Unit 1

Irrigation Scheduling and Water Distribution System

1. Irrigation Scheduling

Definition:

Irrigation scheduling is the **process of determining when and how much water to apply to crops** to maximize crop yield and optimize water use.

---

2. Objectives of Irrigation Scheduling

- ✅ **Optimize Crop Growth** – Prevents water stress and ensures adequate moisture.
- ✅ **Efficient Water Use** – Avoids wastage and prevents over-irrigation.
- ✅ **Improve Irrigation Efficiency** – Balances water supply with crop demand.
- ✅ **Prevention of Waterlogging and Salinity** – Controls excess water application.
- ✅ **Energy and Labor Savings** – Reduces pumping costs and manual efforts.

---

3. Methods of Irrigation Scheduling

A. Based on Soil Moisture Measurement

1. **Feel and Appearance Method** – Checking soil texture manually.
2. **Tensiometer Method** – Measures soil moisture tension.
3. **Gypsum Blocks Method** – Uses electrical resistance to measure soil moisture.

B. Based on Plant Indicators

1. **Leaf Wilting Method** – Irrigate when plants show slight wilting.
2. **Canopy Temperature Method** – Measures leaf temperature changes.

C. Based on Climatic Factors

1. **Evapotranspiration (ET) Method** – Irrigation is scheduled based on **ET losses** using **Penman-Monteith equation**.
2. **Pan Evaporation Method** – Uses evaporation pan readings to estimate irrigation needs.

D. Based on Fixed Intervals

1. **Time-Based Scheduling** – Fixed intervals (e.g., every 7 days).
2. **Depth-Based Scheduling** – A fixed **depth of water per irrigation** is applied.

---

4. Factors Affecting Irrigation Scheduling

✓ **Soil Type:** Sandy soils need frequent irrigation; clayey soils require less frequent but deeper irrigation.
✓ **Crop Type:** Water-intensive crops (e.g., paddy) need more frequent watering than drought-resistant crops (e.g., millet).
✓ **Climatic Conditions:** High temperature and wind speed increase irrigation frequency.
✓ **Irrigation Method:** Drip irrigation requires precise scheduling, while surface irrigation is more flexible.

---

5. Water Distribution System in Irrigation

Definition:

A water distribution system is the **network of canals, pipes, and control structures** that **conveys and delivers irrigation water** from the source (dam, river, or well) to agricultural fields.

---

6. Components of a Water Distribution System

A. Major Conveyance Structures

1. **Main Canal** – Primary canal carrying water from the source.
2. **Branch Canals** – Secondary canals branching from the main canal.
3. **Distributary Canals** – Smaller canals distributing water to fields.
4. **Field Channels** – Final delivery channels reaching individual farms.

B. Control Structures

1. **Head Regulators** – Control water flow at the canal head.
2. **Cross Regulators** – Regulate water flow at intermediate locations.
3. **Outlets and Modules** – Distribute water to fields.

C. Water Distribution Methods

1. **Continuous Flow System** – Water is continuously supplied to farms.
2. **Rotational Water Supply (Warabandi System)** – Water is supplied in fixed time slots to different users.
3. **On-Demand System** – Farmers request water based on need.

7. Merits and Demerits of Different Water Distribution Systems

System	Advantages	Disadvantages
Continuous Flow	Easy to operate, No fixed timing issues	Wastes water, Causes waterlogging
Rotational (Warabandi)	Ensures fair distribution, Saves water	Less flexibility for farmers
On-Demand	Most efficient, Minimum wastage	Requires advanced monitoring & infrastructure

8. Modern Water Distribution Techniques

✓ **Lined Canals** – Reduce seepage losses and improve efficiency.
✓ **Automated Canal Regulation** – Uses **remote-controlled gates** for precise control.
✓ **Piped Water Distribution** – Delivers water directly to farms through underground pipelines.

---

9. Conclusion

- **Irrigation scheduling** ensures water is applied at the **right time and in the right amount**.
- **Water distribution systems** efficiently convey water **from source to fields**.
- **Modern methods (automation, pipelines)** improve water efficiency and sustainability.

This **structured approach** ensures **optimal crop growth, water conservation, and improved irrigation efficiency**!