Q1 :-

Ans :-

"a" Reservioul :- A reservioul is a basin constructed valley of a stream to store the water during the excess stream flow of water. Reservioul can be natural or artifical man made. used as a source of water supply.

They are mainly three type of reservior.

valley dameel reservior, Bankside reservior, service reservior.

The service reservior are requried small space. they are entirely manmade. it is most economical. it is easy to construct. and no need of any natural water body diversion.

Embankment dam:-

Embaukment dam is constructed from natural material excavated or obtain close by

i) Rock fill dam
ii) Earth fill dam

⇒ In hilly area. I will suggest rock fill dam.

Rock fill dams can prove to be economically favorible when any of the following condition exists.

- Large quantities of rock are readily available or will be excavated in connection with the project such as from spillway or tunnel
- Short construction seasons prevails.
- the excellent performance of rock fill dam. and higher durability to resist the water pressure and impact.

Q2:- List down types of Spillways

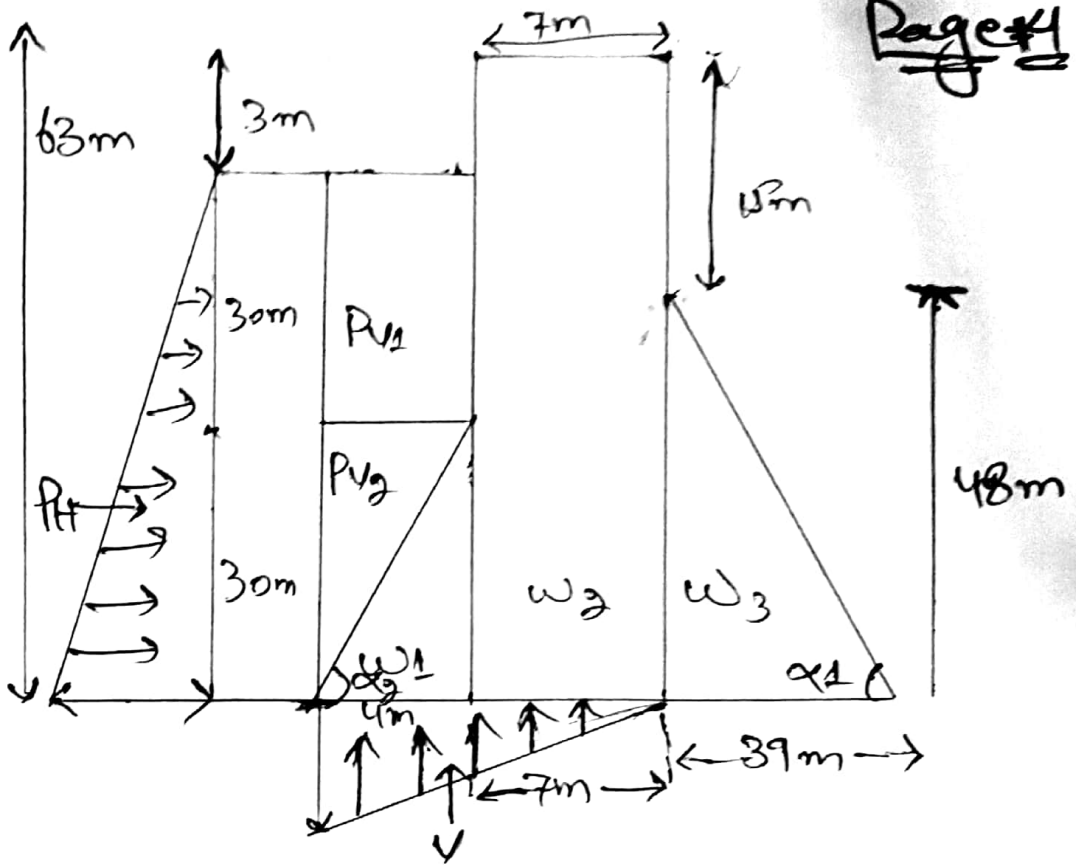
Some of the most common types of spillways which are usually provides in dams.

i) Tunnel spillway, ii) siphen spillway.
iii) side channel spillway, iv) shaft spillway
v) chute spillway, vi) free over-full spillway

=> Tunnel spillway be more efficient in a condition where freezing point of water is less then -10 degree centigrade in winter.

=> As we know that spillway is provided in dams to, transfer the water from upstream of dam to the downstream side from, from preventing the dam from overtopping in flood condition. In winter season the upper surface of water in dam are freezed but below the water in normal which can easily passed through tunnel.

Q No 3



Solution :-

force	force calculation	F_V (KN)	F_H (KN)	lever	MR (KN-M)	M_o (KN·m)
W_1	$\frac{1}{2}\times4\times30\times24$	1440	—	$46+4/3$ = 47.33	68160	—
W_2	$7\times63\times24$		—	42.5	449820	—
W_3	$\frac{1}{2}\times39\times48\times24$	10584	—	26	584064	—
P_{V1}	$(30\times4)\times(10)$	22464	—	48	57600	—
P_{V2}	$\frac{1}{2}\times4\times30\times10$	1200	—	$46+2/3(4)$ = 48.67	29209	—
P_H	$(-)\frac{1}{2}(10)(60)^2$	600	18000	20	—	3,60,000
V	$(-)\frac{1}{2}\times10\times60\times50$ $[\frac{1}{2}(w\times k)\times b]$	(-)15000		$2/3(50)$ = 33.33		5,00,000
		ΣF_V = 21929 KN	ΣF_H = 18000 KN		ΣM_R = 1188246 KN·M	ΣM_o = 8,60,000 KN·m

As we known that

$$\bar{x} = \frac{\Sigma M_R - \Sigma M_o}{\Sigma F_v}$$

$$\bar{x} = \frac{118846 - 8,60,000}{21988}$$

$$\bar{x} = 15.447\,m$$

$$e = B/2 - \bar{x} = \frac{50}{2} - 15.447$$

$$e = 9.553\,m$$

Therefore,

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

$$\sigma_{Toe} = \frac{F_v}{B \times 1}\left(1 + \frac{6(9.553)}{B}\right)$$

$$= \frac{21988}{50}\left(1 + \frac{6(9.553)}{50}\right)$$

$$= 913.78\,kN/m^2$$

$$\sigma_{(heel)} = \frac{F_v}{B \times 1}\left(1 - \frac{6(e)}{B}\right)$$

$$= \frac{21988}{50}\left(1 - \frac{6(9.553)}{50}\right)$$

$$= -69.26\,kN/m^2$$

σ (heel) < 0, the dam is not safe in tension

$\Sigma MR > \Sigma Mo$, the dam is safe

Safety against sliding

$$\frac{M \Sigma V + B_q V}{\Sigma H} > 1$$

M generally 0.65 - 0.75 take

$M = 0.7$

$$\Rightarrow = \frac{M \Sigma V + B_q V}{\Sigma H}$$

$$= \frac{(0.7)(21288) + 50\,(1400)}{18000}$$

$$\Rightarrow 4.716 > 1$$

→ OK