Section - 4

1. Net positive section NPSH :→

1. Net positive suction head is defined as the absolute pressure head at the inlet to the pump minus the vapour pressure head (in absolute unit) plus the velocity head

NPSH = Absolute pressure head at inlet of the pump - vapour pressure head + velocity head

$$= \frac{P_i}{\rho g} - \frac{P_v}{\rho g} + \frac{V_s^2}{2g} \quad \text{---(1)}$$

2. But the absolute pressure head at inlet of the pump is given by.

$$\frac{P_i}{\rho g} = \frac{P_a}{\rho g} - \left[\frac{V_s^2}{2g} + h_s + h_{fs}\right] \quad \text{---(2)}$$

3. Substituting the value of eq (2) in eq (1) we get

$$NPSH = \left[\frac{P_a}{\rho g} - \left[\frac{V_s^2}{2g} + h_s + h_{fs}\right]\right] - \frac{P_v}{\rho g} + \frac{V_s^2}{2g}$$

$$= \frac{P_a}{\rho g} - \frac{P_v}{\rho g} - h_s - h_{fs}.$$

$NPSH = [H_a - H_v - h_s - h_{fs}]$ $\left[\because \frac{P_a}{\rho g} = H_a \text{ and } \frac{P_v}{\rho g} = H_v\right]$

2. Why do we need to calculate NPSH :-

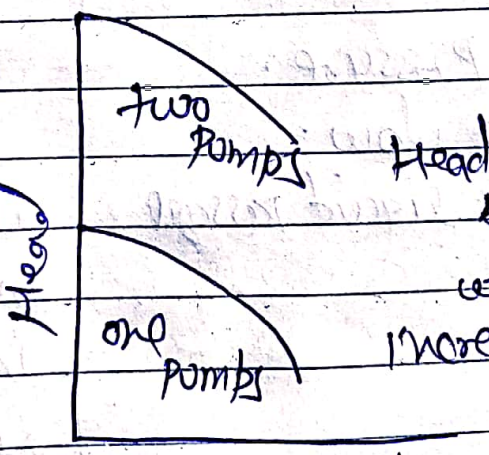
To avoid cavitation, we must ensure that local pressure every where inside the pump stays above vapor pressure.

Net Positive suction head $= \left(\frac{P}{\rho g} + \frac{v^2}{2g}\right) - \frac{P_v}{\rho g}$.

It is useful to employ a flow parameter called net positive suction head (NPSH) defined as the difference between the pump's inlet stagnation pressure head and the vapour pressure head.

3. Centrifugal pump in series :-

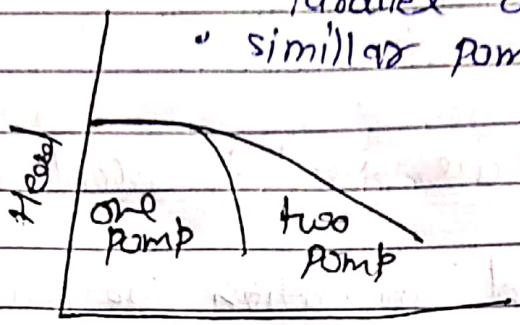
Pumps in series will give higher head



Flow rate.

Centrifugal pumps in Parallel

Pumps in parallel would give steady discharge.



	operational difficulty	remidies.
1.	no liquid delivery. lack of prime, loss of prime	Fill pump and suction pipe completely with liquid
2.	Not enough liquid delivery	if liquid Pumps is water or other non-explosive and explosive gas or dust is not present test flanges for leakage.
3.	Not enough pressure. speed too low. obstruction in liquid passage	dismantle pump and inspect passage of impeller and casing remove obstruction