PNS SCHOOL OF ENGINEERING & TECHNOLOGY

Nishamani vihar, marshaghai, kendrapara

Internal Assessment Examination – 2023 (4th Semester)

Sub-HYDRAULICS & IRRIGATION ENGINEERING

Branch – Civil Engineering

1(a) what is irrigation engineering?

Irrigation is defined as the process supply of water to soil for raising crops. It is a science of planning and designing an efficient, low-cost, economic irrigation system tailored to fit natural conditions. It is the engineering of controlling and harnessing the various natural sources of water, by constructing dams and reservoirs, canals and headworks, and finally distributing the water to the agricultural fields. Irrigation engineering includes the study and design of works in connection with river control, drainage of waterlogged areas and generation of hydroelectric power. India is basically an agricultural country and all its resources depend on the agricultural .

(b)what is weir?

A weir, also known as a low-head dam is a small overflow-type dam commonly used to raise the level of a river or stream. Weirs have traditionally been used to create mill ponds in such places. Water flows over the top of a weir, although some weirs have sluice gates, which release water at a level below the top of the weir. The crest of an overflow spillway on a large dam is often called a weir.

(b)what is barrage?

A barrage is a type of low-head, diversion dam which consists of a number of large gates that can be opened or closed to control the amount of water passing through. This allows the structure to regulate and stabilize river water elevation upstream for use in irrigation and other systems.

(d)what is dam?

dam, structure built across a stream, a river, or an estuary to retain water. Dams are built to provide water for human consumption, for irrigating arid and semiarid lands, or for use in industrial processes.

(e)write two necessity of irrigation?

1. Less Rainfall

When the total rainfall is less than needed for the crop, artificial supply is necessary. In such case, irrigation works may be constructed at a place where more water is available, and then to convey the water to the area where there is deficiency of water. Rajasthan canal is one such example. It conveys water to the arid zones of Rajasthan, where the annual rainfall is hardly 100-200 mm.

2. Non-uniform Rainfall

The rainfall in a particular area may not be uniform over the crop period. During the early periods of the crops, rains may be there, but no rainwater may be available at the end, with the result that either the yield may be less, or the crop may die altogether. By collection of water during the excess rainfall period, water may be supplied to the crop during the period when there may be no rainfall. Most of the irrigation projects in India are based on this premise.

2(a)write down system of irrigation?

- **urface Irrigation**
- **Drip or Micro Irrigation**
- **Sprinkler Irrigation**
- **Center Pivot Irrigation**
- Sub-irrigation

Surface Irrigation Systems

Surface, or flood, irrigation systems are humans' earliest irrigation method.

A surface irrigation system floods a cultivated field with runoff, typically from a water source such as a canal. Fields are graded to slope gradually (or may even be terraced) away from the water source, so the water moves through the entire area. Crops are typically mounded in parallel beds, so the water flows easily down furrows between plant roots.

Furrow irrigation differs from flood irrigation, only that irrigation installation is achieved with the use of pipes or hoses to direct the water away from the initial source.

Drip or Micro-Irrigation Systems

In a drip or micro-irrigation system, water runs through a network of pipes laid on the ground directly next to a plant's root zone. Slowly dripping emitters or micro-sprinkler heads delivers the water. Because a drip irrigation system delivers water so precisely, they use less water than other irrigation methods.

Drip or micro-irrigation systems don't require much pressure to run. Therefore, they can be used with low water pressure. Drip irrigation systems are relatively new but are expanding quickly, especially in specialty crop production such as vegetables and

fruit. However, farmers in areas with high iron content should avoid using drip irrigation and micro-sprinkler systems due to clogging emit

Sprinkler Irrigation Systems

Sprinkler irrigation systems use a pressurized water system to apply water through sprinkler heads. Pressure is achieved from a pump.

Sprinkler irrigation systems may be fixed or portable systems. In addition, many different types of nozzles and sprinkler heads can be used. This creates flexibility in the coverage and spray pattern.

Sub-Irrigation Water Systems

Sub-irrigation is a method of delivering water to crops underneath the soil surface. Water may be applied through a series of pipes and ditches or even using drip irrigation tape buried at the time of planting.

Sub-irrigation water systems aren’t as commonly employed as other irrigation systems but are rising in popularity as they don’t waste water and are easy to use.

(b) Let,

Duty = D (hectares/cumecs)

Delta = A meters Base period = B days By definition,

One cumec of water flowing continuously for “B” days gives a depth of water “A” over an area of “D” hectares.

Volume of water @ $1m^3$sec in one day = 1x24*60*60 = 86400 m^3

Volume of water @ 1m^3sec in "B" days = 1x24*60*60 = 86400B m^3 = 86400 m^2m — (i)

As, 1 Hectare = 10000 m^2

1 m^2 = 1104 H

Then, equation **(i)** becomes,

Volume of water @ 1 m^3sec in "B" days = 86400B m^3 = 86400B*1104 H-m Volume of water @ 1 m^3sec in "B" days = 8.64 x B H-m **— (ii)**

Depth of water required by crop, A = Volume Area A = 8.64xB H-mD H A = 8.64*B D m