METHOD OF DESIGNING RISER

METHOD TO SOLVE NUMERICAL:

1. In the given problem if % of Shrinkage is given use 4th method. E.g. Shrinkage volume consideration.
2. If not, check the values of a, b, c if given use 1st method.
3. If not given, check the table given for shape factor corresponding to volumetric ratio of given use 3rd method.
4. If not then use the 2nd method. E.g. Modulus method.

For Circular Riser, $M_r = D/6$ & $M_c = V_c/A_c$ For Side Riser: $D = H$, For Top Riser: $D = 2H$ $V_r = \pi D^2 H/4$	M_r =Modulus of Riser (Volume/ Surface Area), M_c =Modulus of Casting (Volume/ Surface Area), V_r =Volume of Riser, V_C =Voume of Casting,

1. CAINES METHOD:

$Freezing\ Ratio = \frac{M_r}{M_c}$ $x = \frac{a}{y-b} - c, Where\ y = Volumetric\ Ratio = \frac{V_r}{V_c}$ According to this method, $x = M_r/M_c$	a, b, c =Constants depends on the material, y =Voumetric ratio, A_c=Surface Area of Casting,

2. MODULUS METHOD:

$\tau_r \geq \tau_C$ $M_r \geq M_c (\because \tau \propto M^2)$ According to this method, $M_r = K\ M_c$	τ_C =Solidification time of Casting, τ_r = Solidification time of Riser, K =Constant,	
In exam,	Method-I: $K = 1.2$	Method-II: $K = 1$

3. NOVEL RESEARCH METHOD:

<table>
<tr><td colspan="2">$Shape\ Factor, S.F. = \frac{L+W}{t}$
$Volumetric\ Ratio = y = \frac{V_r}{V_c}$
Hence, $V_r = yV_C$</td><td colspan="2">L = Length of Casting,
W = Width of Casting,
t = Thickness of Casting,
In exam shape factor will be given,</td></tr>
<tr><td>In Exam Table will be given,
<table><tr><td>$S.F.$</td><td>y</td></tr><tr><td></td><td></td></tr></table></td><td>For Sphere,
$L = D, W = D,$
$t = D, \Rightarrow S.F. = 2$</td><td>For Solid Cylinder,
$L = L, W = D, t = D,$
$S.F. = (L + D)/D$</td><td>For Hollow Cylinder,
$W = \pi D_{avg} = \pi[(D_o + D_i)/2],$
$t = (D_o - D_i)/2,$</td></tr>
</table>

4. SHRINKAGE VOLUME CONSIDERATION METHOD:

$V_r \geq 3V_{SC}, Where\ V_{SC} = aV_C$ H & D obtained from above equation is not final, Cross verify, this D with Modulus method criteria with K=1, If Criteria satisfied, D is our answer. Else Obtain new D from Modulus method criteria with K=1 is our answer.	V_{SC} =Voume of Shrinkage, a = % of Shrinkage,