KERALA AGRICULTURAL UNIVERSITY

B.Tech (Agrl.Engg) 2012 Admission

VIth Semester Final Examination- June/July 2015

Cat. No: Lwre.3206 Marks: 80

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

I) Fill up the blanks with suitable words. 10x1=10

1. Flow in an open channel is said to be steady if the depth of flow does not change with _____.
2. At critical state of flow in an open channel, the specific energy is _____.
3. The hydraulic jump is said to be a weak jump when the Froude number remains within _____ to _____.
4. The top seepage line is termed as _____.
5. In a pond, the function of mechanical spillway is to remove _____ from the pond.
6. The core is provided in the _____ of earthen embankment for seepage control.
7. _____ spillways are relatively easy to construct.
8. Drop inlet spillway is efficient for controlling relative high heads usually above_____m.
9. _____ design of soil conservation structures consists of estimating peak rate and volume of runoff expected to be handled.
10. Berms are generally provided at the _____ side of an embankment.

II) Write answers on ANY TEN 10x3=30

(Take suitable assumptions wherever necessary)

1. Name different soil erosion control structures and write their functional requirements.
2. Give the design procedure of a percolation pond.
3. Differentiate between a dam and reservoir and explain different terms associated with them.
4. Define different flow types, state of flow and regimes of flow in case of open channel.
5. What is hydraulic jump? Explain hydraulic jump as energy dissipater considering jump position in design of a stilling basin.
6. Explain the energy principle in open channel flow conditions.
7. A gully is 1.8m deep and 3m wide. The longitudinal slope of gully is 0.005. The peak flow passing through it is 0.5cumec. Calculate the dimensions and spacing of drop structure.
8. What is uplift pressure and how to estimate it in any soil conservation structure?
9. Explain different temporary check dams.
10. Draw drop, chute and drop inlet spillway structures, show different

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components and write where those will be generally constructed in a gully.

11. What is a diversion structure? Give the design procedure of it.
12. Classify the earthen embankments. Show different components of earthen dam with a diagram and write their functions in brief.

III) Answer ANY SIX of the followings. 6x5=30
(Take suitable assumptions wherever necessary)

1. Write down the different permanent gully control structures. Draw a drop structure and show the components of it. Explain the structural design of the drop structure.
2. Design an embankment to store 15m of water in a silty loam soil.
3. Define specific force and derive the criterion for a critical state of flow in open channel.
4. Describe the procedure to check the stability of a structure against sliding, piping and compression.
5. Show the different parts of a chute spillway with a figure and write down its functional use, advantages and disadvantages.
6. Find the specific energy of flowing water through a rectangular channel of width 5m when the discharge is 10 cumec and depth of water is 3m.
7. Classify the different check dams and explain any two in details.
8. Explain the design of a SAF stilling basin.

IV) Answer ANY ONE (Take suitable assumptions wherever necessary) 1x10=10

1. What are the types of permanent structures used to stabilize the gullies? What are the functions of these structures? Draw a diagram (sectional view) of drop inlet spillway and show its components. Describe the hydraulic design criteria of drop inlet spillway.

2. Design the chute spillway with SAF stilling basin which is to be constructed for conveying the runoff generated from upstream area of 20ha into the gully of 4.5m width with 3m as drop considering rainfall intensity during 50 years return period as 12cm/hr for the duration equal to time of concentration, runoff coefficient as 0.35 and a straight inlet with depth of flow as 0.7m at the outlet.