

# KERALA AGRICULTURAL UNIVERSITY

B.Tech (Agrl. Engg) 2008 Admission

VI<sup>th</sup> Semester Final Examination – July 2011– August 2011

Lwre - 3206  
Soil and Water Conservation Structures (2+1)

Max. Marks: 80  
Time: 3.00 hours

## I. Fill up the blanks

1. Hydrologic design of any structure involves the determination of the -----
2. Flow in a chute spillway is at ----- velocities
3. If flow is in uniform state, depth of flow ----- with-----.
4. A rapid change in depth of flow from high stage to low stage in open channel is known as -----
5. For a specified discharge, minimum specific momentum occurs at -----

## Match the following

A

6. Specific force
7. Hydraulic jump
8. Sliding factor
9. Shear friction factor
10. Froude Number

B

- Sequent depth  
Force per unit weight of water

$$\frac{\sum(w-u)f+AxS}{H}$$

$$\frac{V_1}{\sqrt{gD_1}}$$

$$\frac{\sum H}{\sum w-u}$$

Alternate depth

Critical depth

(10x1=10)

## II Answer any ten of the following

1. What are the components of a farm pond- explain
2. The peak rate of runoff expected from the catchment area is  $4\text{m}^3/\text{s}$ . Assuming no temporary storage, find length of surplus weir, if the depth of flow over is not to exceed 0.75 m.
3. Write short note on anti – seep collars
4. How overturning of the structure take place ? What is the precaution to be taken against overturning?
5. Write short note on the various parts of straight drop spillway.
6. What is the difference between sequent depth and alternate depth ?
7. If flow through a triangular channel is  $2.83\text{ m}^3/\text{s}$ , then calculate depth of flow, side slopes is 1:1
8. Draw specific energy diagram for open channel flow, for a given discharge and mark alternate depths on it.
9. What are the important points to be considered while selecting site for a farm pond?
10. What are the forces acting on a gravity dam?
11. Differentiate between uniform and non uniform state of flow conditions
12. Where we use drop inlet spillway? Explain.

(10x3=30)

## III Write short essays on any six of the following

1. What are the structural parts of a drop spillway? Explain structural design procedure
2. Write short note on classification of open channel flow.
3. A discharge of  $16\text{ m}^3/\text{s}$  flows with a depth of 2m in a rectangular channel 4m wide. At a downstream section, the width is reduced to 3.5m and the channel bed is raised by 0.2m. Analyse the change in water surface elevation.
4. How can you calculate the free flow capacity of drop spillways
5. Determine the capacity of a 762 mm diameter corrugated culvert 18.29 m long with a square edged entrance. Elevation of the inlet invert is 127.92 m and elevation of the outlet invert is 127.71 m. Head water elevation is 129.54 m and tail water elevation is 126.80 m.
6. Describe various types of hydraulic jump?
7. What are the forces acting on the head wall of a straight drop spillway. How it is designed against these forces.
8. Describe the criterion for critical state of flow.

(6x5=30)

## IV Answer any one of the following

1. Design a straight drop structure for gully control for the following conditions  
 $Q = 3\text{ m}^3/\text{s}$   
 $H = 2\text{ m}$   
Width available at site = 2.5 m  
Unit wt. of brick masonry =  $1900\text{ Kg}/\text{m}^3$   
Angle of internal friction of soil =  $25^\circ$   
Cohesion resistance of the soil =  $500\text{ Kg}/\text{m}^2$   
Foundation material is firm clay with  $C_w = 2.3$
2. Explain the design procedure of chute spillway

(1x10=10)

x — x — x — x