編號： 119

國立成功大學 107 學年度碩士班招生考試試題

系　　所：工程科學系

考試科目：電磁學

考試日期：0206，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. Vector analysis provides important mathematical tools for electromagnetics.
   (1) Show that if $\mathbf{A} \cdot \mathbf{B} = \mathbf{C} \cdot \mathbf{B}$ and $\mathbf{A} \times \mathbf{B} = \mathbf{C} \times \mathbf{B}$, where $\mathbf{B}$ is not a null vector, then $\mathbf{A} = \mathbf{C}$. (10%)
   (2) A rhombus is an equilateral parallelogram. Show that the two diagonals are perpendicular to each other. (15%)

2. What is an electric dipole? Draw a two-dimensional graph of the equipotential lines and the electric filed lines for an electric dipole. (25%)

3. What electric field intensity and current density correspond to a drift velocity of 6.0×10^{-4} m/s in a silver conductor? For silver, we know that the conductivity $\sigma = 61.7$ MS/m and the mobility $\mu = 5.6 \times 10^{-3}$ $m^2/V \cdot s$. (25%)

4. An infinite current sheet lies in the $z = 0$ plane with a current density $\boldsymbol{J} = J\,\mathbf{a}_y$ (A/m). Find the magnetic field strength $\mathbf{H}$ everywhere. (25%)