

系所組別： 生物醫學工程學系甲、丁組

考試科目： 材料導論

考試日期：0219，節次：2

※ 考生請注意：本試題 可 不可 使用計算機

I 解釋名詞 (文字敘述或圖示)：(50 分，每題 2 分)

1. Athermal transformation
2. Band gap energy
3. Burgers vector
4. Ceramic-matrix composite
5. Coordination number
6. Crevice corrosion
7. Dislocation
8. Doping
9. Elastic deformation
10. Fick's Law
11. Flexural strength
12. Glass-ceramic
13. Hardness
14. Hydrogen bond
15. Impact energy
16. Level rule
17. Martensite
18. Phase diagram
19. Precipitation hardening
20. Semiconductor
21. Solvus line
22. Stress concentration
23. Vacancy diffusion
24. Viscoelastic deformation
25. Whisker

II 計算及簡答題 (50 分，每題 10 分)

1. Calculate the radius of a copper atom, given that Cu has an FCC crystal structure, a density of 88.9 g/cm^3 , and an atomic weight of 63.5 g/mol .

(背面仍有題目。請繼續作答)

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2. For a steel alloy it has been determined that a carburizing heat treatment of 4-h duration will raise the carbon concentration to 0.65% at a point 3.2mm from the surface. Estimate the time necessary to achieve the same concentration at a 6.4-mm position for an identical steel at the same carburizing temperature.
3. For a brass alloy, the stress at which plastic deformation begins is 345 MPa, and the modulus of elasticity is 103 GPa. (a) What is the maximum load that may be applied to a specimen with a cross-sectional area of 260 mm² without plastic deformation? (b) If the original specimen is 152 mm, what is the maximum length to which it may be stretched without causing plastic deformation?
4. Describe and make a schematic cross-sectional view of a metal-oxide-semiconductor field-effect transistor (MOSFET).
5. Describe and make a schematic plot of iron-iron carbide phase diagram.