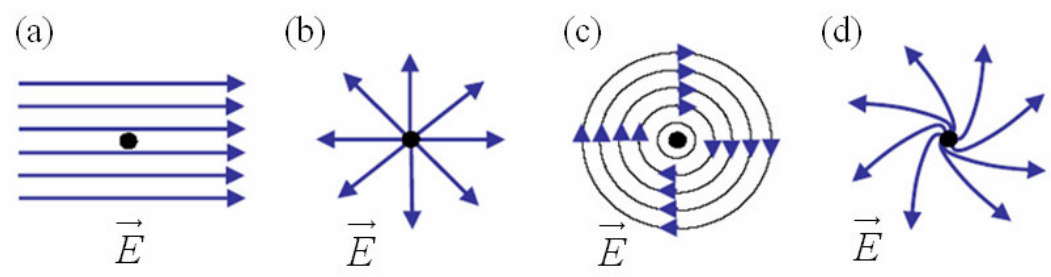
亞洲大學

九十五學年度碩士班招生考試試題紙

系　所　別	組 別	考試科目	考試日期	時　　間	備　　註
資訊學院碩士班		電磁理論	95.4.30	10:30-12:10	

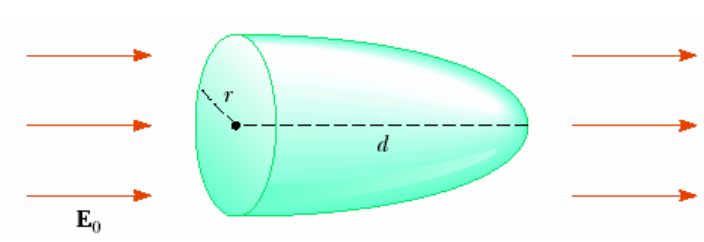
1. Determine $\nabla \cdot \vec{E}=0$ or $\neq 0$ and $\nabla \times \vec{E}=0$ or $\neq 0$ in each situation. (16 points)



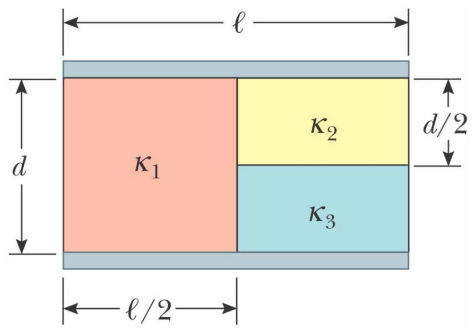
2. Proof that (1) $\nabla \times \nabla f=0$, (2) $\nabla \cdot (\nabla \times \vec{E}) = 0$ (8 points)

3. What is Gauss's law? and derive the Gauss's law from the Coulumb's law. (10 points)

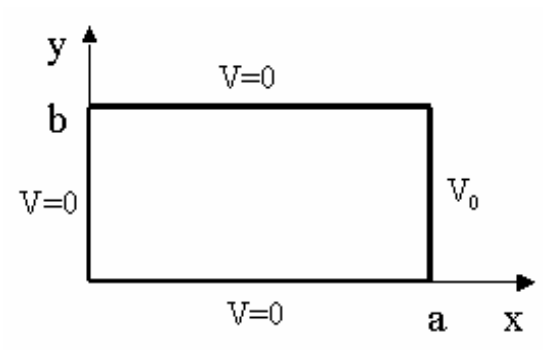
4. Calculate the total electric flux through the paraboloidal surface due to a uniform electric field of magnitude E_0 in the direction shown below. (8 points)



5. A parallel-plate capacitor is constructed by filling the space between two square plates with blocks of three dielectric materials,.assume that $\ell >> d$. Find an expression for the capacitance of the device in terms of the plate area A and d,κ1,κ2, andκ3. (8 points)



6. Find the potential distribution V(x,y) in the two-dimensional conductor. The potential of the right hand plate is V_0. (12 points)



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7. Write down the Maxwell's equations in differential form and integral form. (10 points)

8. Express $\boldsymbol{E}$ and $\boldsymbol{B}$ in terms of potential functions V and $\boldsymbol{A}$. (8 points)

9. Derive the wave equations of electric field $\boldsymbol{E}$ and magnetic field $\boldsymbol{H}$ in free space.
PS : $\nabla\times\nabla\times\boldsymbol{A}=\nabla(\nabla\cdot\boldsymbol{A})-\nabla^2\boldsymbol{A}$ (10 points)

10. Given a traveling plane wave in free space, $\boldsymbol{E}_x=\cos(\omega t-kz)\boldsymbol{i}$. Find the time-instantaneous Poynting vector at z position. Also show the value of intrinsic impedance of free space. (10 points)

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