KERALA AGRICULTURAL UNIVERSITY
B.Tech (Agrl.Engg) 2011 Admission
VIth Semester Final Examination- June 2014

Cat. No: Lwre.3206   **Marks: 80**
Title: Soil and water conservation structures (2+1)   **Time: 3 hours**

I . Fill up the blanks

1. Permanent structures are generally used in -------------- to --------------------- gullies.

2. Common causes of failure of drop spillway are ---------------- and -------------------

3. Change of flow from a depth less than the critical depth to greater than critical depth is known as -----------------------

4. Overturning factor of safety for concrete dam should be -----------------

5. Capacity of chute spillway is controlled by its -------------------------------------

6. In steady state of flow , depth of flow does not vary with ----------------------------

7. The effect of viscosity relative to inertia can be represented by ----------------------

8. In the case of a strong jump, Froude number is -------------------------------

9. The apron thickness is designed to counteract the ----------------------------

10. For permanent gully control structures, a ----------------- year frequency is normally used for hydrologic design.

                                                              (10x1=10)

II Answer any ten of the following

1. What are the basic components of gully control structures ?

2. Write general requirements of soil erosion control structures.

3. Advantages of chute spillway compared to drop spillway.

4 . What is the difference between steady flow and unsteady flow ?

5. Write short note on the effect of various forces such as viscosity, gravity, inertia etc. on the behaviour of open channel flow.

6. Write short note on specific energy and alternate depths.

7. Explain the terms initial depth and sequent depth. What is the relationship between these two depths ?

8. A rectangular channel ,2.5 m wide has a specific energy of 1.5 m when carrying a discharge of 6.4 m³/s. Calculate the alternate depths and Froude number.

9. How dams are classified? Give any three type of classification.

10 What is the maximum capacity of a straight drop spillway having a crest length of 3 m and depth of flow of 0.9 m

11 Point out various applications of hydraulic jump

12 Explain the design criteria of a SAF stilling basin of a chute spillway

(10x3=30)

III Write short essays on any six of the following

1.How we prevent seepage through embankment? Show original and modified seepage line

2. Explain various types of farm ponds

3 Explain hydraulic design part of a chute spillway

4. For what purposes spillways are used? Mention various types of commonly used spillways.

5. Determine the net and gross free board for a farm pond with 0.6 ha water surface and an exposure length of 183 m. Assume the frost depth is 0.15 m, the 25 year design runoff peak is 4 m³/s and flow depth in the flood spillway is 0.3m

6. Compute the critical depth of flow in a rectangular chute 1.82 m in width, if the flow is 2.83 m³/s. If the roughness coefficient is 0.015, what is the slope of the chute?

7. A rectangular channel 2.5 m wide carries 6 m³/s of flow at a depth of 0.5 m. Calculate the height of a flat top hump required to be placed at a section to cause critical flow. The energy loss due to the obstruction by the hump can be taken as 0..1 times the upstream velocity head.

8. Derive the discharge per unit width of a broad crested weir across a rectangular channel

(6x5=30)

IV Write essay on any one of the following

1. Design a chute structure for gully head control for the following conditions

Drop = 2 m , Slope of water way = 1.5 : 1
Width of waterway = 1.2m
Max. water lavel in inlet =0.5 m
Use concrete for construction

Density of concrete = 2300 Kg/m^3
Peak flow = 0.7 m^3/s
        SAF outlet is to be used

2. Write design procedure of a straight drop spillway

(1x10=10)

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