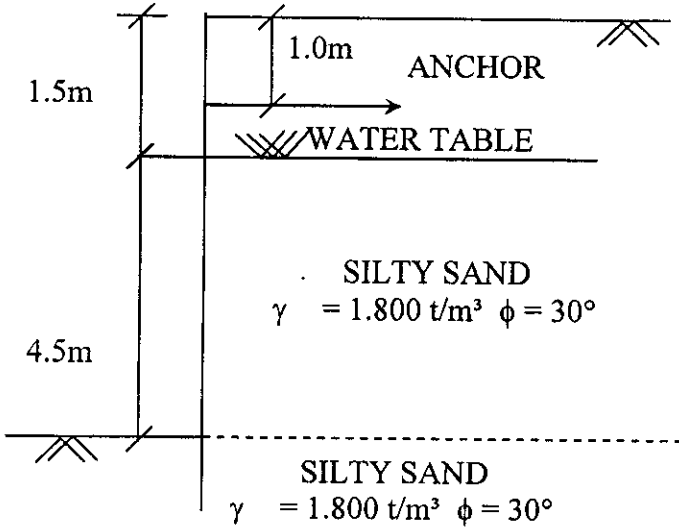# B. E. CONSTRUCTION ENGINEERING 3RD YEAR 2ND SEMESTER - 2017

Subject **Underground Construction**   **Time : Three hours**   **Full Marks : 100**

Part I

Use Separate Answer scripts for each Group

No of Questions		Marks
	Answer any **two** questions.	
Q1.	Find by free earth support method the depth of embedment below the dredge line for the anchored sheet pile shown in Fig A. Use a 30% increase applied to the computed embedment length. Also find the anchor rod forces.	25
	Fig.A	
Q2a.	Describe the method of dewatering by sumps.	10
Q2b.	Write a short note on ground settlement in sandy strata.	10
Q2c.	Write a short note on steel sheet pile.	05
Q3a.	Describe in brief the following.	
	i) Guide walls in case of construction of diaphragm walls.	05
	ii) Alternate panel method of construction of diaphragm walls	05
	iii) Anchored bulkheads	10
	iv) Cellular cofferdams	05

Answer any two questions.

Assume relevant data if required.

Q-1(a) Determine the earth pressure on braced cut using Terzhaghi's theory in purely granular soil.

(15)

(b) Can the determination of earth pressure be made with Rankine's approach?   (5)

© Explain the reasons of using bracing system in deep cuts. (5)

Q-2(a) A braced cut (9m wide and 12 m deep) is to be made with steel sheet pile in a stratified soil deposit as described below. The first layer at proposed site consists of soft grey silty clay C= 3 t/m^2, ⍴= 1.85 t/m^3 which extends up to 12.0 m b.g.l is followed by a stiff clay layer C= 6.0 t/m^2, ⍴= 1.88 t/m^3 up to a depth of 20.0 m b.g.l . The third layer is a medium sand with N= 15. The ground water table is at a depth of 3.5 m b.g.l. Check the stability of cut against base failure, bottom heave and clay bursting. (15)

(b) (i) Explain and define arching in soil. (ii) Describe the significance of arching in the design of under ground structure.   (10)

Q-3(a) A tunnel (6 m wide and 8 m deep) is passing through 26 m below the river bed level through a soil having ɸ= 28 degree, ⍴= 1.88 t/m^3. Determine the load on tunnel roof and tunnel wall. The depth of water above river bed may be considered as 10.0 m.   (12)

(b) Explain significance of settlement ratio in relation to design of projecting conduits.   (8)

© Explain bottom heave failure in deep cut.   (5)