

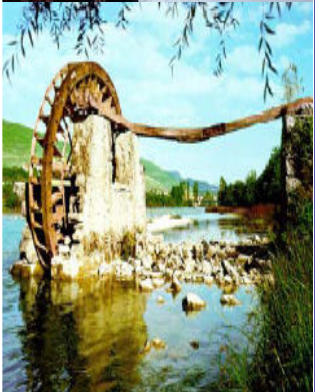
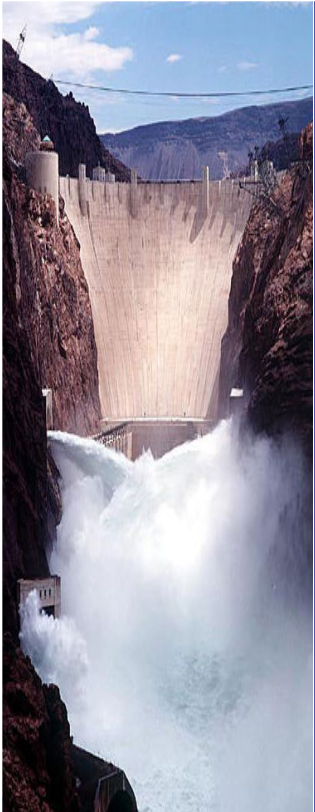


VJEŽBE 5

**-DEFINIRANJE VODNOG LICA ZA ZADANE
RUBNE UVJETE**

**- CRPLJENJE IZ ZDENACA U OGRANIČENIM I
NEOGRANIČENIM UVJETIMA**

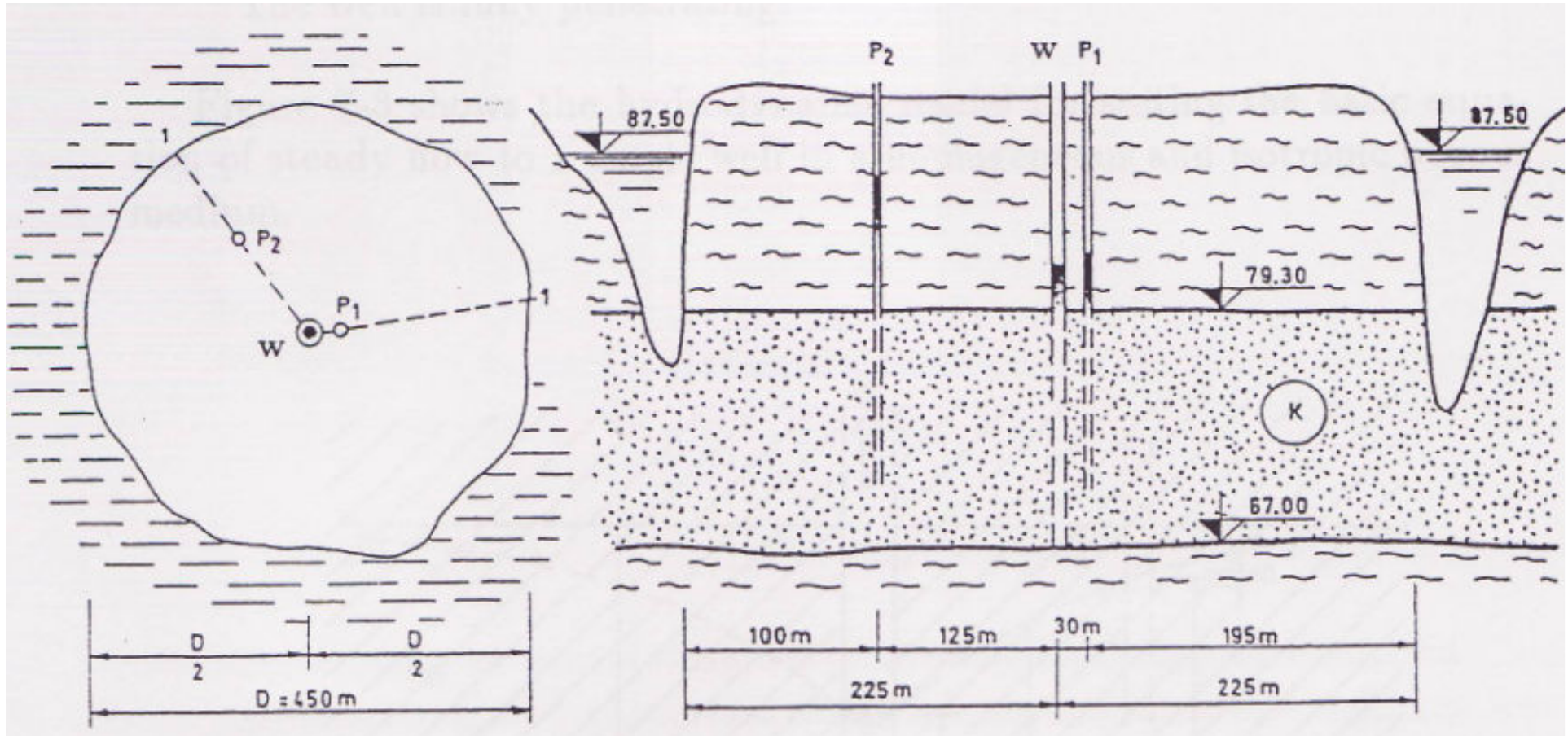
Split, 25. travnja 2012.

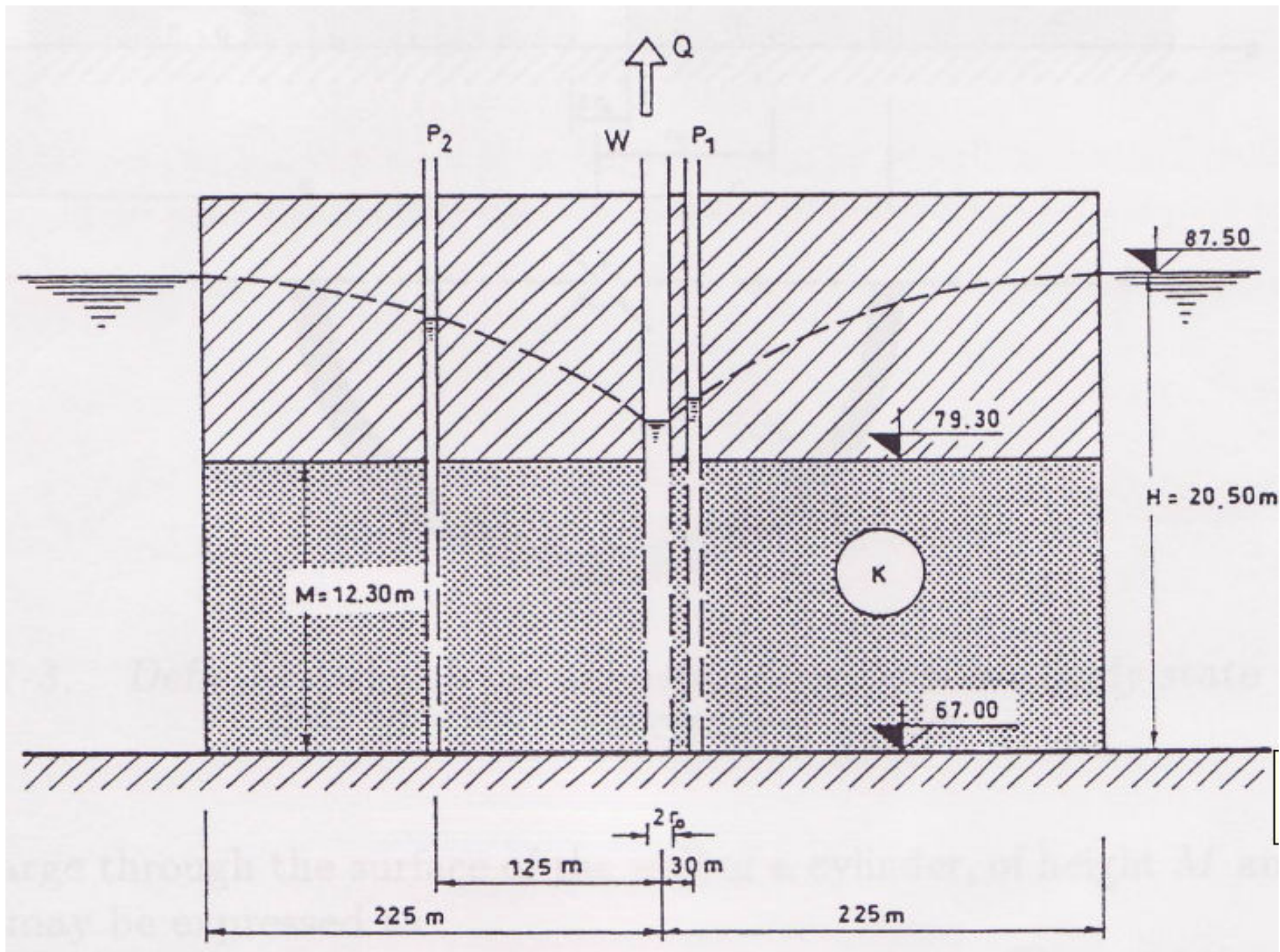


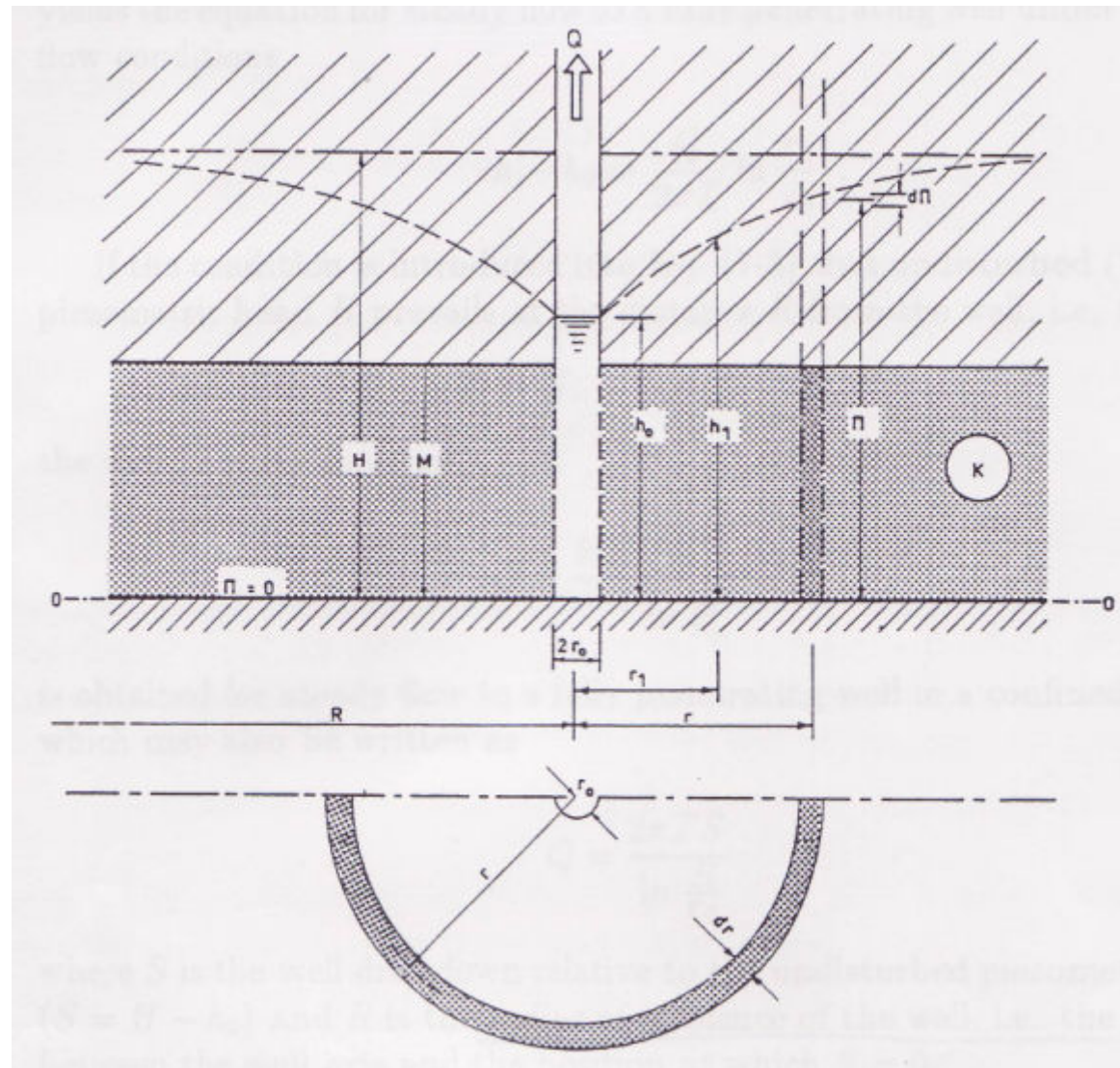
ZDENCI U OGRANIČENOM VODONOSNIKU

6.ZADATAK:

U središtu otoka promjera $D = 450$ m nalazi se zdenac u ograničenom području. Iz njega se crpi $Q=16$ l/s. Za zadani slučaj potrebno je izračunati razinu vodnog lica u zudencu i u dva piezometra uz bunar. Razina vode u jezeru koje okružuje otok iznosi 87.50 m. Promjer zdenca iznosi $2r_0=350$ mm , a konduktivitet vodonosnika je $K = 3 \cdot 10^{-2}$ cm/s.







$$Q = \omega K \cdot \frac{d\Pi}{dr} = 2\pi r M K \cdot \frac{d\Pi}{dr}$$

$$d\Pi = \frac{Q}{2\pi T} \cdot \frac{dr}{r}$$

$$r = r_1 \quad \Pi = h_1$$

$$r = r_0 \quad \Pi = h_0$$

$$h_1 - h_0 = \frac{Q}{2\pi T} \ln \frac{r_1}{r_0}$$

$$r = R \quad \Pi = H,$$

$$Q = \frac{2\pi T (H - h_0)}{\ln \frac{R}{r_0}}$$

$$Q = \frac{2\pi T (H - h_0)}{\ln \frac{R}{r_0}}$$

$$h_1 - h_0 = \frac{Q}{2\pi T} \ln \frac{r_1}{r_0}$$

$$h_1 = h_0 + \frac{Q}{2\pi T} \ln \frac{r_1}{r_0}$$

$h_0 = 15.56 \text{ m} \rightarrow S = 4.94 \text{ m}$

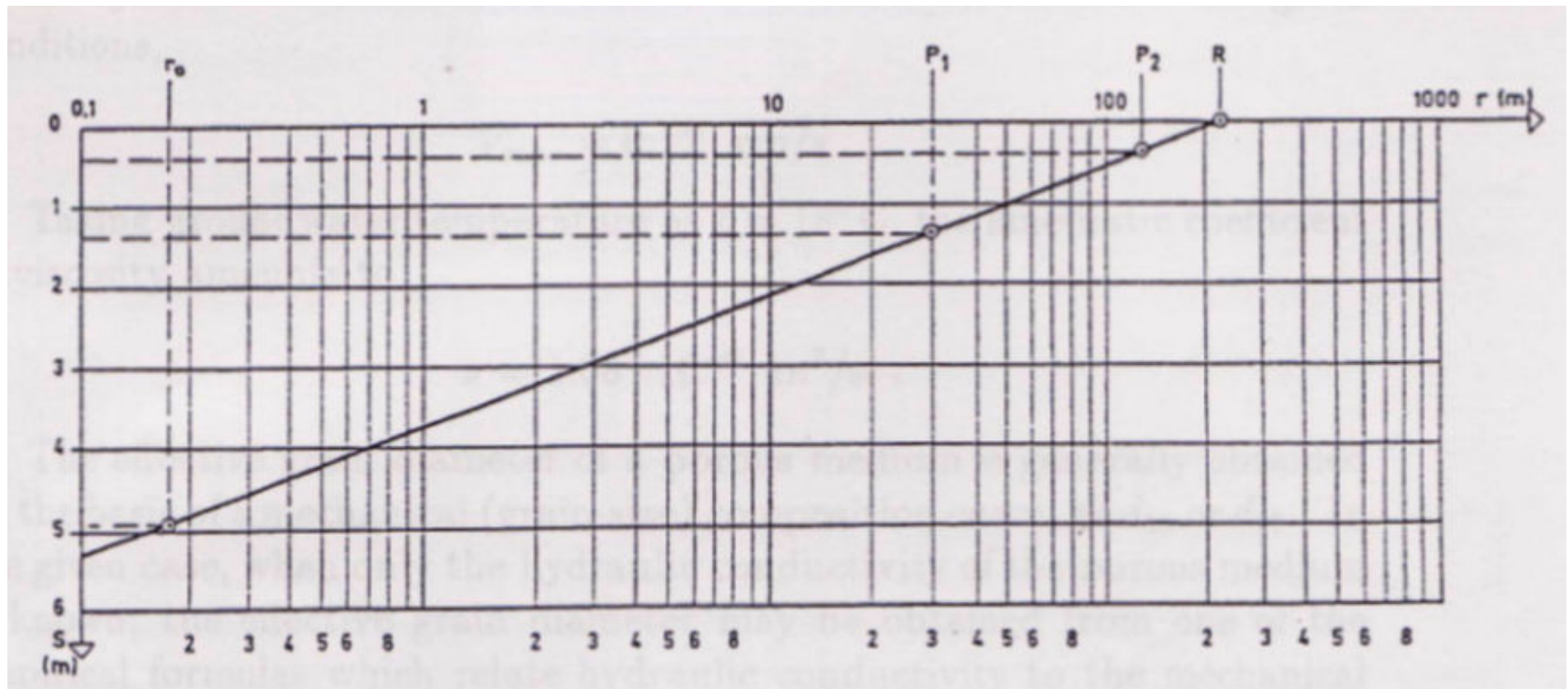
$h_1 = 19.11 \text{ m} \quad h_2 = 20.09 \text{ m}$

$$S_1 = 1.39 \text{ m}$$

$$S_2 = 0.41 \text{ m}$$

$$S = \frac{Q}{2\pi T} \ln R - \frac{Q}{2\pi T} \ln r$$

$$S = -\frac{Q}{2\pi T} \ln r + \text{const}$$

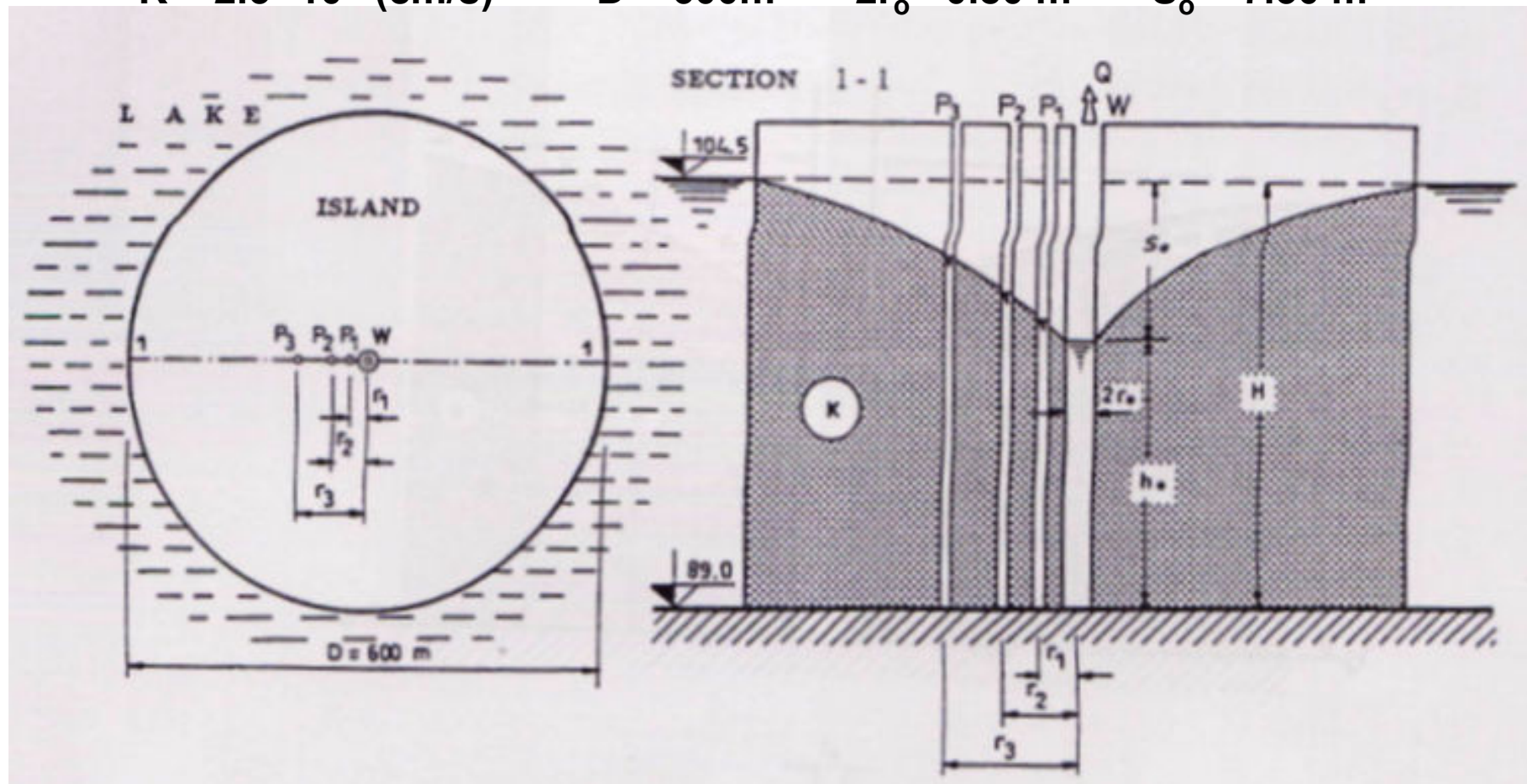


ZDENAC U NEOGRANIČENOM VODONOSNIKU

7. ZADATAK:

Na slici je prikazan otok okruglog tlocrtnog oblika. Razina vode jezera je 104.50 m n.m. Cijeli otok je vodonosnik sa homogenim karakteristikama a tok je sa slobodnim vodnim licem. U središtu otoka nalazi se zdenac i tri piezometra na udaljenostima $r_1 = 3\text{ m}$, $r_2 = 28\text{ m}$ i $r_3 = 125\text{ m}$ od zdenca. Izračunaj količinu koja se crpi iz zdenca i razinu vodnog lica za slijedeće uvjete.

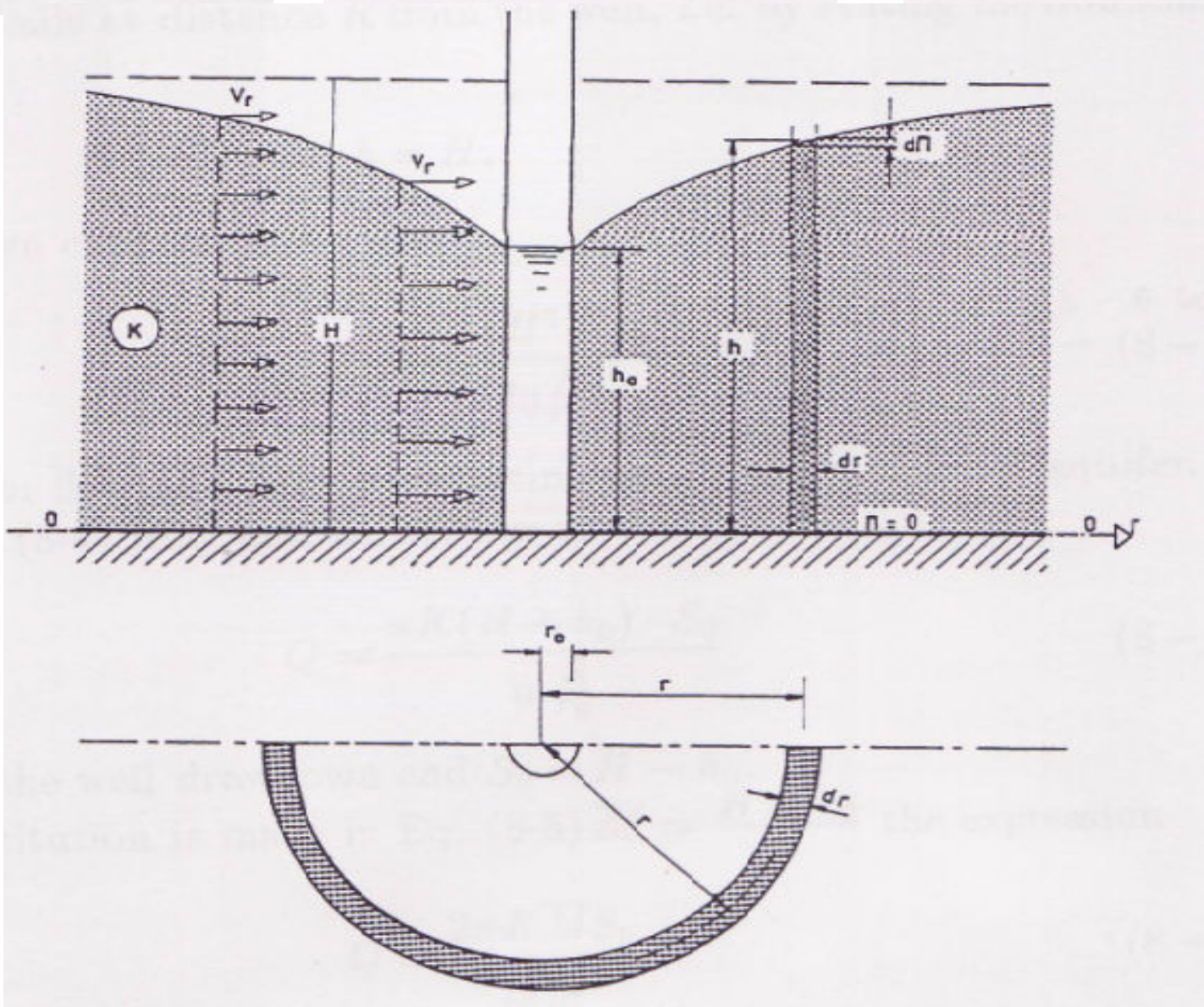
$$K = 2.5 \cdot 10^{-2} \text{ (cm/s)} \quad D = 600\text{ m} \quad 2r_0 = 0.80 \text{ m} \quad S_0 = 7.30 \text{ m}$$



$$Q = \omega K \frac{d\Pi}{dr}$$

$$Q = 2\pi r h K \frac{d\Pi}{dr}$$

$$h d\Pi = \frac{Q}{2\pi K} \cdot \frac{dr}{r}$$



$$\Pi = h$$

$$h dh = \frac{Q}{2\pi K} \frac{dr}{r}$$

$$r = r_0$$

$$h = h_0$$

$$r = r_1$$

$$h = h_1,$$

$$h_1^2 - h_0^2 = \frac{Q}{\pi K} \ln \frac{r_1}{r_0}$$

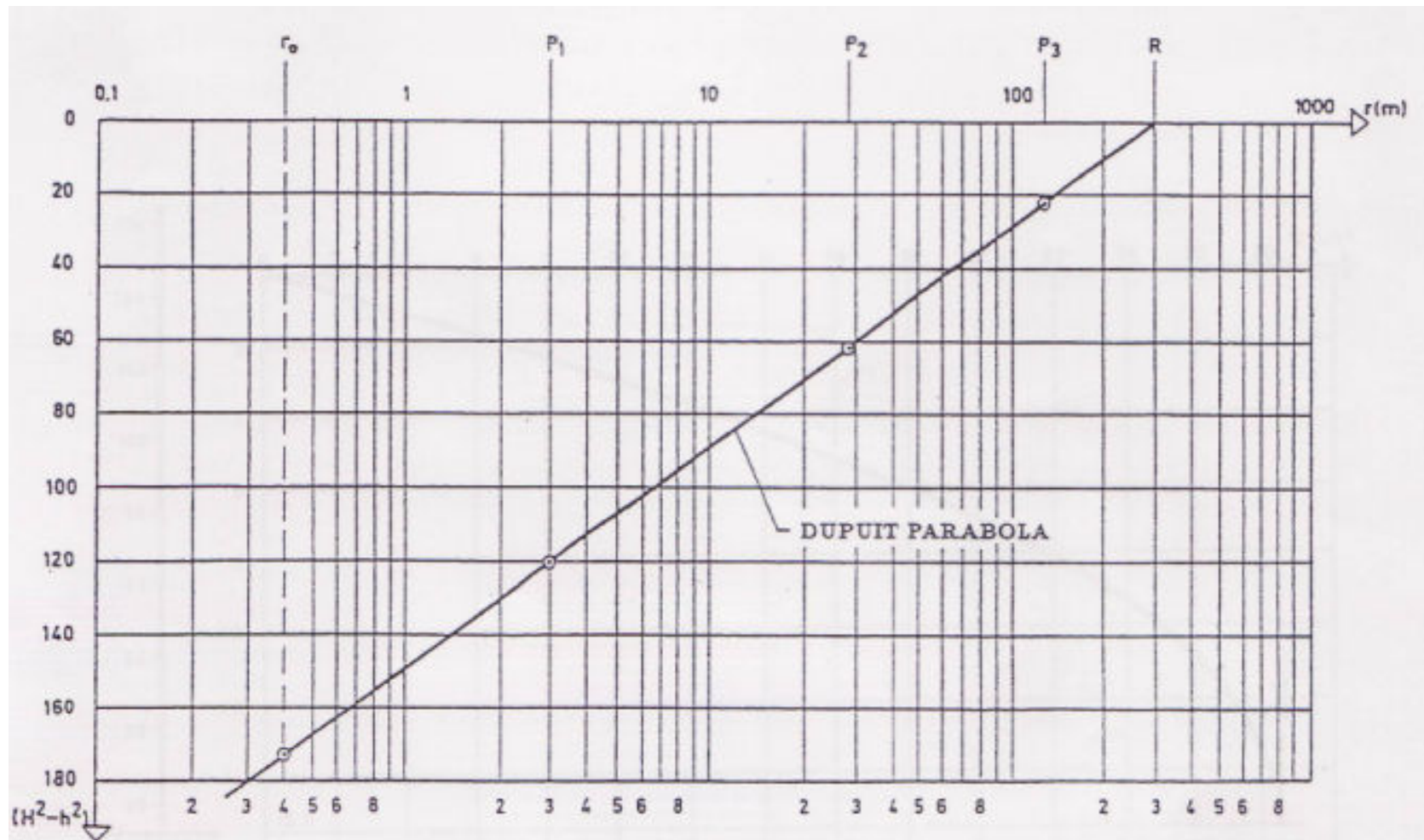
$$r = R \quad h = H$$

$$Q = \frac{\pi K (H^2 - h_0^2)}{\ln \frac{R}{r_0}}$$

$$Q = 20.5 \text{ (l/s)}$$

$$h_1 = \sqrt{h_0^2 + (H^2 - h_0^2) \frac{\ln \frac{r_1}{r_0}}{\ln \frac{R}{r_0}}}$$

$$H^2 - h^2 = -\frac{Q}{\pi K} \ln r + \text{const}$$



Facility	Distance from well axis r (m)	Water height h_1 (m)	Drawdown $S = H - h_1$ (m)	Piezometric head elevation
Well - W	0.4	8.20	7.30	97.20
Piezometer -P ₁	3	10.95	4.55	99.95
Piezometer -P ₂	28	13.35	2.15	102.35
Piezometer -P ₃	125	14.74	0.76	103.74
Lake	300	15.50	0	104.50

8.ZADATAK:

Za podatke iz prethodnog zadatka ispitati utjecaj sniženja potencijala u zdencu na količinu crpljenja iz istog?

$$Q = \frac{\pi K (H^2 - h_0^2)}{\ln \frac{R}{r_0}}$$

Drawdown S (m)	Depth of water in well h_0 (m)	Discharge Q (l/s)
0	15.50	0
3	12.50	9.96
6	9.50	17.80
7.3	8.20	20.50
9	6.50	23.49
12	3.50	27.05
15.5	0	28.5

