QUESTION 1

a) Define reserviour also explian which type of reserviour will be more encnomical and why?

RESERVOIR:

A reservoir is a man-made lake that is primarily used for storing water. They can also be defined as the specific bodies of water formed by the construction of a dam.

Earth fill dam/reservoir is the most economical because:

1. Earth is readily available in most parts of the world close to possible dam sites. Now days the knowledge of soil mechanics has further enhanced the chances to make unstable earth dam as stable.
2. Earth can be excavated by hand, transported in baskets and compacted with cattle's walking over it. In suitable situation, earth can be handled and moved with latest machinery.
3. Earth dams are suited to the sites where a masonry dam cannot be used for structural reasons. These dams can be constructed even on compressible foundations. The intensity of foundation stress due to earth is less than that due to solid masonry. The horizontal water pressure on the dams is distributed over greater area because of greater base width and hence, the danger of sliding on a weak foundation is minimized. The greater width of dam foundation also minimizes the leakage through the foundation beneath the dam.
4. The most important advantage of an earth dam compared to masonry dam is its lesser cost. It has been observed that the total cost of an earth dam, is roughly one-half of a concrete dam.

b) Which type of Embankment dam you will suggest in a hilly area and why?

The two principal types of embankment dams are earth and rock-fill dams, depending on the predominant fill material used. A rock-fill dam is one composed largely of fragmented rock with an impervious core. ln hilly areas the slopes are step and the velocity is very high, In that case rock-fill dam is most preferable having the ability to withstand high pressure of water and easy availably of materails (ROCKS) near by.

QUESTION 2 :List down different types of spillways also mention which type of spillway will be more efficent in a condition where freezing point of water is less then -10 degree centigrade in winters and why?

Spillways:

A spillway is a hydraulic structure built at a dam site for diverting the surplus water from a reservoir after it has been filled to its maximum capacity.

Types Of Spillways:

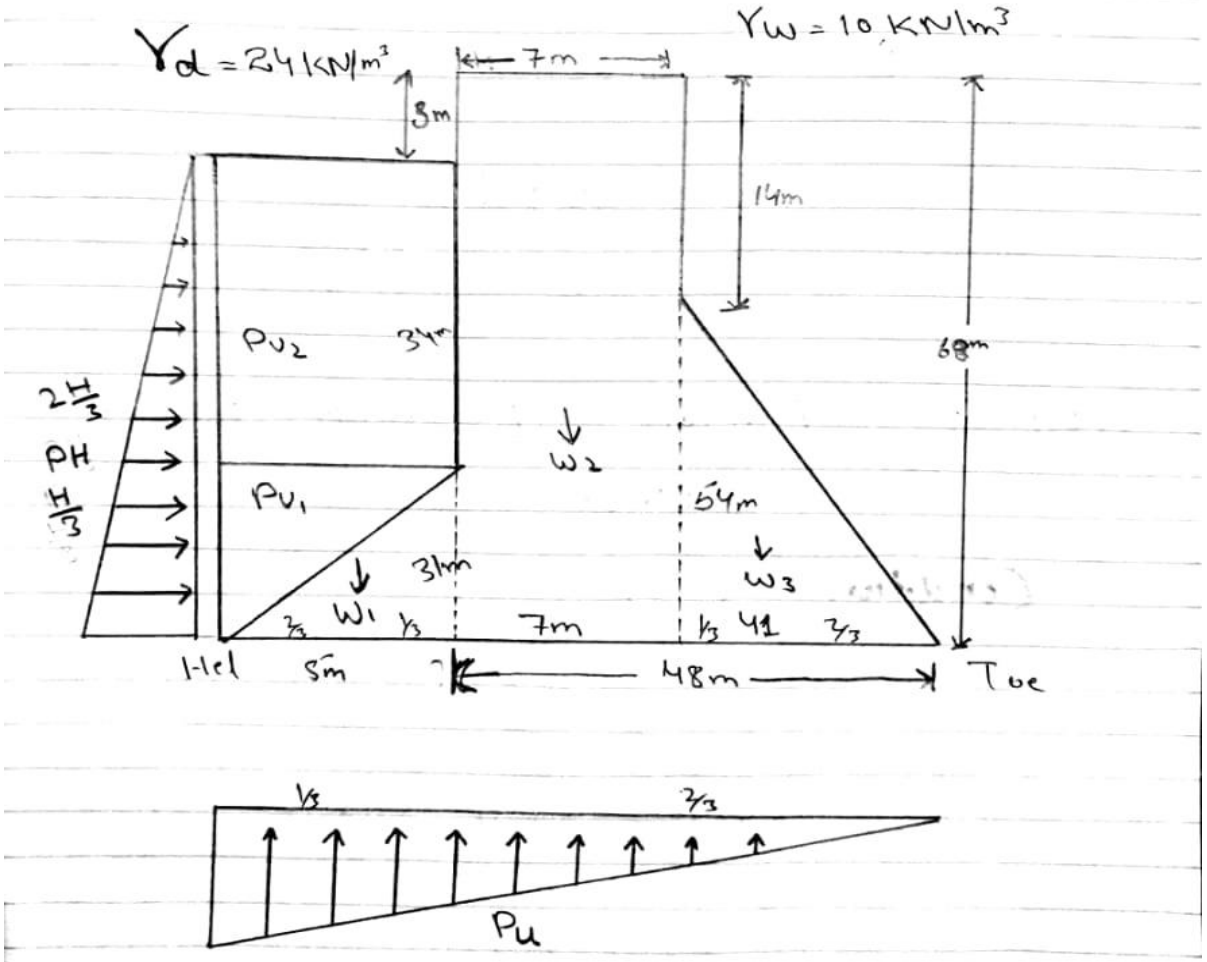
1. Straight Drop Spillway
2. Ogee Spillway
3. Shaft Spillway/ Bell-mouth spillway
4. Chute Spillway
5. Side Channel Spillway
6. Siphon Spillway
7. Labyrinth Spillway
8. Tunnel Spillway

Chute spillway will be more efficent in a condition where freezing point of water is less then -10 degree centigrade in winters. It is very economical as they generally follow the ground slope and safely negotiate the drop of water.

QUESTION 3

Q No '3' (1) ID = 7549

(A) Design the gravity dam by assuming the dam dimmension find all the stability checks at least three must be in safe Condition and economical. In reserviour full Conelition Consickering weight of dam water pressure and uplft Pressure (CLO3).



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Step 1 Moment Calculation

Force	Force Calculation	F_V (KN)	F_H (KN)	levaram	M_r	M_o
W_1	$\frac{1}{2} \times 5 \times 31 \times 24$	1860		$48 + 5 \times \frac{1}{3} = 4.67$	1860×4967 92386.2	
W_2	$7 \times 68 \times 24$	11424		$41 + \frac{7}{2} = 44.5$	508368	
W_3	$\frac{1}{2} \times 41 \times 54 \times 24$	26568		$41 \times \frac{2}{3} = 27.33$	726163.44	
P_{V_1}	$\frac{1}{2} \times 5 \times 31 \times 10$	775		$48 + 5 \times \frac{2}{3} = 51.33$	33780.75	
P_{V_2}	$5 \times 34 \times 10$	1700		$48 + \frac{5}{2} = 50.5$	85850	
P_4	$-\frac{1}{2} \times 53 \times 65 \times \frac{1}{10}$	-1722.5		$53 \times \frac{2}{3} = 35.33$		60855 9.2/5
P_H	$-10 \times \frac{65^2}{2}$		-21125	$\frac{H}{3} = \frac{65}{3} = 21.67$		457778.75
		$\Sigma F_V =$ 25702	$\Sigma F_H =$ 21125		$\Sigma M_r =$ 1452488.39	ΣM_{o_2} 1066338

eccentricity of the resultant force

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

$\bar{X}$, location of resultant force from Toe

$$\bar{X} = \frac{\Sigma M_R - \Sigma M_O}{\Sigma F_V}$$

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$$\bar{X} = \frac{14524488.39 - 1066338}{25102}$$

$$\boxed{\bar{X} = 15.38\,M}$$

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

$$e = \frac{53}{2} - 15.38$$

$$\boxed{e = 11.12\,M}$$

Step 2 Factor of safety against tanson

Condition $e \not> \frac{B}{6}$

$$11.12 \not> \frac{53}{6}$$

$$\boxed{11.12 \not> 8.83}$$ not ok

than

$$\sigma_{heel} > 0$$

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

$$\sigma_{Toe} = \frac{25102}{53}\left(1 \pm \frac{6 \times 11.12}{53}\right)$$

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(4)

$= 1069.8 \text{ kN/m}^2$

$\sigma_{heel} = \frac{251.02}{53}\left(1 - \frac{6 \times 11.12}{53}\right)$

$= -122.6 \text{ kN/m}^2$

Sence $\sigma_{heel} < 0$,

than not safe in tenson

(ii) FOS against over terning

$$\frac{\Sigma M_R}{\Sigma M_O} => 2$$

$$= \frac{14524888.39}{1066338}$$

$= 1.36 \not> 2$

$\Sigma M_R > \Sigma M_O$

$14524888.39 \not> 1066338$

o/c Safe

(iii) FOS against Sliding

$$\frac{\mu \Sigma F_v + B \cdot q}{\Sigma F_s} > 1$$

$$\frac{0.7 \times 251.02 + 53 \times 1400}{2112.5}$$

$= \boxed{4.34}$ o/c Safe

$0.65 + 0.75$

$\boxed{\mu = 0.7}$

$q = 1400$