Important Computation of Runoff Formulas PDF

Formulas
Examples
with Units

List of 27
Important Computation of Runoff Formulas

1) Rainfall given Run-off Formula

Evaluate Formula

Formula

$$P_{cm} = \frac{R}{C_r}$$

Example with Units

$$12\,\text{cm} = \frac{6\,\text{cm}}{0.5}$$

2) Run-off Coefficient given Run-off Formula

Evaluate Formula

Formula

$$C_r = \frac{R}{P_{cm}}$$

Example with Units

$$0.5 = \frac{6\,\text{cm}}{12\,\text{cm}}$$

3) Run-off given Run-off Coefficient Formula

Evaluate Formula

Formula

$$R = C_r \cdot P_{cm}$$

Example with Units

$$6\,\text{cm} = 0.5 \cdot 12\,\text{cm}$$

4) Ingli's Formula Formulas

4.1) Rainfall in cm for Ghat Area Formula

Evaluate Formula

Formula

$$P_{IC} = \frac{R_{IC} + 30.5}{0.85}$$

Example with Units

$$39.9882\,\text{cm} = \frac{3.49\,\text{cm} + 30.5}{0.85}$$

4.2) Rainfall in Inches for Ghat Area Formula

Evaluate Formula

Formula

$$R_{PI} = \frac{R_{II} + 12}{0.85}$$

Example with Units

$$21.6471\,\text{in} = \frac{6.4\,\text{in} + 12}{0.85}$$

4.3) Run-off in cm for Ghat Area Formula

Evaluate Formula

Formula

$$R_{IC} = \left(0.85 \cdot P_{IC}\right) - 30.5$$

Example with Units

$$3.5\,\text{cm} = \left(0.85 \cdot 40\,\text{cm}\right) - 30.5$$

4.4) Run-off in Cm for Non Ghat Area Formula

Evaluate Formula

Formula

$$R_{IC} = \left(\frac{P_{IC} - 17.8}{254}\right) \cdot P_{IC}$$

Example with Units

$$3.4961\,\text{cm} = \left(\frac{40\,\text{cm} - 17.8}{254}\right) \cdot 40\,\text{cm}$$

4.5) Run-off in Inches for Ghat Area Formula

Evaluate Formula

Formula

$$R_{II} = \left(0.85 \cdot R_{PI}\right) - 12$$

Example with Units

$$8.4\,\text{in} = \left(0.85 \cdot 24\,\text{in}\right) - 12$$

4.6) Run-off in Inches for Non Ghat Area Formula

Evaluate Formula

Formula

$$R_{II} = \left(\frac{R_{PI} - 7}{100}\right) \cdot R_{PI}$$

Example with Units

$$4.08\,\text{in} = \left(\frac{24\,\text{in} - 7}{100}\right) \cdot 24\,\text{in}$$

5) Khosla's Formula Formulas

5.1) Mean Temperature in Entire Catchment given Run-off Formula

Evaluate Formula

Formula

$$T_f = \left(\left(R_{PI} - R_{KI}\right) \cdot 9.5\right) + 32$$

Example with Units

$$38.0325\,°\text{F} = \left(\left(24\,\text{in} - 23.75\,\text{in}\right) \cdot 9.5\right) + 32$$

5.2) Mean Temperature in Entire Catchment given Run-off in cm Formula

Evaluate Formula

Formula

$$T_f = \left(\left(P_{cm} - R_{KC}\right) \cdot 3.74\right) + 32$$

Example with Units

$$38.0214\,°\text{F} = \left(\left(12\,\text{cm} - 10.39\,\text{cm}\right) \cdot 3.74\right) + 32$$

5.3) Rainfall in cm by Khosla's Formula Formula

Evaluate Formula

Formula

$$P_{cm} = R_{KC} + \left(\frac{T_f - 32}{3.74}\right)$$

Example with Units

$$11.9943\,\text{cm} = 10.39\,\text{cm} + \left(\frac{38\,°\text{F} - 32}{3.74}\right)$$

5.4) Rainfall in Inches by Khosla's Formula Formula

Evaluate Formula

Formula

$$R_{PI} = R_{KI} + \left(\frac{T_f - 32}{9.5}\right)$$

Example with Units

$$23.9987\,\text{in} = 23.75\,\text{in} + \left(\frac{38\,°\text{F} - 32}{9.5}\right)$$

5.5) Run-off in cm by Khosla's Formula Formula

Evaluate Formula

Formula

$$R_{KC} = P_{cm} - \left(\frac{T_f - 32}{3.74}\right)$$

Example with Units

$$10.3957\,\text{cm} = 12\,\text{cm} - \left(\frac{38\,°\text{F} - 32}{3.74}\right)$$

5.6) Run-off in Inches by Khosla's Formula Formula

Evaluate Formula

Formula

$$R_{KI} = R_{PI} - \left(\frac{T_f - 32}{9.5}\right)$$

Example with Units

$$23.7513\,\text{in} = 24\,\text{in} - \left(\frac{38\,°\text{F} - 32}{9.5}\right)$$

6) Lacey's Formula Formulas

6.1) Catchment Factor given Run-off in cm by Lacey's Formula Formula

Evaluate Formula

Formula

$$S = \frac{-304.8 \cdot F_m \cdot R_{LC}}{R_{LC} \cdot P_{cm} - P_{cm} \cdot P_{cm}}$$

Example with Units

$$1.6994 = \frac{-304.8 \cdot 1.48 \cdot 0.519\,\text{cm}}{0.519\,\text{cm} \cdot 12\,\text{cm} - 12\,\text{cm} \cdot 12\,\text{cm}}$$

6.2) Catchment Factor given Run-off in Inches by Lacey's Formula Formula

Evaluate Formula

Formula

$$S = \frac{-120 \cdot F_m \cdot R_{LI}}{R_{LI} \cdot R_{PI} - R_{PI} \cdot R_{PI}}$$

Example with Units

$$1.6988 = \frac{-120 \cdot 1.48 \cdot 8.84\,\text{in}}{8.84\,\text{in} \cdot 24\,\text{in} - 24\,\text{in} \cdot 24\,\text{in}}$$

6.3) Monsoon Duration Factor given Run-off in cm by Lacey's Formula Formula

Evaluate Formula

Formula

$$F_m = \frac{S \cdot \left(R_{LC} \cdot P_{cm} - P_{cm}^2\right)}{-304.8 \cdot R_{LC}}$$

Example with Units

$$1.4806 = \frac{1.70 \cdot \left(0.519\,\text{cm} \cdot 12\,\text{cm} - 12\,\text{cm}^2\right)}{-304.8 \cdot 0.519\,\text{cm}}$$

6.4) Monsoon Duration Factor given Run-off in Inches by Lacey's Formula Formula

Evaluate Formula

Formula

$$F_m = \frac{S \cdot \left(R_{LI} \cdot R_{PI} - R_{PI}^2\right)}{-120 \cdot R_{LI}}$$

Example with Units

$$1.481 = \frac{1.70 \cdot \left(8.84\,\text{in} \cdot 24\,\text{in} - 24\,\text{in}^2\right)}{-120 \cdot 8.84\,\text{in}}$$

6.5) Run-off in cm by Lacey's Formula Formula

Evaluate Formula

Formula

$$R_{LC} = \frac{P_{cm}}{1 + \frac{304.8 \cdot F_m}{P_{cm} \cdot S}}$$

Example with Units

$$0.5192\,\text{cm} = \frac{12\,\text{cm}}{1 + \frac{304.8 \cdot 1.48}{12\,\text{cm} \cdot 1.70}}$$

6.6) Run-off in Inches by Lacey's Formula Formula

Evaluate Formula

Formula

$$R_{LI} = \frac{R_{PI}}{1 + \frac{120 \cdot F_m}{R_{PI} \cdot S}}$$

Example with Units

$$8.8438\,\text{in} = \frac{24\,\text{in}}{1 + \frac{120 \cdot 1.48}{24\,\text{in} \cdot 1.70}}$$

7) Parker's Formula Formulas

7.1) Rainfall for Catchment in British Isles Formula

Evaluate Formula

Formula

$$R_{PI} = \frac{R_{PRI} + 14}{0.94}$$

Example with Units

$$22.353\,\text{in} = \frac{15.5\,\text{in} + 14}{0.94}$$

7.2) Rainfall for Catchment in East USA Formula

Evaluate Formula

Formula

$$R_{PI} = \frac{R_{PRI} + 16.5}{0.80}$$

Example with Units

$$27.4951\,\text{in} = \frac{15.5\,\text{in} + 16.5}{0.80}$$

7.3) Rainfall for Catchment in Germany Formula

Evaluate Formula

Formula

$$R_{PI} = \frac{R_{PRI} + 16}{0.94}$$

Example with Units

$$23.1907\,\text{in} = \frac{15.5\,\text{in} + 16}{0.94}$$

7.4) Run-off for Catchment in British Isles Formula

Evaluate Formula

Formula

$$R_{PRI} = \left(0.94 \cdot R_{PI}\right) - 14$$

Example with Units

$$17.0482\,\text{in} = \left(0.94 \cdot 24\,\text{in}\right) - 14$$

7.5) Run-off for Catchment in East USA Formula

Evaluate Formula

Formula

$$R_{PRI} = \left(0.80 \cdot R_{PI}\right) - 16.5$$

Example with Units

$$12.7039\,\text{in} = \left(0.80 \cdot 24\,\text{in}\right) - 16.5$$

7.6) Run-off for Catchment in Germany Formula

Evaluate Formula

Formula

$$R_{PRI} = \left(0.94 \cdot R_{PI}\right) - 16$$

Example with Units

$$16.2608\,\text{in} = \left(0.94 \cdot 24\,\text{in}\right) - 16$$

Variables used in list of Computation of Runoff Formulas above

- C_r Runoff Coefficient
- F_m Monsoon Duration Factor
- P_{cm} Rainfall Depth *(Centimeter)*
- P_{IC} Rainfall Depth in CM for Ingli's Formula *(Centimeter)*
- **R** Runoff Depth *(Centimeter)*
- R_{IC} Runoff Depth in CM for Inglis' Formula *(Centimeter)*
- R_{II} Runoff Depth in Inches for Inglis' Formula *(Inch)*
- R_{KC} Runoff Depth in CM for Khosla's Formula *(Centimeter)*
- R_{KI} Runoff Depth in Inches for Khosla's Formula *(Inch)*
- R_{LC} Runoff Depth in CM for Lacey's Formula *(Centimeter)*
- R_{LI} Runoff Depth in Inches for Lacey's Formula *(Inch)*
- R_{PI} Rainfall Depth in Inches *(Inch)*
- R_{PRI} Runoff Depth in Inches for Parker's Formula *(Inch)*
- **S** Catchment Factor
- T_f Temperature *(Fahrenheit)*

Constants, Functions, Measurements used in list of Computation of Runoff Formulas above

- Measurement: **Length** in Centimeter (cm), Inch (in)
  Length Unit Conversion
- Measurement: **Temperature** in Fahrenheit (°F)
  Temperature Unit Conversion

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