**(1) Distinguish between expansion work against constant pressure and work of reversible expansion (10%)**

**(2) What is (a) state function (b) exact differential (10%)**

**(3) Justify Trouton's rule (10%)**

**(4) Please express dG for a closed system in the absence of non-expansion work and at constant composition (10%)**

**(5) What is Clausius-Clapeyron equation (10%)**

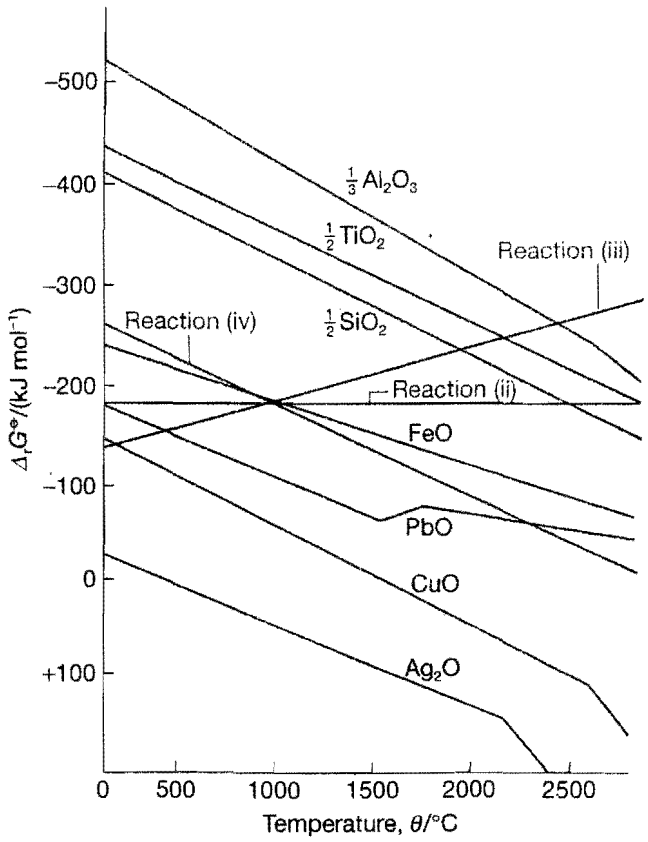
**(6) Explain how colligative properties are used to determine molar mass (10%)**

**(7) Explain what is meant by a regular solution (10%)**

**(8) Define (a) phase (b) phase rule (c)component (10%)**

**(9) Use the Ellingham diagram (Fig. at bottom) to identify the lowest temperature at which zinc oxide can be reduced to zinc metal by carbon (10%)**

**(10) Distinguish between galvanic and electrolytic cells (10%)**




(i) $M(s) + \frac{1}{2}O_2(g) \longrightarrow MO(s)$

(ii) $\frac{1}{2}C(s) + \frac{1}{2}O_2(g) \longrightarrow \frac{1}{2}CO_2(g)$

(iii) $C(s) + \frac{1}{2}O_2(g) \longrightarrow CO(g)$

(iv) $CO(g) + \frac{1}{2}O_2(g) \longrightarrow CO_2(g)$