

※ 考生請注意：本試題不可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

1. Name and describe four casting techniques. (10%)
2. (a) Describe the phenomena of superheating and supercooling. (b) Why do the phenomena occur? (10%)
3. Define isotropy and anisotropy with respect to materials properties, and explain why the polycrystalline materials are most often isotropic. (10%)
4. Briefly explain: (a) Miller indices, (b) Lever rule, (c) Hardness, (d) Tempered martensite, (e) Superconductivity, (f) engineering stress, (g) engineering strain, (h) eutectic reaction, (i) phase diagram, (j) unit cell. (40%)
5. Describe the atomic structure within the vicinity of (a) grain boundary and (b) twin boundary. (10%)
6. Cite the relative Burgers vector-dislocation line orientations for edge, screw, and mixed dislocations. (10%)
7. (a) Compare interstitial and vacancy atomic mechanism for diffusion. (b) Explain why interstitial diffusion is normally more rapid than vacancy diffusion. (10%)