T.E (Civil), Sem-VI.
Geotechnical Engineering-II

27/04/15

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

Total Marks: 100 | **Duration: 3 Hours**
CLASS/SEM: TYBtech. (Civil), Sem. VI | **Date: April 27, 2015**

SUBJECT: Geotechnical Engineering – II (CE 351)

- **Question 1 is compulsory. Attempt any four out of remaining six.**
- **Answers to all sub questions should be grouped together.**
- **Make suitable assumptions where necessary and state them clearly.**
- **State units clearly at all possible places.**

Master

Q1. **a)** Determine the depth of embedment of a cantilever sheet pile retaining clayey soil with unconfined compressive strength of 80kN/m^2, density of 18.5kN/m^3 and height of 6.5m. Assume GWT over 20m below GL. **(10)**

b) What is negative skin friction in piles? Explain how you estimate its value and what methods you can use to reduce it. **(05)**

c) Explain various criteria you will consider while determining the minimum depth of shallow foundation. **(05)**

Q2. **a)** An 8 m high retaining wall retains sand with γ = 18.6kN/m^3. Active thrust on the wall is determined to be 180kN per meter length of wall. The height of the wall is to be increased and to keep the force on the wall constant, 1m of backfilled sand is removed and replaced with geofoam (assume γ = 0.15kN/m^3). If geofoam is used even in the additional height, what is the additional height that may be allowed? Assume $\phi_{sand} = \phi_{geofoam}$. **(10)**

b) Determine the coefficient of lateral earth pressure for at rest condition, active condition and passive condition for ϕ=32°. **(05)**

c) State any two pile driving formulae and their limitations **(05)**

Q3. **a)** Explain the plate load test as per IS ~~1888~~. **(10)**

b) Geotechnical investigations at a site have revealed the following soil strata: **(10)**

If a pile group of 3x4 in constructed at this site, with pile length of 12 m, diameter of 400 mm and spacing of 3d, estimate the consolidation settlement of the clay strata if the expected load is 300t.

Depth	Strata	Remarks
0.0 m to 3.0 m	Sand	γ = 17.5 kN/m^3
3.0 m to 15.0 m	Saturated Sand	GWT 3 m below GL; γ_{sat} = (22) kN/m^3
15.0 m to 25.0 m	Clay	C_c = 0.44, e_o=1.2, γ_{sat} = 19.2 kN/m^3
25.0 m	Intact Rock	

Q4. **a)** It is proposed to construct a gravity retaining wall 6m high, with backfill sloping **(10)**

at 20° with horizontal. The wall base is at 1.5 m below GL The backfilled sand has ϕ = 36°, and density of 18.1 kN/m^3. The angle of wall friction is 23°. The foundation soil has c – 35kN/m^2, ϕ = 36° and density of 19 kN/m^3. Proportion the dimensions of the retaining wall assuming GWT at great depth. Check for safety against overturning and sliding. (one trial even if unsafe)

b) What are conduits? How are they classified? **(05)**

c) Explain various pile types based on method of installation. **(05)**

Q5. a) A 3 m high retaining wall constructed at a site is expected to move towards the backfill. Determine the magnitude and location of the thrust acting on the wall, with soil data as given in Figure 1. **(10)**

b) Explain the following terms related to conduits. **(05)**

- Projection condition
- Ditch condition
- Critical plane
- Plane of equal settlement
- Settlement ratio

c) Explain the importance of drainage provisions in retaining walls. Sketch two typical schemes for providing drainage **(05)**

Q6. a) A square footing has to support 4640 kN load with factor of safety of 3. If the footing is placed at a depth of 3.0m below GL and GWT is deep below, determine the size of the footing if soil has c = 15kN/m^2, ϕ = 30° and γ = 19 kN/m^3. Use IS 6403 recommendations, assume depth factors = 1 and use N_c = 30.14, N_q = 18.4 and N_γ = 22.4. **(10)**

b) A 300 mm diameter pile, 13 m long, is driven in a deposit of soil having unconfined compressive strength of 90 kPa, γ = 19 kN/m^3 and α = 0.6. Estimate its skin friction and end bearing. **(05)**

c) Differentiate between Rankine's and Coulomb's theory of lateral earth pressure **(05)**

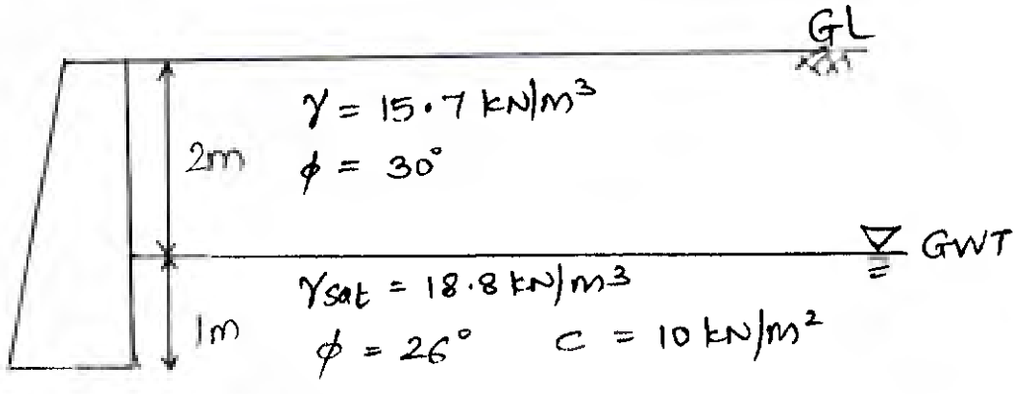
Q7. a) Explain Housel's method of estimating bearing capacity **(05)**

b) Distinguish between shallow and deep foundations with examples **(05)**

c) Explain Culmann's graphical method of determining active earth pressure. **(05)**

d) Write a short note on sheet piles. **(05)**

Figure 1



TE (Civil), Sem-VI, Re-exam, 15/6/15 — 2 pb 15/06/15

Geotechnical Engineering - II

Bharatiya Vidya Bhavan's
SARDAR PATEL COLLEGE OF ENGINEERING

(An Autonomous Institution Affiliated to University of Mumbai)

Re-Exam Paper

June 2015

Total Marks: 100 **Duration: 3 Hours**

CLASS/SEM: TY BTech Civil Sem VI **SUBJECT:** Geotechnical Engineering - II

- **Attempt any FIVE questions out of SEVEN questions.**
- **Answers to all sub-questions should be grouped together.**
- **Figure to right indicate full marks.**
- **Make suitable assumptions where necessary and state them clearly.**

Q1. **a)** Differentiate between active, passive and at rest earth pressures. **(10)**

b) Determine the depth of embedment of a cantilever sheet pile retaining clayey soil with cohesion of 20kN/m^2, density of 19.5kN/m^3 and height of 5.3m. Assume GWT over 12m below GL. **(10)**

Q2. **a)** Load–settlement curve data for a plate load test using 0.3 m square plate on sandy soil are as follows. Determine the size of the square column footing required to carry a net load of 250 t with maximum settlement of 25 mm. **(10)**

Load (t/m^2)	10	20	30	40	50	60	70	80
Settlement (mm)	4.5	10	15.5	22	29	38.5	50	64

b) Write a short note on the effect of ground water table on bearing capacity of shallow foundations. **(05)**

c) Estimate the load carrying capacity of a 13.5 m long, 400 mm diameter pile driven in clay having following properties: **(05)**

0-2.5 m – c_u = 0.4 t/m^2, α = 0.84

2.5-10 m - c_u = 1.5 t/m^2, α = 0.63

Below 10 m - c_u = 2.8 t/m^2, α = 0.5

Q3. **a)** Explain the pile load test for shallow foundations as per IS:2911-Part IV with a neat sketch. How will you calculate the allowable load? **(10)**

b) Classify conduits with neat sketches and derive an expression for load on a ditch conduit. Show all forces acting on the ditch conduit. **(10)**

Q4. **a)** A footing 1.5m x 2.0m is placed at 1.5m below GL on soil having γ_b=1.75 g/cc, γ_{sat}=1.9 g/cc. Determine the safe bearing capacity using FoS as 3. Take c=0.1 kg/cm^2 and ϕ=30°. GWT is deep below. **(10)**

b) In the above problem, if in the rainy season, GWT rises to GL, what is the bearing capacity? **(05)**

c) Write a short note on geotextiles. How are they different from **(05)**

page-1

TE(CIVIL), Sem - VII, Re-exam, 15/6/15,
Geotechnical Engineering - II

c) Write a short note on geotextiles. How are they different from geosynthetics? **(05)**

Q5. a) A 7 m high retaining wall retains soil having c=16 kN/m^2, ϕ=28° and γ=16.2 kN/m^3. The backfill is horizontal and carries a surcharge of 20 kN/m^2. Draw the active pressure when tension cracks occur and when they do not occur. Determine the magnitude and point of application of the resultant thrust. **(15)**

b) Write a short note on imperfect ditch conduit **(05)**

Q6. a) Proportion the area of a combined footing for two columns A and B using the following data. The allowable soil pressure is 3t/m^2 and the columns are spaced 5.5 m center to center. The footing should not extend beyond column A. Show the arrangement with all dimensions. **(10)**

Column	A	B
Size	0.35m x 0.35m	0.4m x 0.4m
Dead Load	56t	70t
Live Load	20t	40.5t

b) A rigid water pipe of diameter 3 m is to be laid in a ditch which is 3.5 m wide at the top of the pipe. It is to be covered with 3.8 m of clayey backfill having unit weight of 18.5 kN/ m^3. Calculate the load on the pipe if C_d = 3.48. What will be the load if this pipe is flexible? **(05)**

c) Write a short note on joints in retaining walls **(05)**

Q7. a) Estimate the group capacity of 2 x 2 piles driven in sandy deposit having ϕ=30°, γ_b=1.8 g/cc up to 3m, γ_{sub}=0.92 g/cc below 3m, k=1.8, δ=0.8ϕ and Nq=31. Length of pile =12m, diameter is 300mm, efficiency factor=1, factor of safety = 3 and assume critical depth as 10d. **(10)**

b) Explain the proportioning of a gravity and cantilever retaining wall with sketches. **(05)**

c) Differentiate between the three zones of failure of a shallow foundation

TE (Civil) Sem - VI, A.T. KT.
Geotechnical Engineering - II.

27/04/15

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

KT Exam

Date: 27 April 2015
Total Marks: 100 **Duration: 3 Hours**

CLASS/SEM: T.E. (Civil), Sem VI. **SUBJECT: Geotechnical Engineering - II**

- **Attempt any FIVE questions out of SEVEN questions.**
- **Answers to all sub questions should be grouped together.**
- **Figure to right indicate full marks.**
- **Make suitable assumptions where necessary and state them clearly.**

Master

Q1. **a)** A strip footing having a width of 2.0m is placed at a depth of 1.5 m below ground surface in soil having cohesion of 12kN/m^2, friction angle of 33°, γ_b=17.6 kN/m^3 and γ_{sat}=19.2 kN/m^3. Assuming GWT is at 1.5m below ground surface, calculate the ultimate bearing capacity of the foundation as per IS code recommendations. **(10)**

b) A retaining wall 6m high has a smooth vertical back. It retains soil with bulk unit weight of 18kN/m^3, ϕ= 18°. The horizontal backfill has a uniformly distributed load of 40kN/m^2. Determine the active pressure and its point of application. **(05)**

c) Write a short note on imperfect ditch conduit. **(05)**

Q2. **a)** A 350m diameter pile is driven in sand having γ_b=18.2 kN/m^3 and γ_{sat}=19.8 kN/m^3. The water table is located at 2m below ground level. The pile penetrates to a length of 10m. Assuming critical depth as 10d, Nq = 34, k=1.6 and δ=24°, estimate the capacity of a group of 2x2 piles if they are spaced at 3d. **(10)**

b) Compare Coulomb's theory of earth pressure with that given by Rankine. **(05)**

c) State briefly the assumptions made in estimating the ultimate bearing capacity of shallow foundations. **(05)**

Q3. **a)** Explain the plate load test for shallow foundations as per IS: 1888-1982 with a neat sketch. State how the results are extrapolated. **(10)**

b) A 10m high retaining wall retains sand backfill with γ_b=19kN/m^3 and ϕ= 34°. Determine the magnitude and point of application of passive pressure assuming a vertical wall. **(05)**

c) Write a short note on the applications of soil reinforcement in civil engineering. **(05)**

Q4. **a)** A 6.5m high retaining wall is battered away from the fill from bottom to **(10)**

TE (Civil), Sem-VI, 27/4/15, A.T.K.T.

Geotechnical Engineering - II

top at an angle of 5° with vertical. The backfill slopes away from the wall at an angle of 15°. If the angle of friction of backfill is 32° and wall friction is 15°, determine the active and passive earth pressure and their point of application as per Coulomb's wedge theory.

b) Write a short note on stability numbers used in slope stability. **(05)**

c) How are piles classified? **(05)**

Q5. a) Explain general shear failure mode of shallow foundation. Explain how it is different from local and punching shear failure. Illustrate with diagrams. **(10)**

b) Differentiate between shallow foundations and deep foundations. **(05)**

c) An embankment is inclined at an angle of 35° and its height is 16m. The unit weight of soil is 18.8kN/m^3, angle of shearing resistance is 15° and cohesion is 200kN/m^2. If Taylor's stability number is 0.06, find the factor of safety with respect to cohesion. **(05)**

Q6. a) Differentiate between the different modes of failure of a shallow foundation. **(05)**

b) Explain wall joints in retaining wall. **(05)**

c) Write a short note on settlement ratio in ditch conduits. **(05)**

d) State the factors that affect the bearing capacity of a footing in sand. **(05)**

Q7. a) Check the adequacy of 12 piles, 12m long driven in clay having an unconfined compressive strength of 10t/m^2. The piles are 400mm in diameter and carry an actual load of 145t. Assume a factor of safety as 2.5 and adhesion factor of 0.46. **(10)**

b) Differentiate between open cuts and retaining walls. **(05)**

c) Write a short note on the design of combined footings. **(05)**

TE (Civil), Sem-VI, Re-exam, 16/6/15
Design & Drawing of Steel Structures.

Lib
16/06/15

Bharatiya Vidya Bhavan's
SARDAR PATEL COLLEGE OF ENGINEERING
(An Autonomous Institution Affilliated to University of Mumbai)
DESIGN AND DRAWING OF STEEL STRUCTURES
T.E.(Civil) Sem VI:

Total Marks : 100 Duration 4hrs JUNE2015

NOTES:1) Q. NO. 1 IS COMPULSORY ANSWER ANY THREE FROM THE REMAINING FIVE QUESTIONS. DRAWING FOR Q NO 1 SHOULD BE DRAWN ON THE DRAWING SHEET AND FOR THE REMAINING SKETCHES SHOULD BE DONE IN THE ANWER BOOKS

2) USE OF IS 800-2007 AND STEEL TABLE IS PERMITTED

3) STEEL HAS F_Y=250MPA AND BOLTS ARE 4.6GRADES..

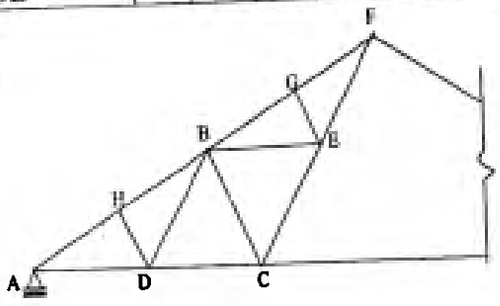
4) ASSUME DATA IF REQUIRED AND STATE IT CLEARLY.

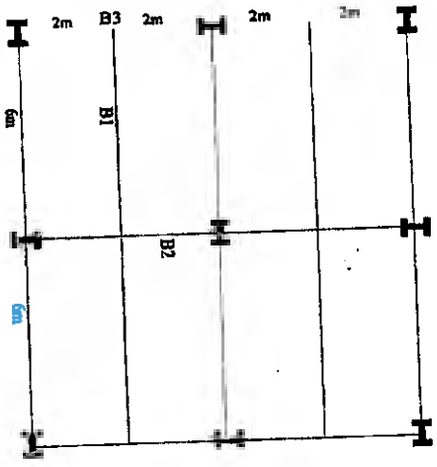
5) NUMBERS TO THE RIGHT INDICATE MARKS

Master

Q 1 A partial truss for an industrial shed shown in the figure. The span is 18m and the central rise is 4m.At the joint 'C' members CA and CB are subjected to the service load shown in the table. Design the members for the required load combinations with bolted connection 20

Member	DL	LL	WL
CA	12(T)	15(T)	30(C)
CB	10(C)	12(C)	40(T)





OR

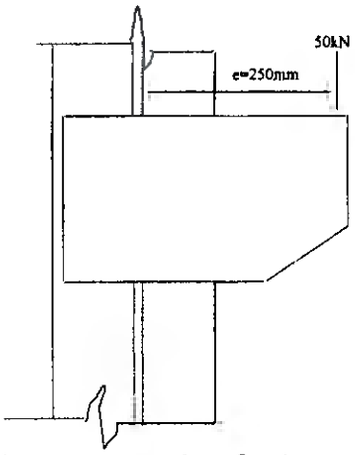
Q 1 A plan of industrial building is shown in the figure. The slab is 125mm thick, LL=3kN/m^2 and FL=1.5kN/m^2.Design beam B1 and B2 if both are laterally supported. Also design the welded connection of B1with B2 and B2 with the flange of the column ISHB400. The internal walls are 150mm thick and the floor height is 4.5m

page-1

TE (CIVIL), Sem-VI, Re-exam, 16/6/15

Design & Drawing of Steel Structure

Q 2	A built-up column of two ISLC400 placed face to face has a length of 8m. Determine the compressive load the column would carry if it is fixed at one end and hinged at the other end. Design bolted single lacing.	20
Q 3 a	Determine the UDL the beam ISMB350 of span 6m would carry if it is laterally unsupported. Check for shear, deflection, web crippling web buckling.	14
b	Keeping the moment in Q3 (a) same if the shear is doubled calculate the change in moment capacity if required?	06
Q 4 a	Determine the tension carrying capacity of the angle 125x75x 8mm if longer leg is connected to a gusset plate 10mm thick using 5bolts of M16 in single line	12
b	For the Q 4(a) design the welded connection if vertical leg is welded.	08
Q 5 a	Determine the compressive force the angle 125x75x 8mm would carry if longer leg is connected to a gusset plate 10mm thick by two bolts and is hinged. The length of the member is 4.0m The load passes through the a) C.G. of the section 2) leg of the section.	10
b	A secondary beam ISMB300 transfers a service load of 65kN to the main beam ISMB400 which is at right angles to secondary beam. If the flanges of both the beams are at the same level design a web angle welded connection	10
Q 6a	An 8mm thick bracket is bolted to the flange of the column ISHB300 @377N/m using M20 bolts. Working load P=50kN and e=250mm.Design the bolted connection	08



b	Design welded stiffened seat connection for beam ISMB400 to the flange of column ISHB200.The beam factored reaction is 250kN.	12
Q 7a	An ISHB400 column carries a service load of 900kN and is resting on M20 concrete. Design the slab base.	08
b	Design a bolted bracket angle connection. A load 250kN is resting on a 10mm bracket plate which is connected to the flange of the column ISHB400 using two angles ISA100x100x8mm. The load is acting at a distance of 200mm from the face of the column. The plane of the load and that of bolts are perpendicular to each other.	12

TE(civil), Sem-VI, (2014)

Design & Drawing of steel Structure.

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29-4-15

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

DESIGN AND DRAWING OF STEEL STRUCTURES

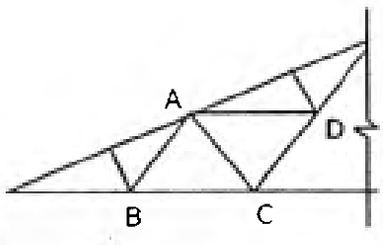
T.E. (CIVIL) SEMESTER VI TIME 4HRS.

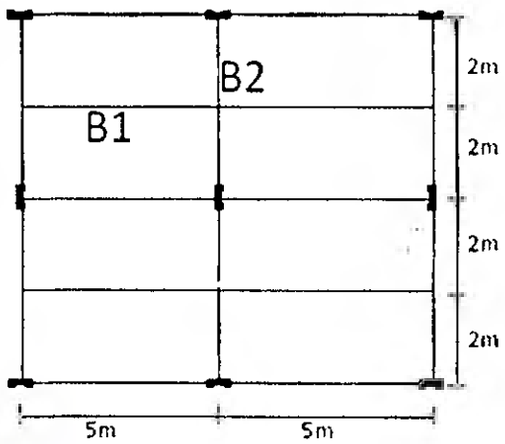
Master

NOTES:1) **Q. NO. 1 IS COMPULSORY ANSWER ANY FOUR FROM THE REMAINING SIX QUESTIONS. DRAWING FOR Q NO 1 DETAILS SHOULD BE DRAWN ON THE DRAWING SHEET.**
2) FOR THE REMAINING QUESTIONS NEAT SKETCHES SHOULD BE DONE IN THE ANWER BOOKS
3) USE OF IS 800-2007 AND STEEL TABLE IS PERMITTED
4) STEEL HAS F_Y=250MPa AND BOLTS ARE 4.6GRADE.
5) ASSUME THE DATA WHEREEVER REQUIRED AND STATE VERY CLEARLY

Q 1 A partial truss for an industrial shed is shown in the figure. The span is 20m and central rise is 4m.The connections should be bolted .At joint 'C' members CA and CB subjected to following service loads Design these members for required load combinations with bolted connections 20

Member	DL	LL	WL
CB	10(T)	12(T)	35(C)
CA	5(C)	6(C)	20(T)





OR

Page 1

TE(Civil), Sem-VI, 29/4/15

Design & Drawing of Steel Structure.

Q 1		A plan of industrial building is shown in the figure.The slab is 150mm thick. It supports a LL=3kN/m^2 and FL=1.5kN/m^2 Design beamB1 and B2 both are laterally supported. Also design the connection between B1 and B2 and B2 with the flange of the column ISHB400. The internal wall is 150mm thick and floor height is 4m.the connections are welded connections	20
Q 2	a	Design a column length of 8m to carry a factored axial load of 1200kN, the ends fixed in both position and direction. Design a suitable channel sections back to back with single lacing bolted to the main column.	20
Q 3	a	A simply supported beam of 5m span is subjected to a UDL of 40kN/m inclusive of self weight over a span of 5m. Design the beam as laterally unsupported beam Check for web buckling and web crippling.	14
	b	A laterally supported beam is subjected to a factored moment of 400kN.m and factored shear of 300kN.Section available is ISMB400.Design the beam. Check only for flexure and shear	06
Q 4	a	A tie member in a truss is subjected to a working load of 80kN(DL) and 120kN(LL).Design double angle section connected back to back on either side of 8mm gusset plate. Provide single row of M16 4.6grade bolts.	10
	b	Design a stiffened welded connection for a factored reaction of 200kN from ISMB350 to ISHB300 column flange.	10
Q 5	a	Design the load carrying capacity of single angle 90x60x8mm connected to a 8mm gusset plate. The member is 3.5m long and connected by two bolts such that it is hinged. If the load is passing through a) the C.G. b) one leg.	10
	b	A secondary beam ISMB300 is to be connected to the web of the main beam ISMB400 at right angles so that the flange of both the beams is at the same level. The secondary beam transfers a service end shear of 65kN.Design a web-angle welded connection.	10
Q 6	a	Design a bracket connection using M20 bolts to carry a factored load of 200kN at a distance of 300mm from the flange of the column. The 12mm thick bracket is connected by two angles 100x100x10mm	12
	b	An ISHB400 column carries a service load of 1000kNand is resting onM20 grade concrete. Design the slab base for the same.	08
Q 7	a	Design a unstiffened bolted connection for a ISMB250 transferring a factored end shear of 100kN to an ISHB200 column.	08
	b	The gusseted base is to be provided to ISHB400 with one plate of 300x12mm attached to each flange It carries a load of 4000kN and rests on pedestal of M20 grade of concrete. Four bolts at the pitch distance in one row can be provided in the flange. The column is machined	12

TE(CIVIL), Sem-VI, Re-exam, 17/6/15

Hydraulic Engineering -II

Lib 17/06/15

Bharatiya Vidya Bhavan's

Sardar Patel College of Engineering

(An Autonomous Institution Affiliated to University of Mumbai)

Department of Civil Engineering

Re-Examination-June 2015

2014-2015

Class/Sem: T.Y. B.Tech. (Civil)/Sem. VI **Subject: Hydraulic Engineering-II**

Max. Marks: 100

Duration: 3 hours

- Solve ***any five questions*** out of seven.
- Answer to all sub questions should be grouped together.
- ***Figure*** to right indicates full marks.
- Assume suitable data wherever necessary and state it ***clearly***.

Master

Q.No.1. (a) Obtain an expression for velocity distribution in terms of average velocity for (i) Smooth Pipe and (ii) Rough Pipe. (10)

(b) A pipe of 300 mm diameter conveys water at the rate of 0.22 cum/sec. If the coefficient of friction is 0.025, calculate the average height of roughness projection on the pipe wall, wall shear stress and shear friction velocity. Take $\nu = 1.10 \times 10^{-2}$ stokes. Assume pipe is rough. (10)

Q.No.2. (a) Define boundary layer and explain the fundamental causes of its existence. Also discuss the various methods of controlling the boundary layer. (10)

(b) Find the displacement thickness, momentum thickness and energy thickness for the velocity distribution in the boundary layer given by $(u/U_0) = 2\eta - \eta^2$; where $\eta = (y/\delta)$ (10)

Q.No.3. (a) Explain with neat sketches: streamlined body and bluff body. (06)

(b) Explain in brief: terminal velocity of a body. (06)

(c) A kite weighing 7.85 N has an effective area of 0.8 m^2 It is maintained in the air at an angle of 10^0 to the horizontal. The string attached to the kite makes an angle of 45^0 to the horizontal and at this point the value of co-efficient of drag and lift are 0.60 and 0.18 respectively. Find the speed of the wind and the tension in the string. Take the density of air as 1.25 kg/m^3 (08)

Q.No.4. (a) Explain the significance of channels of most efficient section and derive the conditions for most economical trapezoidal channel section to carry maximum discharge. (10)

(b) For a discharge of 15 Cu.M./sec. of water, bed slope of channel is 1 in 1350 and Manning's roughness constant = 0.017. Design the most economical trapezoidal channel section. Take side slope as 1H:1V (10)

Q.No.5 (a) Define and explain the following:

(i) Specific energy curve. (05)

(ii) Specific force curve. (05)

(b) Explain with neat sketches formation of hydraulic jump in a prismatic channel. Also explain assumptions involved in the analysis of a hydraulic jump. (10)

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TE(CIVIL), VII, Re-edam, 17/6/15.
Hydraulic Engineering - II

Q.No.6. (a) Derive dynamic equation for gradually varied flow in case of a wide rectangular channel, and explain the flow profiles in case of steep sloped channel. (10)

(b) Determine length of back water curve by an afflux of 2.5 m in rectangular channel of width 40 m and depth 3 m. The slope bed is 1 in 11,000. Take Manning's constant N =0.03. (10)

Q.No.7. (a) Explain: Geometric, Kinematic and Dynamic similarity with suitable examples and state importance of each in dimensional analysis. (10)

(b) State Buckingham's-π theorem. The 'η' of a fan depends on density 'ρ' and viscosity of fluid 'μ', angular velocity 'ω', diameter 'D' and discharge 'Q'. Obtain a functional relationship for 'η' in terms of dimensionless parameters. (10)

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T.Y. B.Tech. (Civil), Sem VI
Hydraulic Engineering - II

2/b
02.05.15.

Bharatiya Vidya Bhavan's

Sardar Patel College of Engineering

(An Autonomous Institution Affiliated to University of Mumbai)

Department of Civil Engineering

End Semester Examination-May 2015

2014-2015

Class/Sem: T.Y. B.Tech. (Civil), Sem. VI **Subject: Hydraulic Engineering-II**

Max. Marks: 100

Duration: 3 hours

- Solve ***any five questions*** out of seven.
- Answer to all sub questions should be grouped together.
- ***Figure*** to right indicates full marks.
- Assume suitable data wherever necessary and state it *clearly*.

MASTER FILE

Q.No.1	(a)	Explain with neat sketches: Hydro-dynamically smooth and rough boundaries.	(06)
	(b)	Explain: Prandtl's mixing length theory.	(06)
	(c)	A rough pipe of diameter 30 cm and length 1km carries water at the rate of 0.50 m^3/sec. The wall roughness is 0.015mm. Determine the coefficient of friction, wall shear stress, centre line velocity and velocity at a distance of 10 cm from the pipe wall.	(08)
Q.No.2.	(a)	Describe the phenomenon of boundary layer separation and explain how to prevent the separation of boundary layer.	(08)
	(b)	For the velocity profile of $u/U = 2(y/\delta) - (y/\delta)^2$; Find (i) Boundary layer thickness; (ii) Momentum thickness; (iii) Energy thickness and (iv) Displacement thickness;	(12)
Q.No.3.	(a)	What is Magnus effect? Explain.	(06)
	(b)	Write short notes on: Singing of telephone wires.	(06)
	(c)	Experiments were conducted in a wind tunnel with a wind speed of 60 kmph on a flat plate of size 2 m x 0.30 m. The plate is inclined at an angle α such that the coefficient of lift and drag are 0.75 and 0.15 respectively. Determine: (i) Lift Force, (ii) Drag Force, (iii) Direction and magnitude of Resultant Force, and (iv) Power exerted by air stream on the plate.	(08)
Q.No.4.	(a)	Derive the conditions for the most economical triangular channel section.	(06)
	(b)	Write short notes on: Waves and surges in open channels.	(06)
	(c)	A trapezoidal channel is required to carry water at the rate of 10 m^3/sec under the most economical condition. The channel has one side vertical and the other side has a slope of 1V: 1.5 H. The longitudinal slope is 1:4500 and Manning's n = 0.018. Design the channel section and calculate mean velocity.	(08)
Q.No.5	(a)	Explain with neat sketch: Standing wave flume.	(06)
	(b)	Derive an expression for discharge (Q) for flow through venturiflume.	(06)
	(c)	A rectangular channel 2.50 m wide carries a discharge of 7.50 m3/s. Calculate the critical depth and specific energy at critical depth.	(08)

p.t.o.

T.Y.B.Tech.(civil), Sem-VI

Hydraulic Engineering - II

Pf 02/5/15

Q.No.6. (a) Derive dynamic equation for gradually varied flow in case of a wide rectangular channel. (06)

(b) Explain with neat sketches: M1, M2, M3 profiles. (06)

(c) Determine the length of back water curve caused by afflux of 1.50 m in a rectangular channel width of 50 m and depth of 2.0 m The slope of the bed is given as 1 in 2500. Take Manning's N = 0.030. (08)

Q.No.7. (a) Explain the terms: Geometric, kinematic and dynamic similarities. (06)

(b) Illustrate Rayleigh's method of dimensional analysis. (06)

(c) The resisting force 'R' of a supersonic plane during flight can be considered as dependent upon the length of the aircraft 'L', velocity 'v', air viscosity 'μ', air density 'ρ', and bulk modulus ' k'. Express the functional relationship between these variables and resisting force. (08)

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p.t.o.

TE(Civil), Sem - VI, Re-exam. 18/6/15 18/06/15
Transportation Engineering - II

Bharatiya Vidya Bhavan's

Sardar Patel College of Engineering

Munshi Nagar, Andheri (West), Mumbai-400 058.

T. E. Civil (Sem - VI)

SUBJECT – TRANSPORTATION ENGINEERING – II

MARKS: 100

Note: (i) solve any five Questions out of seven
(ii) Assume suitable data if required.

Master

Q.1.

(a) Write short notes on First Twenty Years Road Development Plan. (06)

(b) Explain the ideal requirement of highway alignment. (06)

(c) Draw the section of road in embankment and cutting showing all the component parts. Also state the recommended dimension of each part as per IRC. (08)

Q.2.

(a) What is sight distance. Derive the expression for stopping sight distance. (06)

(b) Discuss following geometric element of road, (i) Carriageway, (ii) shoulder (06)

(c) Calculate the safe stopping sight distance for a design speed of 100 km/hr on ascending gradient of 3 %. Assume the necessary data if required. (08)

Q.3.

(a) What is Transition curve? Why it is provided. How you will calculate the length of transition curve. (10)

(b) The speed of overtaking vehicle and overtaken vehicle is 70 km/hr and 40 km/hr respectively on two-lane road. If the acceleration of overtaking vehicle is 3.6 km/hr/sec calculate (10)

(a) Safe overtaking sight distance

(b) Minimum length of overtaking zone

(c) Desirable length of overtaking zone

(d) Draw a neat sketch showing all details

Q.4.

(a) what are the objectives of soil stabilization? List different methods of stabilization. Discuss in brief lime Stabilization. (08)

(b) Calculate the extra widening of pavement required on horizontal curve of radius 600 m on two lane highway. Assume design speed = 90 km/hr, wheel base = 6.2 m. (06)

TE(CIVIL), Sem-VI, Re-exam. 18/6/15
Transportation Engineering-II

(c) The plate bearing test was conducted on soaked subgrade using 30 cm size plate. The load value and corresponding dial gauge reading is shown in the table below. Determine the modulus of subgrade reaction. (06)

Dial Gauge Reading (mm)	0	0.24	0.52	0.76	1.02	1.23	1.53	1.76
Load (kg)	0	460	900	1180	1360	1480	1593	1640

Q.5.

(a) Enlists the different test to be carried out on Road aggregate. Explain with neat sketch any two of them in detail. (10)

(b) Explain in brief how will you conduct California Bearing Ratio (CBR) Test in Laboratory. Also, Discuss the effect of confinement on CBR value of subgrade soils. (10)

Q.6.

(a) Design a pavement section by triaxial method using following data: Wheel load = 5100 Kg, Radius of contact area = 15 cm, traffic coefficient = 1.5, rainfall coefficient = 0.9, design deflection = 0.25 cm, E- Value for subgrade = 125 kg/cm^2, E- value for base = 475 kg/cm^2, assume 7.5 cm thickness bituminous layer provided at the top of base course having E- value 900 kg/cm^2. (10)

(b) The subgrade soil sample was collected from project site and CBR test was conducted at field density the following results were obtained. Design the pavement as per IRC 37- 2001 for a highway passing through (i) plain area (ii) Hilly area.
Use following data for the design, Two Lane single carriageways carries a traffic of 1200 commercial vehicle per day, rate of growth of traffic is 7 %, period required for construction of road after last count is 4 years. Design life of the pavement is 15 years. Also, draw a neat sketch showing thickness of individual layers. (10)

Penetration (mm)	**Load in kg**	**Penetration (mm)**	**Load in kg**
0	0	3	58.5
0.5	6	4	70
1	17.2	5	78.3
1.5	28.1	7.5	90
2.0	42	10	101.5
2.5	50.50	12.5	108.50

BE (Civil), Sem - VII, Re-Exam, 18/6/15
Transportation Engineering - II

Q.7.

(a) The existing flexible pavement was tested using Benkelman Beam with a test vehicle of ESWL 4085 and tyre pressure of 5.6 kg/cm^2. The observations recorded at a pavement temperature of 40^0 c are given bellow.

1.46, 1.52, 1.56, 1.76, 1.96, 1.74, 1.68, 1.74, 1.96, 1.42, 1.56, 1.62, 1.68, 1.90, 1.89

Calculate the thickness of bituminous concrete overlay to be provided over the existing pavement. Assume following data (i) allowable deflection = 1.25 mm, (ii) subgrade moisture content = 1.2, (iii) Use IRC approach for overlay design (10)

(b) write short notes on (any two) (10)

(a) steps involve in preparation of subgrade.

(b) Construction of WBM road.

(c) Mud Pumping in Rigid Pavement.

(d) application of geotextile and geogrid in highway pavements

Plate –I Q. 6. (b)

Cumulative Traffic (msa)	Total pavement thickness (mm)	Pavement Composition		Granular Sub base and Base
		BC (mm)	DBM (mm)	
10	700	40	80	Base = 250 mm Sub base = 330 mm
20	730	40	110	
30	750	40	130	
50	780	40	160	
100	800	50	170	
150	820	50	190	

Page - (3)

TE (Civil), Sem - VI, 05/05/2015
Transportation Engineering - II

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Sardar Patel College of Engineering
Munshi Nagar, Andheri (West), Mumbai-400 058.

T. E. Civil (Sem - VI)
SUBJECT – TRANSPORTATION ENGINEERING – II

MARKS: 100

Note: (i) solve any five Questions out of seven
(ii) Assume suitable data if required.

Master

Q.1
(a) Explain in detail the complete procedure started from map study to location survey required for locating new highway. (10)
(b) Following are the data collected for Road Development Program of one of the District in Maharashtra. The number of town and villages having different population and other required data is given bellow. Calculate the additional length of surface and unsurface road required as per Nagpur Plan. Total area of District = 9000 km^2, Agriculture area = 3500 km^2, Length of Railway Track = 150 km, Length of Exiting Surface road =350 km, Existing Unsurface Road = 500 km. (10)

Population	500	500 to 1000	1000 to 2000	2000 to 5000	> 5000
No of Villages	650	300	140	42	06

Q.2.
(a) Discuss following geometric element of road, (i) Carriageway, (ii) Camber, (iii) shoulder, (iv) Gradient, (v) side slope. (10)
(b) Calculate the safe stopping sight distance for a design speed of 100 km/hr on ascending gradient of 3 %. Assume the necessary data if required. (10)

Q.3.
(a) Derive the expression for superelevetion. How you will provide superelevation on curve portion of road at site. (10)
(b) Two lanes National Highway passing through plain area, the radius of horizontal curve is 400 m .Calculate the total width of pavement on curve portion of road. Also, calculate the length of transition curve. Assume length of wheel base = 6.2 m. (10)

Q.4.
(a) Enlists the different methods for classification of subgrade soil. Explain revised PRA system for classification of subgrade soil. (10)
(b) Explain in brief How will you conduct Plate Bearing Test in field; discuss correction for plate size and for worst moisture content. (10)

TE (Civil), Sem - VI, 5/5/15,
Transportation Engineering - II

Q.5.

(a) Two Lane single carriageways carries a traffic of 1200 commercial vehicle per day, rate of growth of traffic is 7 %, period required for construction of road after last count is 4 years. Design life of the pavement is 15 years. Calculate the cumulative number of standard axle for a highway passing through (i) plain area (ii) Hilly area. (10)

(b) A plate bearing test conducted with 30 cm diameter plate on subgrade and over 15 cm base course. The pressure yield at 0.50 cm deflection is 1.4 kg/cm^2 and 5.1 kg/cm^2 respectively. Design the airfield pavement section for a wheel load of 5100 kg with a tyre pressure of 5 kg/cm^2 for a allowable deflection of 0.5 cm using Burmister theory. (10)

Q.6.

(a) Explain different type of joints of cement concrete pavement (07)

(b) Use of geotextile and geogrid in flexible pavement. (07)

(c) Mud Pumping in Rigid Pavement. (06)

Q.7. Write short notes on the following. (Any four) (20)

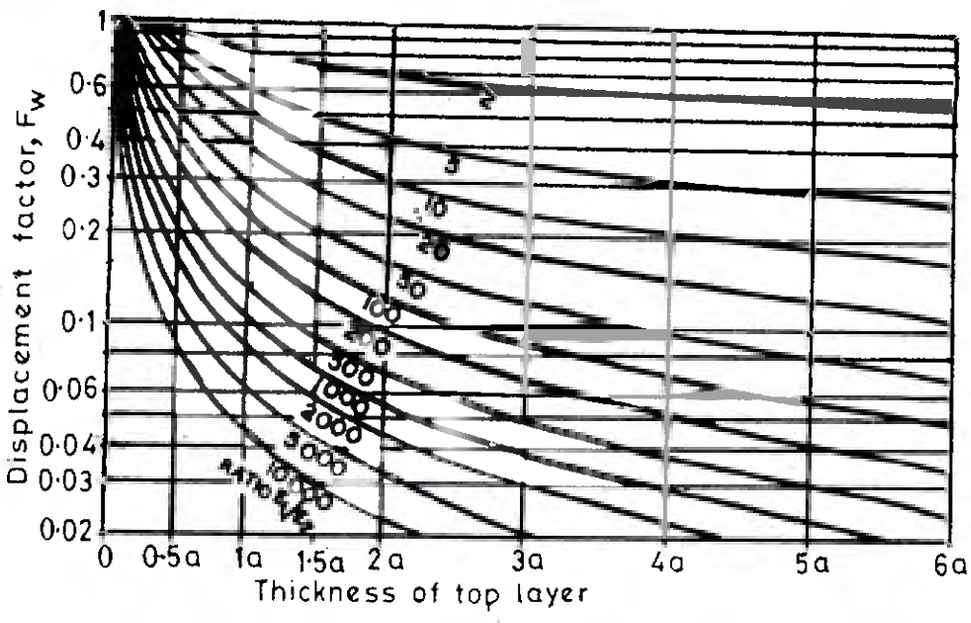
(a) Vehicle Damage Factor.

(b) Method of Construction of Rigid Pavement.

(c) Temperature Stresses

(d) Differentiate between flexible pavement and rigid pavement

(e) Desirable Properties of Subgrade soil



page-(2)

TE (Civil), Sem- VI, Re-exam, 21/6/15. lib 21/6/15
Environmental Engineering-I

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

Total Marks: 100 **Duration: 3 Hours**

Re-exam
CLASS – T.Y. B.Tech/ CIVIL/ SEM-VI
CODE: CE 355
Year- 2014-15
SUBJECT: Environmental Engineering I

- **Question No. 1 is compulsory**
- Attempt **any four** more questions from the **remaining six**
- Make **suitable assumptions** if necessary and state them clearly.
- Draw neat sketches where necessary and show all supporting calculations
- Figures to the right indicate maximum marks

Master.

Q1	**Answer any 4 of the following questions in short:**	**(20)**
i.	Write a note on characteristics (physical, chemical and biological) affecting the quality of water.	**(05)**
ii.	Define air pollution. Classify air pollutants and explain impacts of air pollutants on humans and material.	**(05)**
iii.	Define solid waste and its type. Enumerate the sources of solid waste.	**(05)**
iv.	Define the following : (i) SOR (ii) WLR (iii) G (temporal mean velocity) (iv) Super chlorination (v) Discrete settling	**(05)**
v.	Compare slow and rapid sand filters (atleast 8 points)	**(05)**
Q2	**Answer the following questions:**	**(20)**
i.	Explain carbon and sulphur cycle.	**(05)**
ii.	Write a note on biotic and abiotic factors in detail.	**(05)**
iii.	Explain marine ecosystem and its parts.	**(05)**
iv.	Define ecosystem. Explain Liebig's law.	**(05)**
Q3	**Answer the following questions:**	**(20)**
i.	Define and explain Sound levels; Leq, Lavg, Noise climate	**(05)**
ii.	Describe different soil horizons/layers with correct diagram. Write any two measures to control soil pollution.	**(05)**
iii.	Explain a note on thermal pollution with emphasis on its effects and controls.	**(05)**
iv.	Explain hazardous wastes, their sources and means for their disposal	**(05)**
Q4	**Answer the following questions:**	**(20)**
i.	Explain various mechanisms to remove turbidity, dissolved ions and pathogens from water. Illustrate with a flowsheet of conventional surface water treatment plant in detail. Explain in detail the function of each unit with degrees of removal of turbidity	**(10)**
ii.	Explain the concept of per capita demand with the types of demand (Showing the breake up of each type of demand). How is the total per capita demand calculated and incorporated in design of treatment plant components.	**(10)**

TE (Civil), Sem- VI, Re-exam, 21/6/15.
Environmental Engineering - I

Q5 Answer the following questions: **(20)**

i. Explain type of settling in water treatment and derive Stoke's Law. Find diameter of the particles with specific gravity 1.2 removed in a tank having a surface area of 250 m^2 and treating 5 MLD of water per day. Temperature of water is 20°C. $\mu = 1.0087X10^{-3} Ns/m^2$ $\rho = 998$ kg/m^3 at 20°C. **(10)**

ii. Explain coagulation and flocculation and their necessity. Design a flocculator with baffles of round the end type for treating 30 MLD. Detention time is 20 minutes and average velocity of flow is 0.25 m/s. The basin may be divided into two halves by a central longitudinal wall and each half may have a clear width of 8 m. Mention the number of channels in the basin and overall inside length of the basin **(10)**

Q6 Answer the following questions: **(20)**

i. Explain with short notes any two (i) Filter troubles (ii) Breakpoint chlorination (iii) Odor and color removal techniques (iv) Tube settlers **(10)**

ii. Design a rapid sand filter with underdrainage system for a town requiring 20 MLD water. **(10)**

Q7 Answer the following questions: **(20)**

i. Explain the concept of hardness in water. Enumerate the methods used to remove hardness with explanation and suitable figures **(05)**

ii. **Explain in short any four** (i) Landfills (ii) Transfer stations (iii) Pyrolysis (iv) Composting (v) Nalgonda technique (vi) Reverse osmosis **(05)**

iii. Illustrate with a figure essential elements of solid waste management. Draw a flowsheet to recover material and energy from a solid waste having 70% organic matter **(05)**

TE (Civil), Sem - VI, 2015

Environmental Engineering - I

01

Bharatiya Vidya Bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(An Autonomous Institution Affiliated to University of Mumbai)

Total Marks: 100 **Duration: 3 Hours**

CLASS – T.Y. B. Tech. CIVIL, SEM-VI

CODE : CE 355

Year- 2014-15

SUBJECT: Environmental Engineering I

- **Question No. 1 is compulsory**
- Attempt **any four** more questions from the **remaining six**
- Make **suitable assumptions** if necessary and state them clearly.
- Draw neat sketches where necessary and show all supporting calculations
- Figures to the right indicate maximum marks

MASTER FILE.

Q1 **Answer any 10 of the following questions in short** **(20)**

i. Explain the necessity of water supply schemes. **(02)**

ii. Define a water intake. Enumerate the types of intake provided. **(02)**

iii. Explain hazardous wastes. Explain one method for their disposal **(02)**

iv. Explain any one method to determine residual chlorine in water sample. **(02)**

v. Explain the indicator organisms. Explain the features of indicator organisms. **(02)**

vi. Explain the classification of air pollutants. **(02)**

vii. Illustrate with a figure the two types of settling encountered in water treatment. **(02)**

viii. Explain in short the mechanisms involved in filtration of particles. **(02)**

ix. Chlorine usage in treatment of 20000 cubic meter of water per day is 8 kg/day. The residual chlorine after 10 min contact is 0.2 mg/L. Calculate dosage of chlorine in mg/L and chlorine demand in mg/L. **(02)**

x. Explain in short thermal pollution. **(02)**

xi. Explain various collection services for collection of solid waste. **(02)**

xii. Enumerate water pollutants (atleast 8). **(02)**

Q2 **Answer the following questions** **(20)**

i. Explain Carbon and Nitrogen cycle. **(10)**

ii. Explain energy concepts related to ecosystem. **(05)**

iii. An ecologist harvests 5 plots of 0.2 m^2 each at the end of the growing season to determine NPP and GPP of a grassland, The dry masses for each plot: Plot 1 = 550 grams, Plot 2 = 606 grams, Plot 3 = 553 grams, Plot 4 = 728grams, Plot 5 = 710 grams. A growing season ends every 6 months. **(03)**

iv. Explain Leibig's law **(02)**

Q3 **Answer the following questions** **(20)**

i. Write a note on active and passive method of air quality measurement. **(05)**

ii. Write a note on Bioremediation and its types. **(05)**

iii. Explain sources of noise pollution and methods employed to control it. **(05)**

The noise levels at particular locations are 80 dB, 64dB & 72 dB, measured during an hour of

TE Civil, sem - VI, 815115
Environmental Engineering - I

the day. Find out avg. noise levels at the location.

iv. Explain per capita demand. Explain how the capacity of various design components in a treatment plant determined. (05)

Q4 Answer the following questions (10)

i. Illustrate with a flowsheet of conventional surface water treatment plant in detail. Explain in detail the function of each unit with degrees of removal of turbidity. Explain the additional treatment required if color, odor and hardness is present in the water source (10)

ii. Forecast the population for 2060 using incremental increase and geometric increase method using data depicted in following table (05)

Census	Population
1960-70	1,50,600
1970-80	1,70,000
1980-90	1,80,000
1990-2000	2,10,000
2000-2010	2,40,000

iii. Explain with a graph breakpoint chlorination, chlorine dose and demand (05)

Q5 Answer the following questions (20)

i. Explain how vertical tanks flow and different from horizontal flow tanks with derivation of SOR for both the types of tank. In a continuous flow settling tank 3.5 m deep and 50 m long, what flow velocity of water would you recommend for effective removal of 0.025 mm particles at 25°C. The specific gravity of partioles is 2.65 and kinematic viscosity v for water is 0.01cm^2/sec. (10)

ii. Explain flocculation and the importance of G and GT values. (10)
Design a paddle flocculator (draw fig) for 10 MLD plant with following details:
Detention time= 30 min
Average G= $50s^{-1}$
Speed of paddles = 4 rpm
K=0.25
$\mu = 1.0087X10^{-3}$
ρ=998 kg/m^3 at 20°C

Q6 Answer the following questions (20)

i. Explain with short notes any two (i) Working and backwashing in rapid sad filter (ii) Ozonation and UVtreatment (iii) Aeration (10)

ii. Design a rapid sand filter with underdrainage system and wash water troughs for a town requiring 10 MLD water. (10)

Q7 Answer the following questions (20)

i. The water with following chemical constituents is to be softened by lime soda process. Compute the quantities of chemicals required to treat 200 m^3/d of water flow. Assume soda ash and lime purity 85%. (05)
$CaSO_4$= 200 mg/L; $MgSO_4$ = 103 mg/L; NaCl= 12 mg/L; Mg Cl_2= 100 mg/L

ii. **Explain in short any four** (i) Landfills (ii) Transfer stations (iii) Pyrolysis (iv) Composting (v) Nalgonda technique (vi) Reverse osmosis (10)

iii. Illustrate with a figure essential elements of solid waste management. Enumerate the factors affecting generation rate. (05)

TE (CIVIL), sem - VI 915 115 Lib
Theory of Reinforced & Prestressed concrete. 09/05/15

Bharatiya Vidya Bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(An Autonomous Institution Affiliated to University of Mumbai)

THEORY OF REINFORCED AND PRESTRESSED CONCRETE

TE (CIVIL) SEM VI
Date- / /2015

Duration : 3 Hours
(100 MARKS)

- Attempt any FIVE questions out of SEVEN questions.
- Assume any other data needed suitably if not given; but justify the same.
- Illustrate your answers with neat sketches wherever required, though not sought specifically.
- Use of IS 456:2000 is allowed.

Master

Q.1 (a) A reinforced beam 250 x 550 mm overall in section is reinforced with 4-20mm dia bars. The clear cover to the steel from bottom surface to beam is 25mm. if the effective span of simply supported beam is 3.5m, find the concentrated load the beam can support at centre. Use M20 & Fe 500 — 12

(b) An RCC Column 200 x 350 mm is reinforced with four 25 mm dia bars. The axial load is 200 KN. The column carries a moment of 6 KN M on X-X axis parallel to 200 mm sidde and a moment of 4 KN M on Y-Y axis parallel to 350 mm side. Calculate the max and min stresses indueced in the column. Clear cover is 40mm. Assume suitable grade of concrete — 8

Q.2 (a) Explain the Freyssinet System of Prestressing. — 5

(b) Explain long column and short column and state how code modifies the design. — 5

(c) Design a rectangular column of effective length 4.0 M to carry an axial load of 1000 KN. Adopt M 20 and Fe 415. Draw column section and elevation with reinforcement detai — 10

Q.3 (a) Design a doubly reinforced beam section to carry a moment of 180 kNm using M20 and Fe 415.Size of beam 230 X 500 mm eff depth. Assumes effective cover at top and bottom as 50 mm. — 10

(b) A prestressed concrete beam of section 120mm wide by 300mm deep is used over an effective span of 6m to support a uniformly distributed load of 4KN/m, which includes the self wt of the beam. The beam is prestressed by straight cabie carrying a force of 180 KN and located at an eccentricity of 50mm. Determine the location of the thrust line in the beam and plot its position at quarter and central span section. — 10

Q.4 (a) Design two way slab of effective span 3.0 m.x 5.0 m with two adjacent edges discontinuous resting on 230 mm wide beams. The working load on slab is 2.5 kN/m^2. Floor finishes is 1.0 kN/m^2. Use M 20 and Fe 415.. Draw section showing reinforcement details. — 15

TE Civil, Sem. VI, 9/5/15

Theory of Reinforced & Prestressed Concrete.

(b) What is the difference between a one way slab and a two way slab? Draw a sketch explaining structural behavior. 5

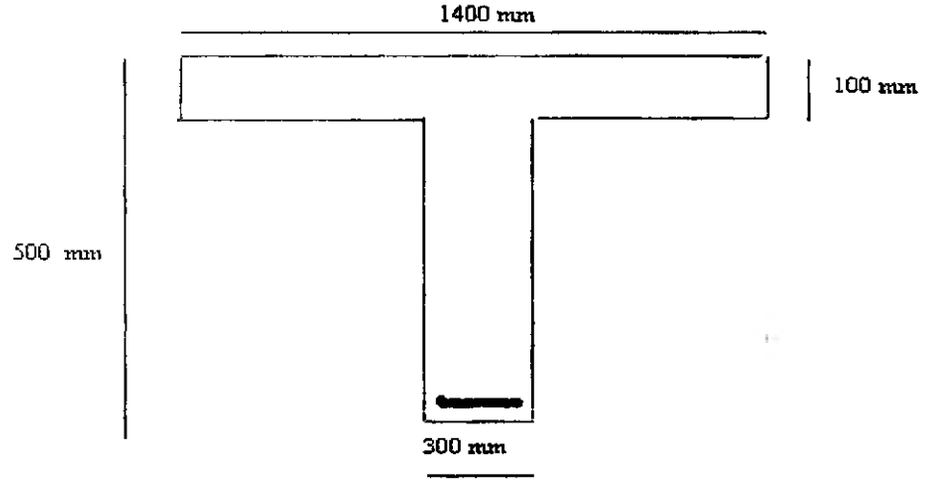
Q.5 (a) A pretensioned beam, 200mm wide and 300mm deep, is prestressed by 10 wires of 7 mm dia initially stressed to 1200 N/mm^2, with their centroids located 100mm from the soffit. Find the maximum stress in concrete immediately after transfer allowing only for elastic shortening of concrete. if the concrete undergoes a further shortening due to creep and shrinkage while there is a relaxation of 5% of steel stress, estimate the final % loss of stress in the wires using IS: 1343-1980 and the following data: E_s = 210 KN/mm2 , E_c = 5700 $(f_{cu})^{1/2}$, f_{cu} = 42 N/mm^2, Creep coefficient (Ø) = 1.6, Total residual shrinkage strain = 3 x 10^4. 15

(b) State and explain the principal of pre-stressing. What is the difference between transfer stage and service stage? 5

Q.6 (a) Explain design of Shear Reinforcement also.are the bent-up bars alone satisfactory as shear reinforcement? And why? 6

(b) A 6m span simply supported beam is to carry a working load of 48 KN/m. the beam is of c/s 350 x 500 mm effective. The beam is provided with 6 nos of 20mm bars on tension side and 3 bars of 20mm dia on compression side. Design shear reinforcement using 6mm dia Fe 415 and grade of concrete is M 20 14

Q.7 (a) Determine area of tension steel for flanged section for the following data: 10
Bending Moment = 250 KN m, grade of concrete = M 25, grade of steel = Fe 415



(b) A prestressed concrete beam upper flange 750 x 20 mm, bottom flange 400 x 300 mm, web 150 x 500mm, span 30m with L.L. of 4 KN/m. It is prestressed by 120 wires of 5mm dia at 100 mm above the bottom edge initial by 1200 N/mm2. Determine the max extreme fibre stresses at transfer and service stage. 10

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TE (Civil), Sem-VI, Re-exam, - 20/06/2015.
Theory of Reinforced and Prestressed Concrete.

HB
20/06/15

BharatiyaVidyaBhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(An Autonomous Institution Affiliated to University of Mumbai)

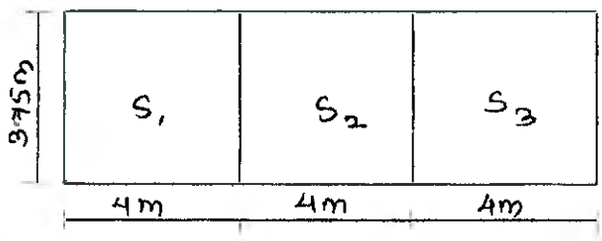
THEORY OF REINFORCED AND PRESTRESSED CONCRETE

Duration : 3 Hours (100 MARKS) TE (CIVIL) SEM VI / Re-exam

- **Question No. 1 is compulsory.**
- Attempt any four questions out of remaining six questions.
- Assume any other data needed suitably if not given; but justify the same.
- Illustrate your answers with neat sketches wherever required, though not sought specifically.
- Use of IS 456:2000 is allowed.

Master

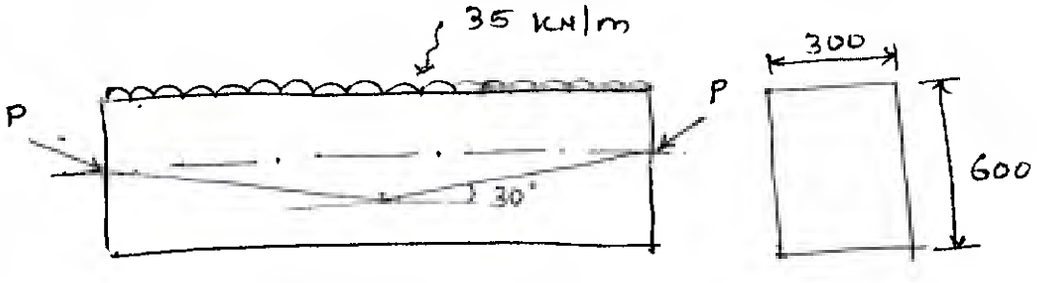
Q.1 (a)	An RCC beam 200 x 45 mm effective is reinforced with three 16 mm Ø bars. Find out the moment of resistance of the beam if σ_{cbc} = 5 N/mm^2, σ_{st} = 140 N/mm^2 and m = 18.66.	8
(b)	An RCC column 300 x 300 mm is reinforced with four 20 mm Ø bars, placed 50 mm from the face of the column. A load of 280 KN is applied at an eccentricity of 50mm from one of its axis. Find the stresses induced in the column. Assume suitable grade of steel and concrete.	12
Q.2 (a)	A rectangular reinforced beam is 360 x 750 mm effective. The beam has to resist a bending moment of 300 KN-m. Find the tensile and compressive steel required for the beam. Consider M20 & Fe 415 .(d' = 50mm)	10
(b)	What is "modular ratio" and what is its significance in design?	5
©	Explain Bond and Development Length. Also the effects of both in RCC.	5
Q.3 (a)	A beam 300 x 1010 mm effective has a span of 7m. Total load on the beam is 45 KN/m. Tensile reinforcement is by 6 nos 22 mm dia bars. If concrete is M20 & Fe 415, design shear reinforcement.	12
(b)	Explain in detail principle of Prestressing and any one method of Pretensioning	8
Q.4 (a)	Figure below shows the line plan of a floor of a residential building. Design the slab (S_2) with the following data. M 25, Fe 415, LL = 2 KN/m^2 and FF = 0.5 KN/m^2	15



(b)	Distinguish between one way and two way slab.	5

TE(Civil), sem- VII, Re-exam, 20/6/17.
Theory of Reinforced and Prestressed Concrete.

Q.5 (a)	A beam of symmetrical I-section spanning 8 m has a flanges width of 200 mm and a flange thickness of 60 mmm respectively. The overall depth of the beam = 400 mm. Thickness of the web = 80 mm. The beam is prestressed by a parabolic cable with an eccentricity on the beam is 2000 N/m. Draw the stress distribution diagram at the mid span section for the following condition: (i) prestress + self-weight (ii) prestress + self weight + live load	15
(b)	Are bent up satisfactory to be provided as shear reinforcement? Justify	5
Q.6 (a)	Design a column to carry an axial load of 850 KN. The length of the column is 5m and the ends ofcolumn are properly restrained in position, but not restrained against rotation. Use concrete M20 and Fe 250.	10
(b)	As shown in fig below a prestressed concrete beam provided with a tendon having a parabolic profile. If the total external load on the beam is 35 Kn/m on the whole span, calculate the extreme stresses for the mid span section. The tendon carries a prestressing force of 1000 KN.	10



Q.7 (a)	An L beam consists of a 120 mm slab monolithically constructed with beams which are 3 m apart. The breadth of web is 200 mm and the effective depth is 550 mm. The beamis reinforced with 3200 mm2 of steel on the tension side. Find the actual stresses in steel and concrete, if the beam is subjected to a bending moment of 190 KN-m. Take m=13.33, lef = 6m.	10
(b)	Write design steps for shear reinforcement.	10