KERALA AGRICULTURAL UNIVERSITY

B.Tech (Agrl.Engg) 2010 Admission

VIth Semester Final Examination- June -2013

Cat. No: Lwre.3206 **Marks: 80**

Title: Soil and water conservation structures (2+1) **Time: 3 hours**

I. **Fill up the blanks** **(10 x 1 = 10)**

1. Vertical distance between designed water elevation and the elevation of embankment top is called as _____
2. Embankment type farm ponds are generally constructed across the _____
3. Homogenous type earthen dam is made up of _____
4. Chute spillways are generally used at drops of ____ m
5. Semi permanent check dams are constructed with ____
6. In an embankment, the core is made of a material which is _____
7. For critical state of flow, Froude number is equal to ____
8. The hydraulic jump is said to be a strong jump when the Froude Number is greater than __
9. Drop inlet spillways are generally used for removal of excess water from a reservoir
10. Open channel flow is said to be unsteady if the discharge of flow changes with time

II. **Write short notes/answers on ANY TEN of the following** **(10 x 3=30)**

1. Differentiate steady and unsteady flow
2. Explain in brief about the aeration of weirs
3. Write short notes on the significance of environmental impact assessment
4. Classify the soil erosion controls structures and sketch and show different parts of these structures
5. What are the advantages and disadvantages of straight drop spillway
6. Explain the momentum principle in open channel flow conditions
7. What are the variable those affect equivalent fluid pressure on a drop structure and how to determine that?
8. Differentiate the functional uses of farm ponds and percolation ponds.
9. Write notes on brushwood check dam with their functions
10. Explain the functions of headwall, wingwall and apron
11. Discuss the types of checkdams
12. Write short notes on seepage analysis

III. **Write short notes on ANY SIX of the following** **(6 x 5=30)**

1. What do you mean by hydraulic jump? Discuss the different types of hydraulic jumps and its application
2. Explain the different types of farm ponds ? Explain the design of farm pond in details.
3. Determine the size of concrete pipe needed in a drop inlet spillway for a peak discharge of 3 cumec and a total head of 3.5 m. Determine the slope to be given to the pipe for the pipe to flow full if length of pipe is 15m, entrance loss coefficient 0.5 and friction loss coefficient 0.03.
4. What is a percolation pond? Give the design procedure of percolation pond
5. Explain triangular load diagram for various flow conditions in hydraulic structures.
6. Discuss in detail about the design criteria of earthen dams
7. Discuss in detail about the various components of chute spillway
8. Discuss briefly about the various types of small earth embankments

IV. **Write essay on ANY ONE of the following** (1 x 10=10)

1. A straight drop spillway is proposed to be constructed in a gully for controlling the erosion. The bed slope of gully is 5 %. The spillway is to be equipped with rectangular weir with crest height of 2.5m above the gully bed. Calculate
   a. Length of weir
   b. Free board required for handling the peak discharge rate of 8 cumec such that the specific energy is limited to 1.25m
   c. The actual head acting on the weir, when cross sectional area of water flow in the gully at 4.5 m distance towards u/s is 7.5 m^2
   d. Maximum discharge handled by the weir if wave action is taken into consideration

2. Discuss at length the different parts of a drop spillway with a figure and the functional use, advantages and disadvantages of a chute spillway