

# 大同大學 107 學年度 (暑)轉學入學考試試題

考試科目:材料導論

系別:材料工程學系

第全頁

註:本次考試 不可以參考自己的書籍及筆記; 不可以使用字典; 不可以使用計算器。

- Rank and explain your answer
  - The magnitudes of the diffusion coefficients from greatest to least for the following systems: (5%)
    - N in Fe at 700 °C
    - Cr in Fe at 700 °C
    - N in Fe at 900 °C
    - Cr in Fe at 900 °C.
  - Would you expect the diffusion rate of copper (self diffusion) to be lower or higher in copper with ASTM grain size 3 than in copper with ASTM grain size 7? (5%)
- Definition and Cite the difference (4%\*3)
  - Cite the difference between mechanical twins and annealing twins.
  - Cite the difference between Frenkel and Schottky defects.
  - Cite the relative Burgers vector–dislocation line orientations for edge, screw dislocations.
- Match (1%\*4)

isotropic	(1) Properties are independent of the crystallographic direction
( a )	(2) Properties are depend on the crystallographic direction
Anisotropic	(3) Polycrystalline materials
( b )	(4) Single crystal
- Determine whether one item is more likely to crystalline than the other (2%\*4)
  - small molecular weight or large molecular weight
  - linear polymer or branching polymer
  - block copolymer or random copolymer
  - isotactic polymer or stereoisomers polymer
- Draw and derive linear density expressions for FCC [111] directions in terms of the atomic radius R. (4%\*2)
  - Draw and derive planar density expressions for FCC (111) planes in terms of the atomic radius R. (4%\*2)
- Plot a typical tensile engineering stress-strain curve for a metal. (5%)
- Plot a typical tensile true stress-strain curve for a metal. (5%)
- ( ) Which of the following properties is to describe the plastic behavior of a metal? a) yield strength, b) Young's modulus, c) Poisson's ratio, d) toughness, e) ductility (5%)
- What is "solid solution strengthening?" (6%)
- What is the driving force for recrystallization of a cold worked metal? (6%)
- What is "strain hardening" of a metal? (6%)
- What is "eutectic reaction?" (6%)
- Draw the microstructure of pearlite in a eutectoid steel. (5%)
- What is "heterogeneous nucleation?" (6%)