

Enrollment No: _____ Exam Seat No: _____

C.U.SHAH UNIVERSITY

Winter Examination-2018

Subject Name : Design of Hydraulic Structures

Subject Code : 4TE06DHS1 **Branch :** B.Tech (Civil)

Semester : 6 **Date :** 22/10/2018 **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) Name the highest dam of the world as well as that of India. **01**
 - b) Enlist various checks carried out for the stability of an earth dam. **01**
 - c) Enlist various factors which are considered for the selection of preliminary section of the dam. **01**
 - d) What is phreatic line for an earth dam? **01**
 - e) What is meant by pore pressure? **01**
 - f) What are contraction joints in gravity dam? **01**
 - g) What is meant by structural height of the dam? **01**
 - h) Enlist different forces that may act on a gravity dam. **01**
 - i) What is meant by a 'Dam sluice'? **01**
 - j) Define spillway. **01**
 - k) What is meant by an energy dissipater? **01**
 - l) What is cross regulator? **01**
 - m) What are the functions of a distributary head regulator? **01**
 - n) Name the type of canal fall, which can be universally used without any if and butts for moderate discharges of the order of 40-60 cumecs and low fall heights of 1 to 1.5 m, is. **01**
- Attempt any four questions from Q-2 to Q-8**
- Q-2 Attempt all questions (14)**
- (a) What are the basic data required for planning of dams and reservoirs? Discuss different levels in the investigation for a reservoir project. **05**
 - (b) What are the essential requirements of spillway? **05**
 - (c) Describe the characteristics of embankment dams. **04**
- Q-3 Attempt all questions (14)**
- (a) What is the various component part of a dam outlet works? Explain their functions. **05**
 - (b) Describe graphical method of stability analysis of dam. **05**
 - (c) Describe various assumptions made in the two dimensional designs of gravity dams. **04**
- Q-4 Attempt all questions (14)**
- (a) What are different types of embankment dams? Discuss in brief. **07**
 - (b) In order to find the factor of safety of d/s slope during steady seepage, the section of the dam was drawn to scale of 1 cm = 4 m, and the following



results obtained on a critical slip circle:

Area of N rectangle = 14.4 sq. cm, Area of T rectangle = 6.4 sq. cm, Area of U rectangle = 4.9 sq. cm, Length of arc = 12.6 cm. Laboratory tests have furnished values of 26° for effective angle and 0.195 kg/cm² for cohesion. Unit weight of soil = 1.9 g/cm³, Determine the factor of safety of the slope.

Q-5 Attempt all questions (14)

- (a) Discuss the methods for the protection of u/s and d/s faces of an earth dam. **07**
 (b) For the overflow section shown in Fig. 1, determine the horizontal force due to water pressure on the upstream face. Take the velocity of approach as 3 m/s. **07**

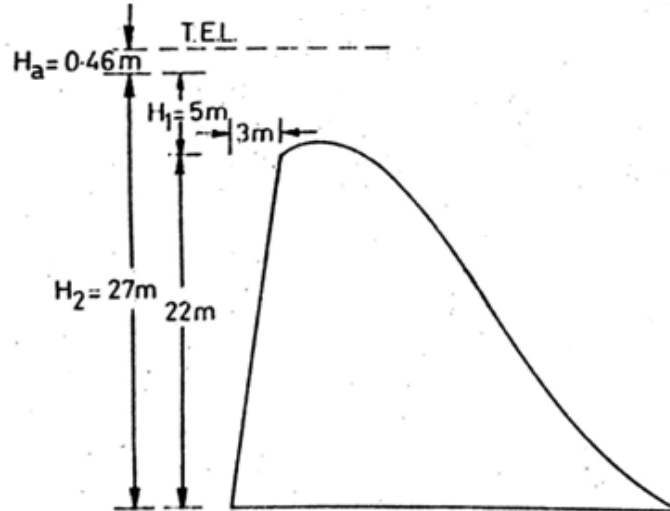


Fig. 1

Q-6 Attempt all questions (14)

- (a) Describe various energy dissipation devices used below spillway. **07**
 (b) What are the functions and types of galleries in dams? **07**

Q-7 Attempt all questions (14)

- (a) Describe the procedure for designing a cross regulator and head regulator for distributary. **08**
 (b) A horizontal apron of 16 m length a sheet pile is provided at 12 m distance from the u/s end. The sheet pile is of 4 m depth. The weir on the floor stores water upon 3 m height. Calculate uplift pressures at both faces of the sheet pile just below the floor and also at lower end of the sheet pile. **06**

Q-8 Attempt all questions (14)

- (a) Design the practical profile of a concrete gravity dam for the given data: **08**
 RL of base of dam 65 m
 RL of HFL = 130 m
 Safe compressive stress in concrete = 3000 kN/m²
 Specific gravity of concrete = 2.4
 Height of waves = 1.0 m
 (b) Distinguish between hydraulic failure and seepage failure of earth dam. **06**

