

## 臺灣綜合大學系統 111 學年度學士班轉學生聯合招生考試試題

科目名稱	電磁學	類組代碼	C01
		科目碼	C0101
※本項考試依簡章規定各考科均「不可以」使用計算機		本試題共計 1 頁	

以下計算題共 5 題，每題 20 分，總分 100 分。

1. Check Stokes' theorem for the function  $\mathbf{v} = y \hat{z}$ , using the triangular surface shown in Fig. 1.

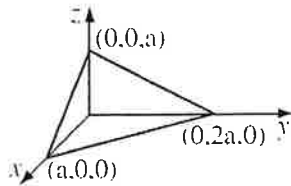


Fig. 1

2. Find the capacitance per unit length of two coaxial metal cylindrical tubes, of radii  $a$  and  $b$  as shown in Fig. 2.



Fig. 2

3. Three point charges are located as shown in Fig. 3, each a distance  $a$  from the origin. Find the approximate electric field at points far from the origin. Express your answer in spherical coordinates, and include the two lowest orders in the multipole expansion.

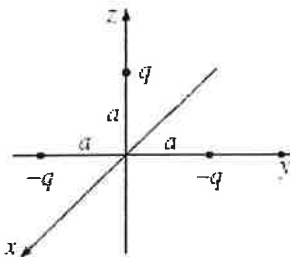


Fig. 3

4. An infinitely long circular cylinder carries a uniform magnetization  $\mathbf{M}$  parallel to its axis. Find the magnetic field (due to  $\mathbf{M}$ ) inside and outside the cylinder.
5. A perfectly conducting spherical shell of radius  $a$  rotates about the  $z$  axis with angular velocity  $\omega$ , in a uniform magnetic field  $\mathbf{B} = B_0 \hat{z}$ . Calculate the emf developed between the "north pole" and the equator.