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10CV55

Fifth Semester B.E. Degree Examination, Dec.2015/Jan.2016
Hydrology and Irrigation Engineering

Time: 3 hrs. Max. Marks:100

Note: 1. ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***
2. Missing data may suitably be assumed.

PART – A

1 a. What do you understand by the term hydrology? Explain with neat sketch, Horton's engineering representation of "Hydrologic cycle". **(08 Marks)**

b. What is Precipitation? List the different forms and types of precipitation. **(07 Marks)**

c. Determine the optimum number of rain gauges in a catchment area from the following data :
i) No. of existing rain gauges = 08.
ii) Mean Annual rainfall at the gauges are = 1000 , 950 , 900 , 850 , 800 , 700 , 600 and 400mm.
iii) Permissible error = 6%. **(05 Marks)**

2 a. What is Evaporation? What are the factors that affect evaporation? How would you measure evaporation? **(06 Marks)**

b. What are the factors that affect infiltration? Explain with sketch, the measurement of infiltration by double ring infiltrometer. **(09 Marks)**

c. The rate of rainfall for half an hour period of 3 – hour storm are 1.6, 3.6, 5.0, 2.8, 2.2 and 1.0cm/hr. The corresponding surface runoff is estimated to 3.6cm. Determine ϕ and W – index. **(05 Marks)**

3 a. Define hydrograph. Describe the various components of a simple hydrograph resulted from a storm rainfall. **(08 Marks)**

b. Explain briefly the various factors affecting flood hydrograph. **(08 Marks)**

c. Define unit hydrograph. List the assumptions made in deriving the unit hydrograph. **(04 Marks)**

4 a. Define Flood. Explain the various empirical formulae for estimating peak flood for catchments (any four). **(10 Marks)**

b. Define flood routing. What are the uses of flood routing? Write down the Muskingum routing equation and the expressions for the routing coefficients C_0, C_1, C_2. **(10 Marks)**

PART – B

5 a. What is Irrigation? Discuss in brief the benefits and ill effects of irrigation. **(12 Marks)**

b. Explain any four advantages and disadvantages of well irrigation over canal irrigation system. **(08 Marks)**

6 a. Give the list of common Indian soils. **(06 Marks)**

b. Explain the soil moisture and soil moisture contents in different zones, with neat sketch. **(08 Marks)**

c. Determine the frequency of irrigation from the following data :
   i) Field capacity of soil = 35%.
   ii) Permanent silting point = 18%.
   iii) Density of soil = 1.5g/cm^3
   iv) Root zone depth = 700mm.
   v) Daily consumptive use of water = 17mm. **(06 Marks)**

7 a. Define Duty, Delta and Base period. Derive the relationship between them. **(06 Marks)**

b. Explain consumptive use of water. List the factors affecting consumptive use of water. **(09 Marks)**

c. A channel is to be designed for irrigating 5000 hectares in Kharif crop and 4000 hectares in Rabi crops. The water required for Kharif and Rabi are 600mm and 250mm respectively. The Kor period for Kharif is 3 weeks and for Rabi is 4 weeks. Determine the discharge of the channel for which it is to be designed. **(05 Marks)**

8 a. What is Canal? Explain various considerations for alignment of a canal, with a sketch. **(12 Marks)**

b. Design an irrigation channel in alluvial soil according to Lacey's silt theory for the given data :
   i) Full supply discharge = 15 cumec.
   ii) Mean diameter of the silt particles = 0.33mm.
   iii) Channel side slope = ½ H : 1V.
   Find also the bed slope of the channel. **(08 Marks)**

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