INSTITUTEOFAERONAUTICALENGINEERING

(Autonomous)

Dundigal,Hyderabad-500043

STRUCTURAL ENGINEERING

QUESTION BANK

Course Name	:	**ADVANCED DESIGN OF FOUNDATION**
Course Code	:	**BSTB17**
Class	:	M. Tech II Semester
Branch	:	STE
Year	:	2018-19
Course Coordinator	:	Mr.N. Venkat Rao, Associate Professor, Department of Civil Engineering
Course Faculty	:	Mr.N. Venkat Rao, Associate Professor, Department of Civil Engineering

COURSE OBJECTIVES:

The course should enable the students to:

I	Decide the suitability of soil strata for different projects
II	Design shallow foundations deciding the bearing capacity of soil.
III	Analyze and design the pile foundation.
IV	Understand analysis methods for well foundation

COURSELEARNING OUTCOMES:

Students, who complete the course, will have demonstrated the ability to do the following:

BSTB17.01	Understand the need and methods of Soil Exploration
BSTB17.02	Understand various methods of sampling and boring
BSTB17.03	Learn how to perform field tests on SPT and DCPT
BSTB17.04	Learn how to perform Plate Load test for finding load bearing capacity, settlements of soils
BSTB17.05	Learn how to perform in-situ test using pressure meter
BSTB17.06	Understand the importance of geophysical methods
BSTB17.07	Pile Group Capacity and Settlement.
BSTB17.08	Understand the need of Laterally Loaded Piles
BSTB17.09	Understand the need of Pile Load Tests
BSTB17.10	Analytical Estimation of Load- Settlement Behavior of Piles,
BSTB17.11	Proportioning of Pile Foundations
BSTB17.12	AnalyzeLateral and Uplift Capacity of Piles
BSTB17.13	Understand IS and IRC Code Provisions
BSTB17.14	Elastic Theory and Ultimate Resistance Methods.
BSTB17.15	Tunnels and Arching in Soils
BSTB17.16	Understand the need of Pressure Computations around Tunnels
BSTB17.17	Sheeting and Bracing Systems in Shallow and Deep Open Cuts
BSTB17.18	Analysis and Design of Coffer Dams
BSTB17.19	Understand Foundations under uplifting loads
BSTB17.20	Understand Soil-structure Interaction.

S.No	QUESTIONS	Blooms taxonomy level	Course Learning Outcomes
UNIT I			
SOIL EXPLORATION			
Part - A (Short Answer Questions)			
1	Distinguish between disturbed and undisturbed samples	Understand	BSTB17.01
2	How do you obtain undisturbed samples?	Remember	BSTB17.01
3	What is Boring log? when does it need	Understand	BSTB17.01
4	List out various methods of soil exploration	Understand	BSTB17.01
5	Explain various methods of drilling holes	Remember	BSTB17.01
6	What is Reconnaissance? What is its use?	Understand	BSTB17.01
7	What is split spoon sampler? What is its use?	Understand	BSTB17.01
8	What are the merits of wash boring method?	Remember	BSTB17.02
9	What is soil exploration?	Understand	BSTB17.02
10	What is the purpose of soil investigation?	Understand	BSTB17.02
11	What is Auger Boring?	Remember	BSTB17.02
12	Name few geophysical investigation techniques?	Understand	BSTB17.03
13	What is Area Ratio?	Understand	BSTB17.03
14	Name few samplers used for soil exploration in field.	Remember	BSTB17.03
15	Name few field tests for obtaining the strength of soil	Understand	BSTB17.03
16	What is SPT write some advantages of SPT	Understand	BSTB17.04
17	What are the corrections to be applied for SPT value?	Remember	BSTB17.04
18	What is difference between SPT and DCPT test?	Understand	BSTB17.04
19	What is CPT write some advantages of CPT	Understand	BSTB17.04
20	What is rule of thumb for spacing between boreholes for soil exploration?	Remember	BSTB17.04
Part - B (Long Answer Questions)			
1	Explain briefly various methods of soil exploration techniques?	Understand	BSTB17.01
2	Write a short note on Auger Boring?	Remember	BSTB17.01
3	Write a short note on Wash Boring?	Understand	BSTB17.01
4	Write a detailed note on various types of boring techniques?	Understand	BSTB17.02
5	Write a short note on Percussion Drilling?	Remember	BSTB17.02
6	Explain in detail Seismic Refraction Method?	Understand	BSTB17.02
7	Explain in detail SPT test?	Understand	BSTB17.02
8	Explain the various parameters which affect the sampling of soil?	Remember	BSTB17.03
9	Explain briefly various Geophysical methods used for soil investigation?	Understand	BSTB17.03
10	Explain the need of Soil Exploration	Understand	BSTB17.03
11	Explain in detail CPT test	Remember	BSTB17.03
12	Explain in detail DCPT test	Understand	BSTB17.04
13	Explain in detail Pressure meter test?	Understand	BSTB17.04
14	Explain briefly field permeability tests?	Remember	BSTB17.04
15	Explain briefly plate load test on soil?	Understand	BSTB17.04
Part – C (Problem Solving and Critical Thinking)			
1	A SPT was conducted in a dense sand deposit of 22m, and a value of 48 was observed for N. the density of the sand was 15kN/m^3. What is the value of N, corrected for overburden pressure?	Understand	BSTB17.01
2	Compute the area ratio of a thin walled tube samples having an externaldiameter of 6cm and a wall thickness of 2.25mm. Do you	Remember	BSTB17.01

	recommend thesampler for obtaining undisturbed soil samplers? Why?		
3	A SPT is conducted on fine sand below water table and a value of 25 is obtained for N. What is the corrected value of N?	Understand	BSTB17.01
4	A SPT was performed at a depth of 20m in a dense sand deposit with a unitweight of 17.5kN/m2. If the observed N-value is 38, what is the N- valuecorrected for overburden?	Understand	BSTB17.02
5	Compute the area ratio of a thin walled tube samples having an externaldiameter of 8cm and a wall thickness of 3.25mm. Do you recommend thesampler for obtaining undisturbed soil samplers? Why?	Remember	BSTB17.02
6	Determine the area ratios for the following soil samplers and comment on the nature of samples obtained in each of the samplers Type of Sampler / Outer Diameter / Internal Diameter Core Cutter / 165 mm / 150 mm Split Barrel / 51 mm / 35 mm Seamless tube (Shelby) / 51 mm / 48 mm	Understand	BSTB17.03
7	The cone penetration resistance obtained in a clay soil in a CPT was 50 kg/cm^2. Determine the undrained strength of clay. The total overburden pressure at the depth was 100 kN/m^2.	Understand	BSTB17.03
8	Determine the area ratio of a Shelby tube sampler having inside and outside diameters of 111mm and 114 mm respectively.	Remember	BSTB17.04
9	A SPT is conducted on clay at a certain depth is 11. What is the corrected value of N? Estimate unconfined compressive strength of soil based on SPT N value.	Understand	BSTB17.04
10	Determine the area ratio of a sampler having inside and outside diameters of 125mm and 120 mm respectively.	Understand	BSTB17.04
UNIT II			
SHALLOW FOUNDATIONS			
Part – A (Short Answer Questions)			
1	How shallow foundation is defined by Terzaghi's	Understand	BSTB17.05
2	What are the various types of Shallow foundations	Remember	BSTB17.05
3	What are the general requirements of foundations	Understand	BSTB17.05
4	According to IRC what is the minimum depth a foundation	Understand	BSTB17.06
5	Define net ultimate bearing capacity	Remember	BSTB17.06
6	What are the methods available to determine bearing capacity of soils	Understand	BSTB17.06
7	Define net safe bearing capacity of soil	Understand	BSTB17.07
8	What are the principle modes of failures of soils	Remember	BSTB17.07
9	What is the basis of Terzaghi's bearing capacity theory	Understand	BSTB17.08
10	Explain plastic equilibrium of soil	Understand	BSTB17.08
Part - B (Long Answer Questions)			
1	Explain general shear failure and its characteristics with neat sketch	Understand	BSTB17.05
2	Explain shear failure and its pattern of failure with neat sketch	Remember	BSTB17.05
3	When does punching shear failure occur and discuss the features of failure	Understand	BSTB17.05
4	Explain the mechanism involved in Terzaghi's bearing capacity theory with a neat sketch	Understand	BSTB17.06
5	Explain Meyerhof bearing capacity theory with a neat sketch of failure mechanism	Remember	BSTB17.06
6	Distinguish between Terzaghi's and Meyerhof bearing capacity theories with neat a sketch	Understand	BSTB17.06
7	Explain settlement of Shallow foundations and their components	Understand	BSTB17.07
8	When does immediate settlement occur explain in detail	Remember	BSTB17.07
9	Explain allowable settlement and allowable bearing pressure in detail	Understand	BSTB17.08

10	Discuss the main features of local shear failure with a neat sketch	Understand	BSTB17.08
Part – C (Problem Solving and Critical Thinking)			
1	Design a strip footing for load bearing wall transmitting a force of 200kN/m proposed to be laid at a depth of 1.50 m below the G.L on a c-φ soil with c=40 kPa and φ=20°, γ=17kN/m3. Given N_C=11.80, Nq=3.90, Nγ=1.70.	Understand	BSTB17.05
2	A 2m wide square footing is laid at a depth of 1.2 m below the GL on a C- φ soil with c=40 kPa and φ=20°, γ=17kN/ m3. Given NC=11.80. Nq=3.90, Nγ=1.70. Using Terzaghi's theory, compute the ultimate bearing capacity (q) when the GWT is, a) 5 m below G.L b) At GL c) 2 m below G.L	Remember	BSTB17.05
3	Determine the ultimate bearing capacity of a strip footing, 1.5 m wide, with its base at a depth of 1m, resting on a dry sand stratum take γ_d=17kN/m^3, c'= 0 kPa and φ=38°. Use Terzaghi's theory	Understand	BSTB17.05
4	Determine the ultimate bearing capacity of a footing, 1.5 m wide, with its base at a depth of 1m, resting on a dry sand stratum take γ_d=17kN/m^3, c'= 0 kPa and φ=38°. Use bearing capacity factors recommended by Meyerhof. Ignore Embedment effect.	Understand	BSTB17.06
5	Determine the ultimate bearing capacity of a strip footing, 1.5 m wide, with its base at a depth of 1m, resting on a sand stratum take γ_d=17kN/m^3, c'= 0 kPa and φ=32°. Use Terzaghi's theory	Remember	BSTB17.06
6	What is 'negative skin friction '? How is it calculated for a single pile and a group of piles in clay?	Understand	BSTB17.07
7	Bored piles of 300 mm are installed in a two layered cohesive soil. The top layer has a thickness of 6 m and the bottom one is of considerable depth. The cohesion values of top layer are 50 kN/$m^2$and 100 kN/ m^2 respectively. Determine the length of the pile required to carry a safe load of 500 kN .Assume a F.S of 3.	Understand	BSTB17.07
8	What are the different circumstance under which a pile foundation is used ?	Remember	BSTB17.08
9	A square pile group of 16 piles penetrates through a filled up soil of 3m depth. The pile diameter is 250 mm and pile spacing is 0.75 m. The unit cohesion of the material is 18kN/m 2 and the unit weight of soil is 15 kN/m^3.Draw the plan and sectional elevation of the pile group. Compute the negative skin friction on the group.	Understand	BSTB17.08
UNIT III			
PILE FOUNDATIONS			
Part – A (Short Answer Questions)			
1	What is bearing capacity?	Understand	BSTB17.09
2	What is difference between ultimate bearing capacity and Safe bearing capacity?	Remember	BSTB17.09
3	What is net safe bearing capacity?	Understand	BSTB17.09
4	Write Terzaghi's ultimate bearing capacity equation for continuous footing.	Understand	BSTB17.09
5	Write Terzaghi's ultimate bearing capacity equation for square footing.	Remember	BSTB17.10
6	What is settlement of footing as per plate load test?	Understand	BSTB17.10
7	What are the various types of settlements in foundations?	Understand	BSTB17.10
8	Define foundation	Remember	BSTB17.10
9	Write Terzaghi's ultimate bearing capacity equation for rectangular footing.	Understand	BSTB17.10
10	Define end bearing pile.	Understand	BSTB17.11
11	Define friction pile.	Remember	BSTB17.11

12	Differentiate between uniform settlement and differential settlement.	Understand	BSTB17.11
14	Classify piles based on their method of installation.	Understand	BSTB17.11
15	Classify piles based on their type of application.	Remember	BSTB17.12
16	What are the various classifications of piles?	Understand	BSTB17.12
17	Write a note on dynamic formula of piles.	Remember	BSTB17.12
18	Write Engineering News Record formula for load carrying capacity of piles.	Understand	BSTB17.12
19	What is the ultimate load capacity of pile	Understand	BSTB17.12
20	Make a note on plate load test.	Remember	BSTB17.12
Part - B (Long Answer Questions)			
1	Explain in detail Terzaghi's Bearing Capacity Theory	Understand	BSTB17.09
2	Explain in detail various types of bearing capacities	Remember	BSTB17.09
3	Explain in detail Meyerhof Bearing Capacity Theory	Understand	BSTB17.09
4	Explain in detail Indian Standard Bearing Capacity equation	Understand	BSTB17.09
5	Explain in detail plate load test	Remember	BSTB17.10
6	What is the Safe bearing pressure based on N value?	Understand	BSTB17.10
7	Explain the Dynamic formulae for Estimating the load carrying capacity of asingle driven pile	Understand	BSTB17.10
8	Explain the Static method for Estimating the load carrying capacity of asingle pile driven in cohesive soil.	Remember	BSTB17.10
9	Explain the in- situ penetration tests for Estimating the load carryingcapacity of a single driven pile	Understand	BSTB17.10
10	What are the effects of Effects of pile driving?	Understand	BSTB17.11
11	Explain how the Group capacity of piles can be found by different methods	Remember	BSTB17.11
12	What is the load carrying of the pile group in sands and clays?	Understand	BSTB17.11
13	What is the load carrying capacity of the pile in cohesion less soil?	Understand	BSTB17.11
14	Estimate the settlement of Pile group	Remember	BSTB17.12
15	Estimate the settlement of foundation by plate load test.	Understand	BSTB17.12
Part – C (Problem Solving and Critical Thinking)			
1	Calculate net ultimate bearing capacity of a rectangular footing 2m X 4m in plan, founded at a depth 1.5 m below GL. The load on the footing is 200 kN/m^2. γ_{sat}= 18 kN/m^3c'= 15 kPa and φ=25°. GWT is at 2m below GL. Use Terzaghi's theory.	Understand	BSTB17.09
2	A pile is driven with a single acting steam hammer of weight 15kN with afree fall of 900 mm. The final set, the average of the last three blows, is 27.5mm. Find the safe load using the Engineering News Formula.	Remember	BSTB17.09
3	A pile is driven in uniform clay of large depth. The clay has unconfined compression strength of 90kN/ m^2. The pile is 30 cm diameter and 6 m long. Determine the safe frictional resistance of the pile, assuming a factor of safety of 3. Assume the adhesion factor = 0.7.	Understand	BSTB17.09
4	A group of 16 piles of 50 cm diameter is arranged with a centre to centrespacing of 1.0 m. The piles are 9 m long and are embedded in soft claywith cohesion 30kN/m^2. Bearing resistance may be neglected for thepiles Adhesion factor is 0.6. Determine the ultimate load capacity of thepile group.	Understand	BSTB17.10
5	Design a square pile group to carry 400kN in clay with unconfined compression strength of 60kN/m^2. The piles are 30 cm diameter and 6 m long. Adhesion factor may be taken as 0.6.	Remember	BSTB17.10
6	A square pile 25 cm size penetrates soft clay with unit cohesion of 75kN/m^2 for a depth of 18 m and rests on stiff soil. Determine the	Understand	BSTB17.11

	capacity of the pile by skin friction. Assume an adhesion factor of 0.75.		
7	A square pile group of 9 piles of 25 cm diameter is arranged with a pilespacing of 1 m. The length of the piles is 9 m. Unit cohesion of the clay is 75kN/ m2. Neglecting bearing at the tip of the pilesdetermine the groupcapacity. Assume adhesion factor of 0.75.	Understand	BSTB17.11
8	Determine the group efficiency of a rectangular group of piles with 4rows, 3 piles per row, the uniform pile spacing being 3 times the pilediameter. If the individual pile capacity is 100kN, what is the groupcapacity according to this concept?	Understand	BSTB17.12
9	A footing 4m X 2m in plan transmits a pressure of 150 kN/m^2on a cohesive soil having E = 6 X $10^4 kN/m^2$ and μ = 0.5. Determine the immediate settlement of the footing at the centre, assuming it to be a) flexible, b) Rigid footing	Remember	BSTB17.12
UNIT IV			
WELL FOUNDATIONS			
Part – A (Short Answer Questions)			
1	What is open caisson?	Understand	BSTB17.13
2	What is Pneumatic caisson?	Remember	BSTB17.13
3	What are the forces acting on well foundation?	Understand	BSTB17.13
4	Write the equation for allowable bearing pressure for well in cohesion less soil.	Understand	BSTB17.13
5	Define scouring	Remember	BSTB17.14
6	What is well cap?	Understand	BSTB17.14
7	What is Cutting Edge?	Understand	BSTB17.14
8	Name various Components of Well.	Remember	BSTB17.14
9	Write a note on floating caisson foundation.	Understand	BSTB17.15
10	How well foundations are classified?	Understand	BSTB17.15
11	Explain the process of well sinking.	Remember	BSTB17.15
12	What are the forces acting on well foundation?	Understand	BSTB17.15
13	Explain the design the criteria for well curb.	Understand	BSTB17.15
14	How skin friction effects the well sinking?	Remember	BSTB17.15
15	Discuss the various types of shapes of well foundations.	Understand	BSTB17.16
16	What is the procedure for sinking of pneumatic caisson?	Understand	BSTB17.16
17	Write a note on floating caisson foundation.	Remember	BSTB17.16
18	What is top plug?	Understand	BSTB17.16
19	What is Dredge hole?	Understand	BSTB17.16
20	What is bottom plug?	Remember	BSTB17.16
Part - B (Long Answer Questions)			
1	Describe various types of caisson foundations and comment on their ability.	Understand	BSTB17.13
2	Explain in detail the procedure of sinking of well foundations.	Remember	BSTB17.13
3	Describe the component parts of a Pneumatic Caisson with a neat sketch.	Understand	BSTB17.13
4	What is a 'Floating Caisson'? How is its stability checked? What are themerits and demerits of a Floating Caisson when compared with other types?	Understand	BSTB17.13
5	Discuss the various kinds of forces likely to act on a well foundation.	Remember	BSTB17.13
6	Discuss the different shapes of Cross-sections of wells used in practice,giving the merits and demerits of each.	Understand	BSTB17.14
7	Sketch and describe the various components of a well foundation,indicating the function of each.	Understand	BSTB17.14
8	What are the advantages and disadvantages of a Pneumatic Caisson whencompared with other types?	Remember	BSTB17.14
9	Explain the various kinds of forces likely to act on a well foundation.	Understand	BSTB17.14

10	What are 'Tilts and Shifts'? What are the remedial measures to control these?	Understand	BSTB17.15
11	Explain the effect of water and earth pressure on well foundations.	Remember	BSTB17.15
12	How is the load-carrying capacity of an Open Caisson determined?	Understand	BSTB17.15
13	What are the merits and demerits of an Open Caisson?	Remember	BSTB17.16
14	Explain an 'Open Caisson' with a neat sketch showing all the componentparts.	Understand	BSTB17.16
15	Describe the "Scour Depth" ,"Grip Length". How are they related infinalizing the depth of sinking of caissons?	Understand	BSTB17.16
Part – C (Problem Solving and Critical Thinking)			
1	A circular well of 6m external diameter and 4m internal diameter is embedded to a depth of 15m below the maximum scour level in a sandy soil deposit. The well is subjected to a horizontal force of 800kN acting at a height of 8m above the scour level. Determine the allowable total equivalent resisting force due to the earth pressure assuming the rotation is about a point above the base. Take γsat = 30kN/m^3, φ = 20°, factor of safety for passive resistance = 2. Use Terzaghi's analysis.	Understand	BSTB17.13
2	A cylindrical well of external diameter 6 m and internal diameter 4 m is sunkto a depth 16 m below the maximum scour level in a sand deposit. The well issubjected to a horizontal force of 1000kN acting at a height of 8 m above thescour level. Determine the total allowable equivalent resisting force due toearth pressure, assuming that (*a*) the well rotates about a point above the base,and (*b*) the well rotates about the base. Assume γ'=10kN/m^3, φ = 30°, andfactor of safety against passive resistance = 2. Use Terzaghi's approach.	Remember	BSTB17.13
3	A square footing carries a load of 1000 kN. The depth of footing is 2 m. The properties of soil are C = 10 kPa and $\Phi = 48^0$, γ = 19.5 kN/m^3. Determine the size of footing for FOS = 3 against shear failure. What will be changes in size of footing? If WT rises to G.L. Give that N_c = 42, N_q = 39 and N_γ = 45.	Understand	BSTB17.13
4	A circular well of 4.5 m external diameter and 0.75m Steining thicknessembedded to a depth of 12m in a sandy soil deposit. The properties of soil γsat = 30kN/m^3, φ = 30°. The well is subjected to a resultant horizontal force of 500kN and a moment of 400 kN-m at the scour level. Determine the allowable total equivalent resisting force due to the earth pressure. A FOS = 2 may be adopted for soil resistance. Determine the magnitude and point of maximum Bending moment at well Steining.	Understand	BSTB17.14
5	Design a strip footing for a load bearing wall transmitting a force of 200 kN/m proposed to be laid at a depth of 1.5 m below GL on C-Φ soil with C = 40 kPa, $\Phi = 20^0$, γ = 17 kN/m^3 given that N_c = 11.8, N_q = 3.9 and N_γ = 1.7.	Remember	BSTB17.14
6	A 2m wide square footing is laid at a depth of 1.2 m below G.L on C-Φ soil with C = 40 kPa and $\Phi = 20^0$, γ = 17 kN/m^3. Give that N_c = 11.8, N_q = 3.9 and N_γ = 1.7. using Terzaghi's theory calculate bearing capacity when a) GWT is at 5 m below GL b) 2 m below GL c) At Gl. Assume change in parameters due to saturation is negligible.	Understand	BSTB17.15
7	A continuous footing of width 2.5 m rests 1.5 m below GL in clay. The unconfined strength of clay is 150 kN/m^2. Calculate the ultimate bearing capacity of footing when there is no effect of water table and when W.T reaches GS. Take γ = 17 kN/m^3 γ_{sat} = 20 kN/m^3	Understand	BSTB17.15
8	A square footing carries a load of 800 kN. The depth of footing is 1.5	Remember	BSTB17.16

	m. The properties of soil are C = 0 kPa and $\Phi = 38^0$, γ = 18.5 kN/m^3. Determine the size of footing for FOS = 3 against shear failure. What will be changes in size of footing? If WT rises to G.L. Give that N_c = 52, N_q = 49 and N_γ = 64.		
9	A 2m wide square footing is laid at a depth of 1.2 m below G.L on C-Φ soil with C = 30 kPa and $\Phi = 10^0$, γ = 18 kN/m^3. Give that N_c = 12, N_q = 17 and N_γ = 25. using Terzaghi's theory calculate bearing capacity when a) GWT is at 2 m below GL b) 5 m below GL Assume change in parameters due to saturation is negligible.	Understand	BSTB17.16
10	A Cylindrical Well is of 6 m external diameter and 3.6 m internal diameter, and is to be sunk to a depth of 15 m below the scour level. It is subjected to ahorizontal load of 600kN at a height of 9 m above the scour level. Determine the allowable resisting force due to earth pressure, usingTerzaghi's approach assuming that (a) the well rotates about a point above base, and (b) the well rotates about the base. γ' = 9.9kN/m3; $\varphi = 30°$, and factor of safety against passive resistance = 2.5.	Understand	BSTB17.16
UNIT V			
OPEN CUTS,COFFER DAMS			
Part – A (Short Answer Questions)			
1	How the cantilever sheet pile derives its stability	Understand	BSTB17.17
2	What is a sheet pile wall write its advantages	Remember	BSTB17.17
3	How the stability of Anchored bulkhead is ensured in design	Understand	BSTB17.17
4	Explain what is Coffer dam and its purpose in detail	Understand	BSTB17.18
5	What are the various types of Coffer dams	Remember	BSTB17.18
6	What is a Bulkhead how does it serve	Understand	BSTB17.18
7	How the Bulkheads are classified in to various types show them with neat sketch	Understand	BSTB17.19
8	What are the forces acting on Bulkhead	Remember	BSTB17.19
9	How does cantilever sheet piling take place in granular soils	Understand	BSTB17.20
10	How does cantilever sheet piling take place in cohesive soils	Understand	BSTB17.20
Part - B (Long Answer Questions)			
1	Explain how Bulkheads are used in different situations in detail	Understand	BSTB17.17
2	Why the braced cuts are provided what are the advantages of braced cuts	Remember	BSTB17.17
3	Explain lateral earth pressure distribution on braced cuts, draw the pressure diagram	Understand	BSTB17.17
4	What are the important cases to be considered in stability of braced cuts in saturated clay	Understand	BSTB17.18
5	What are the main criteria involves in design of sheet pile wall.	Remember	BSTB17.18
6	What is the basic assumption in the analysis of laterally loaded pile	Understand	BSTB17.18
7	What are the main features considered in the design of Cofferdam and explain them in detail	Understand	BSTB17.19
8	What are the various types of imposed loads acting on cofferdam explain them in detail	Remember	BSTB17.19
9	What are the various components of cofferdam explain their purpose and show them diagrammatically	Understand	BSTB17.20
10	Explain various steps involved in construction of cofferdam with a neat sketch	Understand	BSTB17.20
Part – C (Problem Solving and Critical Thinking)			
1	A cut 4.0 m wide 7.0 m deep is proposed in cohesionless soil with $\varphi = 37^0$.Sketch the suitable scheme of sheeting and bracing and also	Understand	BSTB17.17

	determine the maximum strut load. Assume the density of soil as 19kN/m 3		
2	A strutted excavation,2.0 m wide, is made in normally loaded clay of unit weight 18 kN/m 3 . If the undrained shear strength of clay is 24 kN/m 2 and the cut is made up to a depth of 6.0m, check the safety against base failure. Also shown the pressure distribution and scheme of strutting. If the cut is made in stiff fissured clay, what will be the change in the strut load.	Remember	BSTB17.17
3	In a 16 pile group, the pile diameter is 0.4m and center to center spacing of piles in the square group is 1.5m. if c u =50kN/m 2 , determine whether the failure would occur as block failure or the piles act individually. Neglect end bearing at the tip of the pile. All piles are 12m long . Take α=0.7 for shear mobilization around each pile. Also determine the safe load on this group.	Understand	BSTB17.17
4	a)How is the stability of the braced system ensured against heaving of the bottom ? b) An anchored sheet pile wall is to retain soil to a height of 5.5 m. The soil including that into which the pile is driven, is cohesion – less soil with ϕ=30 0 and γ=20.8 kN/m 3 . The surface of the retained soil is horizontal and level with the top of the wall. Determine the minimum penetration depth of the pile to achieve the free earth support.	Understand	BSTB17.18
5	a)Sketch the mode of deflection, distribution of lateral pressure and bending moment diagrams for the various types of sheet pile walls.	Remember	BSTB17.18
6	a)What are the differences between the anchored sheet pile wall 'free-earth support' and the anchored sheet pile wall with 'fixed –earth support' ?	Understand	BSTB17.18
7	a)Describe the analysis used to determine the depth of embedment of cantilever shear pile wall (a) in granular soils, and (b) in cohesive soils.	Understand	BSTB17.19
8	A cut 3m wide, 6.5 m deep is proposed in a cohesion less deposit (ϕ'=36 0 and c' =0). Assuming the first row of struts to be located at 0.5 m below ground surface and spacing between the struts as 1.5 m, calculate the maximum strut load. Assume the horizontal spacing of struts as 3 m, γ = 20kN/m 3 and $\delta=15^0$	Remember	BSTB17.19
9	A rectangular strutted excavation 2 m wide, is made in a plastic clay having γ =18kN/m 3 , and c u =20kN/m 3 .If the depth of the cut is 4.5m. what is the factor of safety against base failure ?	Understand	BSTB17.20
10	A cut 10 m wide is made upto a depth of 12m in a uniform deposit of clay having c u =0.5kgcm 2 , φ u =0 0 and γ =2.0 t/m 3 . Estimate the factor of safety against heave of the bottom if timbering does not extend below the bottom of the cut.	Understand	BSTB17.20

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