Well Design

Steps:

1. From given sieve analysis table find
   - Cumulative % Retained
   - % Finer.
2. Draw % Finer Vs Sieve opening (mm).
3. Find (a) $C_u = \frac{D_{60}}{D_{10}}$
   (b) D_{50}
4. If $C_u < 2.5$

   - Slot size → D_{70} (seventy) of this curve.
   - Slot no → $\left[\frac{D_{70}\,(mm)}{25.4} * 1000\right]$ → Take lower integers

   If $C_u > 2.5$

   (a) Draw new curve parallel to previous one by one point ↓ $\boxed{D_{30} * (4 \text{ to } 6)}$

   (b) Prepare new table of sieve analysis

Math done in book of Aziz Sir (09)

If $C_u > 2.5$

Check $C_u < 2.5$ for new curve.

$$\text{Slot no} \rightarrow \left[\frac{D_{10}\,(\text{mm})}{25.4} * 1000\right]$$

(D_{10} : ten)

Take lower integer

DISCHARGE :

D → dia of strainer (feet)

H = 1'

Velocity = 0.1 fps

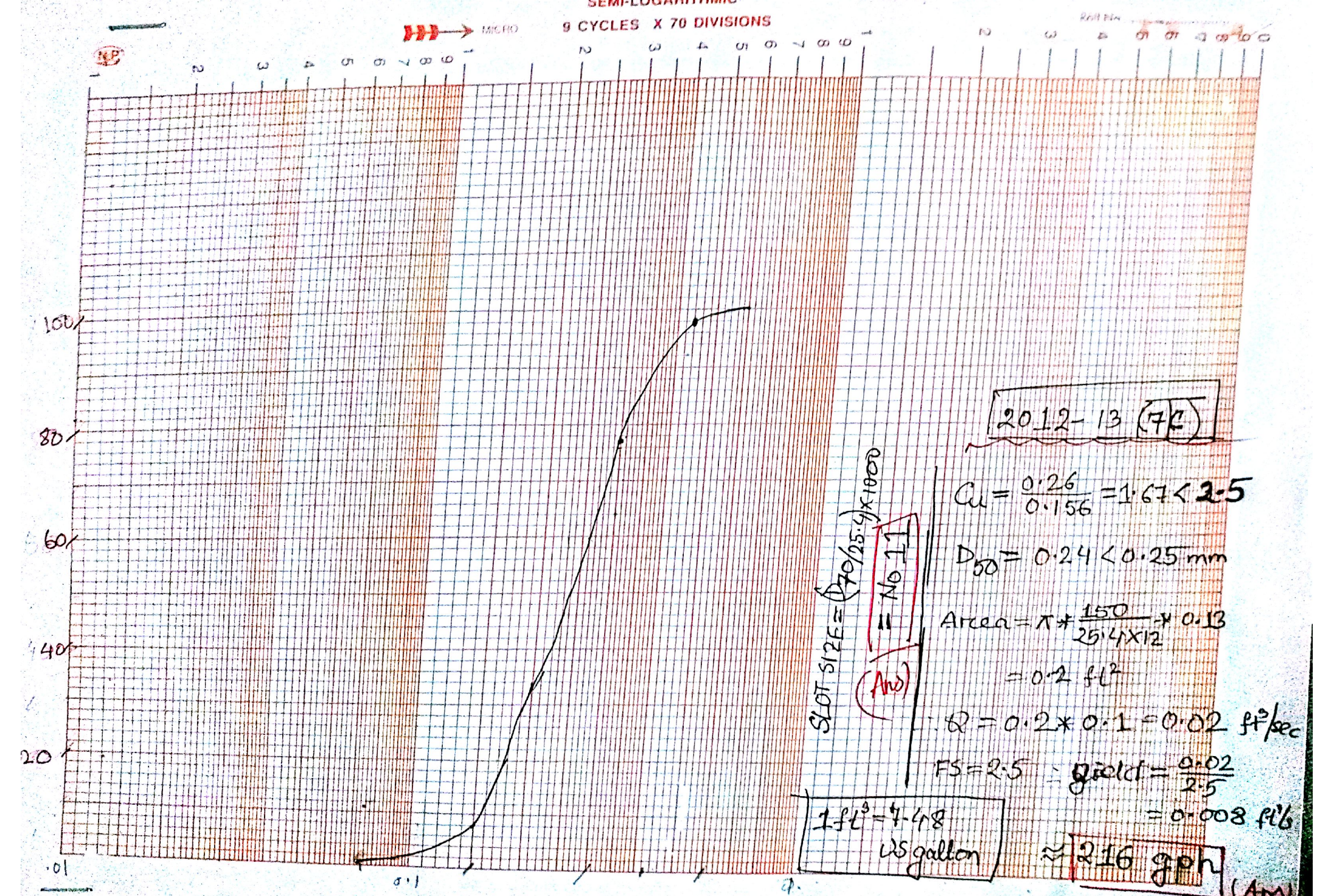
Area = (π D H) * opening of strainer.

Discharge = (Area x velocity)

F.S = 2.5

$$\therefore \text{Yield} = \frac{\text{Discharge}}{2.5}\ ft^3/\text{sec.} = [\quad] * 7.48 \text{ US gallon per sec}$$

Ans: ⓐ slot No:
ⓑ Discharge OR Yield =



2012-13 (7F)

$C_u = \frac{0.26}{0.156} = 1.67 < 2.5$

$D_{50} = 0.24 < 0.25$ mm

$\text{Area} = \pi * \frac{150}{25.4 \times 12} * 0.13$

$= 0.2 \text{ ft}^2$

$\therefore Q = 0.2 * 0.1 = 0.02 \text{ ft}^3/\text{sec}$

$FS = 2.5 \quad \therefore q_{allo} = \frac{0.02}{2.5}$

$= 0.008 \text{ ft}^3/\text{s}$

$\approx 216 \text{ gph}$ (Ans)

Slot size = (70/25.4)x1000

= No 11 (Ans)

1 ft³ = 7.48 US gallon

AQUIFER

12-13

6 (b) well dia = 0.3 m.

$\therefore r = 0.15$ m.

$D = 50$m.

$D - d = 10$ m.

$\therefore d = 40$m.

$Q = 1800$ litre/min.

$$1800 = 2\pi x y * K \frac{dy}{dx}$$

$$\Rightarrow K = \frac{1800 \int_{0.15}^{47.5} dx/x}{2\pi * \int_{40}^{47} y\,dy}$$

$$= \frac{1800 \ln(47.5/0.15)}{\pi * (47^2 - 40^2)}$$

$$K = 3.68 \text{ lpm/m}^2$$

Now,

$$1800 = \frac{\pi k (50^2 - 40^2)}{\ln(R/0.75)}$$

$\Rightarrow R =$ ~~732.44 m.~~
~~243.14 m~~ 48.6.

$\omega =$ ~~67.5~~ 7.5
$r = 0.15$ m
$D = 50$ m
$d = (50 - 9)$
$= 41$ m.

$$\therefore Q_1 = Q_2 = \frac{\pi k (D_2^2 - d_2^2)}{\ln(R^2/\omega r)}$$

$$= \frac{\pi k (50^2 - 41^2)}{\ln\left(\frac{243.44^2}{0.15 \times 67}\right)}$$

= ~~871.2 m³/min~~ .1238 m³/min.

$Q_1 + Q_2 =$ ~~2473 m³/min.~~

(Ans)

2476 lpm

(Ans)