

臺中健康暨管理學院

九十四學年度碩士班暨碩士在職專班招生考試試題紙

公告
用

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	94.4.24	10:30-12:10	共二頁

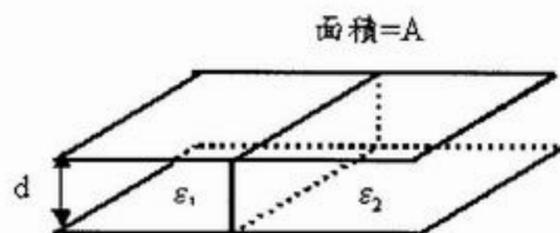
1. Let \vec{F} is a vector function and ϕ is a scalar function then (1) $\nabla \times \nabla \phi = 0$ (2) $\nabla \times \nabla \times \vec{F} = 0$,

$$(3) \oint \vec{F} \cdot d\vec{S} = \iiint \nabla \cdot \vec{F} dV$$

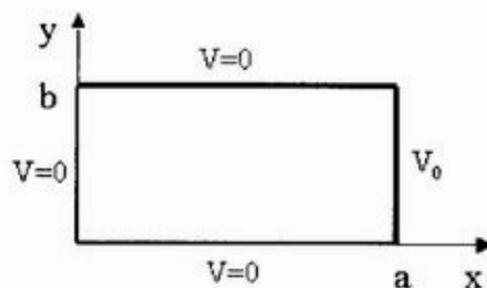
are true or false? (是非題) (10 points)

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

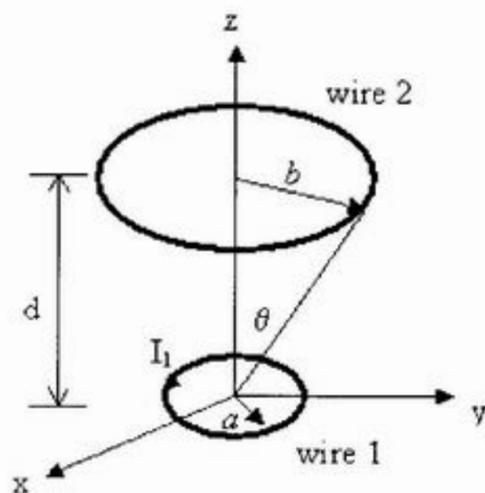
3. A parallel plate capacitor is filled with two dielectrics (ϵ_1 and ϵ_2) as shown in the figure. Find the capacitor C. (10 points)



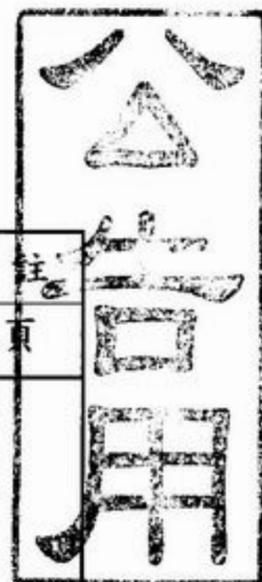
4. Find the potential distribution $V(x,y)$ in the two-dimensional conductor. The potential of the right hand plate is V_0 . (10 points)



5. The coaxial circular wires of radii a and b ($b > a$) are separated by distance h ($h \gg a, b$) as shown below. Find the mutual inductance. (10 points)



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

7. Express \vec{E} and \vec{B} in terms of potential functions V and \vec{A} . (10 points)

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

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

10. For a relative permittivity of 2.56 and nonmagnetic medium (10 points)

: $\vec{E}_y = 20 \cos(8\pi \times 10^9 t - kz) \hat{j}$ (V/m).

Find f , v , λ , k , η , and \vec{H} .