

B.Tech. CIVIL ENGINEERING (BTCLEVI)

Term-End Examination

December, 2016

00303

**BICEE-019 : EARTH AND ROCKFILL DAM
ENGINEERING**

Time : 3 hours

Maximum Marks : 70

Note : Answer any seven questions. All questions carry equal marks. Assume the suitable missing data, if any. Use of scientific calculator is allowed.

1. (a) What is the difference between an earth dam and a rockfill dam ? In what conditions, is a rockfill dam more suitable than an earth dam ? 5
- (b) What are the various types of earth dams according to the section of the dam ? What type of section is commonly used in practice and why ? 5

2. Discuss the various causes of hydraulic and structural failures of earth dams. 10
3. (a) Draw the typical cross-section of earth dams when : 6
- (i) Only pervious material is available
 - (ii) Only impervious material is available
 - (iii) Both pervious and impervious materials are available
- (b) Write short notes on any *two* of the following : 4
- (i) Rock Toe
 - (ii) Consolidation of earth dams
 - (iii) Pore pressure and its significance in relation to earth dam construction
4. A homogeneous earth dam is 25 m high and has a crest width of 7 m. The u/s and d/s slopes are 4 : 1 and 3 : 1 respectively. Check the stability of u/s slope by the approximate method. Assume a free board of 3 m and the height of the phreatic line above the base at the u/s shoulder as 19 m. Take saturated weight of soil = 22 kN/m³, submerged weight of soil = 12 kN/m³, specific weight of water = 10 kN/m³, $\phi = 24^\circ$, $c = 50 \text{ kN/m}^2$. 10

5. An earth dam made of a homogeneous material has the following data :

Coefficient of permeability of the dam material =

$$5 \times 10^{-4} \text{ cm/sec.}$$

Level of top of the dam = 200.0 m

Level of deepest river bed = 178.0 m

H.F.L of reservoir = 197.5 m

Width of top of the dam = 4.5 m

Upstream slope = 3 : 1

Downstream slope = 2 : 1

Determine the phreatic line for this dam section and the discharge passing through the dam, if a horizontal filter of length equal to 25 m is provided inward from the downstream toe of the dam.

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6. (a) Describe the Swedish slip circle method for examining the stability of slopes of an earthen embankment.

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- (b) Write short notes on any *two* of the following :

4

(i) Design of filters

(ii) Protection of upstream slope

(iii) Protection of downstream slope

7. (a) Describe the construction details of Rolled-fill method for earth dams.

5

- (b) Explain and elaborate the importance of seepage through earth dams.

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8. (a) What do you understand by critical gradient ? What will happen if the critical gradient is exceeded ? What is Khosla's safe exit gradient ? 4
- (b) Find out the pore pressure in a layer of soil due to continuous loading which results in decrease of volume by 4%. Assume initial porosity 0.35 and saturation ratio 0.85. Henry's coefficient may be taken as 0.02 and the initial pressure in the soil pores as atmospheric. 6
9. (a) What are the design considerations for a rockfill dam ? Discuss in brief. 5
- (b) How would you prevent piping failure in an earth dam ? 5
10. Explain the following terms : $4 \times 2 \frac{1}{2} = 10$
- (a) Pitching
- (b) Berms
- (c) Relief Walls
- (d) Cut-off
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