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SEC : C

8th semester

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 land, 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 thus 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 shals 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

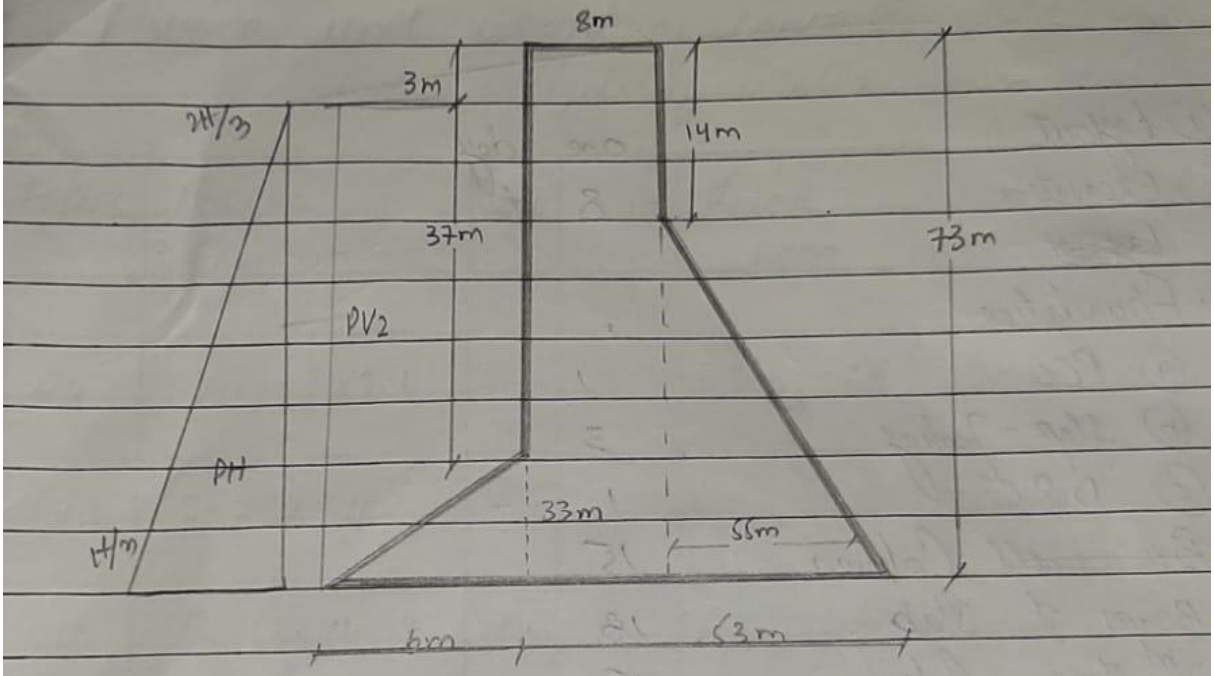
7. Labyrinth Spillway

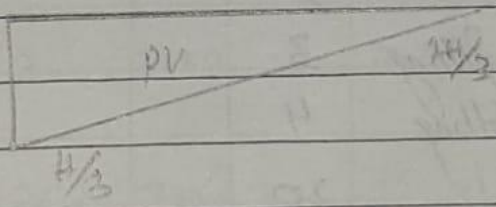
In a condition where freezing point of water is less than -10 degree centigrade in winter the most efficient spillway is chute spillway because chute spillway disposed water from upstream to the downstream through a steeply sloped open channel, So that the flow will be very fast the flowing water pressure will be high and will be in supercritical condition that will dissipate energy from the falling water, energy dissipaters

are also provided in this type of spillway thus the temperature of water will go high and it will not allow water to freeze and stop. So the water will move freely and this cold area also and this type of spillway as the water flow from steeply channel so that the kinetic energy will take place and increase the temperature of water.

QUESTION NO “3”

SOLUTION


8m
3m
14m
37m
73m
2H/3
PV2
PH
H/m
33m
55m
6m
53m


PV
2H/3
H/3

Moment Calculation:-

Assume unit weight of concrete $\gamma_c = 24\ KN/m^3$
unit weight of water $\gamma_w = 10\ KN/m^3$

FORCES	FORCES CALCULATION	FV	FH	LEVER ARM	MV	MO
W1	$\frac{1}{2}\times 6\times 33\times 24$	2376		$63+\frac{6}{3}=65$	154440	
W2	$3\times 73\times 24$	14016		$55+\frac{3}{2}=57$	826944	
W3	$\frac{1}{2}\times 55\times 59\times 24$	38940		$55\times\frac{2}{3}=36.67$	1427929.8	
PV1	$\frac{1}{2}\times 6\times 33\times 10$	990		$63+\frac{2\times 6}{3}=69$	60330	
PV2	$6\times 37\times 10$	2220		$65+\frac{6}{2}=66$	146520	
PU	$-\frac{1}{2}\times 69\times 70\times 10$	-24150		$69\times\frac{2}{3}=46$	1110700	
PH	$-\frac{70^2}{2}\times 10$	-24500		$70\times\frac{1}{3}=23.3$	570850	

$\Sigma F_V = 34392$ $\Sigma F_H = 24500$ $\Sigma M_V = 2622163.8$
$\Sigma M_O = 1681750$

$e = \frac{B}{2} - \bar{x}$

$\bar{x} = \frac{2622163.8 - 1681750}{34392}$

$\boxed{\bar{x} = 27.34\ m}$

Condition :-

⇒ $e < B/6$

$e < 69/6$

$7.16 < 11.5$ ok safe

⇒ $\gamma_{heel} > 0$

$$\gamma = \frac{\Sigma FV}{B}\left(1 \pm \frac{6e}{B}\right)$$

$$\gamma = \frac{\Sigma FV}{B}\left(1 + \frac{6e}{B}\right) = \frac{34392}{69}\left[1 + \frac{6(7.16)}{69}\right]$$

$$\boxed{\gamma = 808.76\ KN/m^2}$$

$$\gamma_{heel} = \frac{\Sigma FV}{B}\left(1 - \frac{6e}{B}\right) = \frac{34392}{69}\left[1 - \frac{6(7.16)}{69}\right]$$

$$\boxed{\gamma_{heel} = 133.10\ KN/m^2}$$

$\boxed{\gamma_{heel} > 0}$ ok safe

⇒ $\frac{\Sigma M_r}{\Sigma M_e} > 2$

$= \frac{2622163.8}{1681750.0}$

$\boxed{= 1.56 \not> 2 \quad \text{Not safe}}$

⇒ $\Sigma M_r > \Sigma M_o$

$2622163.8 > 1681750.0$ ok safe

Date:

$$e = \frac{69}{2} - 27.34$$

$$\boxed{e = 7.16 \text{ m}}$$

$$\Rightarrow \frac{(1 \pm F_v + B \times e}{\Sigma F_H} > 1$$

$$\frac{0.75 \times 34392 + 69 \times 1400}{24660}$$

$$\boxed{4.99 > 1 \quad \text{ok safe}}$$