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Sec :: B

Subj:: Hydraulic Structure

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Question No "1" Part (A)

Answer

Reservoirs:-

A natural or artificial place where water is collected and stored for use especially water for supplying a community, irrigating lands, furnishing power, etc.

OR

A receptacle or chamber for holding a liquid or fluid.

Economical Reservoir:-

Service reservoir is the most economical because it is entirely man made. Its frame construction is easy as no need of any natural water body diversion. It also requires small space.

Question No "1" Part (B)

Answer

There are two types of embankments

Earth-fill embankment

Rock-fill embankment

The most suitable embankment for hilly areas is Rock-fill embankment because of the following reasons:

1. It contains about 50% or more rock-fill materials of the total volume of constituents that can be easily available in hilly areas and are economical because of minimizing of transport charges.
2. Similarly it is constructed on hard rock type foundation which can be easily available in hilly areas as well as rock forms best foundation material which are free from faults, seams of soft shales or clay etc.

Question No "2"

Types of Spillways:-

Different types of spillways are as follows

1. Straight Drop spillway
2. Ogee spillway
3. Shaft spillway
4. chute spillway
5. Side channel spillway
6. Siphon spillway
7. Labyrinth spillway

⇒ Selection of spillway for the given condition (in question).

In the condition where the temp decrease to -10 degree in winter season:

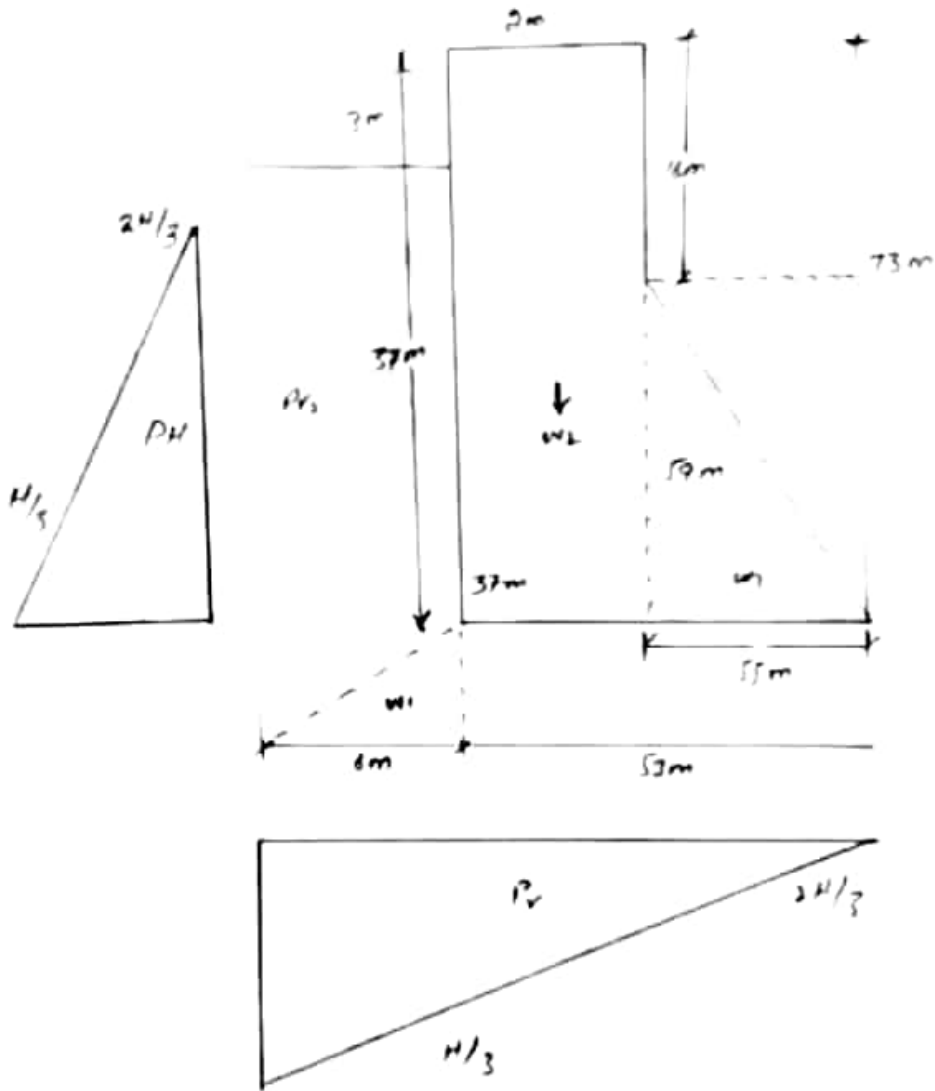
The most efficient spillway is chute spillway because chute spillway dispose water from upstream through a steeply sloped open channel so that flow velocity will be very high which leads to the super

Critical flow condition.

Due to high kinetic energy of water results in increase of temp thus the water will not freeze and the flow will remain continuous.

Question NO "3"

④



Condition:-

$$\Rightarrow e < \frac{B}{6}$$

$$e < \frac{69}{6}$$

$$7.16 < 11.5 \quad \text{ok safe}$$

\Rightarrow $\sigma_{\text{heel}} > 0$

$$k = \frac{2FV}{B} = \left(1 + \frac{6e}{B}\right)$$

$$k = \frac{2FV}{B} \left(1 + \frac{6e}{B}\right) = \frac{34392}{69} \left(1 + \frac{6(7.16)}{69}\right)$$

$$k = 608.76 \text{ KN/m}^2$$

$$\sigma_{\text{heel}} = \frac{2FV}{B} \left(1 - \frac{6e}{B}\right) = \frac{34392}{69} \left(1 - \frac{6(7.16)}{69}\right)$$

$$\sigma_{\text{heel}} = 163.10 \text{ KN/m}^2$$

\Rightarrow $\sigma_{\text{heel}} > 0$ ok safe

$$\Rightarrow \frac{E M_1}{E M_2} > 2$$

$$= \frac{262163.8}{1681750.0}$$

$$= 1.56 < 2 \quad \text{Not Safe}$$

$$\Rightarrow \text{EM} > \text{EM}_0$$

$$2622163.8 > 1681150.0 \quad \text{ok safe}$$

$$\Rightarrow \frac{11250 + 1800}{240} > 1$$

$$\frac{0.75 \times 34392 + 1.69 \times 11000}{24,500}$$

$$49971 \quad \text{ok safe.}$$