1. 請解釋下列名詞：(15%)

    (a) Interstitial defect、Schottky defect、substitutional defect。

    (b) Curie 溫度。

    (c) Kirkendall effect。

2. 假設所有的價電子對電流流動都有貢獻；(1)計算銅的電子遷移率及(2)計算一根 100cm 長的銅線施加 10V 電壓時的平均漂移速度。 (10%)

3. (a) 試畫出矽晶在(100)，(111)與(110)面的原子位置。(b) (111)面的原子面密度。(c) 計算矽原子的堆積率(atomic packing factor)。(d) 矽晶在[111]方向的線密度(linear density)。(e) 畫出 GaAs 在(111)面的 Ga 與 As 之位置。 (15%)

4. 試件厚度為 1mm 的碳酸鋇系陶瓷板，測其介電係數為 500。但因製件電極時不小心使試件與電極之間產生 5μm 空隙。試求實際介電係數為何？(10%)

5. Explain the following terms. (20%)

    (a) Covalent bonding（共價鍵） (b) Dielectric loss (c) Grain (d) Eddy current.

6. Given three dielectric materials as in the table. At a given voltage, which dielectric will have the lowest power dissipation per unit capacitance at 1 KHz and at an operating temperature of 50℃? Is this also true at 120℃? (10%)

	T=50℃		T=120℃	
Material	ε_r'	ε_r''	ε_r'	ε_r''
#1	2.47	0.003	2.535	0.003
#2	2.58	0.003	2.75	0.0027
#3	2.24	0.003	2.25	0.003

7. The resistivity ρ_{dc} of copper at 27℃ is 1.70×10^{-8} ohm and the relative permeability is $\mu_r \sim 1$. (20%)

    (a) Estimate the most efficient diameter for a copper wire carrying a current at 60 Hz for power transmission?

    (b) What is the change in the dc resistance of a copper wire of radius 1 mm for an ac signal at 10 MHz?