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Section-4

Q.1 NPSH :-

1. Net Positive Suction head is defined as the absolute pressure head at the Inlet to the pump minus the vapour pressure head. plus the velocity head.

NPSH = Absolute pressure head at Inlet of the pump − vapour pressure head + velocity head.

$$= \frac{P_1}{\rho g} - \frac{P_v}{\rho g} + \frac{V_s^2}{2g} \quad \text{— (1)}$$

(2) But the absolute pressure head at Inlet of the pump is given by

$$\frac{P_1}{\rho g} = \frac{P_a}{\rho g} - \left[\frac{V_s^2}{2g} + h_s + h_f\right] \quad \text{— (2)}$$

(3) Substituting the value of eq (2) & eq (1)

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

$$= \frac{P_a}{\rho g} - \frac{P_v}{\rho g} - h_s - h_f$$

$$\boxed{NPSH = H_a - H_v - h_s - h_f}$$

$$\left[\text{where } \frac{P_a}{\rho g} = H_a \text{ & } \frac{P_v}{\rho g} = H_v\right]$$

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When the delivery valve is opened the liquid is made to flow in an outward radial direction thereby leaving the vanes of the impeller at the outer circumference with high velocity and pressure.