10CV55

Fifth Semester B.E. Degree Examination, Aug./Sept.2020
Hydrology and Irrigation Engineering

Time: 3 hrs.
Max. Marks:100

Note: *Answer any FIVE full questions, selecting atleast TWO questions from each part.*

PART – A

1   a. With a neat sketch, explain the working of Syphon self recording Raingauge.   **(05 Marks)**
    b. Explain double mass curve method for checking the consistence of Rainfall data.   **(05 Marks)**
    c. The rainfall measured at Five Raingauge stations are 89, 54,45, 41 and 55cm. If the error in the measurement of rainfall not to exceed 10%. Calculate i)   Optimum number of gauges ii)   Additional gauges required.   **(10 Marks)**

2   a. Explain with a neat sketch, measurement of evaporation using ISI class A Pan.   **(05 Marks)**
    b. For the data given in the Table below, determine the evapotranspiration using Blaney Criddle method. The crop factor can be taken as 0.8.   **(05 Marks)**

Month	Nov	Dec	Jan	Feb
Mean monthly Temp (^{0}C)	18	15	13.5	14.5
Mean monthly % of day time hour of the year	7.20	7.15	7.30	7.10

    c. Explain factors affecting infiltration.   **(10 Marks)**

3   a. Define Unit hydrograph. Explain any two methods of base flow separation.   **(05 Marks)**
    b. Given below are the observed flows from a storm of 4 – hr duration in a stream having drainage area of 1600 km^2. Derive 4 – hr unit hydrograph ordinates. Assume a constant base flow of 100m^3/s.   **(05 Marks)**

Time (day)	1	2	3	4	5	6	7	8	9	10	11	12
Flow m^3/s	100	1000	830	630	520	420	350	280	218	180	155	100

    c. Given the ordinates of a 4-hr unit hydrograph. Derive 12-hr unit hydrograph ordinates using S – Curve method.   **(10 Marks)**

Time (hr)	0	4	8	12	16	20	24	28	32	36	40	44
4-hr UHO	0	20	80	130	150	130	90	52	27	15	5	0

4   a. Define Flood. Mention factors affecting flood.   **(05 Marks)**
    b. Explain any three Empirical formulae used to estimate the flood.   **(05 Marks)**
    c. In a river, the following inflow hydrograph was recorded. Route the hydrograph in the reach, when K = 10 hrs , X = 0.25 , Initial outflow = 10m^3/s.   **(10 Marks)**

Time (hr)	0	6	12	18	24	30	36	42	48	54	60	66
In flow	10	25	50	75	80	74	65	50	40	30	20	10

PART – B

5   a. Define Irrigation and mention the benefits of irrigation.   **(05 Marks)**
    b. Explain the term Infiltration galleries.   **(05 Marks)**
    c. Explain the following systems of Irrigation briefly : Gravity irrigation , Lift irrigation , Tube well irrigation.   **(10 Marks)**

6 a. Mention classification of Indian Soils. **(05 Marks)**
   b. Explain with a neat sketch, the presence of Soil – moisture in different zones. **(05 Marks)**
   c. Determine the frequency of Irrigation using the following data :
   Field capacity = 27% ;   Permanent wilting point = 13% ;
   Density of soil = 1.5 g/cm^3 ;   Depth of Root zone = 1.25 mt ;
   Daily consumptive use of water = 20mm. Readily available moisture in soil 80% of available moisture content. **(10 Marks)**

7 a. Define Duty , Delta and Base period and derive the relation between them. **(05 Marks)**
   b. Define any five Irrigation efficiencies. **(05 Marks)**
   c. A main canal taking off from a storage reservoir has to irrigate a land with following crops. Assuming 25% losses in the canal system and giving an allowance of 20% for peak demand, calculate the capacity of the main canal and volume of water required for each crop.

Crop	Crop period (days)	Area to be Irrigated (Ha)	Duty Ha/Cumec
Sugar can	365	1250	850
Paddy	120	1500	850
Wheat	120	2500	1700

(10 Marks)

8 a. List the different types of Canal. **(05 Marks)**
   b. Mention the stepwise procedure to design canal using Kenedy's theory. **(05 Marks)**
   c. Design a canal in alluvial soil by Lacey's theory for the data given below :
   Full supply discharge = 10 cumec.
   Silt factor = 1.0.
   Canal side slope ½ H : 1 V
   Find also the bed slope of the canal. **(10 Marks)**

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