



**KERALA AGRICULTURAL UNIVERSITY**  
**B.Tech. (Agri. Engg.) 2023 & previous admissions**  
**V Semester Final Examination – January 2026**

Lwre.3107

**Water Harvesting and Soil Conservation Structures (2+1)**

**Marks: 50**  
**Time: 2 hours**

- I Fill in the blanks (10x1=10)**
1. The upstream face on the earth dam is considered as .....
  2. Rainwater harvesting is a technology used for ..... rainwater.
  3. Soil erosion is the process by which ..... is removed from the Earth's surface by wind or water flow.
  4. Hydraulic jump takes place due to the transformation of super-critical to.....
  5. ....Sills are constructed in the apron section.
- State True or False**
6. The hydraulic design includes estimation of peak flow that the structure is required to handle.
  7. Gully control structures can be grouped into two categories, namely, temporary gully control structures and permanent gully control structures
  8. For safety against piping, the weighted creep ratio  $C_w$  should be lower than the recommended value.
  9. Toe drains or filter is a component of earthen embankment.
  10. Seepage is the more common phenomenon in soil and water conservation structures
- II Write short notes on ANY FIVE of the following (5x2=10)**
1. What is importance of water harvesting?
  2. Differentiate between runoff and flood water harvesting.
  3. Define Hydraulic jump. List down assumption made before deriving the expression for the depth of hydraulic jump.
  4. What are the design Requirements of Gully Control Structure?
  5. What are the uses of drop structures?
  6. Define chute spillway and enlist its uses.
  7. The chute spillway is to be provided with a straight inlet with peak flow discharge  $3.57 \text{ m}^3/\text{s}$ . The depth of flow is to have 1.28 m. What should be the weir length? ( $C_d = 0.6$ )?
- III Answer ANY FIVE of the following (5x4=20)**
1. Find the depth of flow of water after the hydraulic jump in a rectangular channel of 4 m width having a discharge of  $16 \text{ m}^3/\text{s}$ . The depth of water in the channel before hydraulic jump was 0.5 m.
  2. Describe in brief about Woven Wire Dams with the help of neat sketch.
  3. Describe permanent structures for gully control. Also elaborate about Components of Gully Control Structures.
  4. Describe the various type drop inlet spillways.
  5. Design a trapezoidal diversion channel to carry design discharge of 2 cumec to the reservoir through earthen channel. The prevailing slope is 0.001 m/m and soil type is clay loam. Take Manning's roughness coefficient as 0.03? The permissible velocity for this type of soil is 0.65 m/s. For clay loam soil, the side slope should be 2:1.



6. Describe in brief about the site selection for Dugout type farm pond.
7. A dugout farm pond of capacity 500 m<sup>3</sup> is to be constructed in clay loam soil. The soil profile is such that the depth is limited to 3 m and site permits length width ratio as 1. Determine the dimension of the dugout farm ponds and inverted cone farm pond.

**IV Write an essay on ANY ONE of the following (1x10=10)**

1. Design a drop structure which is to be constructed across the gully. The catchment area of the gully is 50 ha. The maximum rainfall intensity was recorded as 12 cm/h once in 50 - years return period, for the period equal to  $T_c$ . The drop of bed is 2 m. and runoff coefficient is 0.35. the value of  $h/F > 0.5$  is not suitable. Further, in all case,  $L/h$  ratio should be greater than 2 (Assume necessary data required).
2. Describe in brief the design of various components of earthen embankment for water storage with expression.

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