JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST – 3 EXAMINATION - 2023

B.Tech. - VIII Semester (Civil)

COURSE CODE (CREDITS): 18B1WCE736 MAX. MARKS: 35

COURSE NAME: Dam and Reservoir Design

COURSE INSTRUCTORS: Saurabh Rawat MAX. TIME: 2 Hours

Note: (a)All questions are compulsory.

(b) Marks are indicated against each question in square brackets.

(c) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

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Q1. Explain in detail the various forces causing instability in a gravity dam. Also draw a section of an earth dam of 20 m height indicating the various parts of the dam. (*CO3, CO5*) **[3+3 = 6]**

Q2. An earthen dam is made of homogeneous material has the following data:

Level of the top of the dam	200.00 m
Level of deepest riverbed	178.0
H. F. L. of reservoir	197.5 m
Width of top of dam	4.5 m
Upstream slope	3:1
Downstream slope	2:1
Length of the horizontal filter from d/s toe, inwards	25 m
Cohesion of soil of dam	24 kN/m^2
Cohesion of soil of 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 weight of the soil in the dam	18 kN/m^3
Submerged 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 soil consists of 8 m thick layer of clay, having negligible coefficient of permeability. Check the stability of the dam and its foundations. (*CO5*) **[8]**

Q3. Differentiate between a 'low gravity dam' and a 'high gravity dam'. How does the practical profile of a low gravity profile differ from that of the theoretical one and why? Derive an expression for the limiting height of a low dam. (*CO4, CO5*) **[2+1+3 = 6]**

Q4. Briefly explain the following:

a) Drainage gallery
b) Construction joints in a dam
c) Ogee spillway

(CO1, CO2, CO5) **[2+2+2 = 6]**

Q5. A flow net is plotted for a homogeneous earthen dam of height 22 m and freeboard 2.0 m. The result obtained are:

Number of potential drops = 10
Number of flow channels = 4
The dam has a horizontal filter of 30 m length at the downstream end and the coefficient of permeability of the dam material is 5×10^{-4} cm/sec. Calculate the discharge per run of the dam.

(CO5) **[5]**

Q6. Explain and elaborate the importance of 'seepage' through earthen dams. What precautions and remedial measures would you undertake to control the 'seepage' through

a) Earthen dam body
b) Dam foundation

(CO1, CO5) **[2+1+1 = 4]**