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Irrigation Engineering

Waightage :

ESE pre : 7-8 question.

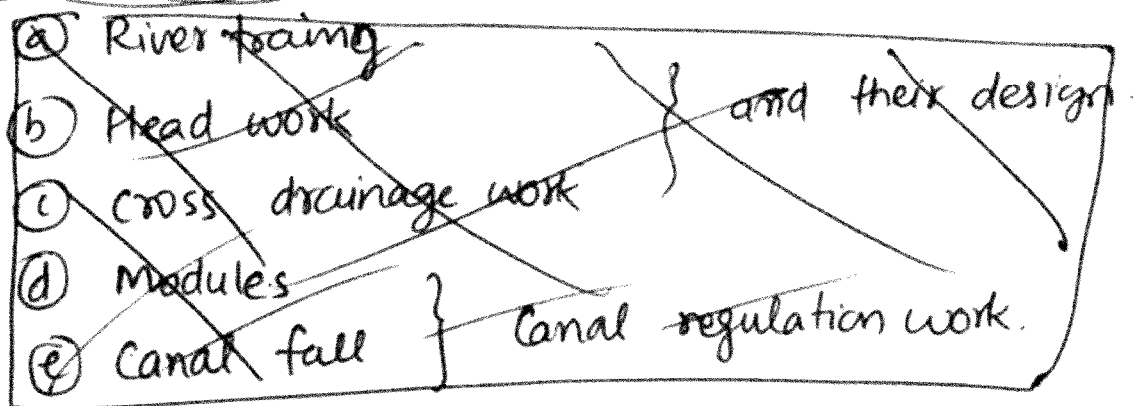
ESE Mains : 30-40 Marks.

GATE : 3-4 marks.

Content

- ① Introduction
- * ② Soil plant relationship
- ** ③ water requirement of crops
- ** ④ Design of canals.
- * ⑤ Sediment Transport.
- ⑥ Lining of canal
- ⑦ Reclamation of water logged & Saline soil.
- ⑧ Design of gravity dam
- ⑨ Theory of seepage

~~⑩ Miscellaneous~~



⑩ Miscellaneous Topics

- Canal head work
- Canal Regulation work
- Cross drainage work
- River Engineering
 - ↳ spillways

Introduction :

Irrigation:

It is the science of artificial application of water to the land in accordance with the crop requirement throughout the crop period for full fledged nourishment of plant.

Necessity :

- water is normally supplied to the plants by nature through direct rain or through the ~~for~~ flood water of rivers.
- Due to inadequate and irregular rainfall or due to uneven distribution of ^{rainfalls} crops can not be reached successfully.
- thus -----
- To overcome such problems it is necessary to provide adequate irrigation facilities to the crops.

Advantages : of irrigation :

Direct :

- ① Increase in crop yield.
- ② Protection against drought & famine.
- ③ Optimum utilisation of water.
- ④ Perennial crops (sugar cane) can be grown.
→ through year.
- ⑤ Multiple crops (2-3 crops in a year) and superior crops (cash crops) can be grown.
- ⑥ Elimination of mixed cropping.

Note : Mixed cropping

mixed cropping means ~~so~~ sowing two or more crops in the field at the ~~time~~ same time.

Advantages of mixed cropping :

- - It is found economical and necessary when irrigation facility are lagging.
- If weather conditions are not suitable for one of the crops, they may be suitable for other crops and hence farmer will get some yield.

Disadvantage of mixed cropping :

- Different crops require different types of field preparation, watering, manuring etc.
Since it will be difficult to satisfy the needs of both the crops simultaneously in the same field therefore results in low yield.
- Also at the time of harvesting, the crops get intermixed and thereby reducing purity and value of crop in the market.

Indirect Advantages :

- ① Power Generation
- ② Flood control.
- ③ Transportation (roads as well as in land navigation)
- ④ Ground water recharge.
- ⑤ Industrial and domestic water supply.
- ⑥ Employment generation.

Disadvantages of Irrigation :

- ① water logging.
- ② Intense irrigation results in cold and damp climate, causing outbreak of disease like malaria & dengue

③ Pollution of river and ground water.

Note:

Bad effects of irrigation can be reduced ~~by~~ or ~~eliminate~~ eliminated by scientific ~~use~~ and economical use of water.

Types of irrigation :

① Classification on the basis of duration of irrigation

① Perennial / Control irrigation

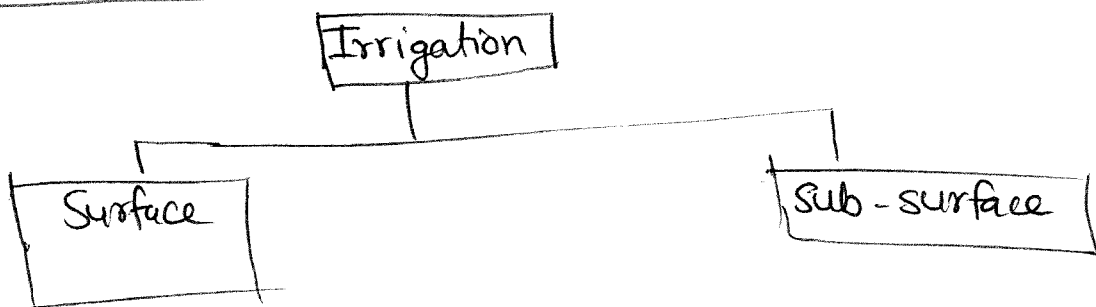
In this irrigation system water is supplied as per the crop requirement at regular intervals throughout the crop life.

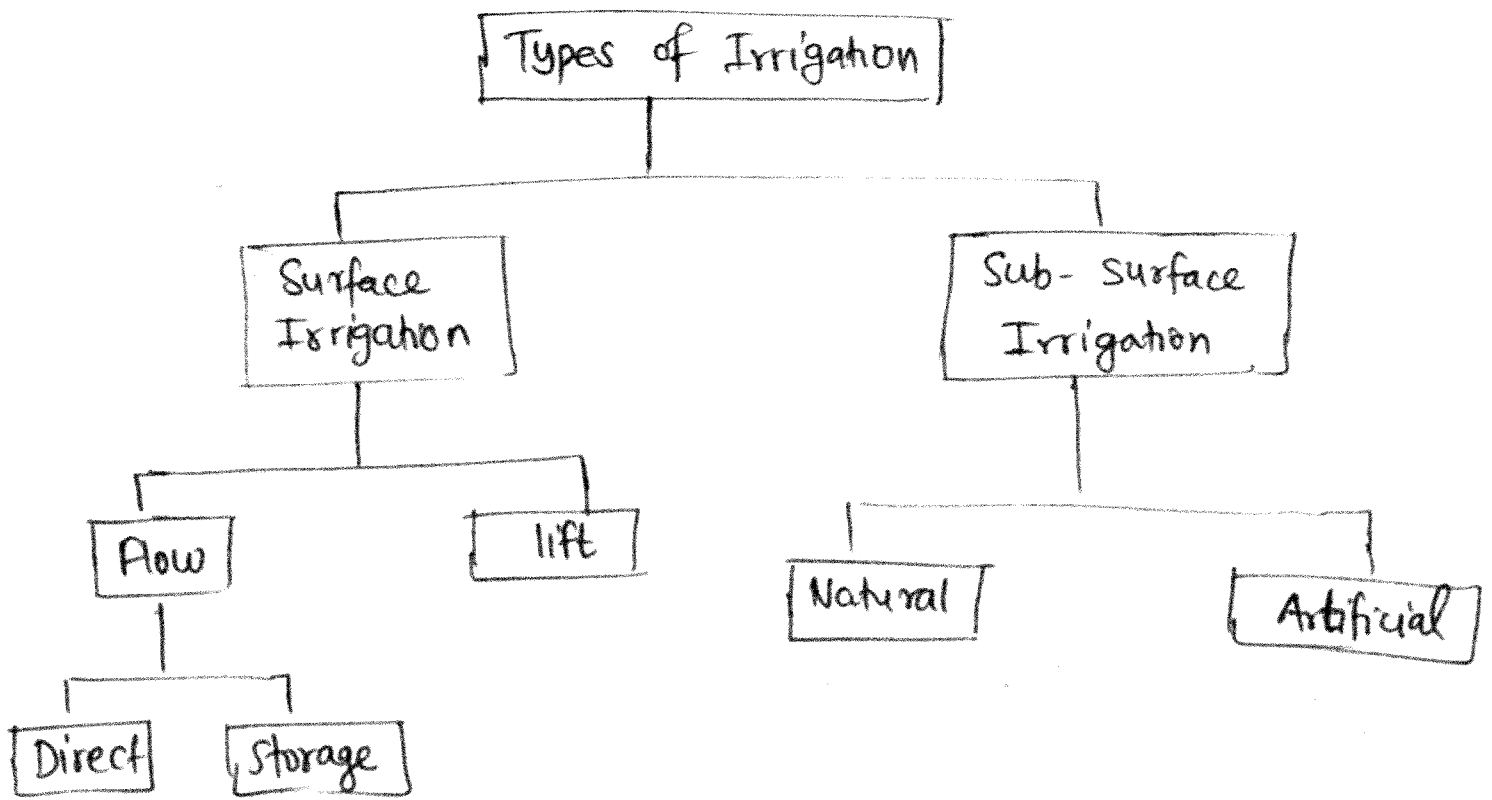
② Flood (Inundation) / Uncontrolled irrigation :

- In this system a large quantity of water flowing in ~~the~~ a river during floods is allowed to flood or inundated the land to be ~~control~~ cultivated.

- Soil is kept submerged and thoroughly flooded with water. (Usually practiced in delta region).

② Classification on the basis of availability & Application of water





Surface Irrigation

- water is applied and distributed over the soil surface either by gravity or by pumping.
- Best suited to soils with low to moderate infiltration capacities
- It can be further classified into

- ① Flow
- ② Lift.

① Flow Irrigation :

- If water is available at a higher level which is to be supplied to a lower level under action of gravity, irrigation is called flow irrigation.
- Flow irrigation can be further sub-divided into
 - ① Direct irrigation
 - ② ~~Direct~~ storage

(a) Direct Irrigation

- If irrigation is done by diverting the river water into the canal by constructing a diversion weir or barrage across the river, the irrigation is called direct irrigation.

Example: Ganga canal system.

(b) Storage irrigation

- When a dam is constructed across a river in order to store water during high flow, so as to ~~feed~~ feed ~~the~~ water to the off taking canal during low flow irrigation is called storage irrigation.

ex: Ram ganga dam project in UP.

(2) Lift irrigation :

- If water is lifted by some mechanical and manual means and then supplied to the agricultural field, irrigation is called lift irrigation.

Ex: pump, tube well, well.

- Lift irrigation is costlier than surface irrigation.

Sub-surface irrigation :

- water does not actually wet the soil surface rather it flows underground and nourishes the plant roots by capillarity.

(1) Natural sub-surface irrigation :

- Leakage water from channels goes underground and during passage through the sub-soil this leakage causes the water table to rise up which helps in irrigation of crops by capillarity, and this irrigation is called natural sub-surface irrigation.

② Artificial sub-surface irrigation

- water is directly supplied to the root zone of the plants by a network of perforated pipes laid below the soil surface
- very costly process, hence adopted on a very small scale.

Techniques of irrigation :

① Free flooding / ordinary flooding / wild flooding :

- In this method ditches (खाल) are excavated in the field.
- water from these ditches spreads over the land to be irrigated.
- After the water leaves the ditches, ~~no~~ no attempt is made to control the flow by means of levees. (सीढ़) etc.
- Hence the method is also known as wild flooding
- * most suitable for closed-growing crops, pastures etc. particularly where the land is steep. (ढाल)
- * may be used on rolling land (topography irregular) where borders, check basins and furrows are not ~~feasible~~ feasible.

