

Hydrology and Water Resources

1.Introduction

Q1. Describe recording & Non-recording type of Rain guage stations.

Q2. Discuss factors affecting Evapotranspiration.

Q3. A catchment area of 30 sq km has 1 recording gauge. During a storm the following mass curve of rain fall was recording

Time from start a Storm (hour)	0	2	4	6	8	10	12	14
Accumulated rainfall(mm)	0	6	17	57	70	81	87	90

If the volume of runoff due to storm measure is $1.2 \times 10^6 \text{ m}^3$, Estimate Φ -index of the catchment.

Q4. What is hydrology cycle? Give a brief description of different components of it.

Q5. Explain the terms:(i) Φ -index (ii) W-index)(iii) W_{min} index

Q6. Describe various methods of Computation of average rainfall over a basin .

Q7. Explain Cyclonic Convective & orographic precipitation.

Q8. Explain how you will find out missing rainfall data.

Q9. In a water shed the average annual precipitation for 4 sub basin were recorded as follows: 100.84, 112.27, 84.84 & 73.406 cm. The areas of sub basin were 93264.3, 71243.5, 108808.2 & 168393.8 ha. Calculate the average precipitation of the total watershed using Thiessen polygon Method.

Q10. The excess rainfall (Direct runoff) produced from a 10 cm rainfall of a storm is 6 cm. The rainfall each hour of the storm recorded by rain gauge is as under. Calculate the infiltration index of the storm.

Time(Hour)	1	2	3	4	5	6	7	8
Incremental Rainfall(cm)	0.1	1.0	1.4	2.6	2.0	1.5	1.0	0.4

2. Hyetograph & Hydrograph analysis

Q1. What is Hyetograph? How will you constructed? Write its uses

Q2. What is Drainage basin discuss Drainage basin characteristics

Q3. Describe the various factor that affect runoff from a basin area

Q4. What is Hydrograph? Draw single peaked Hydrograph & explain its components write its uses.

Q5. Define (i) Effective Duration (ii) Basing Lag (t_p)(iii) Recession Time t_r (iv) Time of Concentration t_c

Q6. What do you understand by Unit Hydrograph? Explain clearly the basic Concept of Unit Hydrograph Theory

Q7 Write the Assumption & Limitations of Unit Hydrograph Theory.

Q8. What is S- Hydrograph how it is constructed What are its uses?

Q9. Fine the Ordinates of Storm- Hydrograph Resulting From a 3- hours storm with Rainfalls of 2.5, 6.75,4.85cm during subsequent 3-hours intervals the ordinates of a Unit Hydrograph are given in the following Table:

Time of ordinates (hours)	03	06	09	12	15	18	21	24	03	06	09	12	15	18	21	24
Unit Hydrograph (cumecs)	0	115	350	520	390	325	260	225	180	135	85	70	50	30	15	00

Assume an initial of 5mm, infiltration 2.5 mm/hr & Base flow of 16 cumecs.

Q10. The following are ordinates of 4 hour unit hydrograph. Determine the ordinates of 12hr Unit Hydrograph for the catchment by S-curve Method .

Time in hr	0	4	8	12	16	20	24	28	32	26	40
O.U.H.of 4-hours (m3/s)	0	60	110	120	150	100	90	70	50	30	00

3. GROUND WATER

Q1. Describe occurrence of ground water in unconfined and confined aquifer with sketch

Q2. Discuss types of aquifer with sketches

Q3. Define: (1) porosity (2) permeability (3) specific yield (4) specific retention (5) storage coefficient (6) transmissibility

Q4. Explain the Darcy's law. What are the limitations of it? Discuss its validity.

Q5. What is well hydraulics? What are its assumptions made in Dupuit-thiem theory to analysis the radial flow of ground water towards a well?

Q6. Derive an expression for discharge from a well fully penetrating a confined aquifer

Q7. Explain the method of determining the coefficient of transmissibility of a (1) Confined aquifer (2) Un confined aquifer

Q8. Write short notes on (1) well losses (2) yield of well

4. RESERVOIR

Q1. What is meant by reservoir? List the various purposes for which reservoir is constructed to serve them.

Q2. Differentiate between single purpose and multipurpose reservoir

Q3. Describe in brief various investigations required for reservoir planning .

Q4. What are factors will you keep in mind while selecting a suitable site for reservoir.

Q5. Explain the terms (1) normal pool level (2) minimum pool level (3) maximum pool level

Q6. Discuss with sketch the various storage zones of the reservoir.

Q7. Explain the terms (1) the reservoir yield (2) safe yield (3) secondary yield (4) average yield

Q8. Define the terms (1) density currents (2) trape efficiency (3) useful life of reservoir

5. INTRODUCTION TO DAMS

- Q1. Describe the various types of dams based on the function served
- Q2. What are the different types of dams based on (1) hydraulic design (2) material of construction (3) rigidity?
- Q3. Discuss in brief advantages and disadvantages of various types of dams
- Q4. What factors affects the selection of type of dam? Discuss them briefly
- Q5. What is spillway? What are its functions?
- Q6. Discuss the various types of energy dissipation devices used below the spillway.

6. HYDROELECTRIC POWER

Q1. Explain the following hydro plants with sketches (1) low head plants (2) medium head plants (3) high head plants

Q2. Differentiate between

- (1) Runoff river plant and storage plant
- (2) Low head plant and high head plant
- (3) Pumped storage plant and tidal plants
- (4) Pen stocks and turbines
- (5) Draft tube and tail race

7. FLOOD MANAGEMENT

Q1. What is flood? What is flood management?

Q2. What are the various causes of flood?

Q3. Write short notes on (1) levees (2) flood walls (3) flood ways (4) channel improvement

Q4. Differentiate between

- (1) Flood walls and flood ways
- (2) Flood proofing and flood forecasting
- (3) Direct damage and indirect damage
- (4) Tangible losses and intangible losses

8. HYDROLOGIC ANALYSIS

Q1. Define the terms

- (1) Design flood
- (2) Ordinary flood
- (3) Standard project flood (SPF)
- (4) Maximum probable flood (MPF)

Q2. What are the methods of estimating flood?

Q3. Explain the terms

- (1) Chance flood
- (2) Frequency or probability of flood
- (3) Return period or recurrence interval
- (4) Probability of occurrence
- (5) Probability of non-occurrence
- (6) Probability of non- occurrence in n successive years
- (7) Probability of occurrence at least once in n successive years

Q4. Discuss theoretical probability distribution Gumbel's method

Q5. Describe the flood routing with sketch.

Q6. Discuss reservoir routing in detail.

Q7. Discuss Muskingum's Method in detail.

Q8. Explain different methods of estimating discharge for designing storm water drain.

Q9. Explain different factors affecting discharge of storm water drain.

9. DROUGHT MANAGEMENT AND WATER HARVESTING

Q1. Define drought

Q2. What are the various types of drought?

Q3. Discuss various causes of drought.

Q4. What is augmentation of water? Discuss various measure adopted for augmentation of water

Q5. What is conservation of water. Discuss various water conservation measures.

Q6. What are the various rain water harvesting techniques? Discuss each method in detail

Q7. Discuss the discharge to the ground water method of rain water harvesting.