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BICEE-019

B.Tech. CIVIL ENGINEERING (BTCLEVI)

Term-End Examination

June, 2016

00126

BICEE-019 : EARTH AND ROCK FILL 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 are the relative advantages and disadvantages of rock-fill dams over earth dams ? *5*

(b) According to the method of construction, what are the different types of earth dams ? Discuss their relative advantages and disadvantages. *5*

2. (a) Explain, in brief, the classification of earth dam foundation. *5*

(b) What are the criteria for safe design of earth dams ? Discuss in brief. *5*

3. (a) Draw the typical cross-section of earth dams when (i) only pervious material is available, (ii) only impervious material is available, and (iii) both pervious and impervious materials are available. *6*

(b) Describe the analytical method to draw a Phreatic line for a homogeneous earth dam with a horizontal drainage blanket. *4*

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/m^3, submerged weight of soil = 12 kN/m^3, specific weight of water = 10 kN/m^3, ϕ = 24°, C = 50 kN/m^2. *10*

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

Level of the top of the dam = 200·00 m

Level of deepest river bed = 178·0 m

H.F.L of reservoir = 197·5 m

Width of the top of the dam = 4·5 m

Upstream slope = 1 : 3

Downstream slope = 1 : 2

Length of the horizontal filter from d/s toe, inwards = 25 m

Cohesion of soil of the dam = 24 kN/m^2

Cohesion of soil of the foundation = 54 kN/m^2

Angle of internal friction of soil in the dam = 25°
Angle of internal friction of soil in the foundation = 12°
Dry unit weight of the soil in the dam = 18 kN/m^3
Submerged unit weight of the soil in the dam = 12 kN/m^3
Dry unit weight of the foundation soil = 18·3 kN/m^3
Coefficient of permeability of soil in the dam = 5×10^{-6} m/sec

The foundation of soil consists of 8 m thick layer of clay, having negligible coefficient of permeability. Check the stability of the dam. *10*

6. (a) Describe in brief the various measures to control seepage through pervious foundations. *6*

(b) Discuss the uses of flow nets. *4*

7. (a) Describe the construction details of hydraulic fill earth dams. *5*

(b) What is the difference between an earth dam and a rock-fill dam ? In what conditions is a rock-fill dam more suitable than an earth dam ? *5*

8. (a) Describe in brief the design considerations for earth dams in seismic regions. *6*

(b) Discuss the stability of upstream slope of an earth dam during sudden drawdown condition. *4*

9. (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 as 0·35 and saturation ratio as 0·85. Henry's coefficient may be taken as 0·02 and initial pressures in soil pores as atmospheric. *6*

10. (a) Discuss with a sketch, surface protection of downstream slope of an earth dam. *5*

(b) Explain in brief the various undesirable effects of water seepage through the body of earth dam and its foundation. *5*
