

國立高雄科技大學 109 學年度碩士班 招生考試 試題紙

系 所 別：化學工程與材料工程系碩士班

組 別：丙組

考科代碼：1015

考 科：材料導論

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注意事項：

- 1、各考科一律可使用本校提供之電子計算器，**考生不得使用自備計算器**，違者該科不予計分。
- 2、請於答案卷上規定之範圍作答，違者該題不予計分。

1. Most elements have body-centered cubic (BCC) and face-centered cubic (FCC) crystal structure, please answer the following questions.
 - (a) How many atoms in the cells. (10%)
 - (b) The coordination number of the cells. (10%)
 - (c) The atomic packing factor (APF) of the cells. (10%)
2. Compute the theoretical density of silver. Silver has an FCC crystal structure with an atomic radius of 0.145 nm and an atomic weight of 107.87 g/mol. (10%)
3. What are the defects in (a) metals and (b) ceramics? (10%)
4. Write the relationship of the equilibrium concentration of defects with temperature in metals and ceramics. Please give your answer. (10%)
5. (a) What is the steady-state diffusion? Please give your answer. (b) A iron plate is exposed to a carburizing atmosphere on one side at 800°C. Compute the diffusion flux of carbon through the plate if the concentration of carbon at positions of 10 and 20 mm beneath the carburizing surface are 1.5 and 0.5 kg/m², respectively. Assume a diffusion coefficient of 5×10^{-10} m²/s at 800°C and a condition of steady-state is achieved. (20%)
6. How to measure (a) hardness and (b) fracture toughness of materials? Please give your best answer. (20%)