

考生作答前請詳細閱讀下列注意事項以免評分錯誤：

1) 本學科試題為證明題型

2) 請在答案紙欄上依序註明題目號碼(例如:1、2、.....、10)

3) 推證過程及最後結果請詳細列出

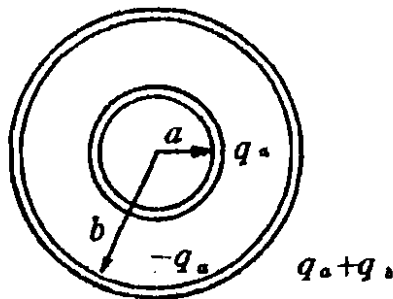
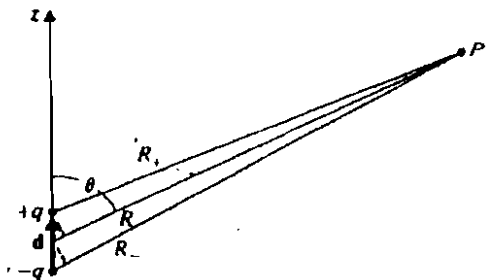


Fig-1

Fig-2

1. Prove that $\nabla \cdot \left(\frac{\hat{r}}{r^2} \right) = 0$, where $\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$. (20%)

2. As shown in Fig-1, find the electric field \vec{E} and the potential V for the electric dipole. (25%)

3. As shown in Fig-2, find the capacitance C of two concentric spherical metal shells, with radii a and b . (25%)

4. Write the Maxwell's equations (in differential form) in the free space (vacuum). (10%)

5. Show that the Maxwell's equations in free space (vacuum) may predict the existence of the electromagnetic wave motions. (20%)