Important Empirical Formulae for Flood-Peak Area Relationships Formulas PDF

Formulas
Examples
with Units

List of 17
Important Empirical Formulae for Flood-Peak Area Relationships Formulas

1) Dicken's Formula (1865) Formulas

1.1) Catchment area when maximum flood discharge is considered in Dickens formula Formula

Evaluate Formula

Formula

$$A = \left(\frac{Q_{mp}}{C_D}\right)^{\frac{1}{0.75}}$$

Example with Units

$$36.0644\,\text{km}^2 = \left(\frac{88.3\,\text{m}^3/\text{s}}{6.0}\right)^{\frac{1}{0.75}}$$

1.2) Dicken's Formula for maximum flood discharge Formula

Evaluate Formula

Formula

$$Q_{mp} = C_D \cdot A^{\frac{3}{4}}$$

Example with Units

$$96.3258\,\text{m}^3/\text{s} = 6.0 \cdot 40.5\,\text{km}^2{}^{\frac{3}{4}}$$

1.3) Dicken's Formula for Maximum Flood Discharge in Central Andhra and Orrisa Formula

Evaluate Formula

Formula

$$Q_{mp} = C_{CA} \cdot A^{\frac{3}{4}}$$

Example with Units

$$417.4117\,\text{m}^3/\text{s} = 26 \cdot 40.5\,\text{km}^2{}^{\frac{3}{4}}$$

1.4) Dicken's Formula for Maximum Flood Discharge in Central India Formula

Evaluate Formula

Formula

$$Q_{mp} = C_{CI} \cdot A^{\frac{3}{4}}$$

Example with Units

$$401.3574\,\text{m}^3/\text{s} = 25 \cdot 40.5\,\text{km}^2{}^{\frac{3}{4}}$$

1.5) Dicken's Formula for Maximum Flood Discharge in North-Indian Hilly Regions Formula

Evaluate Formula

Formula

$$Q_{mp} = C_{NH} \cdot A^{\frac{3}{4}}$$

Example with Units

$$192.6516\,\text{m}^3/\text{s} = 12 \cdot 40.5\,\text{km}^2{}^{\frac{3}{4}}$$

1.6) Dicken's Formula for Maximum Flood Discharge in North-Indian Plains Formula

Evaluate Formula

Formula

$$Q_{mp} = 6 \cdot A^{\frac{3}{4}}$$

Example with Units

$$96.3258\,\text{m}^3/\text{s} = 6 \cdot 40.5\,\text{km}^2{}^{\frac{3}{4}}$$

2) Inglis Formula (1930) Formulas

2.1) Inglis Formula for Areas between 160 to 1000 square kilometers Formula

Evaluate Formula

Formula

$$Q_{mp} = 123.2 \cdot \sqrt{A} - \left(2.62 \cdot \left(A_L - 259\right)\right)$$

Example with Units

$$784.04\,\text{m}^3/\text{s} = 123.2 \cdot \sqrt{40.5\,\text{km}^2} - \left(2.62 \cdot \left(259\,\text{km}^2 - 259\right)\right)$$

2.2) Inglis Formula for Larger Areas Formula

Evaluate Formula

Formula

$$Q_{mp} = \frac{124 \cdot A}{\sqrt{A + 10.4}}$$

Example with Units

$$703.9111\,\text{m}^3/\text{s} = \frac{124 \cdot 40.5\,\text{km}^2}{\sqrt{40.5\,\text{km}^2 + 10.4}}$$

2.3) Inglis Formula for Small Areas (also applicable for fan shaped catchment) Formula

Evaluate Formula

Formula

$$Q_{mp} = 123.2 \cdot \sqrt{A}$$

Example with Units

$$784.04\,\text{m}^3/\text{s} = 123.2 \cdot \sqrt{40.5\,\text{km}^2}$$

3) Other Formulae Formulas

3.1) Baird and McIllwraith (1951) Formula for Maximum Flood Discharge Formula

Evaluate Formula

Formula

$$Q_{mp} = \frac{3025 \cdot A}{\left(278 + A\right)^{0.78}}$$

Example with Units

$$1366.9576\,\text{m}^3/\text{s} = \frac{3025 \cdot 40.5\,\text{km}^2}{\left(278 + 40.5\,\text{km}^2\right)^{0.78}}$$

3.2) Fuller's formula for Maximum Flood Discharge Formula

Evaluate Formula

Formula

$$Q_{Tp} = C_f \cdot A^{0.8} \cdot \left(1 + 0.8 \cdot \log10\left(T_r\right)\right)$$

Example with Units

$$95.3071\,\text{m}^3/\text{s} = 1.80 \cdot 40.5\,\text{km}^2{}^{0.8} \cdot \left(1 + 0.8 \cdot \log10\left(150\right)\right)$$

3.3) Jarvis Formula for Peak Discharge Formula

Evaluate Formula

Formula

$$Q_{mp} = C_J \cdot \sqrt{A}$$

Example with Units

$$89.0955\,\text{m}^3/\text{s} = 14 \cdot \sqrt{40.5\,\text{km}^2}$$

4) Ryves Formula (1884) Formulas

4.1) Catchment area when maximum flood discharge in Ryve's formula Formula

Evaluate Formula

Formula

$$A = \left(\frac{Q_{mp}}{C_R}\right)^{1.5}$$

Example with Units

$$46.7927\,\text{km}^2 = \left(\frac{88.3\,\text{m}^3/\text{s}}{6.8}\right)^{1.5}$$

4.2) Ryves Formula for maximum flood discharge Formula

Evaluate Formula

Formula

$$Q_{mp} = C_R \cdot A^{\frac{2}{3}}$$

Example with Units

$$80.1947\,\text{m}^3/\text{s} = 6.8 \cdot 40.5\,\text{km}^2{}^{\frac{2}{3}}$$

4.3) Ryves Formula of Maximum Flood Discharge for Areas within 80-160km from East Coast Formula

Evaluate Formula

Formula

$$Q_{mp} = 8.5 \cdot A^{\frac{2}{3}}$$

Example with Units

$$100.2434\,\text{m}^3/\text{s} = 8.5 \cdot 40.5\,\text{km}^2{}^{\frac{2}{3}}$$

4.4) Ryves Formula of Maximum Flood Discharge for Areas within 80km from East Coast Formula

Evaluate Formula

Formula

$$Q_{mp} = 6.8 \cdot A^{\frac{2}{3}}$$

Example with Units

$$80.1947\,\text{m}^3/\text{s} = 6.8 \cdot 40.5\,\text{km}^2{}^{\frac{2}{3}}$$

4.5) Ryves Formula of Maximum Flood Discharge for Limited Areas near Hills Formula

Evaluate Formula

Formula

$$Q_{mp} = 10.2 \cdot A^{\frac{2}{3}}$$

Example with Units

$$120.292\,\text{m}^3/\text{s} = 10.2 \cdot 40.5\,\text{km}^2{}^{\frac{2}{3}}$$

Variables used in list of Empirical Formulae for Flood-Peak Area Relationships above

- **A** Catchment Area *(Square Kilometer)*
- A_L Catchment for Larger Area *(Square Kilometer)*
- C_{CA} Dickens's Constant for Coastal Andhra and Orissa
- C_{CI} Dicken's Constant for Central Indian
- C_D Dicken's Constant
- C_f Fuller's Coefficient
- C_J Coefficient (Jarvis Equation)
- C_{NH} Dickens's Constant for North India hilly regions
- C_R Ryve's Coefficient
- Q_{mp} Maximum Flood Discharge *(Cubic Meter per Second)*
- Q_{Tp} Maximum 24-hour Flood Peak Discharge *(Cubic Meter per Second)*
- T_r Return Period

Constants, Functions, Measurements used in list of Empirical Formulae for Flood-Peak Area Relationships above

- Functions: **log10**, log10(Number)
  The common logarithm, also known as the base-10 logarithm or the decimal logarithm, is a mathematical function that is the inverse of the exponential function.
- Functions: **sqrt**, sqrt(Number)
  A square root function is a function that takes a non-negative number as an input and returns the square root of the given input number.
- Measurement: **Area** in Square Kilometer (km²)
  Area Unit Conversion
- Measurement: **Volumetric Flow Rate** in Cubic Meter per Second (m³/s)
  Volumetric Flow Rate Unit Conversion

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