國立成功大學

112學年度碩士班招生考試試題

編　號：169

系　所：電機工程學系

科　目：電子材料概論

日　期：0206

節　次：第 2 節

備　註：不可使用計算機

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※ 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. Shortly explain or define the following terms (a) covalent bonding (b) ionic bonding (c) edge dislocation (d) eutectic reaction (e) dielectric constant (f) grain boundary (g) twin boundary (h) vacancy (24%)
2. Discuss the differences between the ceramic semiconductors and the elementary or compound semiconductors. (10%)
3. Describe the properties of the following devices. (a) light-emitting diode (b) varistor (c) Schottky diode (d) metal-oxide-semiconductor capacitor (e) photodetector (20%)
4. Thermoelectric figure of merit is defined as $ZT = \frac{S^2\sigma T}{k}$, where S is the seebeck coefficient, σ is the electrical conductivity, T is the temperature, and k is the thermal conductivity. From the design of material point of views, please suggest the required material properties that could be important to obtain a high ZT thermoelectric material. (10%)
5. Magnetic materials can be used in many fields, such as inductors, transformers, electromagnetic shielding, etc. Please explain the following magnetic-related characteristics. (a) magnetic hysteresis (b)hard magnetic material (c) coercive field (d) permeability (e) saturation magnetization. (10%)
6. To build a measurement system that can sense temperature, what electronic components might you use? (10%)
7. Explain the work function requirement for a metal to from an ohmic contact on a p-type semiconductor. (8%)
8. X-ray diffraction is a powerful tool to determine the crystal structure. Explain the Bragg's law. (8 %)