

國立成功大學

113學年度碩士班招生考試試題

編 號：166

系 所：電機工程學系

科 目：電子材料概論

日 期：0201

節 次：第 2 節

備 註：不可使用計算機

※ 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. Single choice question (21%)

- (1) Which one has the strongest magnetic response? (a) Paramagnetic (b) ferromagnetic (c) diamagnetic (d) ferroelectric material.
- (2) Which measurement cannot be used to determine the conduction type (p or n) of a semiconductor? (a) 4-point probe method (b) hot probe method (c) Hall measurement
- (3) Thermal stress happens when a material undergoes a (a) hard work (b) heat conduction (c) constrained thermal expansion in a rapid cooling (d) annealing process.
- (4) Which property of a semiconductor cannot be determined by the Hall measurement? (a) carrier concentration (b) mobility of carriers (c) conduction type of a semiconductor (d) band gap
- (5) The major difference between a soft and a hard magnetic materials is the (a) magnetic induction (b) conductivity (c) susceptibility (d) coercivity field
- (6) The major difference between a diamagnetic and a paramagnetic magnetic materials is (a) magnetic induction (b) conductivity (c) susceptibility (d) coercive magnetic field.
- (7) About superconductivity, which description is not correct? (a) Zero resistivity (b) mostly found in metal and oxide materials (c) mainly in high temperature (d) expel magnetic fields.

2. Define the material optical, thermal and magnetic properties. (36%)

- (a) Color temperature (b) thermal expansion coefficient (c) thermal conductivity (d) thermal stress
(e) thermal shock resistance (f) thermal-electric effect (g) paramagnetic (h) coercivity field (i) residual induction (j) soft magnetic (k) superconductivity

3. Short answer questions. (21%)

- (a) grain size (b) List all possible slip systems of a fcc crystal (c) dislocation (d) twins (e) toughness
(f) strain hardening (g) solid solution

4. Draw in unit cubes the crystal planes that have the following Miller indices:

(a) $(\bar{1}\bar{1}\bar{1})$ (b) $(\bar{1}\bar{2}\bar{1})$ (c) $(\bar{3}\bar{2}\bar{1})$ (12%)

5. Plot the TEM diffraction patterns of a FCC crystal along the $[111]$ zone axis and label the miller indices. (5%)

6. Compare the ceramic semiconductor (ZnO) and elementary semiconductor (Si, Ge). (5%)