.597	11.782	11.952	12.109	12.252	12.382	12.780	10.961	11.126	11.278	11.418	11.545	11.660	12.077
45	11.657	11.841	12.010	12.165	12.306	12.433	12.819	11.015	11.179	11.330	11.468	11.593	11.705	12.108
46	11.715	11.898	12.065	12.218	12.357	12.482	12.855	11.067	11.230	11.379	11.515	11.638	11.748	12.137
47	11.770	11.952	12.118	12.269	12.405	12.526	12.888	11.116	11.278	11.426	11.560	11.680	11.788	12.164
48	11.823	12.004	12.168	12.317	12.451	12.569	12.919	11.163	11.324	11.470	11.602	11.721	11.826	12.189
49	11.875	12.054	12.216	12.363	12.494	12.610	12.948	11.209	11.369	11.513	11.643	11.759	11.862	12.212
50	11.924	12.102	12.262	12.407	12.535	12.648	12.975	11.253	11.411	11.554	11.682	11.796	11.896	12.233

B.E. (Civil), Sem-VIII, Re-exam, 16/6/15
Quantity Survey, Estimation & Valuation.

Bharatiya Vidya Bhavan's
SARDAR PATEL COLLEGE OF ENGINEERING
(An Autonomous Institution Affiliated to University of Mumbai)

Re-Exam

Class/Sem: B.E. (Civil), Sem VIII.

Date: 16th June 2015

Total Marks: 100

Duration: 4 Hours

Subject: Quantity Survey, Estimation and Valuation

1. Q1 compulsory
2. Answers to all sub questions should be grouped together.
3. Illustrate answer with neat sketches wherever required.
4. Make suitable assumptions where necessary and state them clearly.
5. Figure to right indicate full marks.

Master

Q1) Figure 1. Shows plan and sectional detail of load bearing structure. Prepare a measurement sheet for following work. (20M)

- a) Earthwork in excavation including backfill
- b) First class brick work in super structure
- c) First class brick work in (1:3) cement mortar up to plinth level
- d) 2.5cm D.P.C (1:2:4)

Q2 a) State different method of approximate estimate and explain bay method and cubic-meter method with an example. (10M)

Q2c) Prepare a preliminary estimate of G+1 office building having carpet area of 250m² built up area rate for ground floor is 1500/m² and 1st floor is 1200/m² (10M)

- i) Area of corridor, verandah and lavatories etc. = 15% of the plinth area
- ii) Area of walls = 8% of plinth area
- iii) Cost of water supply = 3% of the building cost
- iv) Cost of sanitation = 2% of the building cost
- v) Cost of electrification = 10 % of the building cost
- vi) Cost of approach road = 2% of the building cost
- vii) Contingency & work establishment charges 3% & 2% respectively.

Q3a) Enlist different types of contract and explain any two with its advantage and disadvantage. (10M)

Q3b) Explain the causes considered for revocation of arbitration agreement. (10M)

B.E (CIVIL), Sem - VIII, Re-exam, 16/6/15
Quantity Survey & Estimation & Valuation.

Q4a) Perform a rate analysis for 12mm plastering work in superstructure with (1:3) cement mortar. The task work of labour is as follow (10M)

LABOUR	WORK PER DAY
head mason	300sqm
mason	15sqm
mazdoor	10sqm
Bisti	100sqm

Q4b) Write general specification for 1st class building work. (10M)

Q5a) Prepare a detailed estimate of RCC column with footing as shown in fig.2. The detailed estimate should have measurement sheet & bar bending schedule. (15M)

Q5b) Prepare a material statement for column in above question. (5M)

Q6a) Find the quantity of earth work of a kutchra road to be constructed with following data. Formation width of road is 10m. (10M)

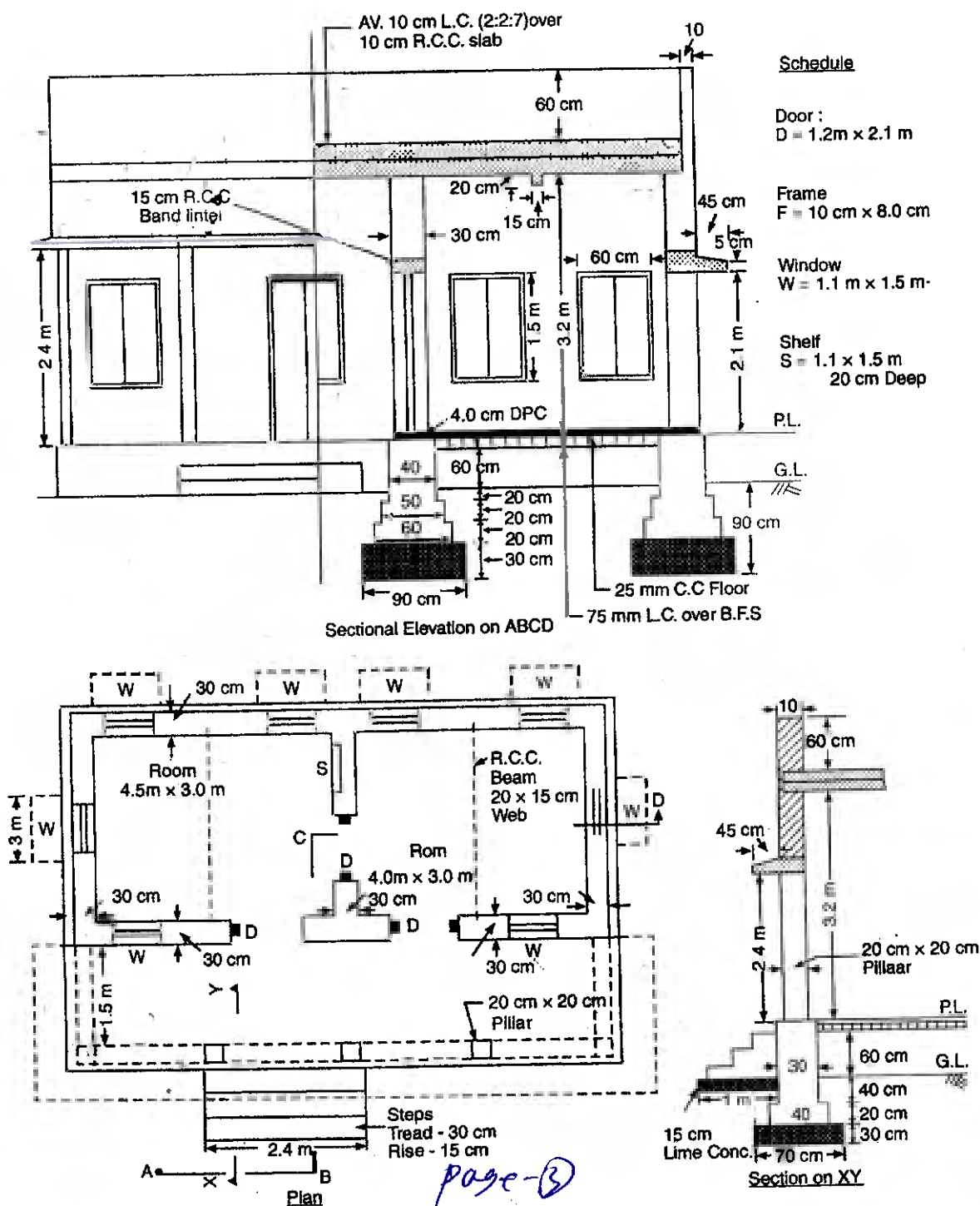
Chainage meters	0	40	80	120	160	200	240	280	320	360	400
R.L	99.00	98.22	99.56	100.24	104.48	104.80	105.60	107.35	107.75	106.52	102.06
Formation	103.00	Downward gradient 1 in 120						upward gradient 1 in 80			
Side slope	In banking 2:1, In cutting 1:1										

Q6b) Explain the following terms: (10M)

- Global tender
- Arbitration
- Overhead cost
- Earnest Money
- Retention money

BE (CIVIL), Sem-VIII, Re-exam, 16/6/15
Quantity Survey, Estimation & Valuation.

- Q7. a) A plot was purchased for a cost of Rs. 80 lakhs and a building was constructed on it, costing Rs. 90 lakhs. The building has 10 flats of 800 square feet each. Fix the monthly rent of each flat making the following assumptions. (10M)
- i) Net return expected on land and building is 6.5%
 - ii) Life of building is 65 years
 - iii) Interest rate on sinking fund is 5%
 - iv) Taxes, repairs and all outgoings are 25% of gross rent.
- b) Explain belting method of valuation (5M)
- c) Explain the factors affecting valuation (5M)



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Fig-1

BE (CIVIL), Sem-IV, Re. exam, 16/6/15.
 Quantity ^{Survey} Estimation & Valuation.

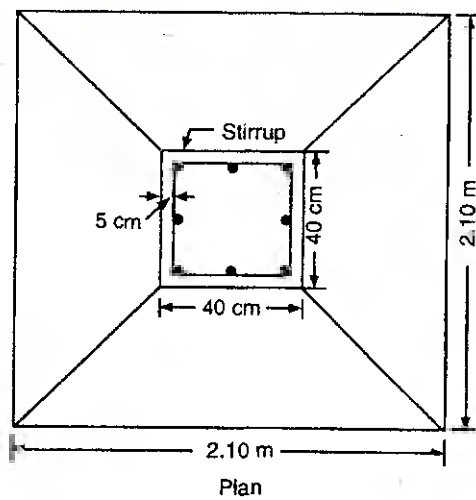
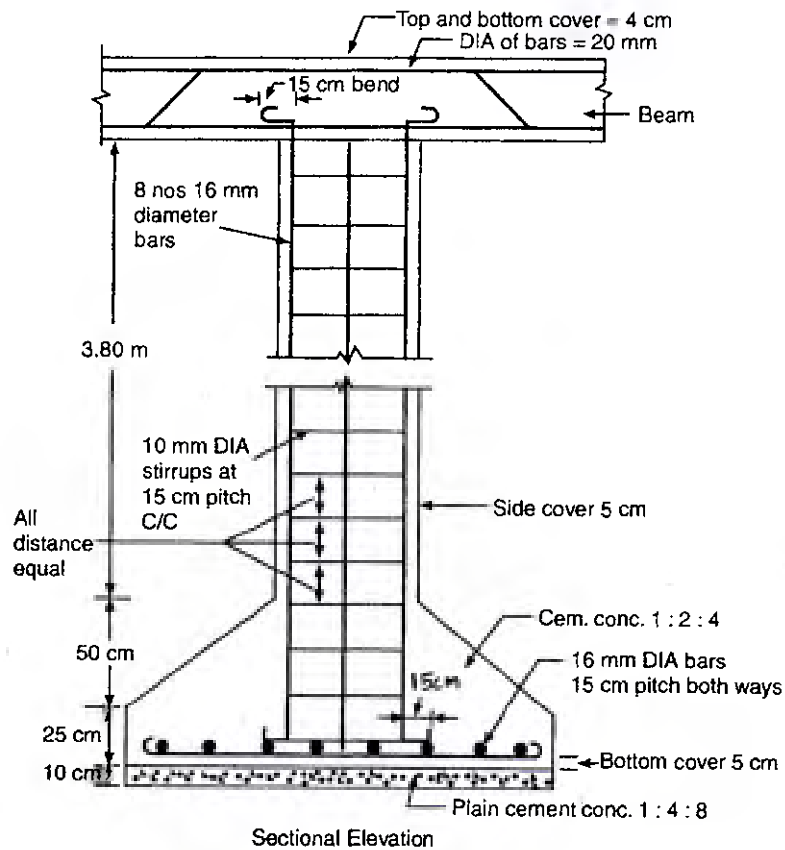


Fig-2.

BE (CIVIL), Sem - VIII, 215/15
Construction Management.

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02.05.15.

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SARDAR PATEL COLLEGE OF ENGINEERING
[An Autonomous Institution Affiliated to University of Mumbai]



END SEM EXAM. - 2015

CLASS: B. Tech. Civil Sem. - VIII

Marks : 100

SUB. : Construction Management

Duration : 3 Hrs.

Master

- Attempt any FIVE questions out of seven questions.
- Answer to all sub questions should be grouped together.
- Figures to right indicate full marks.
- Assume suitable data if necessary and state them clearly

Q.1 a) Describe salient features of construction Industry. (10)

b) Describe the importance of construction project planning. Also describe various stages of construction project planning. (10)

Q.2 a) What is Work Breakdown Structure? Explain it in detail with an example. (10)

b) What are the different phases of project? Explain each stage in brief. (10)

Q.3 a) Given below details of work.

- Draw Activity on Node (AON) network.
- Activity on Arrow (AOA) Network.
- Carry out Node numbering using Fulkerson's Rule.
- Total Float value
- Draw Time Scale Network.
- Project Completion Time. (12)

Sr.No.	Activity	Predecessor	Duration (Months)
1	A	-	6
2	B	-	9
3	C	-	12
4	D	A	4
5	E	A,B	6
6	F	C	3
7	G	C,E	7
8	H	C	5

b) Describe bar chart technique of planning with an example. (08)

Page 0

BEC (CIVIL), ~~Construction~~ Semr VIII, 2/15/15
 Construction Management

Q.4 a) Following tables shows detail of small project for PERT technique.

- Draw A-O-A network.
- Determine project completion time.
- Determine slack values for each activity.
- Determine critical path and critical activity.
- Determine variance and standard deviation of each activity.

(10)

Activity	Preceding activities	Following activities	t_o	t_m	t_p
A	Starting	C,D	2	4	6
B	Starting	E	3	6	12
C	A	F	2	5	10
D	A	G	5	7	9
E	B	H	4	7	16
F	C	K	7	9	19
G	D	L	9	12	18
H	E	L	2	4	12
K	F	-	7	8	15
L	G,H	-	8	6	16

b) Write in Detail about line of balance technique.

(10)

Q.5 a) Activity data for small construction project are given below:

- Prepare resource histogram for early start schedule
- Determine most preferred schedule where constraint on resource is 12.

(12)

Activity	Preceding Activity	Duration(Days)	Resource Rate
P	-	2	9
Q	-	1	7
R	-	2	3
S	-	3	8
T	P	5	4
U	Q	1	6
V	R	5	6
W	S,T,U	5	6

b) What is site layout? Discuss with suitable examples the factors that need to be considered while preparing a site layout for construction project.

(08)

BE (CIVIL), Sem-VIII, 2(5)15
Construction management

Q.6 a) Differentiate between (10)

(i) Injury and lost time accident, (ii) Quality control and Quality Assurance

b) Discuss the role of different personnel to ensure safety at construction site. (10)

OR

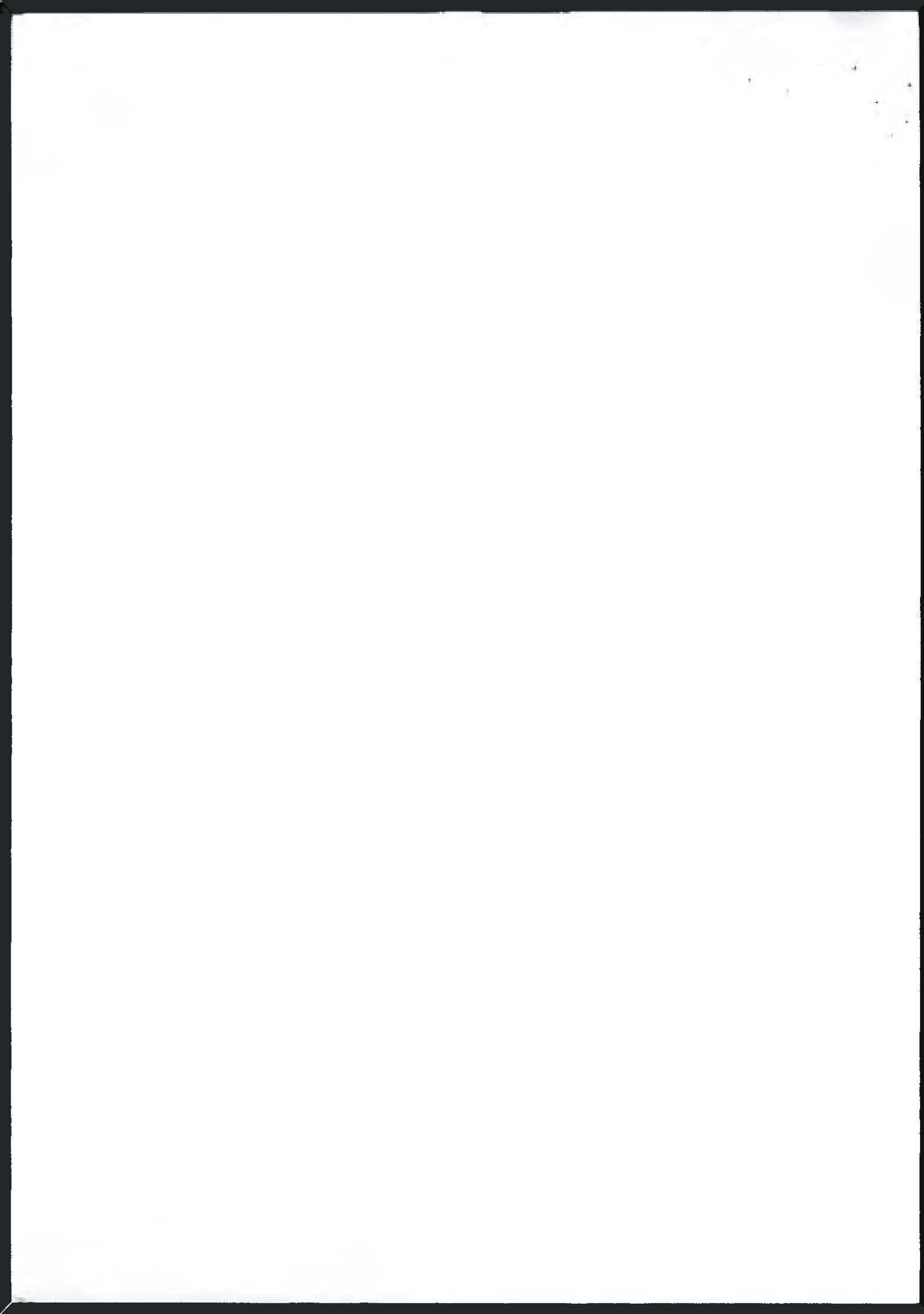
b) Explain process of updating with suitable example. (10)

Q.7) a) Explain Minimum Wage Act (08)

b) Apply stage by stage compression technique. If overhead cost for the project is

Rs.1400 per unit time, determine optimum time-cost combination. (12)

Activity	Preceding activity	Normal		Crash	
		Duration in Week	Cost in Rs. (Thous.)	Duration in week	Cost in Rs. (Thous.)
M	-	7	35	6	40
N	M	5	55	3	65
P	N	9	65	7	70
R	N	19	45	18	50
S	N	10	20	9	25
T	P	8	12	6	17
W	T	5	72	5	72
X	S	11	95	10	100
Z	X,W,R	7	45	6	47



BEC (CIVIL), Sem - VIII, 5/5/15
(Elective-II, Advanced Construction Engineering)

LIB
05/05/15

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SARDAR PATEL COLLEGE OF ENGINEERING
[An Autonomous Institution Affiliated to University of Mumbai]

END SEM EXAM. - 2015



CLASS: B. E Civil/Sem. - VIII

Marks : 100

SUB. : Elective-II Advanced Construction Engineering

Duration: 3 Hrs.

Master

- Attempt any FIVE questions out of seven questions.
- Answer to all sub questions should be grouped together.
- Figures to right indicate full marks.
- Assume suitable data if necessary and state them clearly

Q.1 a) Prepare work method statement for major activities for hydropower project. (10)

b) Write in detail about new materials for the construction. (10)

Q.2 a) What kind of the safety measures to be taken in excavation operations? (10)

b) Explain how we can handle the drainage conditions during excavation process. (10)

Q.3 a) what criteria to be followed while selecting equipments for concreting operations? (10)

b) Write short note on following special types of concrete, (10)

A) Pre-placed aggregate concrete

B) Roller Compacted Concrete

Q.4 a) How transportation of pre-casted components is done? Explain in detail. (10)

b) Write in detail about erection of pre-casted components. (10)

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BEC(CIVIL), sem - ~~VIII~~ , 5/5/15

Elective - II - Advanced Construction Engineering

Q.5 a) what kind of the safety measures to be taken during fabrication & erection of steel structures as per IS: 7205-1974? (10)

b) What criteria to be followed while selecting equipments for erection of steel operations? (05)

c) Write short note on different types of welding used in steel structures? (05)

Q.6 a) Write in detail about specific issues related to planning, site layout of concrete dams. (10)

b) Write in detail about special equipment and their application to off-shore construction(10)

Q.7 a) Write in brief about the case study of high rise construction project. (10)

b) What type of equipments required for operations of cutting & Joining in steel structures? (10)
(Explain with their specifications/Figures)