1. **Definition of Irrigation**
- **Definition**: This artificial application of water to the land in accordance with the crop requirement is called as Irrigation.
2. **Q. State any four advantages of irrigation**
- **Protection from famine:** By giving water and fulfilling requirements of people during scarcity period and thus protect them from famine.
- **Domestic water supply**: Irrigation helps in augmenting the water supply of town, where water is available with great difficulty.
- **In-land navigation**: If large irrigation canals are designed then it can also be used for navigation purpose.
- **Revenue generation**: Due to direct taxes, revenue returns are sometimes high which helps in development of country.
3. **Q.Define Hydrology**.
- It is the science which deals with the occurrence distribution and circulation of water on earth.
4. **Q. Define Rainfall**.
- **Definition**: Rainfall is depth in mm or cm of water that would stand on the surface of earth if it is not lost any manner like evaporation, absorption etc.
5. **Q. Define run-off**.
- The amount of water which flows over the surface of the earth after considering all losses is called as runoff. Runoff is expressed as in 'm' OR 'cm' or mm.
6. **Q. State the factors which affect runoff.**
- **Topography::**In topography, it depends on whether it is smooth or rough. It also depends upon surface and its degree of inclination.
- **Geology::**Runoff depends upon nature of soil i.e. whether soil is pervious or impervious.
- **Surface condition::**Runoff depends on surface condition whether it is natural or cultivated, drained or undrained. If cultivation or vegetation is more runoff is less.
- **Meteorological condition:**Amount of runoff will be more if ground is saturated and in frozen condition and it is less if temperature is high.

7. **Q. Define yield::**It is the total quantity of water available from a catchment area at the outlet in period of one year. It is expressed in Mm^3 (million cubic meters) or ham is called as yield.

8. **Q. Derive relation between duty delta and base period**

   Let, D-Duty in hectares / cumec

   Δ×Delta for crop in meter

   B-Base period of crops in days

   If 1 cumec flowing for base period (B) and irrigates field of (D) hectares then total

   volume is given by,

   Volume 1x (24 x 60 x 60) B m3 = 8.64 x 10 x B cubic m

   Volume calculated from delta A cm of depth required in base period

   Volume 4 x 10° and for D hectares Volume 10 x A x D cubic m

   Equating above equations, 1 x (24 x 60 x 60) B = 104 x Δ x D

   Therefore, D=8.64B/Δ

9. **Q.State factors affecting on silting of reservoir**

- **Catchment area**: In case of fan shaped catchment the amount of deposition of finer soil fractions will be more as compared to fern shaped catchment.

- **Slope of country**: If the slope is steep more particles are deposited through runoff as velocity is more which carries silt and clay particles with it and high velocity may erode soil more.

- **Climatic condition**: It also plays important role in silting, as climatic condition like dryness, rain, heat etc. helps in production of silt.

- **Nature of surface soil**: If the soil is loose then silting is more as more particles will move along with runoff.

  10   Q. State the advantages of bandhara irrigation,

- The system of irrigation is economical

- Maximum utilization of water.

- The length of canal and distribution system is small, hence water losses are very less.

- The area to be irrigated is close to the source, hence duty and intensity of

- irrigation is high. E. Ease in construction

11 .Q Differentiate between earthen dam and gravity dam.

Earthen Dam	Gravity Dam
More seepage	:: Less seepage
Suitable on almost any foundation	:: Suitable only when foundation is of solid rock having no fissures, cracks, cavities, etc
Construction materials are stone earth containing silt, clay, and sand Construction	:: materials are stone, brick, concrete, etc.
More costly	:: Less costly
Require less skilled labour	:: Require more skilled labour
More susceptible to failure	:: Less susceptible to failure

12 Q Differentiate between weir and barrage

Weir	Barrage
Initial cost of weir is low	:: Initial cost of barrage is high.
Due to crest there is problem of silting	:: There is good control over silt entry into canal.
The control over flood is not possible.	:: There is good control over flood situation.
It is difficult to inspect and repair.	:: These provide better facilities for inspection and repair of various structures
Roadway is not possible across river	:: Road way can be provided across the river

13 Q EXPLAIN Hydrological cycle:

- The earth's water circulatory system is known as the hydrologic cycle. Hydrologic cycle is the process of transfer of moisture from the atmosphere to the earth in the form of precipitation, conveyance of the precipitated water by streams and rivers to ocean and lakes etc., and evaporation of water back to the atmosphere.

14 Q. Define Dependable yield.

- **Dependable yield**: It is the quantity of water available for a given number of years per rainfall cycle.

15. Q Explain the factors affecting Duty

- **Rainfall**: More the rainfall less will be the requirement of irrigation water, and hence more will be the duty.
- **Type of Soil:** If soil is permeable, water lost due to percolation will be more, hence duty will be less and vice-versa.
- **Method of Irrigation**: If method of irrigation is not proper i.e. in case of free flooding, wastage of water will be more and hence less duty.
- **Method of tilling (cultivation)**: If proper method of tilling is adopted there will be less wastage of water, thus duty is more.

16 Q. Define crop period and base period

- **Crop period ::**Crop period is that period in number of days that crop takes from the instant of its sowing to that of its harvest.
- **Base period ::**Base period is period in days from first watering before sowing to the last watering before harvesting. Base period is different for different crops.

17 Q. Draw a neat labeled typical section of earthen dam

- **Cut off trench ::**It is excavated below ground level under hearting zone and filled with the same material as that of hearting
- It prevent overturning of dam, it also prevent piping of dam through foundation.
- **Rock toe ::**It is constructed from rock pieces which helps to prevent slogging of toe due to seepage flow, and increases the stability of dam.
- Care should be taken that minimum depth of toe should be such that it should be equal or slightly more than d/s tailwater. It protects
- **Pitching ::**It is the layer of stones provided on upstream side which prevent erosion of casing on upstream face caused due to wave action and protect slope from sudden draw down.
- **Turfing ::**It is special type of grass planted over the downstream face of the dam, which protect downstream slope from eroding action of rain water.

18 .Q.Explain the requirement of site for percolation tank

- The bed of tank should be pervious so that the water will percolate and then join the ground water table.
- There should be sufficient number of wells and bore wells existing in the command area.
- The nallo or stream should have sufficient discharge in monsoon.
- The flanks on the both sides of the nalla should rise with steep slope.
- Construction material, labour, machinery should be available near th

19 .Q. Draw layout of lift irrigation scheme and explain in brief component parts of the sam

- **Rising main** – It is a pipe used for carrying water from well to delivery chamber
- **Inlet chamber** – It avoids the entry of silt and debris into Jack well

20.Q Draw a layout of diversion headwork

- **Head Regulator: 1.**To regulate the supply of water entering in canal. **2.**To controls the entry of silt into canal**.3.**To prevents the river flood entering the canal.
- **Divide Wall**: 1)To separate flow from scouring weir.
  2. To separate the stilling pocket from scoring sluices.
- **Fish ladder**:To provide free movement of fishes. To help the survival of the fishes.
- **Scouring Sluice:1)** To scour deposited silt and soil**.2)** To provide greater waterway for floods.**3**) To control the silt entry into canal.
  5)Weir (barrage) 6) Silt excluder 7)Marginal bunds 8) Guide bank

21.Q.Explain the various forces acting on Gravity dam with neat sketch

- **Weight of wedge water on upstream slope**
  Weight of wedge water on upstream slope acting downward towards through CG.
  P_2 = Area of cross section of water on slope x w
- **Weight of wedge on downstream slope**
  Weight of water on downstream wedge acting as CG downwards.
  P_3= Area of triangle x W acts downward

22.Q.Describe in brief working of Symons rain gauge with neat labelled sketch.

Working: A Symons Rain gauge consists of a cylindrical vessel of 127 mm internal diameter with an enlarged base of 210 mm diameter. With each raingauge, a cylindrical graduated measuring glass is also provided. Each graduation of this glass reads 0.2 mm. The reading should be read correctly up to 0.1 mm. The raingauge is set upon a concrete block. The rim of the funnel should remain at least 305 mm above the

23.Q.Define silting of reservoir.

- **Silting of reservoir**: Silting of reservoir means the deposition of silt and clay i.e. fine particles of soil in reservoir

24.Q.Enlist any four functions of spillway.

- To effectively dispose off the surplus quantity of water from upstream to downstream side of the reservoir.
- To control the discharge from reservoir.
- To avoid overtopping of surplus water.
- To protect downstream slope from scouring and erosion.

25.Q.Draw a neat sketch of Barrage with its components. Enlist any two advantages and disadvantages of it.

State two advantages of Barrage

- As compared to weir these are just like low cost flood bank.
- These are more safe than weir as afflux is less.
- It is economical as cost of protective and energy dissipation work is less.

State two disadvantages of Barrage 1.Storage capacity is less.

2. Maintenance cost is more 3. Initial cost is more