Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E. SEMESTER III–EXAMINATION – WINTER 2015

Subject code: 2734303 **Date: 04/12/2015**

Subject Name: Earth and Rockfill Dams

Time: 2:30 PM to 5:00 PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks**
4. **Use of Programmable calculator is strictly prohibited**

Q.1 Attempt **any seven** out of the following. Answer only in two-three lines with proper reasons: **14**

i. Which type of dam section can be suggested for clayey foundations and why?

ii. What do you mean by sloughing?

iii. How relief wells helps in reducing seepage pressure?

iv. What is the role of core thickness in dam and how it is decided?

v. Which criteria should be followed for selection of rock toe? Is there any relation between height of dam and rock toe?

vi. How thickness and vertical interval between filter layers are decided?

vii. What do you mean by sudden draw down condition and how it affects stability?

viii. What is the disadvantage of membranes in rockfill dams and why?

ix. Due to which reason differential movements in embankment take place?

x. What are the advantages of pneumatic type piezometers?

Q.2(a) State the various criteria given by Sherard for classification of core materials on the basis of resistance to concentrated leak. Also state the criteria given by Sherard for deciding ócore thicknessô **07**

Q.2(b) Categorized location of core in dam section. Explain various conditions under which they are provided. **07**

OR

Q.2(b) Discuss various quality control measures of construction as per IS: 14690-1999. Justify their various criteriaôs. **07**

Q.3(a) Give the detail classification of earthen dam and discuss its suitability with respect to type of foundation. **07**

Q.3(b) Define earthen dam and show the comparison between rigid dams and embankment dams with respect to their characteristics. **07**

OR

Q.3(a) What do you mean by transition filter? Explain Terzaghi criteria for design of transition filters. Discuss IS codal guidelines. **07**

Q.3(b) Describe the various types of failure for earthen dams. Support your answer with any one case study. **07**

Q.4(a) Determine the thickness of inclined filter and horizontal filter for zoned earth dam as per IS: 9429-1999 for a given data: **07**

Depth of overburden = 25m, head of water = 95m, permeability of filter = 1.66 x 10^{-4} m/s, permeability of impervious material = 4.46 x 10^{-8} m/s, permeability of over burden = 6.23 x 10^{-4} m/s, angle of discharging face with horizontal = 63.1°, base width of impervious core = 110m, length of horizontal filter = 250m. Assume any other data if necessary with proper justification.

Q.4(b) What are the functions of impervious membranes in case of rockfill dams? How they are categorized and how their selection is made? Give the short comparison between "cement concrete membranes" and "asphaltic concrete membranes. **07**

OR

Q.4(a) Following is the data of an undisturbed soil sample collected for an earth dam section: **07**

Dry unit weight = 16.4 kN/m^3, water content = 20%, G = 2.67, porosity = 38%. The volumetric strain (%) obtained was 2.5, 3.65 and 4.2 for applied stress of 70kPa, 140kPa and 210kPa respectively based on consolidation test data. Determine construction pore pressure developed within the soil under increasing fill load using Hilf's method. Assume any other data if necessary.

Q.4(b) What do you mean by good instrumentation? Which type of problems can be instrumented or prevented with suitable instrumentation? What are the codal provinces for instrumentation in earthen dams? **07**

Q.5(a) Enlist the various types of piezometers and vertical movement devices used for instrumentation in earthen dams. Discuss the advantages and disadvantages of only piezometers in comparative form. **07**

Q.5(b) Explain stability of earthen dams. Which are the various conditions for which stability analysis is performed? Explain each condition in detail with necessary equations. **07**

OR

Q.5 Determine the stability of u/s slope for a given dam section as shown in fig.1 for ćend of constructionô condition by either Swedish circle method **or** Modified Bishops method. Soil properties as per zonation are given below. Assume any other relevant data if required with proper justification. **14**

Zone	Moist density (kN/m^3)	Submerged density (kN/m^3)	Saturated density (kN/m^3)	Cohesion (kg/cm^2)	Tan Ø
Shell	21.2	----	---	0	0.60
Core	18.5	9.35	19.16	2.2	0.44
Foundation	---	7.76	---	1.5	0.49