

Enrollment No: _____

Exam Seat No: _____

C. U. SHAH UNIVERSITY

Summer Examination-2022

Subject Name : Design of Hydraulic Structures

Subject Code : 4TE06DHS1

Branch: B.Tech (Civil)

Semester: 6

Date: 04/05/2022

Time: 02:30 To 05:30

Marks: 70

Instructions:

- (1) Use of Programmable calculator & any other electronic instrument is prohibited.
- (2) Instructions written on main answer book are strictly to be obeyed.
- (3) Draw neat diagrams and figures (if necessary) at right places.
- (4) Assume suitable data if needed.

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- Q-1 Attempt the following questions: (14)**
- a) What are the two main causes of failure of hydraulic structure on the pervious foundation? 1
a) Seepage and Over-turning b) Undermining and Uplift
c) Over-turning and Piping d) Overturning and Uplift
- b) Heave piping may occur on the _____ 1
a) downstream of sheet pile or cut off wall
b) upstream of sheet pile or cut off wall
c) body of earth structure
d) below the foundation
- c) What is the purpose of constructing a dam? 1
a) Flood control b) Irrigation c) Water supply d) All of the Above
- d) An overflow dam is a type of dam, classified on the basis of 1
a) Structural behavior b) Hydraulic behavior c) Materials d) None
- e) A pitot tube is used to measure 1
a) pressure b) difference in pressure c) velocity of flow d) none of these
- f) When a body is totally or partially immersed in a fluid, it is buoyed up by a force equal to 1
a) weight of the body
b) weight of the fluid displaced by the body
c) weight of the body and fluid displaced by the body
d) difference of weights of the fluid displaced and that of the body
- g) The phenomenon occurring in an open channel when a rapidly flowing stream abruptly changes to a slowly flowing stream causing a distinct rise of liquid surface, is 1
a) water hammer b) hydraulic jump c) critical discharge d) none of these.
- h) Highest dam in India, is 1
a) Bhakra dam b) Hirakund dam c) Nagarjuna Sagar dam d) Iddiki dam.
- i) Which type of canal does not need cross drainage structures? 1
a) Side Slope Canal b) Contour Canal c) Watershed Canal d) Field Channel
- j) The safety valve of a dam is its _____ 1
a) drainage gallery b) inspection gallery c) spillway d) outlet sluices



- k) Which of the following is the simplest type of spillway and may be constructed on small bunds or thin arch dams? 1
 a) Straight drop spillway b) Ogee spillway c) Shaft spillway d) None
- l) Which of the following spillway is least suitable to earthen dams? 1
 a) Ogee spillway b) Chute spillway c) Side-channel spillways d) Shaft spillway
- m) What is the value of the pier abutment coefficient for pointed nose piers? 1
 a) 0.1 b) 0.02 c) 0.01 d) 0.0
- n) Hight of saradarsarovar dam With Foundation 1
 a) 163 m b) 164 m c) 161 m d) 138.6 m

Attempt any four questions from Q-2 to Q-8

Q-2 Attempt all questions (14)

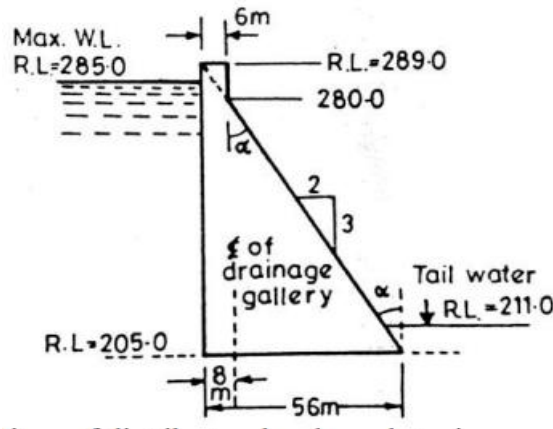
- a) Why canal fall is provided in canal ? Enlist different types of fall. And describe Rapid falls 7
- b) Explain the different types of failure in the earthen dam with neat sketch 7

Q-3 Attempt all questions (14)

- a) Discuss the Swedish slip circle method for checking the stability of downstream slop under steady seepage conditions. 7
- b) Distinguish clearly between a low gravity dam and high gravity dam. Derive an expression used for such a distinction 7

Q-4 Attempt all questions (14)

- a) Fig. shows the section of a gravity dam (non-overflow portion) built of concrete. Calculate (neglecting earthquake effects) 10
- (i) The maximum vertical stresses at the heel and toe of the dam.
 (ii) The major principal stress at the toe of the dam.
 (iii) The intensity of shear stress on a horizontal plane near the toe.
 Assume weight of concrete = 23.5 kN/m³ ; and unit length of dam.
 Allowable stress in concrete may be taken 2500 kN/m² .



- b) Enlist stepwise procedure for designing a sarda type fall 4

Q-5 Attempt all questions (14)

- a) Distinguish between the Rolled-fill earth dam and Hydraulic-fill earth dam 7
- b) What is meant by "concrete gravity dams"? Draw a neat typical cross- 7



section of such a dam. Name the highest dam of the India as well as that of Gujarat.

- Q-6** **Attempt all questions** **(14)**
- a) Describe various energy dissipation devices used below spillway in relation to the position of jump height curve (JHC) and tail water rating curve (TWRC). **7**
- b) A siphon spillway has the following particulars: **7**
Height of the throat = 1.50 m, length of the throat = 4.0 m.
At the design discharge, the tail water elevation is 5.0 below the summit (crest) of the siphon and the head over the summit is 2.0 m.
Determine: (i) The capacity of the siphon, if $C_d = 0.60$.
(ii) The head that would be required on an ogee-shaped spillway with its crest at the same level to discharge the same flow. Take $C_d = 2.25$
(iii) The length of the ogee-shaped weir required to discharge the same flow with a head of 2.0 m over the crest.
- Q-7** **Attempt all questions** **(14)**
- a) Explain design procedure for canal cross regulator and head regulator **7**
- b) Explain Design of glacis type fall **7**
- Q-8** **Attempt all questions** **(14)**
- a) Describe selection of site for dam **7**
- b) Enlist the types of spillways and explain any two with neat sketch **7**

