

WATER RESOURCES ENGINEERING – I

(Civil Engineering)

Time: 3 hours

Max Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 (a) What are the various types of precipitation?
(b) Explain natural syphon type rain gauge.
- 2 (a) What is meant by evaporation and list the various factors which affect evaporation?
(b) Explain water-budget method.
- 3 (a) Explain area-velocity method of discharge measurement.
(b) Explain ultrasonic method of stream flow measurement.
- 4 (a) Define and differentiate D-h UH and IUH.
(b) Given below are the ordinates of a 6-h unit hydrograph for a catchment. Calculate the ordinates of the DRH due to excess of rainfall 3.5 cm occurred in 6 hrs.

Col(1)	0	3	6	9	12	15	18	24	30	36	42	48	54	60	69
Col(2)	0	25	50	85	125	160	185	160	110	60	36	25	16	8	0

Here Col(1) indicates Time(h) And Col (2) indicates U.H ordinates in m^3/s .

- 5 (a) Explain the terms well losses, specific capacity, specific drawdown and well efficiency.
(b) Ground water flows through an aquifer with a cross-sectional area of $1.0 \times 10^4 \text{ m}^2$ and a length of 1500 m. Hydraulic heads are 300 m and 250 m at the groundwater entry and exit points in the aquifer respectively. Groundwater discharges into a stream at the rate of $1500 \text{ m}^3/\text{day}$. What is the hydraulic conductivity of the aquifer? If the porosity of the material is 0.3, what is the pore velocity of water?
- 6 (a) Do you think that the socio-economic development of an area depends on the development of agriculture? Explain.
(b) Describe the border method of irrigation. Give a sketch layout plan of the method.
- 7 (a) What do you mean by crop rotation? What is the necessity of crop rotation? Give few examples of rotation of crops.
(b) The field capacity and the permanent wilting point for a given soil are 35% and 15% respectively. Determine the storage capacity of the soil within the root zone of the soil which may be taken as 80 cm. At a given time the soil moisture in the field is 20% and a farmer applies 25 cm of water. What part of this water would be wasted? Assume porosity of soil as 40% and relative density as 2.6.
- 8 (a) What is balancing depth in a canal? Derive an expression for the same.
(b) A stable channel is to be designed for a discharge of $40 \text{ m}^3/\text{s}$ and $f = 1.0$. Calculate the dimensions of the channel using Lacey's regime equations. What would be the bed width of this channel if it is designed on the basis of Kennedy's theory? Adopt $m = 1.0$ and B/D ratio same as obtained from Lacey's equation.
