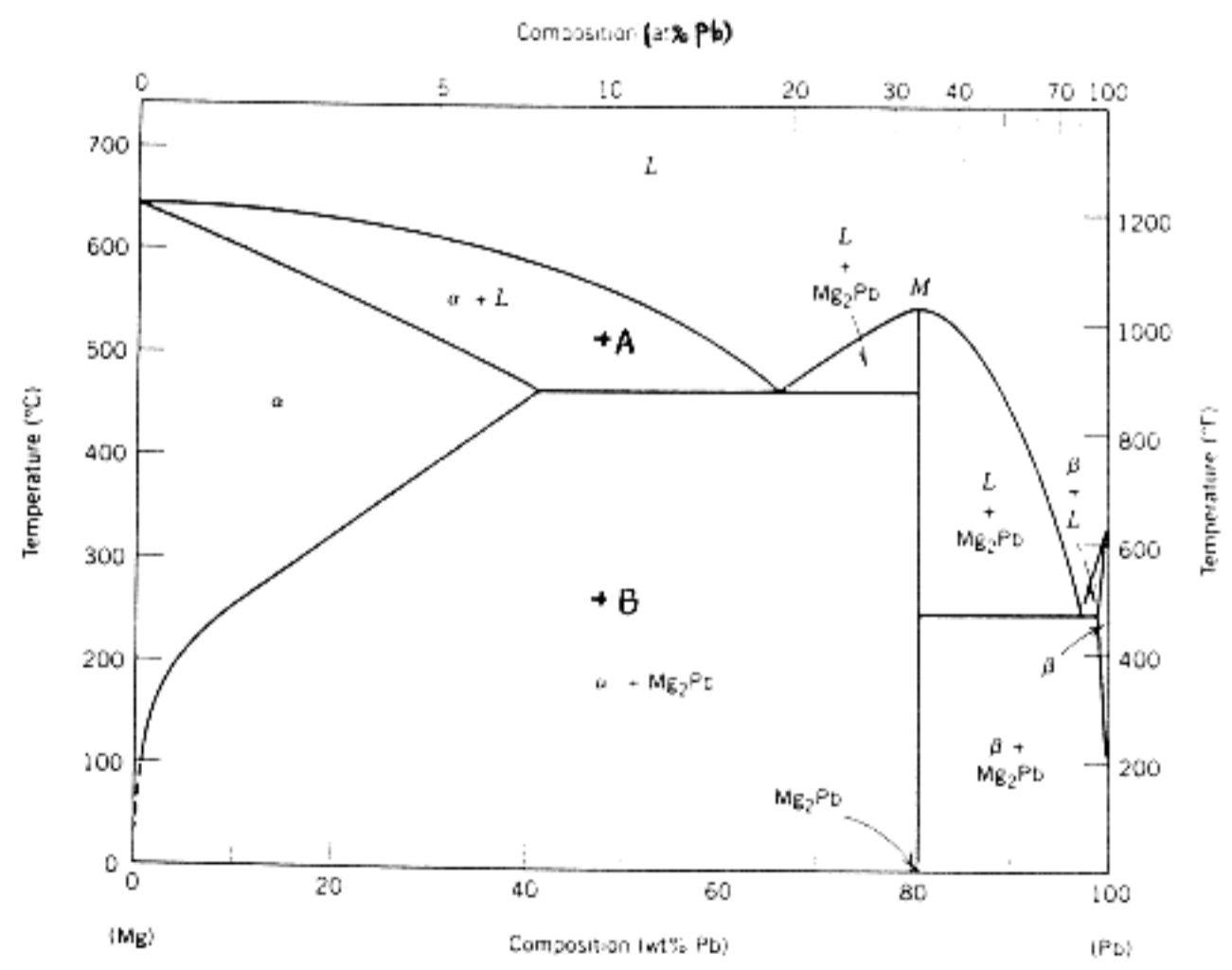


材導第一部份 (50%)

1. For FCC crystal structure, interstitial sites that may be occupied by impurity atoms are located at the centers of each of the unit cell edges, compute the radius  $r$  of an impurity atom that will just fit into one of these sites for the crystal structure in terms of the atomic radius  $R$  of the host atom. (10%)
2. (a) Draw the schematic tensile engineering stress-strain diagram for an aluminum alloy and show (b) the modulus of elasticity (c) the proportional limit (d) the yield strength at a strain offset of 0.002 (e) the tensile strength. (10%)
3. What are the driving forces for (a) diffusion in solids (b) grain growth (c) recrystallization (d) sintering (10%)
4. From the magnesium-lead phase diagram shown below, calculate the phase fractions at points (a) A (b) B (10%)
5. Describe the effects of residual compressive stress in surface layer on (a) the fatigue strength of metals (b) the bending strength of ceramics. (10%)



(背面仍有題目, 請繼續作答)

材導第二部份 (50%)

1. 請說明熱震裂(thermal shock)之形成原因, 並舉例說明如何防止。(10%)
2. 請說明半導體「能隙」( $E_g$ )如何量測, 並說明此能隙在材料研究上有何應用。(10%)
3. 請說明材料有那些腐蝕機制, 如何防止材料發生腐蝕。(10%)
4. 請說明強化玻璃之熱處理過程及其應力之變化情形。(10%)
5. 請說明如何以實驗方式分辨一磁性材料為 ferromagnetic 或是 ferrimagnetic。(10%)