國立屏東科技大學 九十三 學年度 碩士班暨碩士在職專班 招生考試
材料工程研究所碩士班
專業科目（二）材料科學導論 試題

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1. Estimate the coordination number for the cation in Al_2O_3 oxide.(r_{Al+3}=0.057 nm, r_{O-2}=0.132 nm).(20%)
2. Calculate the linear density of the [100] direction for BCC. (20%)
3. The diffusion coefficients for copper in aluminum at 500℃ and 600℃ are $4.8X10^{-14}$ and $5.3X10^{-13}$ m^2/s, respectively. Determine the approximate time at 600℃ that will produce the same diffusion result (in terms of concentration of Cu at some specific point in Al) as a 100-h heat treatment at 500℃. (20%)
4. Determine the principal stresses σ1 and σ2 for the state of stress (20%)

$$\begin{pmatrix} \sigma_x=28 & \tau_{yx}=6 \\ \tau_{xy}=6 & \sigma_y=12 \end{pmatrix} \quad \text{MPa}$$

5. Explain the meanings of the true strain and the glass transition temperature. (20%)