**EXERCISE 2**

**RATING CURVE CONSTRUCTION AND CALCULATION OF THE FLOOD WATER VOLUME FROM A HYDROGRAPH**

1. In station Poros Riganiou 12 discharge measurements have been conducted that can be seen in the next page. Find the relationship between stage, h, and discharge, Q, (rating curve).

2. Based on this rating curve and the stage hydrograph of the next table, sketch the discharge hydrograph and calculate the volume of water that passed through the station within the given time-period (Stage h= 0,4 is considered as base flow -> existed before and after the flood, attributed to the contribution of groundwater).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **t (hr)** | **h (m)** | **Q tot**  **(cms)** | **Q bas**  **(cms)** | **Q flood**  **(cms)** | **Vol**  **flood**  **(m3)** |
| 0 | 0.4 |  |  |  |  |
| 1 | 0.4 |  |  |  |  |
| 2 | 0.6 |  |  |  |  |
| 3 | 0.8 |  |  |  |  |
| 4 | 1.2 |  |  |  |  |
| 5 | 1.8 |  |  |  |  |
| 6 | 2 |  |  |  |  |
| 7 | 1.7 |  |  |  |  |
| 8 | 1.5 |  |  |  |  |
| 9 | 1.2 |  |  |  |  |
| 10 | 1 |  |  |  |  |
| 11 | 0.9 |  |  |  |  |
| 12 | 0.8 |  |  |  |  |
| 13 | 0.7 |  |  |  |  |
| 14 | 0.6 |  |  |  |  |
| 15 | 0.5 |  |  |  |  |
| 16 | 0.4 |  |  |  |  |
|  |  |  |  | **ΣVol=** |  |

(**Q tot** comes from the rating curve. **Q bas** is the same for all the time period.

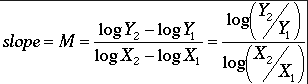
**Q flood** = **Q tot - Q bas.** Flood water volume, **Volflood** is calculated by multiplying **Qflood** by the seconds of an hour (or any other time period given in the time axis – x). The sum of this column is the volume of water that passed from the station within the time covered by the hydrograph.

3. If the catchment has a surface of Α = 240 *km2* find the *active rain* (meaning this part of the rainfall that made it to the river and became river flow) for this flood incident.

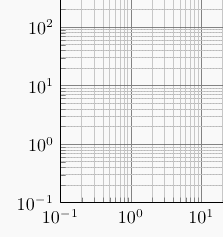
<http://www.geol.lsu.edu/jlorenzo/geophysics/graphing/graphingpart2.html>

**y = axb => logy = loga + b\*logy**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **α/α** | **Stage** | **Discharge** | **α/α** | **Stage** | **Discharge** | **α/α** | **Stage** | **Discharge** | **α/α** | **Stage** | **Discharge** |
|  | *h (m)* | *Q (m3/s)* |  | *h (m)* | *Q (m3/s)* |  | *h (m)* | *Q (m3/s)* |  | *h (m)* | *Q (m3/s)* |
| 1 | 1.35 | 25.3 | 4 | 1.42 | 34.2 | 7 | 1.49 | 40.2 | 10 | 0.87 | 5.4 |
| 2 | 0.58 | 1.4 | 5 | 1.19 | 18.0 | 8 | 0.99 | 7.5 | 11 | 0.75 | 3.5 |
| 3 | 1.13 | 15.8 | 6 | 1.05 | 10.5 | 9 | 0.63 | 2.1 | 12 |  |  |



**log-log paper**



For finding a, check to see where your trendline will meet **h =1**.