

※ 考生請注意：本試題 可 不可 使用計算機

1. Show that the atomic packing factor for the face-centered cubic crystal structure is 74%. (10%)
2. Explain (a) conduction band, (b) metal-matrix composite, (c) slip system, (d) steady-state diffusion, (e) cold working. (20%)
3. Compare isothermal transformation and athermal transformation. (10%)
4. Calculate the equilibrium number of vacancies per cubic meter for copper at 800°C. The energy for vacancy formation is 0.8 eV/atom; the atomic weight and density (800°C) for copper are 63.5 g/mol and 8.2 g/cm³, respectively. (10%)
5. The diffusion coefficient and activation energy for diffusion copper in nickel is 2.7×10^{-5} (m²/sec) and 256 (kJ/mol), respectively. At what temperature will the diffusion coefficient have a value of 6.5×10^{-17} m²/sec? (10%)
6. Describe and explain the phenomenon of strain hardening in terms of dislocation and strain field interactions. (10%)
7. For the tensile deformation of a ductile cylindrical specimen, describe changes in specimen profile to the point of fracture. (10%)
8. Describe the four possible electron band structures for solid materials. (10%)
9. Explain why ceramic materials are very resistant to corrosion. (10%)