

科目：電磁學

適用：應光系

考生注意：

1. 依次序作答，只要標明題號，不必抄題。
2. 答案必須寫在答案卷上，否則不予計分。
3. 限用藍、黑色筆作答；試題須隨卷繳回。

本	試	題
共	1	頁
第	1	頁

編號：392

1. A electrical dipole having a moment $\vec{p} = 20 \hat{a}_x$ located at the origin. Find V and \vec{E} at Q (2, 2, 0). (25%)
2. A cloud shell located around $0 \leq R \leq 2a$ in the spherical coordinate system and the volume charge density is as follows. Find V everywhere (free space).

$$\rho_v = \begin{cases} -\rho_0 & 0 \leq R \leq 2a \\ 0 & \text{elsewhere} \end{cases} \quad (25\%)$$

3. A plane defined by $z = 0$ separate 2 dielectrics the upper dielectric ($z > 0$) has $\epsilon_{r1} = 2$ and the lower dielectric ($z < 0$) has $\epsilon_{r2} = 4$. If $\vec{E}_{upper} = 2\hat{a}_x + 2\hat{a}_y + 2\hat{a}_z$ (V/m) is in the upper dielectric, Find \vec{E}_{lower} . (25%)
4. Given a vector current density $\vec{J} = 2x\hat{a}_x + y\hat{a}_y + 2z\hat{a}_z$ (A/m²). Find the total charge Q(t) within a cube ($0 \leq x \leq 1, 0 \leq y \leq 1, 0 \leq z \leq 1$) if the cube contains zero charge at $t=0$. (25%)

試

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