

Department of Metallurgical Engineering and Materials Science
MM 359 Metals Casting and Joining; Test-1

Date: 24/01/2022

Time: 9.45 am – 10.15 am

Max. Marks: 10

1. If the shape of the critical cluster for nucleation is a 'cube', what will be the size of this cluster ? Will this cluster be stable – give suitable justification of your answer.
2 + 3 Marks

2. A spherical cluster of critical size has a finite probability of becoming unstable and hence become subcritical. Determine the size of the cluster which will be absolutely stable with almost zero probability of becoming subcritical. 2 Marks

3. The volumetric free energy change driving transformation between the two phases solid and liquid ΔG is given by $(G_l - G_s)$. Draw schematically the variation of free energy of the system as a function of cluster size at $T > T_m$, $T = T_m$ and $T < T_m$. Label all significant points clearly. 3 Marks

LATE SUBMISSIONS BEYOND 5 MINS WILL NOT BE ACCEPTED.
SHOW ALL STEPS CLEARLY.
ALL STATEMENTS AND ASSUMPTIONS SHOULD BE CLEARLY WRITTEN.
NO PARTIAL MARKS.