編號： 177

國立成功大學 104 學年度碩士班招生考試試題

系所組別：電機工程學系甲組

考試科目：電子材料概論

考試日期：0211，節次：2

※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. Please explain or define following noun: (20%)

a). Hall coefficient

b). Lattice-scattering-limited drift mobility

c). Linear combination of atomic orbitals

d).Electron effective mass

e). Skin effect

f). Seebeck effect

g). Schottky effect

h). Contact potential

i). First Brillouin zone

j). Bragg diffraction condition

2. Please prove effect work function in the presence of an applied field (E) is

$\Phi_{eff}=\Phi-(e^3E/4\pi\varepsilon_o)^{1/2}$: (10%)

3. Copper(ion radius=0.125nm) and nickel (ion radius= 0.128nm) form a solid solution in all properties. Predict this result using the Hume-Rothery rules (10%)

4. Please compare the effect of temperature and impurity on the conductivity for metal, inorganic semiconductor and insulator. (20%)

5 Draw the following direction vectors in cubic unit cells(10%)

(a). [100] and [110]

(b) [112]

(c) [-110]

(d) [-321]

6. a). What is polarization ? please describe all possible the polarization mechanisms .(10%)

b).What is Magnetization ? please describe all possible the magnetization mechanism. (10%)

7. A cooper-nickel alloy contains 47 wt% Cu and 53 wt% Ni at 1300°C, Using Fig.1 and answer the following: (10%)

(a). What is the weight percent of copper in the liquid and solid phases at this temperature?

(b) What weight percent of this alloy is liquid and what weight percent is solid?

國立成功大學 104 學年度碩士班招生考試試題

系所組別：電機工程學系甲組

考試科目：電子材料概論

考試日期：0211，節次：2

Fig.(1)