

# 國立臺灣師範大學 103 學年度碩士班招生考試試題

科目：電磁學

適用系所：光電科技研究所

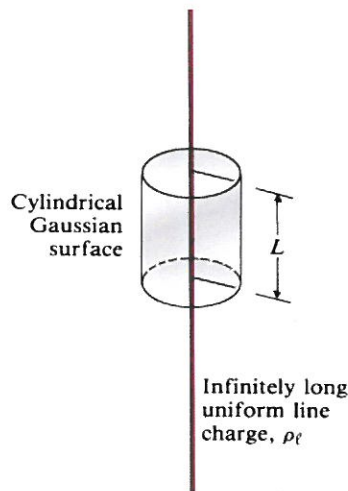
注意：1.本試題共 2 頁，請依序在答案卷上作答，並標明題號，不必抄題。2.答案必須寫在指定作答區內，否則不予計分。

1. Given  $\vec{A} = a_x 5 - a_y 2 + a_z$ , find the expression of a unit vector  $\vec{B}$  such that (20 分)

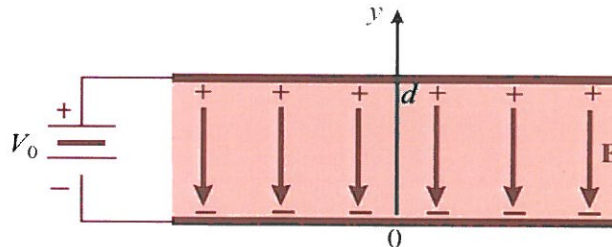
a)  $\vec{B} \parallel \vec{A}$

b)  $\vec{B} \perp \vec{A}$ , if  $\vec{B}$  lies in the  $xy$ -plane

2. Please determine the electric field intensity  $\vec{E}$  of an infinitely long, straight, line charge of a uniform density in air. (20 分)

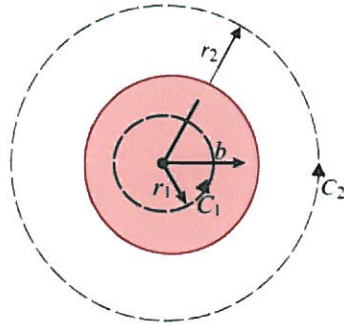


3. The two plates of a parallel-plate capacitor are separated by a distance  $d$  and maintained at potentials  $0$  and  $V_0$ . Assuming negligible fringing effect at the edges, please determine (a) the potential at any point between the plates, (b) the surface charge densities on the plates. (20 分)



國立臺灣師範大學 103 學年度碩士班招生考試試題

4. An infinitely long, straight conductor with a circular cross section of radius  $b$  carries steady current  $I$ . Determine the magnetic flux density both inside and outside the conductor. (20 分)



5. A conducting material of uniform thickness  $h$  and conductivity  $\sigma$  has the shape of a quarter of a flat circular washer, with inner radius  $a$  and outer radius  $b$ . Please determine the resistance between the end faces. (20 分)

