9th Oct,
SUNDAY

02. METHODS OF IRRIGATION

1. Surface Irrigation Methods.
   (i) Flooding Method.
      a) Uncontrolled Flooding. Eg: Inundation irrigation
      b) Controlled Flooding
         - Field Channel method.
         - Border irrigation method.
         - Check or leave method.
         - Basin method.

   (ii) Furrow method.

   (iii) Contour Farming.

2. Subsurface Irrigation Method.
   (i) Natural Subsurface
   (ii) Artificial Subsurface.
   (iii) Drip Irrigation method.

3. Sprinkler Irrigation Method.

* Border Strip Method.

$$t = \frac{y}{I} \log_e \left(\frac{q}{q - IA} \right)$$

where $y \rightarrow$ average depth of sheet of flowing water.
$t \rightarrow$ time required for water to cover an area
$q \rightarrow$ discharge of a stream
$A \rightarrow$ area of the strip covered at any time
$I \rightarrow$ rate of infiltration.

$$A_{max} = \frac{q}{I}$$

Amax → max area that can be irrigated.

⊙ Slope should be along the length of the border.

→ Infiltration Oppurtunity Time (IOT) = Advance time − Recession time.

Using IOT, deep percolation loss is calculated from infiltration profiles. Knowing the deep percolation loss and tail water run off loss, application efficiency (η_a) is calculate

Advance time — time at which the water reaches a particular section.

Recession time — time at which the water siezes from that section.

* Furrow Method.

Furrows are small channels with mild slope which carry water with low velocities. Due to lateral seepage of water, the crops are grown. The water is directly supplied to the root zon

Depth of flow is 10 cm

Width of furrow is 25 cm with mild slope.

Eg: Maize crop.

* Sprinkler Method.

- Application efficiency, $\eta_a = 80\%$
- used when water is scarce.
- Tail water run off loss and DP loss are less
- No erosion.
- No channels, no bunds, no land preparation.

- high initial investment and power requirement.
- distribution efficiency gets affected by wind action.

* Drip Irrigation

- $\eta_a = 90\%$ (highest)

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Q.1 $A = 100\,m \times 10\,m$.

$q = 0.03\ m^3/s$

$y = 7.5\ cm = 0.075\ m$.

$I = 5\ cm/hr = \frac{5}{100 \times 3600}\ m/s$.

$$t = \frac{y}{I} \log_e \left(\frac{q}{q - IA} \right).$$

$$= \frac{\frac{7.5}{100}}{\frac{5}{100 \times 3600}} \log_e \left(\frac{0.03}{0.03 - \frac{5 \times 100 \times 10}{100 \times 3600}} \right)$$

$$= 3357\ s = \underline{55.95\ min}$$

$$A_{max} = \frac{q}{I} = \frac{0.03}{\frac{5}{100 \times 3600}} = \underline{\underline{2160\ m^2}}$$