Subject Foundation Engg. B.E.(Civil) Sem VII

Q.1	Explain factors affecting selection of type of foundation
Q.2	Write purposes of site investigation
Q.3	Enlist boring methods and explain any one in detail
Q.4	Explain standard penetration test.
Q.5	A square footing is to be constructed on a deep deposit of sand at a depth of 0.9 m to carry a design load of 300 kN with a factor of safety of 2.5. The ground water table may rise to the ground level during rainy season. Design the plan dimension of footing given γ_{sat} = 20.8 kN/m^3, N_c = 25, N_q = 34 and N_γ =32.
Q.6	Write assumptions made in Terzaghi's theory
Q.7	Distinguish between general shear failure and local shear failure.
Q.8	A strip footing 1 m wide and a square footing 1 m side are placed at a depth of 1 m below the ground surface. The foundation soil has cohesion of 10 kPa, angle of friction of 26^o and unit weight of 18 kN/m^3. Calculate the safe bearing capacity using IS:6403. Use factor of safety of 3.
Q.9	Enlist factors affecting bearing capacity and explain any two in detail
Q.10	Enlist types of pile according to material used and explain one in detail.
Q.11	How the load transferred by the pile?
Q.12	A precast concrete pile of size 40 cm X 40 cm is to be driven into stiff clay. The unconfined compressive strength of the clay is 150 kN/m^2. Determine the length of pile required to carry a safe working load of 300 kN with factor of safety is 2.5.
Q.13	Briefly explain Settlement of single pile and settlement of group of pile,
Q.14	A precast concrete pile 40 cm X 40 cm is driven by a single acting steam hammer .Estimate the allowable load using (a)Engineering News Record Formula (F.S.=6).(b)Hiley Formula(F.S.= 4).Use the following data: (i) Maximum rated energy = 4000 kN-cm (ii) Weight of hammer = 40 kN (iii) Length of pile = 15 m (iv) Efficiency of hammer = 0.82 (v) Co-efficient of resistitution = 0.5 (vi) Weight of pile cap = 3.2 kN (vii) No. of blows for last 25 mm = 6 (viii) Modulus of elasticity of concrete = 2 x 10^7 kN/m^2 Assume the other data, if necessary
Q.15	List properties of expansive soil and give details of any two from it.
Q.16	A bored concrete pile of 350 mm diameter and having overall length of 12 m is embedded in saturated stratum of C- φ soil having following properties, C=35 kN/m^2, φ=30^0,γ_{sat}= 18 kN/m^3.Determine safe bearing capacity of pile. Use IS bearing capacity factor. Assume reasonable value for all other factors
Q.17	How will you identify the collapsible soil?
Q.18	Enlist uses of geosynthetics and explain any one in detail
Q.19	What are the effects of swelling of soils on buildings?
Q.20	Discuss effect of inclination of load and water table on bearing capacity.

Q.21 A 40 cm square pre-cast RCC pile is driven by 8 m into a sandy bed. The standard penetration test results, performed on this ground are given below

Depth(m)	1.5	3	4.5	6	7.5	9	10.5	12
SPT-N values	4	6	12	12	20	24	35	39

Compute the factor of safety available if 1000 kN of compressive load is applied on this pile.

Q.22 A precast concrete pile of size 40 cm X 40 cm is to be driven into stiff clay. The unconfined compressive strength of the clay is 150 kN/m^2. Determine the length of pile required to carry a safe working load of 300 kN with factor of safety is 2.5.

Q.23 Explain Plate load test.

Q.24 A concrete pile of 40 cm diameter was driven into sand of loose to medium density up to a depth of 12 m. The following properties are known (a) average unit weight of soil along the length of pile γ= 17 kN/m^3 and average value of $\varphi=30^0$. (b) Average value of K_s= 1.6 and δ= 0.70φ. Calculate (a) the ultimate bearing capacity of pile and (b) allowable load with F_s=2.5.Assume the water table at great depth.

Q.25 A single test pile of 0.3 m X 0.3 m square c/s is driven through a stratum up to a depth of 12 m. It is observed that undrained cohesive strength is varying from 12.4 kN/m^2 at its surface to 65.3 kN/m^2 at depth of 12 m. Determine safe load the pipe can carry if factor of safety is 2.5. Take α=0.55

Q.26 A bored concrete pile of 350 mm diameter and having overall length of 12 m is embedded in saturated stratum of C- φ soil having following properties, C=35 kN/m^2, $\varphi=30^0$,γ_{sat}= 18 kN/m^3.Determine safe bearing capacity of pile. Use Terzaghi bearing capacity factor. Assume reasonable value for all other factors

Q.27 A pile load test is made on a 400 mm diameter test pile and following data are obtained.

Load (kN)	Settlement (mm)
0	0.0
250	1.20
500	3.70
1000	7.85
1250	14.00
1500	23.90
1750	36.75

Determine the allowable load on pile considering the settlement and shear criteria.

Q.28 A 350 mm diameter concrete 10 m long pile is driven in a deposit of coarse sand extending to a great depth. The average total unit weight of the soil is 18 kN/m^3, the average correct N value is 15.Determine the allowable load on pile. Factor of safety is 2.5.

Q.29 A concrete pile of 40 cm diameter is required to be driven in to a homogeneous mass of cohesion less soil. Pile is required to carry a safe load of 700 kN. The soil consist at silty sand up to 10 m in which the average cone resistance q_c= 4000 kPa along the pile. Silty sand is underlain by dense sand. The average cone resistance increase to 13000 kPa after 10 m. depth

	.Calculate the length of pile. F.S =2.5.
Q.30	Explain principles & methods of placing foundation on expansive soils.
Q.31	Justify the statement: "Under reamed piles provide better solution for foundation in expansive soil." Give codal provisions. For under reamed piles.
Q.32	Comments on following statements 1. Foundations resting on the piles never undergo differential settlement. 2. Piles driven in dense sand are never useful. 3. The load taken by point bearing in case of piles in purely cohesive soil remains constant with depth of pile.
Q.33	A pile group consist of 9 friction piles of 30 cm diameter and 10 m length driven in clay(C_u =100 kN/m^2, γ = 20 kN/m^3).Centre to centre spacing provided to pile is 75 cm. Determine the safe load for the group.(Factor of safety is 3.0,adhesion factor α =0.6).And also find individual pile capacity.
Q.34	Discuss the influence of following on ultimate bearing capacity of soil for cohesive and cohesion less soil. (a) C and φ values (b) S.P.T values (c) Ground water table (d) Width of footing
Q.35	A square footing of size 4.5 m X 4.5 m is founded at a depth of 1.8 m below ground surface in fine loose to medium dense sand. The water table is at the base level of the foundation. The corrected standard penetration test value N is 13.Compute the net safe bearing pressure for settlement of 45 mm by the use of modified equations of (a) Teng, and (b) Meyerhof.
Q.36	A rectangular footing (2.5 m X 1.5 m) is subjected to a pressure of 150 kN/m^{2}on a cohesive soil, having properties E_s = 4 X 10^4 kN/m^2 and μ = 0.4.Estimate the immediate settlement at the centre, assuming the (i) the footing is flexible (ii) the footing is rigid
Q.37	A plate load test was carried out on a ground having a uniform soil stratum up to sufficient depth. The size of plate used was 0.3 m x 0. 3 m. Load(kN) | 3 | 6 | 12 | 24 | 36 | 48 | 60 Settlement (mm) | 0.70 | 1.10 | 1.85 | 3.20 | 5.25 | 7.85 | 10.80 Plot load settlement curve. Determine the bearing capacity and load that can be taken by a column footing of size 1.4 m X 1.4 m, for allowable settlement of 25 mm.
Q.38	A square foundation of 2.8 m width is laid at a depth of 1.8 m in medium sand. γ = 18 kN/m^3 ,the water table is at a depth of 2.8 m from the ground level. The SPT value recorded is as under: Depth | 0.5 | 1.5 | 3.0 | 4.5 | 6.0 | 7.5 SPT No | 10 | 17 | 15 | 24 | 22 | 23 Estimate allowable bearing capacity based on medium settlement of 25 mm

	with corrected N values
Q.39	A square footing of size 2.0 m x 2.0 m is placed over loose sand at a depth of 0.6 m. With the soil properties γ = 17 kN/m^3 and $\varphi = 32^0$.Determine the total load that can be carried by the footing.
Q.40	A footing of 1.5 m square is laid at a depth of 1.3 m below the ground surface. Determine the net ultimate bearing capacity using IS code method .Take γ = 19 kN/m^3 and $\varphi' = 32^0$,C' = 0. Assume appropriate data.