Code No: RT32012 **R13** SET - 1

III B. Tech II Semester Regular/Supplementary Examinations, April - 2018

GEOTECHNICAL ENGINEERING – II

(Civil Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

*****

PART –A

1	a)	What is a soil profile? What is its influence on the exploratory programme?	[4M]
	b)	What is the Taylor's Stability Number? What is the importance of this number?	[4M]
	c)	Write a brief note on types of failures in shallow foundations.	[3M]
	d)	How does the construction period effect the settlement of the foundation?	[3M]
	e)	Write brief note on the Engineering New's Formula.	[4M]
	f)	What is caisson disease? What are the precautions necessary to prevent it?	[4M]

PART -B

2	a)	How soil samples are classified based on the amount of disturbance in sampling?	[4M]
	b)	Write briefly about the Standard penetration test conducted in the field. What are the corrections to be made to the standard penetration value?	[12M]
3		A vertical gravity retaining wall, 12 m high, is to retain a clayey soil for which c_u = 25 kN/m^2, ϕu = 15^o and the bulk unit weight γb = 19 kN/m^3. The soil surface is horizontal and level with the top of the wall. The water table is horizontal and level with the bottom of the wall. Determine the magnitude and direction of the minimum force on the wall for a trial wedge whose slip surface rises from the bottom of the wall at 70^o to the horizontal. Assume that the angle of wall friction is 10^o and the wall adhesion is 15 kN/m^2.	[16M]
4		A strip footing (Fig. 1) of width 2 m is founded at a depth of 2 m below the ground surface in a $(c$ - $\varphi)$ soil having a cohesion c = 30 kN/m^2 and angle of shearing resistance, ϕ = 35°. The water table is at a depth of 8 m below ground level. The moist weight of soil above the water table is 17.25 kN/m^3. Determine (i) the ultimate bearing capacity of the soil, (ii) the net bearing capacity, and (iii) the net safe bearing pressure and the load/m for a factor of safety of 3. Use the general shear failure theory of Terzaghi. For ϕ = 35°, N_c = 57.8, N_q =41.4, and $N\gamma$ = 42.4.	[16M]

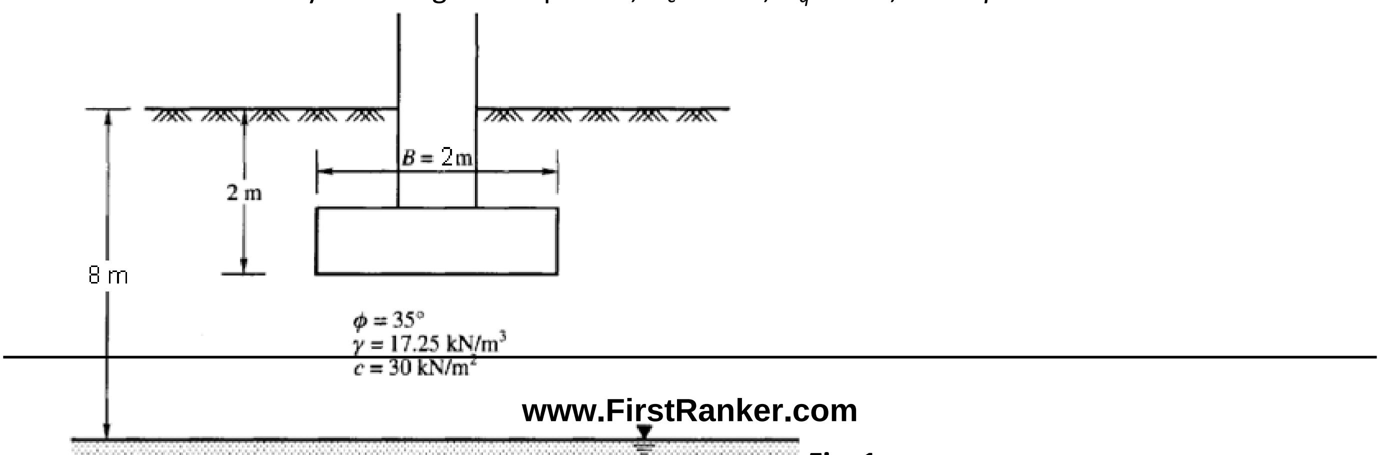

Fig. 1

Code No: RT32012 **R13** SET - 1

5 a) Explain the effects on differential settlements of the foundations. [6M]

b) A square footing of size 4 x 4 m is founded at a depth of 2 m below the ground surface in loose to medium dense sand. The corrected standard penetration test value N_{cor} =11. Compute the safe bearing pressure, q_s by using Teng's equation for the settlement of 25 mm. [10M]

6 a) What are the advantages and disadvantages of Driven piles? [6M]

b) A concrete pile of 45 cm diameter was driven into sand of loose to medium density to a depth of 15m. The following properties are known: Average unit weight of soil along the length of the pile, y = 17.5 kN/m^3 , average ϕ = 30°, average K_s = 1.0 and δ= 0.750. [10M]
Calculate (i) the ultimate bearing capacity of the pile, and (ii) the allowable load with Fs = 2.5. Assume the water table is at great depth. For L/d ratio of 33.3 and ϕ = 30°, the N_q value is 16.5.

7 a) Write short note on Sinking of Wells. [8M]

b) What are 'Tilts and Shifts'? What are the remedial measures to control these? [8M]

*****

Code No: RT32012 **R13** SET - 2

III B. Tech II Semester Regular/Supplementary Examinations, April - 2018

GEOTECHNICAL ENGINEERING – II

(Civil Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

*****

PART –A

1	a)	Write down the design considerations of open drive sampler.	[4M]
	b)	What are the basic assumptions made in the stability analysis of slopes	[4M]
	c)	Write short note on General shear failure.	[3M]
	d)	Why the elastic settlement is not much important compared to the consolidation settlement in settlement of foundations	[3M]
	e)	What is the basis on which Dynamic pile formula is derived?	[4M]
	f)	What are the forces acting on the Well foundation? Explain in detail.	[4M]

PART -B

2	a)	Describe the procedure for conducting a Pressure meter Test.	[8M]
	b)	Write short Note on Depth of Exploration and How can you fix the Depth of Boring in different case of Foundations? i.e Shallow and Deep Foundations.	[8M]

3 Find the factor of safety of a slope of infinite extent having a slope angle = 25°. The slope is made of cohesive soil. The soil made of clay having c' - 30 kN/m^2, ϕ' = 20°, e = 0.65 and G_s = 2.7 and under the following conditions: (i) when the soil is dry, (ii) when water seeps parallel to the surface of the slope, and (iii) when the slope is submerged. [16M]

4 A foundation 1.5 m square is installed 1.5 m below the surface of uniform sandy gravel having a density of 18.9 kN/m^3 above the water table and a submerged density of 9.8 kN/m^3. The effective strength parameters are c^1 = 0 kN/m^2 and ϕ^1 = 36^0. Find the gross ultimate bearing capacity for the conditions of water table well below the base (with rupture zone above the water table) Water table rising to the level of the base of the foundation and the water table raises to the ground level. Use IS – Code theory. The bearing capacity factors are, ϕ = 35^0, Nq = 33.30 and N_r = 48.30. Shape factors: S_q = 1.2; S_r = 0.8 and $d_q = d_r = 1 + 0.1\sqrt{k_p}\,\frac{D}{B}$, where $k_p = \tan^2(45+\phi/2)$. [16M]

5 The following observations relate to a plate load test conducted on a 30cm square test plate placed at a depth of 1.5m in a soil deposit. [16M]

Intensity of load(kg/cm^2)	0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0
Settlement (mm)	0	2	4	7	11	16	23	32	45

Plot the load-settlement curve and determine the allowable bearing pressure for a 2m square footing for a minimum factor safety 2.5 with respect to shear failure and a maximum permissible settlement 25mm. water table is at a depth of 2m below ground surface. What will be the actual factor of safety with respect to shear failure and maximum permissible settlement?

Code No: RT32012 **R13** SET - 2

6	a)	Write short note on Efficiency of Pile Groups	[6M]
	b)	A group of 9 piles with 3 piles in a row was driven into a soft clay extending from ground level to a great depth. The diameter and length of piles were 30 cm and 10 m respectively. The unconfined compressive strength of the clay is 70 kPa. If the piles were placed 90 cm center to center, compute the allowable load on the pile group on the basis of a shear failure criterion for a factor of safety of 2.5.	[10M]
7	a)	Draw component parts of Well foundation and list out their functions.	[8M]
	b)	Explain the significance of grip length in Well foundations.	[8M]

*****

Code No: RT32012 **R13** SET - 3

III B. Tech II Semester Regular/Supplementary Examinations, April - 2018

GEOTECHNICAL ENGINEERING – II

(Civil Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

*****

PART –A

1 a) Explain the fallowing terms used in soil exploration. [4M]
(i) Area ratio (ii) Recovery ratio

b) What are the basic assumptions in Rankine's theory [4M]

c) What are the factors affecting the bearing capacity of the foundation? [4M]

d) What is the secondary settlement? Why it is developed? [3M]

e) Explain the basic difference between the bearing capacity of shallow foundation and deep foundation? [3M]

f) What is floating Caisson? How its stability can be checked? [4M]

PART -B

2 a) What are the objectives of the exploration program? [8M]

b) Explain and discuss the various factors that help to decide the number and depth of bore holes required for subsoil exploration. [8M]

3 a) Compute the factor of safety of an infinite slope in a cohesionless soil for a steady state seepage condition, when the flow is parallel to the slope. [8M]

b) Find the critical height of an infinite slope having a slope angle of 30°. The slope is made of stiff clay having a cohesion 20 kN/m^2, angle of internal friction 20°, void ratio 0.7 and specific gravity 2.7. Consider the following cases for the analysis. (i) the soil is dry. (ii) the water seeps parallel to the surface of the slope. (iii) the slope is submerged. [8M]

4 A square footing 1.8mx1.8m is placed over loose sand of bulk density 16kN/m^3, saturated density 18kN/m^3 and at a depth of 1.0m. The angle of shearing resistance is 30^0. Determine the ultimate bearing capacity when there is no effect of water table and when it is submerged (for ϕ= 30^0, the Nc=30.14, Nq=18.4and Nγ=15.1). [16M]

5 a) Differentiate between total settlement and differential settlement. What are the problems associated with the differential settlements on structures? What are the possible remedial measures? [8M]

b) A foundation 6 m X 3 m, carrying a uniform pressure of 200 kN/m^2, is located at a depth of 1.5 m in a layer of clay 4 m thick for which the value of E_u is 35 MN/m^2. The layer is underlain by a second clay layer 12 m thick for which the value of E_u is 80 MN/m^2. A hard stratum lies below the second layer. Determine the average immediate settlement under the foundation [8M]

For H/B = 2 and L/B ➔ μ_1 = 0.60
H/B = 6 and L/B ➔ μ_2 = 0.85
For D/B = 0.5 and L/B = 2 ➔ μ_0 = 0.94.

Code No: RT32012 **R13** SET - 3

6	a)	Discuss how pile load test can be conducted and the results are interpreted in design.	[8M]
	b)	A 30 cm dia. Pile penetrates a deposit of soft clay 9m deep and rests on sand. Compute the skin friction resistance. The clay has a unit cohesion of 0.6 kg/cm^2. Assume an adhesion factor of 0.6 for the clay.	[8M]
7	a)	What are ‘Tilts and Shifts’? Explain the remedial measures to control these?	[8M]
	b)	Sketch a completed well foundation for a Bridge pier. Indicate the various components and their functions.	[8M]

*****

Code No: RT32012 **R13** SET - 4

III B. Tech II Semester Regular/Supplementary Examinations, April - 2018

GEOTECHNICAL ENGINEERING – II

(Civil Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**

*****

PART –A

1	a)	Explain the following terms used in soil exploration. (i) Representative sample (ii) Undisturbed sample	[4M]
	b)	What are the basic assumptions in Coulomb's theory.	[3M]
	c)	What are the assumptions made in the Terzaghi bearing capacity theory?	[4M]
	d)	In fully saturated clay, with undrained condition, what will be the immediate settlement of the foundation, if it is constructed on it.	[4M]
	e)	What is main difference between the friction piles and end bearing piles?	[3M]
	f)	Draw the component parts of well foundation and explain its functions.	[4M]

PART –B

2	a)	Describe the procedure of conducting a Pressure meter test.	[8M]
	b)	Describe open excavation methods of exploration. What are their advantages and disadvantages?	[8M]
3		A vertical wall 9 m high retains soil level with the top of the wall retains sand for which $\phi = 30^{o}$, $c' = 0$, $\gamma_{dry} = 18$ kN/m^3, $\gamma_{sat} = 20$ kN/m^3. Use Rankine's method to obtain the magnitude and line of action of the active earth force on the wall, if the water table lies: (i) at the upper soil surface (ii) below the bottom of the wall (iii) half-way up the wall In each case sketch the pressure distribution on the wall.	[16M]
4	a)	What are the points to be kept in consideration for locating of depth of footing?	[6M]
	b)	A continuous footing of width 2.5m rests 1.5m below the ground surface in clay. The unconfined compressive strength of the clay is 150kN/m^2. Calculate the ultimate bearing capacity of the footing. When there is no effect of water table and when water table reaches ground surface. Take γ=18kN/m^3, γ_{sat}=20kN/m^3.	[10M]
5	a)	Differentiate between Safe bearing Capacity and Allowable bearing capacity.	[7M]
	b)	A footing, 2m square, is founded at a depth of 1.5m in a sand deposit, for which the observed SPT value (N) is 35.Water table is at a depth of 1.5m from the surface. Determine the net allowable bearing pressure, if the permissible settlement is 40mm and factor of safety of 3 is desired against shear failure.	[9M]

Code No: RT32012 **R13** SET - 4

6 a) What are the factors that governs, during selection of Piles? [6M]

b) A group of 16 piles with 4 piles in a row was driven into a soft clay extending from ground level to a great depth. The diameter and the length of the piles were 40 cm and 10m respectively. The unconfined compressive strength of the clay is 85 kPa. If the piles were placed 1.20 m center to center, compute the allowable load on the pile group on the basis of a shear failure criterion for a factor of safety of 2.5. Neglect bearing resistance of Piles. [10M]

7 a) Sketch a completed well foundation for a Bridge pier. Indicate the various components and their functions. [8M]

b) How do you analyze the well for its lateral stability? [8M]

*****