

M.E. CIVIL ENGINEERING FIRST YEAR FIRST SEMESTER EXAMINATION 2018

SLOPE STABILITY AND EARTHEN DAM (SMFE)

Time: Three Hours

Full Marks 100
(Part I: 60 Marks
Part II: 40 Marks)

Use a separate Answer-Script for each part

Question No.	Part I (60 Marks)	Marks
<i>Answer ALL questions from this Part. Assume reasonable values of data, if not supplied</i>		
Q.1 a)	Why drains are required for embankment dams?	3
b)	Illustrate the purpose of providing core in a dam and discuss selection criteria of core materials in details	12
Q.2	An earth dam has the following details : Top width = 7 m = Core top width U/S. Slope = 2.5 H : 1V, D/S Slope = 2 H : 1 V Height = 53 m, Freeboard = 2 m U/S Slope of Core = 0.5 H : 1 V = D/S Slope of Core. The permeability of the blanket material and that of foundation material are 1.5×10^{-5} cm/sec and 2.5×10^{-3} cm/sec respectively. Design a suitable impervious blanket of variable thickness, if the foundation material extends down to 23m below the base of the dam.	20
Q.3	An earthen dam of homogeneous section has the following dimensions: Top Width: 6m, U/S Slope: 3.5 H:1 V, D/S Slope: 2.5 H:1 V, Height: 22m, Freeboard: 2m A horizontal blanket on the downstream side extends 23m from the toe along the base of the dam. i) Draw the top flow line. ii) If the coefficient of permeability of the embankment is 4.3×10^{-5} cm/sec, find the quantity of seepage per unit length of the dam. iii) Also draw the top flow line if K_h/K_v is 11.	10+3+12 =25

MASTER OF CIVIL ENGINEERING EXAMINATION 2018
(First Year; First Semester)

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Question No.	Part II (40 Marks)	Marks
<i>Answer any TWO questions from this Part. Assume reasonable values for the parameters, if not supplied.</i>		
1	(a) Discuss about the factors affecting slope stability analysis. (b) Define 'Limit equilibrium method' and 'Limit analysis method'? (c) Explain the residual shear strength of a soil sample. How it can be obtained? Which soil samples might have the residual strength? (d) Explain the importance of pore water pressure.	10 2+2=4 1+2+1=4 2
2	(a) Distinguish between total stress method and effective stress method of slope stability analysis. Indicate the shear strength parameters required for each type of analysis. (b) Derive factor of safety through Bishop's method for slope stability analysis considering all types of forces on an elementary slice.	5+5=10 10
3	(a) Derive the stability number for seepage condition parallel to ground up to a depth of H. (b) Derive the stability number of an infinite slope in clay. (c) Explain the steps of slope stability analysis through Bishop & Morgenstern Method (1960).	6 8 6
4	A homogeneous earth dam resting on impervious foundation is 10m high with a free board 2m was constructed with isotropic soil mass. It has a crest width of 3m, with U/s and D/s side slopes of 3(H):1(V) and 2.5 (H):1(V) respectively. Estimate the Factor of Safety in total stress condition, for the slip circle passing through toe, with a radius 1.20 times of the dam height. Provide centre of the slip circle graphically. Assume $C_u = 2.0t/m^2$, $\phi = 5.5^\circ$ and $\gamma = 1.78t/m^2$.	20