



**KERALA AGRICULTURAL UNIVERSITY**  
**B.Tech.(Agri. Engg.) 2016 Admission**  
**III Semester Final Examination-January-2018**

Lwre.2104

**Watershed Hydrology (2+1)**

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

**(10x1=10)**

**I**

**Fill in the blanks:**

- 1 The -----method is the simplest method of determining a real average rainfall.
- 2 -----is the process of water penetrating from the ground surface into the soil
- 3 In Phillip's infiltration equation ----- is the function of the soil suction potential.
- 4 The total volume of flow under the annual hydrograph is the -----yield.
- 5 -----is the ratio of the peak rate of direct runoff to the average intensity of rainfall in a storm.
- 6 -----are lines of equal time of flow to the outlet of watershed.
- 7 -----is the ratio of the total length of stream channels in a watershed to it's area.
- 8 Measurement of infiltration are made using a -----
- 9 A fine sprinkle of numerous water droplets of size less than 0.5 mm and intensity less than 1 mm/ hr is known as-----
- 10 The recurrence interval is also known as.-----

**II**

**Write Short notes on ANY FIVE of the following**

**(5x2=10)**

- 1 Classify the rainfall on the basis of intensity.
- 2 Describe the orographic precipitation.
- 3 What do you mean by coefficient of variation? Write it's mathematical form.
- 4 Write a short note on Intensity-Duration-Frequency relationship?
- 5 Enlist the different direct and in-direct methods of stream flow measurement.
- 6 Enlist the use and limitations of unit hydrograph.
- 7 Write a short note on Gumbel's distribution method.

**III**

**Answer ANY FIVE of the following**

**(: PTO**

- 1 A small tube with a cross sectional area of  $40 \text{ cm}^2$  is filled with soil and laid horizontally. The open end of the tube is saturated and after 15 minutes  $100 \text{ cm}^3$  of water have infiltrated into the tube. If the saturated hydraulic conductivity of the soil is  $0.4 \text{ cm/hr}$ . Determine how much infiltration would have taken place in 30 minutes if the soil column had initially been placed upright with it's upper surface saturated.
- 2 Define the term Hydrology. Write it's applications in short?
- 3 Estimate the maximum flood flow for the following catchment by using an appropriate empirical formula. Assume necessary data if required.
  1.  $A_1 = 40.5 \text{ km}^2$  for Western Ghat area, Maharashtra.
  2.  $A_2 = 40.5 \text{ km}^2$  for Gangetic plain
  3.  $A_3 = 40.5 \text{ km}^2$  for Curvery delta, Tamil Nadu
  4. What is the peak discharge for  $40.5 \text{ km}^2$  by the maximum flood experience? (Dickens coefficient = 6.0, Ryves coefficient = 6.8.)
- 4 Write in brief about the guidelines adopted by CWC, India for selecting design floods.
- 5 What are the different measures of flood control? Explain any one structural method of flood control.
- 6 Write down the different types of climatic regions along with their characteristics?
- 7 What are the factors affecting runoff.

IV

Write an essay on ANY ONE of the following

(1x10=10)

1. Rainfall of magnitude 3.8 cm and 2.8 cm occurring on two consecutive 4- hr duration on a catchment of area 27 km<sup>2</sup> produced the following hydrograph of flow at the outlet of the catchment. Estimate the rainfall excess and  $\Phi$  -index. Assume necessary data if required.

Time from start of rainfall(hr)	-6	0	6	12	18	24	30	36	42	48	54	60	66
Observed flow(m <sup>3</sup> /sec)	6	5	13	26	21	16	12	9	7	5	5	4.5	45

2. Write in details about the various effects and types of drought. Explain in detail on drought management strategies.

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