

※ 考生請注意：本試題不可使用計算機。 請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

- (1) Explain clearly what is meant by a thermodynamically reversible process. Why is the reversible work done by a system the maximum work? (10%)
- (2) What is (a) state function (b) exact differential (10%)
- (3) What is Kirchhoff's law? Please describe its usefulness (10%)
- (4) What is the physical basis for the experimental result that  $U$  is a function of  $V$  at constant  $T$  for a real gas? Under what conditions will  $U$  decrease as  $V$  increases? (10%)
- (5) Which thermodynamic state function gives a measure of the maximum electric work that can be carried out in a fuel cell? (10%)
- (6) Giving an account of the effect of pressure on (a) the position of equilibrium and (b) the equilibrium constant. (10%)
- (7) Detail the steps in going from the clapeyron equation to the Clausis-Claperon equation. What specific assumptions are made? (10%)
- (8) What is Gibbs-Duhem equation? Please derive it (10%)
- (9) What is activity and activity coefficient? Please describe its usefulness (10%)
- (10) Distinguish between galvanic and electrolytic cells (10%)