

**UNIT – I – INTRODUCTION****PART – B - 2 Marks****1. Define irrigation**

Irrigation is defined as the science of artificial application of water to the land in accordance with the crop requirements.

**2. What is irrigation engineering?**

Irrigation engineering deals with the planning, designing, and maintaining irrigation systems for the transport and distribution of water to residential and agricultural sites.

**3. What is the scope of irrigation as far as engineering aspects are concerned?**

- Irrigation engineering addresses ongoing issues of drought and national water shortages focus on developing irrigation systems that priorities water sustainability.
- Irrigation engineering may be involved in researching water recycling methods and developing new ways of minimizing water seepage and evaporation loss.

**4. What is the necessity of irrigation?**

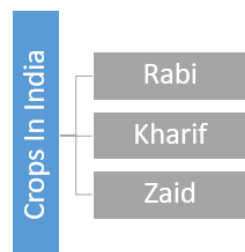
- inadequate rainfall
- increasing yield of crops
- growing perennial crops
- Uneven distribution of rainfall.

**5. What are the advantages of irrigation?**

- increase in food production
- optimum benefits
- general prosperity
- Afforestation.

**6. What are the disadvantages of irrigation?**

- over irrigation may lead to water logging
- it may reduce crop yield
- it is expensive and complex.

**7. What are the crop seasons in India?****8. Define crop ratio**

The ratio of area irrigated in Rabi season to that irrigated in Kharif season is known as crop ratio

**9. Label the term consumptive use of water.**

**Consumptive use of water** - It is the quantity of water used by the vegetation growth of a given area. It is the amount of water required by a crop for its vegetated growth to evapotranspiration and building of plant tissues plus evaporation from soils and intercepted precipitation. It is expressed in terms of depth of water.

**10. Distinguish between evaporation and consumptive use**

**Evaporation** - Movement of water to the air from sources such as the soil and water surface. it continues as long as water is available on the surface.

**Consumptive Use** - Quantity of water required by plant to meet its evaporation-transpiration & to meet metabolic activities.

**11. What are the factors affecting consumptive use/water requirement?**

- Radiation
- Temperature
- Humidity
- Rainfall
- Wind velocity
- Growth of plant
- Duration of crop
- Water holding capacity
- Infiltration rate
- Soil and Topography

**12. Define duty**

The term duty means the area of land that can be irrigated with unit volume of irrigation water. Duty represents the irrigating capacity of a unit. It is the relation the between the area of a crop irrigated and the quantity of irrigation water required during the entire period of the growth of that crop.

**13. Define delta**

It is the total depth of the water required by a crop during the entire period the crop is in the field and is denoted by the symbol  $\Delta$ .

**14. Define base period**

Base period for a crop refers to the whole period of cultivation from the time when irrigation water is first issued for preparation of the ground for planting the crop, to its last watering before harvesting.

**15. Define crop period**

Crop period is the time in days that a crop takes from the instant of its sowing to that of its harvesting.

**16. What are the factors affecting duty?**

- type of crop
- climate and seasons
- useful rainfall
- type of soil
- efficiency of cultivation method

**17. What are the methods for improving duty?**

- Suitable method of applying water to the crops should be used.
- The canal should be so aligned that the areas to be cultivated are concentrated along it.
- The source of supply should be such that it gives good quality of water.
- The rotation of crops must be practiced.
- Volumetric method of assessment should be used.

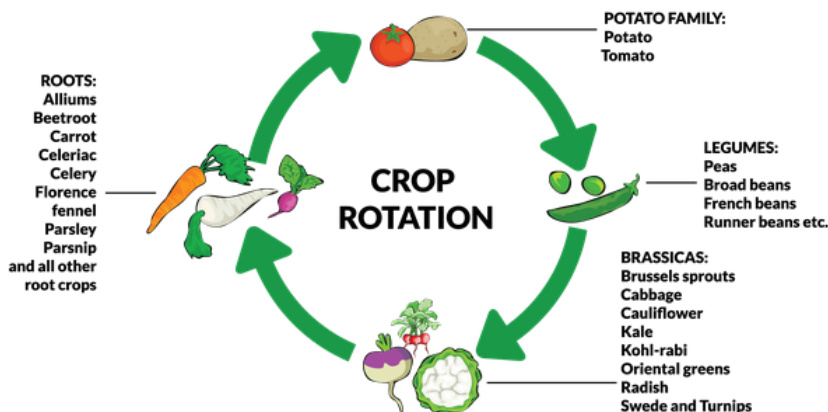
### 18. Define field capacity

Field Capacity is the amount of soil moisture or water content held in the soil after excess water has drained away and the rate of downward movement has decreased. This usually takes place 2–3 days after rain or irrigation in pervious soils of uniform structure and texture.

### 19. What is mean by crop rotation?

Crop rotation is the practice of growing a series of dissimilar or different types of crops in the same area in sequenced seasons. It is done so that the soil of farms is not used for only one set of nutrients. It helps in reducing soil erosion and increases soil fertility and crop yield.

### 20. Mention two crop rotation pattern



### 21. Define Irrigation Efficiency

Irrigation efficiency is defined as the ratio between the amount of water used to meet the consumptive use requirement of crop plus that necessary to maintain a favourable salt balance in the crop root zone to the total volume of water diverted, stored or pumped for irrigation.

### 22. List the types of Irrigation efficiency

- Water conveyance
- Water application
- Water use
- Water storage

### 23. Differentiate Water Use and Water Storage Efficiency

**Water Use Efficiency** - The term water use efficiency denotes the production of crops per unit water applied. It is expressed as the weight of crop produce per unit depth of water over a unit area. i.e., kg/cm/ha.

**Water Storage Efficiency** - The water storage efficiency evaluates the storage of water in the root zone after the irrigation in relation to the need of water prior to irrigation.

**24. Distinguish Water Conveyance and Water Application Efficiency**

**Water Conveyance Efficiency** - It is defined as the ratio between the water that reaches a farm or field and that diverted from the irrigation water source.

**Water Application Efficiency** - Application efficiency relates to the actual storage of water in the root zone to meet the crop water needs in relation to the water applied to the field.

**25. Give the relation between Duty and Delta**

$$\Delta = \frac{B \times 24 \times 60 \times 60}{D \times 10^4} = 8.64 B/D \text{ metres.}$$

B=Base Priod

$\Delta$  = Delta

D = Duty

**26. Find the delta for a crop when its duty is 864 hectares/cumec on the field. The base period of this crop is 120 days.**

In this question, B = 120 days; and D = 864 hectares/cumec

Since,  $\Delta = 864 B / D$  cm

$$= 864 \times 120 / 864$$

$$= 120 \text{ cm}$$

**PART – C - 14 Marks**

1. Explain the term duty and delta and derive their relationship.
2. Discuss the need for the irrigation projects in the Indian context.
3. Discourse in detail the planning and the development of irrigation project in the Indian context
4. Explain the merits and demerits of irrigation in the present day. Also discuss the environmental consequences of major irrigation project.
5. What are the methods of improving duty and factors affecting duty?
6. Discuss some of the important irrigation projects of our country
7. Define irrigation efficiency and give brief notes on various types of irrigation efficiency.
8. The depth of penetration along the length of border strip at 30 m interval was probed. There observed values are: 2.0,1.9,1.8,1.6 and 1.5. Compute the water distribution efficiency.
9. A stream of 135 litres per second was diverted from a canal and 100 litres per second were delivered to the field. An area of 1.6 hectares was irrigated in 8 hours. The effective depth of root zone was 1.8 m. the runoff loss in the field was 432 cu.m. The depth of water penetration varied linearly from 1.8 m at the head end of the field to 1.2 m at the tail end. Available moisture holding capacity of the soil is 20 cm per meter depth of soil. Determine the water conveyance efficiency, water application efficiency, water storage efficiency and water distribution efficiency. Irrigation was started at a moisture extraction level of 50 percent of the available moisture.