

GUJARAT TECHNOLOGICAL UNIVERSITY
M. E. - SEMESTER – II • EXAMINATION – SUMMER • 2013

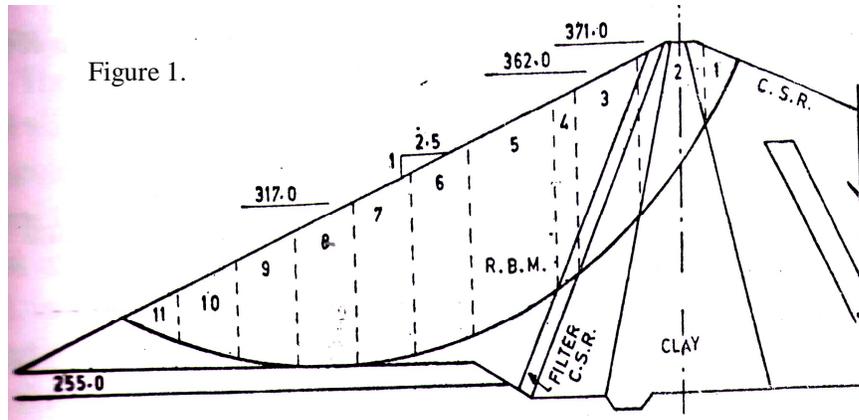
Subject code: 1724305**Date: 05-06-2013****Subject Name: Earth and Rockfill Dams****Time: 10.30 am – 01.00 pm****Total Marks: 70****Instructions:**

1. Attempt any five questions and Q-1 is compulsory.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** Attempt any seven out of the following. Support your answer in just two- 14
three lines with reasons:
- i. Which is the basic difference between earthen dams and gravity dams?
 - ii. Which is most suitable foundation for homogenous dams?
 - iii. State the factors considered while deciding minimum thickness of core?
 - iv. What criteria should be followed for selection of core material in case of earthen dams?
 - v. Which type of material is preferable on u/s of dam so as to control pore water pressures when reservoir is lowered after being full for some time?
 - vi. What do you mean by foundation piping?
 - vii. Define Sloughing and which type of failure is observed under such phenomena?
 - viii. How to control under seepage in case of dams resting on pervious foundations?
 - ix. Under which conditions grouting is preferable technique for treatment of foundations?
 - x. What is major disadvantage of relief wells? Why?
- Q.2** State and explain in detail classification of earth dams with neat sketches. 14
Also give various quality control measures to be satisfied in case of earth dams.
- Q.3** (a) State the various criteria given by Sherard for classification of core materials 07
on the basis of resistance to concentrated leak. Also state the criteria given by Sherard for deciding core thickness
- (b) Categorized location of core in dam section. Explain various conditions 07
under which they are provided.
- Q.4** (a) Explain Terzaghi criteria for design of transition filters. Explain briefly rock 07
toe and chimney drain
- (b) Describe the various types of failure for earthen dams. Support your answer 07
with any one case study.

- Q.5 (a)** What is the role of pore pressures in design of earthen dams how they are determined. Explain difference between total and effective stress methods of analysis. Discuss in detail the steady seepage and rapid drawdown condition for stability analysis of earthen dams with equations. **07**
- (b)** Explain in detail with steps the Simplified Bishop's ϕ method for stability analysis of earth dams. Support your answer with necessary equations and calculations. **07**

- Q.6** Determine the stability of u/s slope of Ramganga dam section as shown in figure 1. for end of construction condition by Swedish circle method considering following geometrical features and soil properties. What FOS is obtained if Modified Bishop's ϕ method is applied to same section? **14**



Soil Properties

Material	Moist density (kg/m^3)	Cohesion (kg/cm^2)	ϕ
Clay core	2.0×10^3	1.02	20°
Crushed sand rock	1.85×10^3	0.36	30°
River bed material	1.67×10^3	----	36°
Filter	2.12×10^3	----	39°

- Q.7 (a)** Discuss the relative merits of impervious membranes in case of Rockfill dams compare to earth cores. Also give advantages of cement concrete membranes **07**
- (b)** Describe the necessity of good instrumentation and how choice of instrumentation is made. Explain in detail open standpipe piezometers with neat sketch. **07**