



Printed Pages : 4

CE – 032

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 0037

Roll No.

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B. Tech.

(SEM. VIII) EXAMINATION, 2006-07

EARTH & EARTH RETAINING STRUCTURES

Time : 3 Hours]

[Total Marks : 100

- Note :*
- (1) Attempt all questions.*
 - (2) All questions carry equal marks.*
 - (3) In case of numerical problems, assume data if not provided.*
 - (4) Answers should be precise and diagram should be neat and clean.*

1. Attempt any **two** parts of the following: **10×2=20**
- (a) Discuss, with a neat sketch important components and embankment details of an earth dam.
 - (b) How does (i) excess seepage and (ii) excess pore water pressures and gradients, affect the stability and performance of an earth dam. Discuss effective measures to control the same.

- (c) What is the criteria to be met by transition filters for protection against piping? The core of an earth dam heading protection against piping has D_{15} of 0.001 mm and D_{85} of 0.006 mm. Three soils, namely A, B, C are available for serving as transition filter. The grain size distribution curve of all these three soils has the same general shape as the soil to be protected. D_{15} of these soil's are 0.0025 mm 0.006 mm and 0.036 mm respectively for soil A, B and C. Which of these soils would you select as transition filter material ?

2. Attempt any **two** parts of the following:- **10×2=20**

- (a) Discuss various types of slope failures (slides). For infinite slopes, prove that the critical height of slopes, for the given shear strength parameters, depends on slope angle.
- (b) A canal is to be excavated through a soil with $C = 15 \text{ kN/m}^2$, $\phi = 20^\circ$, $e = 0.9$ and $G = 2.67$. The depth of canal is 6 m. Determine the factor of safety with respect to cohesion when the canal runs full. What will be the factor of safety if the canal is rapidly emptied.
- (c) Explain friction circle method for the investigation of stability of finite slopes.

3. Attempt any **two** parts of the following: **10×2=20**

- (a) Give step by step procedure for analyzing the stability of upstream slope of an earth dam by Swedish method of slices. Show the effect of sudden drawdown on the stability of slope.
- (b) A 9 m deep cut is to be made in clay with a unit weight of 18 kN/M^2 and a cohesion of 27 kN/m^2 . A hard stratum exists at a depth of 18 m below the ground surface. Using Taylor's charts, determine if 30° slope is safe. If a factor of safety of 1.50 is desired, what would be the slope angle given for $D = 2$ and $\beta = 30^\circ$, $S_n = 0.172$ and for $D = 2$ and $S_n = 0.11$, $\beta = 8^\circ$
- (c) Explain in what aspects, dynamic loads differ from static loads. Discuss in brief what additional soil properties are required for dynamic loading problems in soils.

4. Attempt any **two** parts of the following: **10×2=20**

- (a) Discuss how the stability and performance of an earth retaining structure is affected by submergence.
- (b) What is understood by construction condition or end of construction in earth dams. How are upstream and downstream slopes are analysed post construction ?
- (c) What performance parameters need to be mentioned during as wells as post construction period for the earth dam ? Briefly discuss various types of earth pressure cells and settlement gauges.

5. Attempt any **two** parts of the following: **10×2=20**

- (a) A masonry retaining wall of trapezoidal section has its top width equal to 0.75 m and height 5 m. Its face in contact with backfill is vertical. The backfill surface is horizontal. The average unit weight of soils is 16 kN/m^3 and ϕ is 30° . The masonry weights 16 kN/m^3 . Determine minimum width of base to avoid tensile stresses and determine the maximum compressive stresses for this base width. If coefficient of friction between base and soil is 0.60, check the stability of retaining wall against sliding.
- (b) Discuss various types of coffer dams with neat sketches.
- (c) An anchored sheet-pile wall supports a cohesion-less soil having unit weight of 24 kN/m^3 and angle of shearing resistance, 28° . The anchor ties are positioned 1 m below the top of wall at 1 m horizontal spacing. Find the minimum depth of anchor for sheet – pile neglecting the friction on the surface of pile.
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