

國立臺北科技大學

九十三學年度材料及資源工程系碩士班入學考試

物理冶金試題

填 准 考 證 號 碼

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注意事項：

1. 本試題共六題，配分共 100 分。
2. 請按順序標明題號作答，不必抄題。
3. 全部答案均須答在答案卷之答案欄內，否則不予計分。

1. What are the reasons to make a fatigue failure of metals ? Can you give two examples ? (10%) How to improve the fatigue life ? (10%)
2. In the Iron-Carbon Alloy System, the nucleation of a pearlite colony can occur by sympathetic sideways nucleation of the ferrite and cementite lamellae.
 - a. Please drawing the schematic picture. (10%)
 - b. Explain it. (10%)
3. A completely recrystallized metal the driving force for grain growth can be the same theory of cells in a foam of soap. If D : the mean diameter of the average-sized soap cell, C : the curvature of the cell walls, t : the time. and K' : a constant of proportionality.

$$\frac{dD}{dt} = K' C$$

Please prove the grain growth Law $D = Kt^{1/2}$ (15%)

4. The Iron is said to be "hot short" , that is, its properties are deficient at hot-working temperatures.
- Why the iron loses its ductility? (10%)
 - Please explain it. (10%)
5. If the critical resolved shear stress is 3500 psi, will an applied stress of 7000 psi cause the single crystal of metal to yield ? If not, what stress will be necessary ?
- $\theta=30^\circ$ is the angle between the slip plane normal and the stress axis.
- $\Phi=60^\circ$ is the angle between the slip direction and the stress axis. (15%)
6. Please describe the internal energy of a crystal is considered to be composed of two parts. (10%)