DEPARTMENT OF AI&DS, AI&ML, CSE & IT

APPLICATION ANSWER KEY

SUBJECT CODE: 23CH6603 **YEAR/SEMESTER: III/VI**

SUBJECT NAME: WATER AND SOIL CONSERVATION

UNIT-I WATER CONSERVATION

PART-B

3. **Elaborate in details about problems caused by deposition of sediments in irrigation system.** 16 K3

Sedimentation is the process by which different sized particles are transported and deposited into the water bodies and any other points along the water flow paths. 4

Problems caused by deposition of sediments in irrigation system:

- Deposition occurs when the agents (wind or water) of erosion lay down sediment.
- Deposition changes the shape of the land.
- Sediment is solid material that is or has been transported from its site of origin by air, water, gravity, or ice to a field or low landscape position. **4**
- Deposition occurs when the amount of sediment becomes greater than the carrying capacity of the force that is moving it.
- Deposition is the geological process in which sediments, soil and rocks are added to a landform or landmass. Examples include beaches, deltas, glacial moraines, sand dunes and salt domes.
- In order to obtain thin films with good quality, there are two common deposition techniques: physical and chemical depositions.
- Too much sediment deposition can also bury habitats and even physically alter a waterway.
- Excessive levels of suspended load tend to have negative impacts on aquatic life. Suspended sediment can prevent light from reaching submerged vegetation and clog fish gills
- A major effect of sedimentation is the loss of storage capacity, which can have a serious impact on water resources development by reducing water supply, hydropower production, the supply of irrigation water, and the effectiveness of flood control schemes. 4
- The unwanted deposition of eroded material is the most common expression of a sedimentation

problem. Within the context of sediment control on watershed areas, however, sedimentation problems begin with the detachment of soil or rock materials by irrigation.

- They include also any associated adverse effects upon water quality and the stability and hydraulic efficiency of stream channel systems as well as problems resulting from the deposition of eroded material. Thus, geologists are faced with identifying sediment damages as well as sediment sources. **4**
- The extent of sediment deposition in channels and in irrigation and drainage ditches and its influence on watershed problems; deposition of sediment in existing reservoirs; the effect and extent of sediment in transport on water supplies; and the location of the sources of sediment in terms of erosion are among the types of data collected in formulating a program of sediment control in watershed areas.

6. Evaporation losses occurring in sprinkler irrigation but do not occur in drip irrigation. Justify and explain with the help of neat sketches. **16 K3**

Drip irrigation system:

Drip irrigation system, also known as 'trickle irrigation system', is a method of applying the required amount of water directly to the root zones of plants through drippers or emitters at frequent intervals. In this system, water is applied drop-by-drop or by a micro jet on the soil surface or sub-surface at a rate lower than the infiltration rate of the soil. The emitters dissipate pressure from the distribution system by means of orifices,

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Crops suitable for drip irrigation system: 2

- Orchard Crops. Grapes, Banana, Pomegranate, Orange
- Vegetables. Tomato, Chilly, Capsicum, Cabbage
- Cash Crops. Sugarcane, Cotton
- Flowers. Rose, Carnation, Gerbera, Anthurium
- Plantation. Tea, Rubber, Coffee, Coconut etc.
- Spices. Turmeric, Cloves, Mint etc,
- Oil Seed.

Types of drip irrigation system: **8**

Drip irrigation system can be classified into the following:

(i) Surface drip irrigation
(ii) Sub-surface drip irrigation
(iii) Family drip
(iv) Online drip
(v) In-line drip

(i) Surface drip irrigation:

Surface drip irrigation is used to irrigate perennial crops (plants that live for more than two years) and annual crops (plants that germinate, produce seeds, flower and die in one year). Typical surface drip irrigation system consists of the following.

Pump unit: It comprises a pump and a power unit to supply electricity to the pump. The pump draws water from the source and provides the right pressure for its delivery into the pipe system.

Head control unit: It consists of shut-off, air and check (non-return) valves to control the discharge and pressure of water in the entire system. A pressure relief valve is installed after the pump unit to return excess water when the system is not operated at its full capacity. It may also have filters to clear the water. The filters remove sediment and debris, which can clog the system. Disc filters are commonly used to filter water from ponds, reservoirs, tanks and other sources that contain algae. Some head control units contain a fertiliser or nutrient tank to supply

fertiliser solution to plants.

Tubings: It consists of a main line, sub-main lines or sub-mains and laterals. The main line conveys water from the source and distributes it to the sub-mains. The sub-mains convey water to the laterals, which in turn supply it to the emmiters or drippers. The laterals are, usually, 13–32 mm in diameter and supply water into fields through the head control unit.

(ii). Sub-surface drip irrigation:

Sub-surface drip irrigation is a method of irrigating crops through buried plastic tubes, containing embedded emitters located at regular spacings. A subsurface drip irrigation system has a similar design as surface drip irrigation system. But in this case, the drip tubes are typically located 38–84″ (97–213 cm) apart and 6–10″ (15–25 cm) below the soil surface. In sub-surface drip irrigation, evaporation is minimised and water is used more efficiently as compared to surface irrigation.

In sub-surface irrigation, the effects of surface infiltration like crusting, water losses via evaporation and surface run-off are eliminated. Water is applied directly to the root zone of a crop as opposed to surface irrigation, in which most weed seeds hibernate. Water application is efficient and uniform in this system. Sub-surface drip irrigation helps in water conservation in open field agriculture, often resulting in saving up to 25–50 per cent water as compared to the flood irrigation system.

(iii) Family drip or gravity fed drip irrigation:

Family drip or ‘gravity fed drip irrigation’ system is a low-cost system developed for small family plots. It is suitable for house gardening and peri-urban agriculture. It can also be used to demonstrate the working of drip irrigation system. Family drip system is designed for areas measuring 500–1000 m2. It consists of five components — elevated tank, shut-off valve, filter, main line and drip line. Generally, a family drip irrigation system comprises a drum, control or shut-off valve, filter (small disc or screen filter), main line and drip laterals. The drip outlets are spaced at 30 cm. No central pressurised water system or power source is required in this system. Therefore, it is cheap, easy to install and operate.

(iv). Online drip irrigation:

In this system, emitters or drippers are fixed externally on the laterals at designed spacings. Thus, the drippers can be checked and cleaned easily in case of clogging. The dripper spacing can be changed any time to cover the increased root zone of a plant. Online dripper system is used in orchards, vineyards, artificial landscapes and nurseries. It is, generally, used for irrigating horticultural plants like mango, coconut, orange, lemon, banana, grapes, pomegranate, papaya, sapota, guava, teakwood, bamboo, amla (Indian gooseberry), etc.

(v). In-line drip irrigation:

In this system, drippers are fixed in the lateral tube at designed spacings at the time of manufacturing to meet the requirement of various crops. It is effective for row crops like cotton, sugarcane, groundnut, vegetables and flowering crops. Dripper spacing depends on the water

Advantages: **2**

- Water saving - losses due to deep percolation, surface runoff and transmission are avoided. Evaporation losses occurring in sprinkler irrigation do not occur in drip irrigation.
- Uniform water distribution
- Application rates can be adjusted by using different size of drippers
- Suitable for wide spaced row crops, particularly coconut and other horticultural tree crops
- Soil erosion is reduced
- Better weed control

- Land saving
- Less labour cost

Disadvantages: **2**

- High initial cost
- Drippers are susceptible to blockage
- Interferes with farm operations and movement of implements and machineries
- Frequent maintenance
- Trees grown may develop shallow confined root zones resulting in poor anchorage.