

國立臺北科技大學 106 學年度碩士班招生考試

系所組別：3302 材料科學與工程研究所

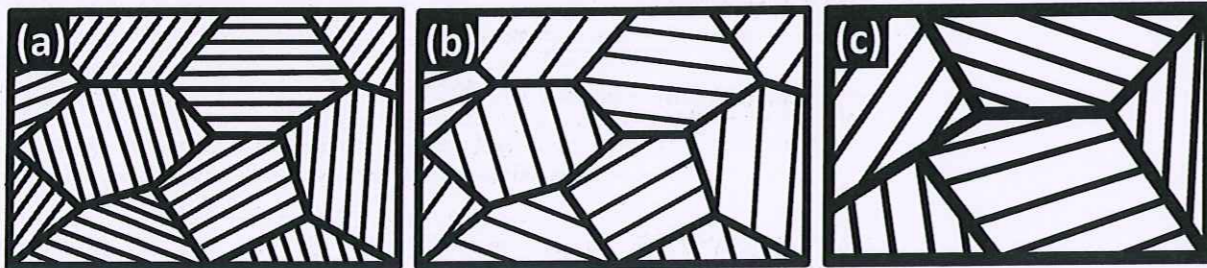
第二節 物理冶金 試題 (選考)

第一頁 共二頁

注意事項：

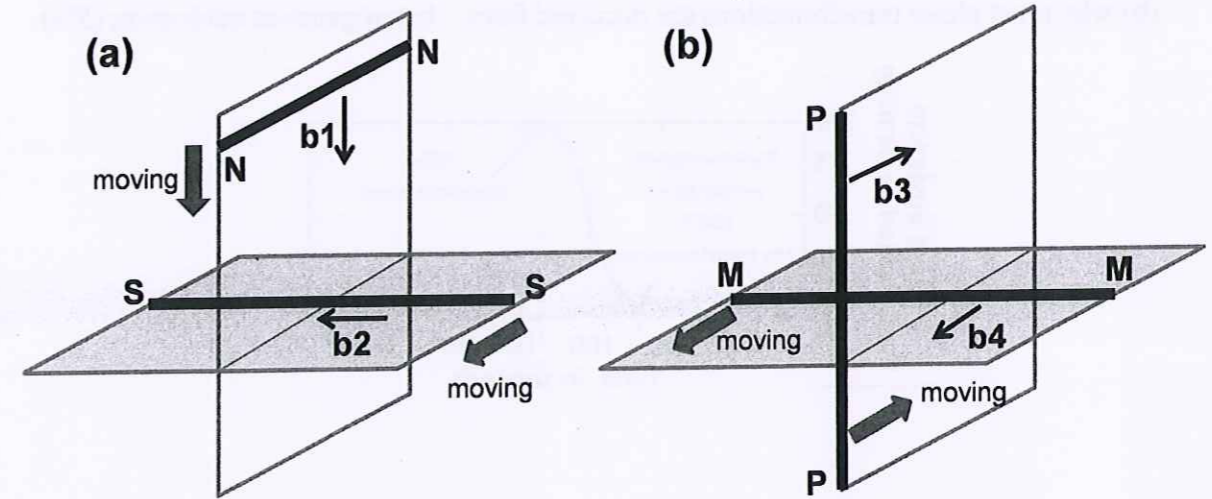
1. 本試題共十一題，共 100 分。
2. 請標明大題、子題編號作答，不必抄題。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。

1. Three microstructures of eutectoid steel with same composition are as below,
 - (a) Which one will show the better strength? why? (5%)
 - (b) After austenitizing treatment, steel will be quenched, which one will show the higher hardenability? (5%)



2. There is no perfect material without defect above 0 K. Please prove it by
 - (a) the existence of dislocation (5%)
 - (b) inter-diffusion behavior of metal (5%)
3. Please describe the important of grain boundary on (a) solid diffusion (5%), (b) strength of material (5%).

4. About the dislocation intersections, please draw the results of dislocation intersections show as below. (you must indicate the dislocation line, burger's vector, dislocation moving direction) (10%)

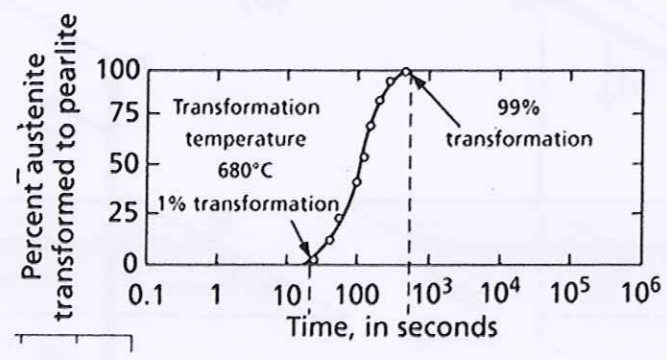


5. According to your learning, could you explain why the mechanical strength of an alloy is higher than pure metal? (5%)
6. Please draw the triple phase points of Iron-Carbon phase diagram (please mark the temperature, phase and composition in your answer).
 - (a) Eutectic point (3%)
 - (b) Peritectic point (3%)
 - (c) Eutectoid point (3%)
7. (a) What is thermal supercooling and result in what kind of microstructure (give an example)? (5%), (b) What is constitutional supercooling and result in what kind of microstructure (give an example)? (5%)
8. (a) What is the "dispersion strengthen" in the precipitation hardening process? (5%), (b) Please prove the relation between the dispersion strength and particle size. (5%)

注意：背面尚有試題

9. Please refer to the figure below:

- (a) why there is no transformation before 10 sec? (5%)
- (b) why most phase transformations are occurred from heterogeneous nucleation (5%)



- 10. Annealing and Tempering are two kinds of heat treatment, please compare these two methods for each of the following: “purpose”, “driving force”, “phase transformation” and “mechanical property”. (10%)
- 11. Why the “continuous cooling transformation cure” of the eutectoid steel only show the “pearlite transformation” part? (6%)

