

UNIT I - PRECIPITATION AND ABSTRACTIONS

1. Define Hydrology.

Hydrology means science of water. It is the science that deals with occurrence, distribution and movement of water is on, above and beneath the earth.

2. Enlist the various phases of a hydrological cycle?

- i) Precipitation
- ii) Infiltration
- iv) Transpiration
- v) Runoff
- iii) Evaporation

3. Define Precipitation?

Any form of moisture reaching the earth surface is called precipitation. The usual forms of precipitation are rainfall, snow, hail, sleet, frost, dew etc.

4. Define infiltration?

It is defined as the process by which water enters the sub-surface strata of the earth. The infiltrated water first meet the soil moisture deficiency and there after moves vertically downwards to reach the ground water table.

5. Define evaporation?

It is the process by which water from liquid state passes into vapour state under the action of sunrays.

6. Define transpiration?

The process by which water passes from liquid to vapour through plant metabolism is termed as transpiration.

7. Define runoff?

It is the precipitation excess after meeting the demands of evaporation, transpiration and infiltration

8. Enlist the various forms of precipitation?

The usual forms of precipitation are,

- i) Rainfall

- ii) Drizzle
- v) Glaze
- vi) Snow
- iii) Hail
- vii) Frost

9. Write short notes on evaporimeters?

It is a device used to measure evaporation. These are water containing chambers which are exposed to atmosphere and the loss of water by evaporation is measured at regular intervals.

10. Define pan coefficient?

Pan coefficient = Lake evaporation / Pan Evaporation

UNIT II – RUNOFF

1. Define runoff?

The portion of the precipitation which appears in the surface either perennial or intermittent in nature is called runoff. The unit of runoff is cumecs.

2. Write short notes on drainage density?

Drainage density = Length of the channel / Area of the basin

3. Define hydrograph?

It is a graph drawn between discharges against time. It consists of direct runoff and base flow.

4. Define unit hydrograph?

It is defined as the hydrograph of direct runoff resulting from an isolated rainfall of unit duration occurring uniformly over the basin and produces unit runoff.

5. What are the methods to determine the unit hydrograph?

Unit hydrograph developed by the following two methods,

- i) Method of Super position
- ii) S-curve technique

6. Write short notes on method of super position?

If a D-h unit hydrograph is available and it is easy to develop hydrographs of nD-h where n is an integer. It is easily accomplished by superimposing n-unit hydrograph with each separated from the previous on D-h.

7. Define S-curve technique?

It is a curve obtained from the summation of infinite series of D-h unit hydrograph spaced by D-h apart. A smooth curve is obtained resulting to S shape curve called S-curve hydrograph.

8. Define instantaneous unit hydrograph?

If the duration of effective rainfall approaches zero, the unit hydrograph may be called as instantaneous unit hydrograph

9. Differentiate stream density and drainage density?

The stream density of a basin is expressed as the no.of streams per sq.km. Drainage density is expressed as the total length of all stream channels per unit area of the basin.

10. Define concentration time?

The time required for the falling rain at the most distant point in a drainage area to reach stream outlet is called concentration time.

UNIT III – FLOOD AND DROUGHT

1. 1. Define design flood?

It is a flood discharge adopted for the design of structure after careful consideration of economic and hydrologic factors.

2. Define MPF?

It is defined as the flood that may be expected from the most severe combination of critical meteorological and hydrological conditions that are reasonably possible in the region. This is very large flood and it is very rarely used in design except for reservoir spillways.

3. Define flood?

Any flow which is relatively high and which overtops natural or artificial banks in any reach of the river is called flood. Floods are produced when the capacity of the river channel is inadequate to carry off the abnormal quantity of water arising from heavy rainfall.

4. . State any two formulae to calculate flood discharge?

i) Dickens formula, $Q = CA$

ii) Ryves formula, $Q = CA$

where Q = Max.flood discharge

A = Catchment area

C = Dickens constant varies from 6 to 30

C = Ryves constant

5. What are all the methods available to determine the flood peak?.

- * Physical indications of past flood
- * Empirical formulae and curves
- * Concentration method
- * Overland flow hydrograph
- * Rational method
- * Unit hydrograph method
- * Frequency analysis

6. Define return period?

It represents the average no. of years within which a given event will be equaled or exceeded.

7. Define prism storage and wedge storage?

Prism storage is proportional to the outflow where as wedge storage is the difference between inflow and outflow.

8. Write short notes on flood control measure?

* By confining the flow between high banks by constructing levees, dykes or flood walls.

* By channel improvement by cutting, straightening or deepening and following River training works.

* By diversion of a portion of a flood through bypasses or flood ways

* By providing a temporary storage of the flood peaks by constructing upstream reservoirs and retarding basins.

9. Write short notes on flood forecast?

The flood forecasts are issued on the basis of the analysis of weather charts and indicate the likelihood of heavy rainfall over the specified areas with the next 24 to 48 hours. All India forecasts are prepared every day at Poona.

10. Define Recurrence interval of flood

Recurrence interval or Return period, T , is defined as the number of years in which a flood can be expected once or a flood of given magnitude will be equaled or exceeded only once. Probability P and return period of flood of T_r are related as $P=1/T$.

UNIT IV – FLOOD AND DROUGHT

1. Differentiate b/w single and multipurpose reservoir.

A single purpose reservoir is for a single purpose. e.g conservation or flood control. They are constructed to store water during the period of high flow for use during periods of drought when the demand is more due to depletion of natural water storage. A multipurpose reservoir is a man-made lake which is managed for multiple purposes like water supply, flood control, soil erosion, environmental, management, hydroelectric power generation, navigation, recreation and Irrigation.

2. What are the different types of single purpose reservoirs?

Depending upon the arrangement for releasing stored water, single purpose flood control reservoir may be further sub-classified as,

- (i) Retarding reservoir
- (ii) Detention reservoirs.

3. Write short notes on reservoir sedimentation.

Sediment load carried by a flow will drop out if the transport capacity of flow is diminished. In general, the capacity of a given flow decreases with a reduction of its velocity. As a river enters the reservoir, the cross-sectional area of flow is increased, the average velocity is decreased and sediment load starts dropping out.

4. What is spillway?

Spillway is a structure constructed at a dam site for disposing the surplus water from upstream to downstream.

5. Define dead Storage.

It is the total storage below the invert level of the lowest discharge outlet from the reservoir. It may be available to contain sedimentation, provided the sediment does not adversely affect the lowest discharge.

6. What is the Effect of sedimentation in planning of reservoirs?

It is important to note that storage reservoirs built across rivers and streams lose their capacity on account of deposition of sediment. This deposition which takes place progressively in time reduces the active capacity of the reservoir to provide the outputs of water through passage of time. Accumulation of sediment at or near the dam may interfere with the future functioning of water intakes and hence affects decisions regarding location and height of various outlets.

7. Define life of reservoir.

The term 'life of reservoir' as loosely used denotes the period during which whole or a specified fraction of its total or active capacity is lost. In calculating this life, the progressive changes in trap efficiency towards the end of the period are commonly not considered.

8. State diff types of spillways.

1. Straight drop spillway
2. Ogee spillway
3. Trough spillway
4. Side channel spillway
5. Shaft spillway
6. Syphon spillway

9. List out the various zones of storage in a reservoir.

Reservoir storage is divided into four zones. These include, from top to bottom, the flood-control zone, conservation zone, buffer zone and inactive zone. The conservation and buffer pools, together, constitute the reservoir's active storage. It should be ensured that the flood-control zone is always kept vacant, i.e., the volume of water in the reservoir cannot exceed the top of the conservation pool.

10. What are the preferable combinations for a multipurpose reservoir?

- (i) Irrigation and power
- (ii) Irrigation, power and navigation
- (iii) Irrigation, power and water supply
- (iv) Recreation, fisheries and wild life
- (v) Flood control and water supply
- (vi) Power and water supply
- (vii) Flood control, irrigation, power and water supply

UNIT V – GROUNDWATER AND MANAGEMENT

1. Define Transmissivity?

It is the flow capacity of an aquifer per unit width under unit hydraulic gradient and is equal to the product of permeability times the saturated thickness of the aquifer.

2. Enlist the formations that serve as good aquifers?

- * Unconsolidated gravels, sands, alluvium
- * Lake sediments and glacial deposits
- * Lime stones with cavities
- * Granites and marbles with fissures and cracks
- * slates

3. What are all the assumptions made in derivation of Dupuits equations?

- * Stabilized draw down
- * The aquifer is homogeneous, isotropic, of infinite areal extent and of constant thickness
- * Complete penetration of the well with 100% efficiency
- * Flow lines are radial and horizontal and the flow is laminar

4. Define Aquifer.

An aquifer is a saturated formation of earth materials which not only stores water but yields sufficient quantity of water.

5. Define aquitard.

It is a formation through which only seepage is possible and thus the yield is insignificant compared to an aquifer.

6. Define aquiclude.

It is a geological formation which is neither porous nor permeable. There are no interconnected openings and hence it cannot transmit water.

7. Define confined and unconfined aquifer?

Confined aquifer - It is an aquifer which is confined between two impervious beds such as aquicludes or aquifuges. Recharge of this aquifer takes place only in the area where it is exposed to the ground surface.

Unconfined aquifer - It is an aquifer in which there exists a free water surface. Recharge of this aquifer takes place through infiltration..

8. Define porosity?

The amount of pore space per unit volume of the aquifer is called porosity.

9. Define specific yield?

The actual volume of water that can be extracted by the force of gravity from a unit volume of aquifer is called Specific yield

10. Define specific capacity.

The discharge per unit draw down is known as specific capacity of a well.