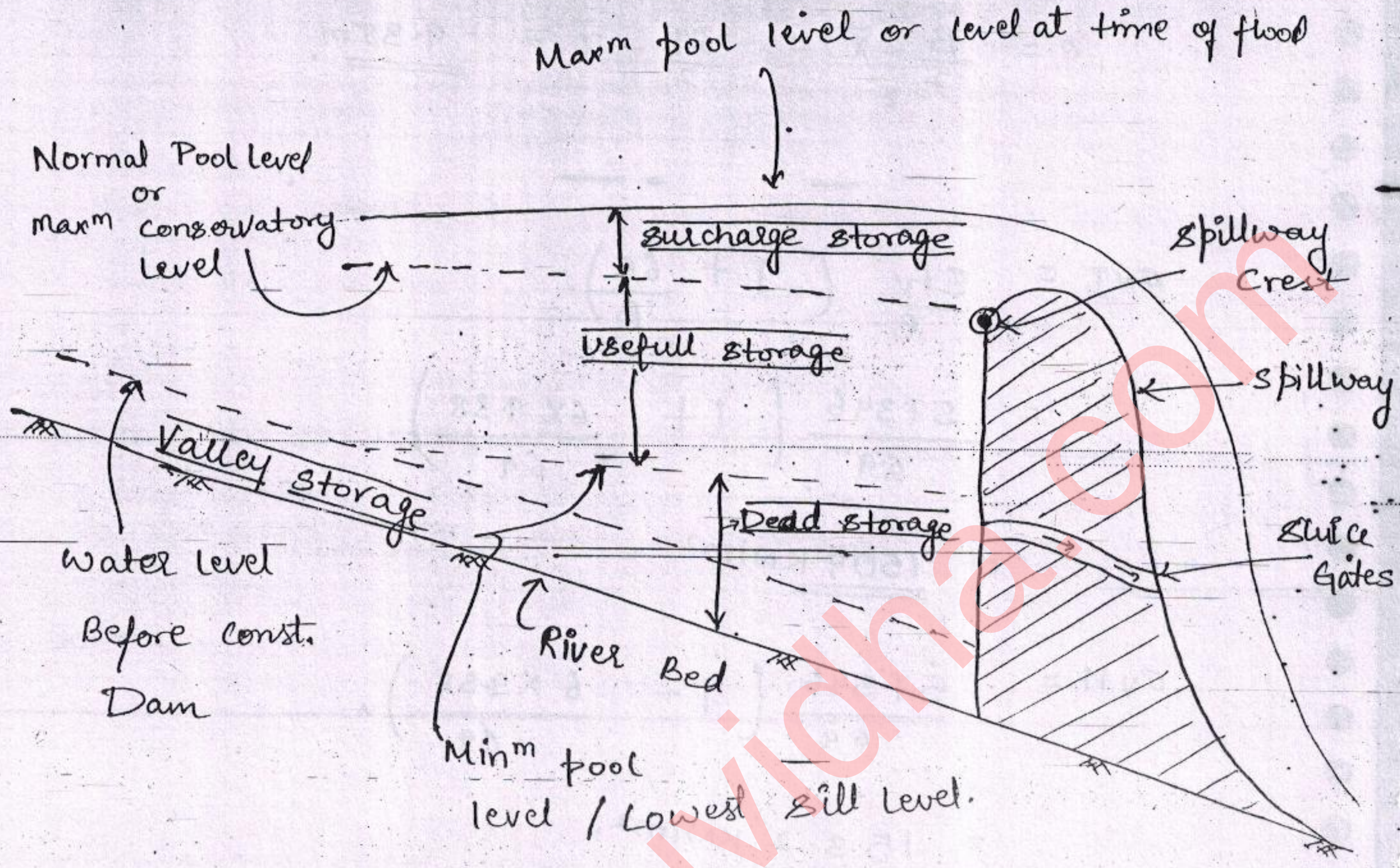
# ⇒ STORAGE ZONES IN RESERVOIR




→ MIN. POOL LEVEL

→ it is the level corresponding to minm quantity of water that has to be kept in the reservoir for the ~~non~~ normal working of the reservoir.

→ it is decided on the basis of Lowest outlet level of the Reservoir.

→ And minm Head reqd. for the efficient working of the turbine (if any)

→ **NORMAL POOL LEVEL:-**

it is the water level corresponding to the maxm quantity of water that can be stored in the reservoir for its normal working.

→ **USEFUL STORAGE**

→ Quantity of water stored b/w normal pool level and minm pool level.

→ the water stored in this zone can be used for following purposes:-

(i) Net crop water requirement
(ii) flood mitigation "
(iii) Power Generation "
(iv) Conservation of water

→ The reservoir used for more than one of the purposes is called multi purpose.

→ **DEAD STORAGE** → Water stored below the minm pool level.

→ The soul purpose of providing dead storage is to accomodate the silt deposited at the base of the reservoir and it doesnot serve any engineering purpose (mentioned above).

## SURCHARGE STORAGE

→ quantity of water stored b/w the Maxm pool level and the normal pool level.

↳ it is uncontrolled storage as it occurs only at the time of flood and cannot be used latter for any engineering purposes.

## BANK STORAGE :-

↳ When the reservoir is full some quantity of water seeps into the permeable soil below the dam and comes out into the reservoir when the water level starts falling.

↳ Hence Bank storage effectively ↑ the Capacity of the reservoir.

↳ But is not considered for the design purpose

## VALLEY STORAGE

↳ Even Before the construction of dam certain variable amount of water is present in the valley flowing over the valley is known as Valley storage

↳ Valley storage effectively ↓ capacity of Reservoir.

⇒ Gross storage = S.S + U.S. + V.S + D.S.

⇒ Effectively storage = S.S + U.S + D.S or Gross storage − V.S.

⇒ Effective storage = U.S + S.S. or GS − VS − DS

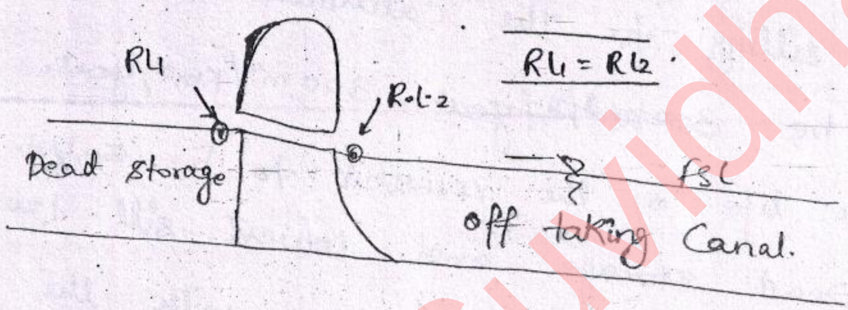
Note if any engineering purpose is mentioned than D.S will not be considered.

- Dead storage is generally taken as Maxm of :-

(I) D.S. = Rate of silting × Life of Reservoir.

(II) D.S. = 10% of G.S. or net water demand.

(III) Dead storage level = full supply level of the off taking canal.




→ CAPACITY = MINIMUM of

(I) Dependable yield of Reservoir.

(ii) Gross Capacity to fulfill all the demands

Eg:- Dependable — 550 hacm. G.C. — 220 hac.m || Dependable — 180 hacm. G.C — 200 hcam

Q The lowest portion of the capacity elevation curve of ~~the~~ ~~pro~~ a purposed irrigation reservoir draining 20 $Km^2$ of the catchment is represented by the following data:-

| ELEVATION (m) | CAPACITY (HAC-m) |
|---|---|
| 600 | 24.2 |
| 602 | 26.6 |
| 604 | 30.3 |
| 606 | 36.8 |

The rate of silting for the catchment has been assesed to be ~~300 km²/s/year~~. 300 $m^3/Km^2$/year. Assuming the life of the reservoir to be 50 yrs. Compute Dead storage and lowest sill level, if the main canal is 6 Km long with the bed slope of 1 in 1000 and the canal bed level at the tail end is 594.5 m. if the full supply depth of the canal at the Head is 80 cm. and the crop water requirement is 250 Hac-m. What will be the gross capacity of reservoir if dependable yield of the catchment is estimated to be 0.29 m

Soln ① D-S = R.O.S × D.C

$= 300 \times 20 \times 50 = 3 \times 10^5\ m^3$

$\frac{m^3}{K^2 \times year} \times year \times Km^2$ = ~~300~~ 30 hacm.

(2) Dead Storage = 10% G.S or Net water demand

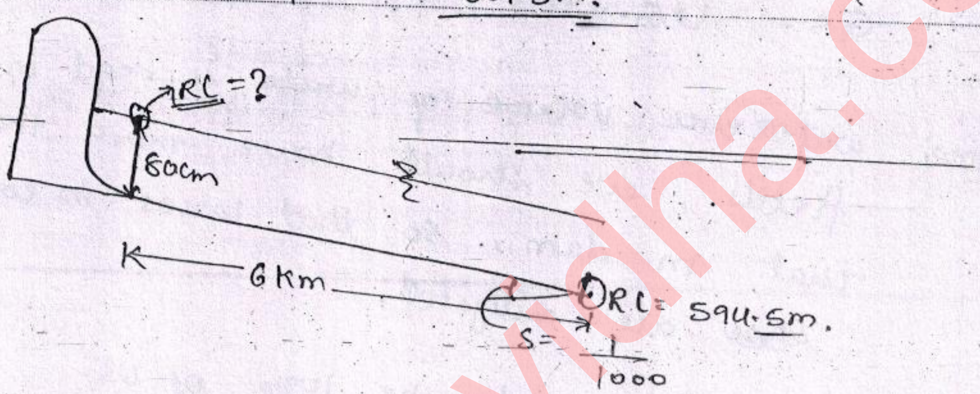
$= 10\% \times 250$ hac-m

$=$ 25 hac m.

(3). Dead storage level. = full supply level of off taking Canal.

$= 594.5 + (6 \times 1000) \times \frac{1}{1000} + 80 \times 10^{-2}$

$=$ 601.3m.




Now, from elevation curve, D.S corresponding to RL of 601.3.

$D.S. = 24.2 + \frac{(26.6 - 24.2)}{2} \times 1.3$

$=$ 25.6 hac-m.

⇒ D.S is max^m of (1) (2) & (3).

**D.S = 30 Hac-m**

⇒ for lowest sill level, we need to find the elevation corresponding to the above capacity.

∴ min^m sill level $= 602 + \frac{2}{(-26.6 + 30.3)}(30 - 26.6)$

$=$ 603.837.

Gross Capacity is minm of

① Dependable yield = 0.29m × Area

$= 0.29m \times 20 \times 10^6 \times 10^{-4}$

= 580 Ha-m

② Gross storage to meet all the demand.

$G.S = V.S + D.S + U.S + S.S$ (V.S → 0, not given; S.S → 0)

G.S = U.S + D.S.

Now, whatever volume of water is reqd in fields, we should have more than that in dam., so that losses in conveyance are mitigated.

③ Assume losses to be 10% of US.

∴ G.S = US + Losses + D.S

$= 280 + \frac{15}{100} \times 280 + 30.$

= 317.5 hac-m

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Gs = 317.5 hac-m.

DS = 30 hac-m.

$Ros = 300 \frac{m^3}{Km^2} \times \frac{20 Km^2}{year} \times 10^{-4}$

= 0.6 hac-m.

Life of Reservoir = $\frac{G.S}{R.O.S} = \frac{317.5}{0.6}$ = 529 yrs.

Note Here R.O.S is assumed to be constant