Section - 5

Ans-2 Casting solidification :- It covers the understanding mechanism of solidification of metals and alloys, it is essential for understanding the structure developed in castings there are three types of Solidification :-

(1) Large casting than insulating mould.
(2) Simple casting (flat mould wall)
(3) Directional Solidification.

method for design of risers :-

∴ there are two method for design of risers :-

(a) Chvorinov's Rule :-

(1) Solidification time (t_s) as might be expressed is directly proportional to the square of the ratio of volume V to the surface area A through which cooling occurs.

$$t_s \propto \left(\frac{V}{A}\right)^2$$

(2) Solubility of a gas in the melt increases with the square root of the partial pressure of that gas over the melt according to Sievert's law.

$$S \propto \sqrt{P_g}$$

(b) Caine's method :-

(1) this method is based upon experimentally determined hyperbolic relationship b/w freezing times and volumes of castings and the risers.

(2) Relative freezing time or freezing ratio R_F is defined as,

$$R_F = \frac{(A/V)\ \text{Casting}}{(A/V)\ \text{riser}}$$

(4) Volume ratio R_V is given as :- $R_V = \frac{V_{riser}}{V_{Casting}}$

(5) then Caine's formula is given by $R_F = \frac{a}{R_V - b} + c$

where,

(a) = Freezing characteristic constant for the metal.
(b) = contraction ratio from liquid to solid, and.
(c) = Relative freezing ratio of riser and casting