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# Flood Discharge Method Formulas

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# List of 14 Flood Discharge Method Formulas

## Flood Discharge Method

### 1) Catchment Area given Flood Discharge

$$\text{fx } A_{fd} = \left( \frac{Q_{fe}}{C_F} \right)^{\frac{1}{n}}$$

[Open Calculator !\[\]\(a870788d6ed9b8fd294b7654a8c8526b\_img.jpg\)](#)

$$\text{ex } 1.998514\text{m}^2 = \left( \frac{1.08\text{m}^3/\text{s}}{0.12625} \right)^{\frac{1}{3.1}}$$

### 2) Flood Coefficient given Flood Discharge

$$\text{fx } C_F = \left( \frac{Q_{fe}}{(A_{fd})^n} \right)$$

[Open Calculator !\[\]\(c50c8b7b2cc2cf9ff925edec0ee94c0d\_img.jpg\)](#)

$$\text{ex } 0.125959 = \left( \frac{1.08\text{m}^3/\text{s}}{(2.0\text{m}^2)^{3.1}} \right)$$

### 3) Flood Discharge

$$\text{fx } Q_{fe} = C_F \cdot (A_{fd})^n$$

[Open Calculator !\[\]\(f60b7a900783ac3fd531bfd9c111be6d\_img.jpg\)](#)

$$\text{ex } 1.082491\text{m}^3/\text{s} = 0.12625 \cdot (2.0\text{m}^2)^{3.1}$$



#### 4) Flood Frequency given Recurrence Interval

$$fx \quad F = \frac{100}{T_r}$$

[Open Calculator !\[\]\(cbe80b694ebd74fcfe136a095b608235\_img.jpg\)](#)

$$ex \quad 33.33333 = \frac{100}{3}$$

### Gumbel's Method

#### 5) Average Flood Discharge given Flood Discharge Having Highest Frequency

$$fx \quad Q_{av} = Q_f + (0.45 \cdot \sigma)$$

[Open Calculator !\[\]\(5361750c22c4e047a52f4eac1ec2d4cc\_img.jpg\)](#)

$$ex \quad 20.288\text{m}^3/\text{s} = 20\text{m}^3/\text{s} + (0.45 \cdot 0.64)$$

#### 6) Flood Discharge given Gumbel's Reduced Variate

$$fx \quad Q_f = \left( \frac{y}{a} \right) + Q_{fe}$$

[Open Calculator !\[\]\(b792654f2cef9719eabeb6c5be00811e\_img.jpg\)](#)

$$ex \quad 19.97552\text{m}^3/\text{s} = \left( \frac{37.98}{2.01} \right) + 1.08\text{m}^3/\text{s}$$

#### 7) Flood Discharge Having Highest Frequency

$$fx \quad Q_f = Q_{av} - (0.45 \cdot \sigma)$$

[Open Calculator !\[\]\(84f47badaad7772cd95667a7c387a639\_img.jpg\)](#)

$$ex \quad 20.002\text{m}^3/\text{s} = 20.29\text{m}^3/\text{s} - (0.45 \cdot 0.64)$$



8) Gumbel's Constant given Gumbel's Reduced Variate 

$$fx \quad a = \frac{y}{Q_f - Q_{fe}}$$

[Open Calculator !\[\]\(e78f798d4ea5c530c9db49e7d26e6b95\_img.jpg\)](#)


$$ex \quad 2.0074 = \frac{37.98}{20\text{m}^3/\text{s} - 1.08\text{m}^3/\text{s}}$$

9) Gumbel's Constant given Standard Deviation 

$$fx \quad a = \frac{1.28}{\sigma}$$

[Open Calculator !\[\]\(05be7c7a8995decd503647c99211f7c2\_img.jpg\)](#)

$$ex \quad 2 = \frac{1.28}{0.64}$$

10) Gumbel's Reduced Variate 

$$fx \quad y = a \cdot (Q_f - Q_{fe})$$

[Open Calculator !\[\]\(fe3aebe81acea8d45108cd2768939da7\_img.jpg\)](#)

$$ex \quad 38.0292 = 2.01 \cdot (20\text{m}^3/\text{s} - 1.08\text{m}^3/\text{s})$$

11) Probability of Occurrence given Recurrence Interval 

$$fx \quad p = 1 - \left( \frac{1}{T_r} \right)$$

[Open Calculator !\[\]\(899d8b7697d64725bf017d3296cfcf1b\_img.jpg\)](#)

$$ex \quad 0.666667 = 1 - \left( \frac{1}{3} \right)$$



## 12) Recurrence Interval given Probability

$$\text{fx } T_r = \frac{1}{1 - p}$$

[Open Calculator !\[\]\(e2376d476d06eb31946dc01a69a4403a\_img.jpg\)](#)

$$\text{ex } 2 = \frac{1}{1 - 0.5}$$

## 13) Standard Deviation given Flood Discharge Having Highest Frequency

$$\text{fx } \sigma = \frac{Q_{\text{av}} - Q_f}{0.45}$$

[Open Calculator !\[\]\(0b5e7e25e8775f7e7e80906ada4f0021\_img.jpg\)](#)

$$\text{ex } 0.644444 = \frac{20.29\text{m}^3/\text{s} - 20\text{m}^3/\text{s}}{0.45}$$

## 14) Standard Deviation given Gumbel's Constant

$$\text{fx } \sigma = \frac{1.28}{a}$$

[Open Calculator !\[\]\(bd3b31712ad9bab5a241210fa6925cdd\_img.jpg\)](#)

$$\text{ex } 0.636816 = \frac{1.28}{2.01}$$





## Variables Used

- **a** Gumbel's Constant
- **A<sub>fd</sub>** Catchment Area for Flood Discharge (*Square Meter*)
- **C<sub>F</sub>** Flood Coefficient
- **F** Flood Frequency
- **n** Flood Index
- **p** Probability
- **Q<sub>av</sub>** Average Discharge (*Cubic Meter per Second*)
- **Q<sub>f</sub>** Flood Discharge having Highest Frequency (*Cubic Meter per Second*)
- **Q<sub>fe</sub>** Flood Discharge (*Cubic Meter per Second*)
- **T<sub>r</sub>** Recurrence Interval
- **y** Gumbel's Reduced Variate
- **σ** Standard Deviation



## Constants, Functions, Measurements used

- **Measurement: Area** in Square Meter ( $m^2$ )  
*Area Unit Conversion* 
- **Measurement: Volumetric Flow Rate** in Cubic Meter per Second ( $m^3/s$ )  
*Volumetric Flow Rate Unit Conversion* 



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- [Computation of Runoff Formulas](#) 
- [Evaporation and Transpiration Formulas](#) 
- [Flood Discharge Formulae Formulas](#) 
- [Flood Discharge Method Formulas](#) 

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