

Subject Code: H8710/R13

M. Tech –II Semester Regular/Supply Examinations, October, 2015

**EARTH RETAINING STRUCTURES**

(Common to SE&SD, SM&FE, GTE)

Time: 3 Hours

Max Marks: 60

Answer any FIVE questions

All questions carry EQUAL marks

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1. An underground retaining wall has to be constructed for a railway passage at 20m below the ground level. Find the active pressure distribution for the side wall (whose height is 7m) of underground structure. The details of the soil layers are given in Table 1.

Layer No	Unit wt (kN/m <sup>3</sup> )	Angle of internal friction (deg)	Thickness of layer (m)
I	17.3	35.8	1
II	17.3	35.8	3.5
III	17.5	30	3.5
IV	17.5	30	4.5
V	17.3	35.8	4.5
VI	17.5	30	3
VII	17.5	30	7

2. a. Describe different types of retaining walls with neat sketch.  
b. A masonry retaining wall of trapezoidal section of 10m height has top width of 1.5m, bottom width of 6.5m. The earth face of the retaining wall has a batter of 1 in 10. Check the stability of the masonry wall for sliding and overturning moment. Assume soil surface is horizontal at the top of the masonry wall. Unit weight of the soil is 18kN/m<sup>3</sup>. The angle of repose of the soil is 30°. Factor of safety against sliding is 0.6.
3. a. What are different types of sheet pile walls?

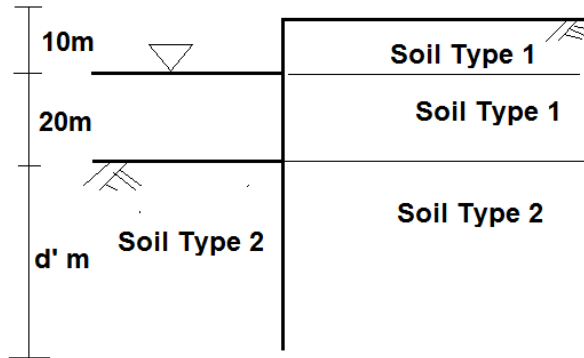
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3. b. Find the depth of penetration of the cantilever sheet pile wall for the following data.  
Use Mayniel's active earth pressure coefficients

For $\delta' = 10^\circ$ .	, $\phi = 20^\circ$	$K_a = 0.44$
For $\delta' = 20^\circ$ .	, $\phi = 40^\circ$	$K_a = 0.20$

Use Caquot and Kerisel's coefficients for passive pressure

For $\delta' = \phi'$ .	$\phi' = 40^\circ$	$K_p = 17.5$
For $\delta' = 26.7^\circ (0.66\phi')$ .		$K_p = 0.75 * 17.5$



Soil Type	Bulk Density (kN/m <sup>3</sup> )	C' (kN/m <sup>2</sup> )	$\Phi'$ (degrees)
1	15	0	20
2	20	0	40

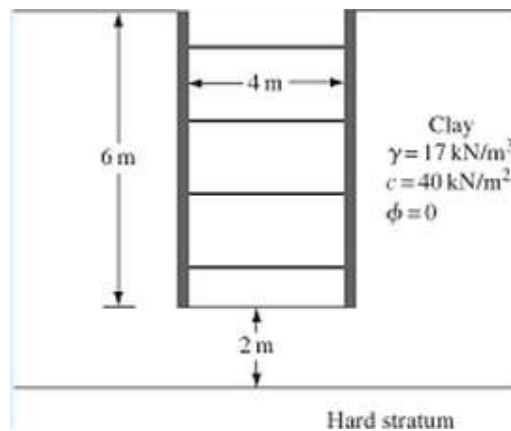
4. Describe the stability checking of sheet pile wall using fixed and free earth support methods
5. a. Write short notes on coffer dams and different types of coffer dams including merits and demerits  
b. Describe components of cellular cofferdams
6. Design a cellular cofferdam diaphragm type with the following data.  
The depth of the water medium is 9m. The depth of the soil strata below water is 6m. The free board of cofferdam is 1.0m. The submerged unit weight of soil strata outside the cell is  $11.1 \text{ kN/m}^3$ , angle of internal friction is  $30^\circ$ . Friction coefficient fill on rock is 0.57. Interlock friction is 0.3, Interlock tension allowed is  $1450 \text{ kg/cm}$ , Frictional coefficient of steel on fill is 0.4. Allowable steel tensile stress is  $1500 \text{ kg/cm}^2$ .



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7. Find the factor of safety against heave for the braced cut shown in figure with the following data.

Width of braced cut = 4m.  
Depth of the braced cut = 6m  
Length of the braced cut = 15m  
Thickness of heave = 2m  
Unit weight of soil = 17kN/m<sup>3</sup>  
Cohesion  $c = 40\text{kN/m}^2$   
Uniform surcharge adjacent to the excavation,  $q = 0$



8. Describe the necessity of reinforced earth. Write different components of reinforced earth, their functions.  
How do we assess strength characteristics of reinforced soil. Explain laboratory tests.

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