U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

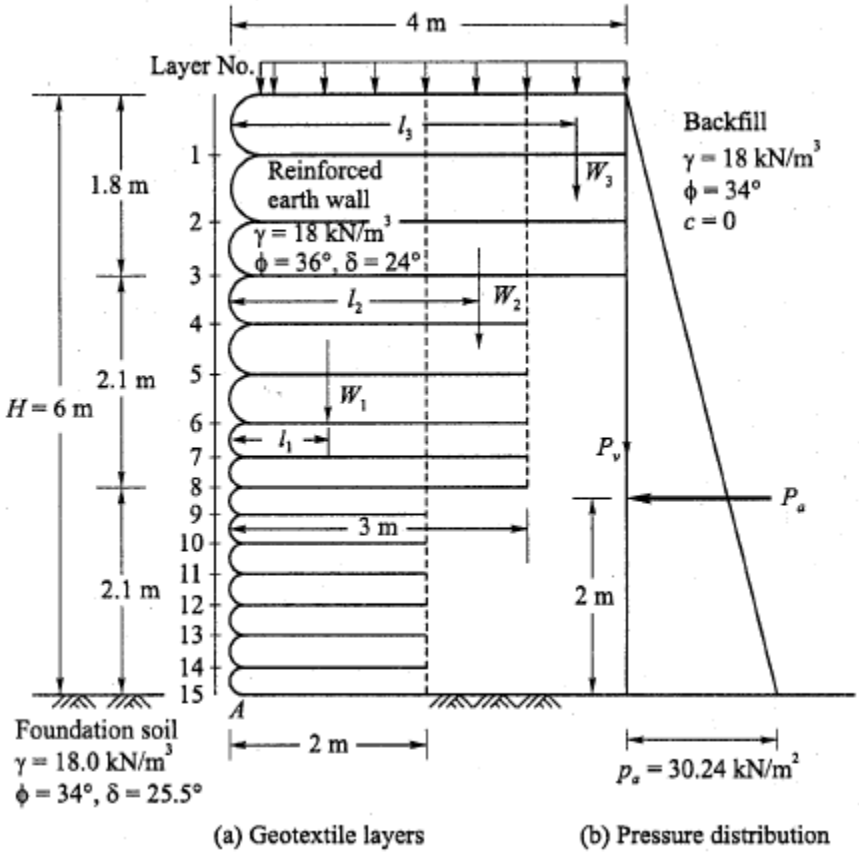
July 2023 Semester End Main Examinations

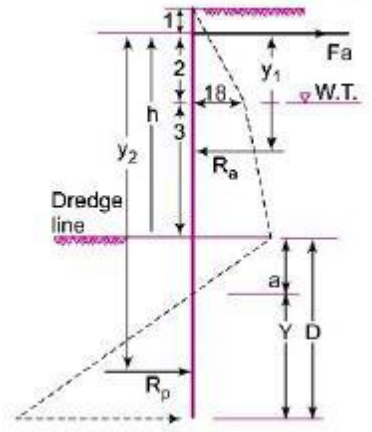
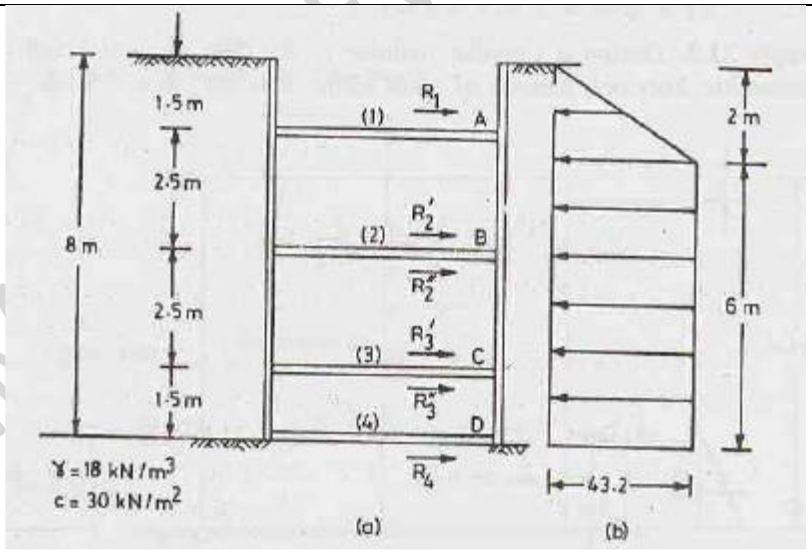
Programme: B.E. **Semester: VI**
Branch: Civil Engineering **Duration: 3 hrs.**
Course Code: 20CV6PEERS **Max Marks: 100**
Course: Earth Retaining Structures **Date: 19.07.2023**

Instructions: Answer FIVE full questions choosing one full question from each unit.
Assume any missing data suitably. Draw sketches wherever necessary.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

			UNIT - I	CO	PO	Marks
1	a)	Explain the precautions and remedial measures adopted to control seepage through the body of earthen dam.		*CO1*	*PO1*	**08**
	b)	Discuss the advantages and disadvantages of earth and rock fill dams		*CO3*	*PO1*	**07**
	c)	Compute the quantity of water seeping under a weir per day for which the flownet has been satisfactorily constructed. The coefficient of permeability is 2 x 10-2 mm/s, Nf = 5 and Nd = 18. The difference in water level between upstream and downstream is 3m. The length of the weir is 60m		*CO4*	*PO3*	**05**
		OR				
2	a)	Sketch a typical cross section of an earth dam and explain its components		*CO3*	*PO3*	**07**
	b)	A fine grained soil that needs to be protected with a transition filter has D_{15} of 0.0030 mm and D_{85} of 0.0075 mm. Three soils X, Y, Z are candidates for serving as the transition filter. The grain size distribution curve of all these soils has the similar shape as that of the soil to be protected. D_{15} of these soils are as follows **Soil** | **D_{15} (mm)** X | 0.028 Y | 0.0075 Z | 0.004 Assess the suitability of the above soils as filter material		*CO2*	*PO2*	**08**
	c)	In order to compute the seepage loss through the foundation of a cofferdam, flownets were constructed. The result of the flownet study gave N_f=6 and N_d=16. The head of water lost during seepage was 6m. If the coefficient of permeability of the soil is k=4 x 10-5m/min. Compute the seepage loss per meter length of dam per day		*CO4*	*PO2*	**05**
		UNIT - II				
3	a)	Discuss the types of retaining walls with sketches.		*CO3*	*PO1*	**08**

		b)	Design a gravity retaining wall, 5m high with vertical back to retain a dry cohesionless backfill of unit weight 18kN/m^3 and angle of shearing resistance 30^o. Find also the factor of safety against sliding assuming the angle of friction between the base of the wall and the foundation soil as 30^o. The wall is to be 1m wide at top and to be constructed of brick masonry having unit weight 20kN/m^3. Use Rankine's theory	*CO4*	*PO3*	**12**
			UNIT - III			
	4	a)	With a neat sketch discuss the general construction procedures for using geotextiles in reinforced retaining wall	*CO1*	*PO1*	**08**
		b)	Fig.Q.4(b) shows a section of a retaining wall with geotextile reinforcement. The wall is backfilled with a granular soil having γ=18kN/m^3 and ϕ=34^o. The backfill surface carries a uniform surcharge load of 10kN/m^2. Check for overturning, sliding and foundation failure  **Fig.Q.4(b)**	*CO2*	*PO2*	**12**
			UNIT - IV			
	5		The details of a cantilever sheet pile provided are as follows i) Height of cantilever above the dredge line is 7m. ii) Water table is located at a depth of 4m below the ground level. iii) Properties of soil above water table, γ=19kN/m^3 and ϕ=36^o. iv) Properties of soil below ground water level, γ^1=9kN/m^3 and ϕ=36^o. Determine the depth of embedment of the sheet pile. Also compute the same by approximate analysis	*CO4*	*PO2*	**20**

			OR			
	6	a)	Compute the embankment length and the pull in the anchor rod for the sheet pile structures shown in the fig.Q6(a). The soil of the backfill and that below the dredged line is the same, having the following properties. Use the free earth support method. $\Phi = \Phi' = 30^o$, c=0, $\Upsilon sat = 20 kN/m^3$, $\Upsilon = 18\ kN/m^3$  **Fig.Q6(a)**	*CO4*	*PO3*	**12**
		b)	Draw the earth pressure of cantilever sheet pile in a) granular soil alone, b) Cohesive soil alone c) Backfill being sandy soil and embedded in clay	*CO3*	*PO2*	**08**
			UNIT - V			
	7	a)	List the types of coffer dams. Discuss any two	*CO1*	*PO1*	**08**
		b)	 **Fig.Q7(b)** Determine the forces in the struts for the bracing system in the fig.Q7(b) given below. Assume hinges at level B, C and D take $\Upsilon = 18 kN/m^3$, $c = 30 kN/m^2$ and s=2.0m	*CO4*	*PO3*	**12**

******