Ex/CE/5/T/403/2018

B.E. CIVIL ENGINEERING (PART TIME) FOURTH YEAR FIRST SEMESTER - 2018

SOIL MECHANICS II

Time: 3.0 HRS **Full Marks: 100**

(50 marks for this part)

Part – I

Q. 1 is compulsory and answer any two from the rest.

1. A retaining wall 6 m high retains sand with $\varphi = 30^0$ and unit weight 24 kN/ m^3 upto a depth of 3 m from top. From 3 m to 6 m the material is a cohesive soil with c = 20 kN/ m^2 and $\varphi = 20^0$. Unit weight of cohesive soil is 18 kN/ m^3. A uniform surcharge of 100 kN/ m^2 acts on the top of soil. Determine the total lateral pressure force acting on the wall and its point of application. Draw earth pressure diagram. 10

2. (a) How can you analyze stability of an infinite slope of cohesionless soil? Explain 7

(b) Differentiate between slope failure and base failure 3

(c) An embankment is to be made of a sandy clay having cohesion of 30 kN/ m^2, angle of internal friction 20^0 and unit weight of 18 kN/ m^3. The slope and height of embankment are 1:1 and 10 m respectively. Determine the factor of safety. 10

3. (a) State assumptions used in Rankine's earth pressure theory. 3

(b) What do you understand lateral earth pressure at rest condition. Explain with figure. 4

(c) What do you understand by critical height? 3

(d) Design a gravity retaining wall, 5 m high with vertical back to retain a dry cohesionless backfill of unit weight 18 kN/ m^3 and angle of shearing resistance 30^0. Find also the factor of safety against sliding assuming the angle of friction between the base of the wall and the foundation soil is 30^0. The wall is to be made 1 m wide at top, and to be constructed of brick masonry having unit weight 20 kN/ m^3. Use Rankine's active earth pressure theory. 10

4. (a) A retaining wall with soft saturated clay with c = 17 kN/ m^2, γ = 19 kN/ m^3, backfill is 7 m high. For the undrained condition ($\varphi = 0^0$) of the backfill determine (i) maximum depth of tensile crack, (ii) active force before tensile crack and (iii) active force after tensile crack. 7

(b) What is meant by stability number? Describe briefly. 3

(c) A slope is 12 m high and has an inclination of 30^0. If soil of the slope has c = 25 kN/ m^2, $\varphi = 12^0$ and γ = 19 kN/ m^3. Determine factor of safety with respect to shear strength. Following values are given. For any other values interpolate. 10

For angle of inclination = 30^0,

φ	5^0	15^0	25^0
Stability no.	0.11	0.046	0.009

B.E. CIVIL ENGINEERING (PART TIME) EXAMINATION, 2018

(Fourth Year, First Semester)

SOIL MECHANICS-II

[PART-II]

Time: Three Hours

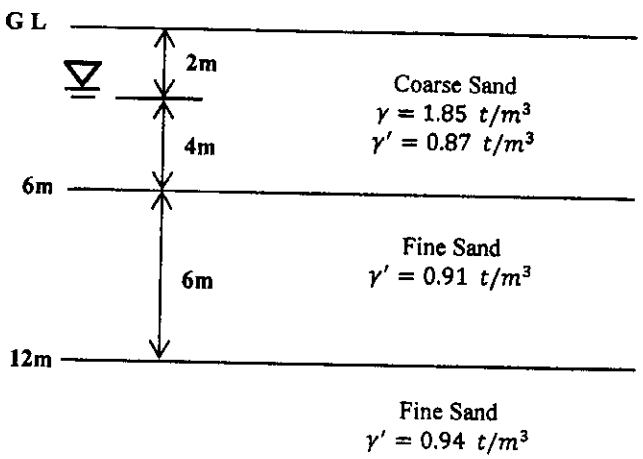
Full Marks 100
(50 marks for this part)

Question No.	(Answer all the questions.) [Assume any data reasonably if necessary]	Marks 25x2=50
1(a)	(i) Define net safe bearing capacity.	[2]
	(ii) Describe different types of shear failure with neat sketches.	[9]
(b)	Calculate the net-ultimate bearing capacity of a rectangular footing 2m x 4m in plan, founded at a depth of 1.3 m below the ground surface. The load on the footing acts at an angle of 17^o to the vertical and is eccentric in the direction of width by 12cm. The saturated unit weight of soil is 18.5 kN/m^3. The rate of loading is slow and hence effective stress shear strength parameters can be used in the analysis. $C' = 13.8$ kN/m^2, and $\varphi' = 26^o$. Natural water table is at a depth of 1.2 m below the ground surface. Use IS: 6403 - 1981 recommendations.	[14]

φ^o	N_c	N_q	N_γ
25^o	20.72	10.66	10.88
30^o	30.14	18.4	22.4

2(a)	(i) Define Soil exploration. (ii) Write a short note on Percussion boring.	[2+6]
(b)	(i) Define Representative soil sample. (ii) Write a short note on Depth of soil exploration.	[2+ 4]
(c)	(i) What is SPT (N) value? What are the corrections applied to N value? (ii) Find the corrected N values at 1.5 m, 6.0 m, 10.5m and 12m depth of the following soil profile.	[1+2]

Depth (m)	N-value
1.5	7
3.0	12
4.5	17
6.0	20
7.5	21
9.0	27
10.5	30
12.0	32



[8]