

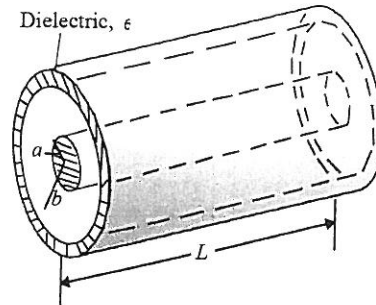
國立臺灣師範大學 104 學年度碩士班招生考試試題

科目：電磁學

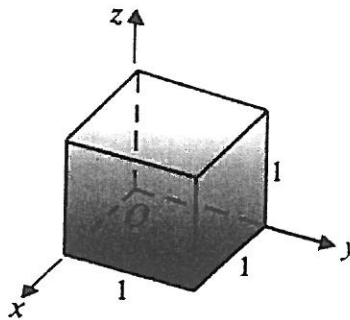
適用系所：光電科技研究所

注意：1.本試題共 2 頁，請依序在答案卷上作答，並標明題號，不必抄題。2.答案必須寫在指定作答區內，否則不予計分。

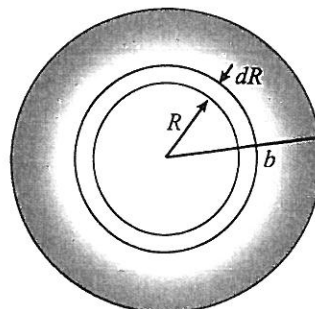
1. A cylindrical capacitor consists of an inner conductor of radius a and an outer conductor whose inner radius is b . The space between the conductors is filled with a dielectric of permittivity ϵ , and the length of capacitor is L . Determine the capacitance of this capacitor. (20 分)



2. Given $\vec{A} = a_x x^2 + a_y xy + a_z yz$, please verify the divergence theorem over a cube one unit on each side. The cube is situated in the first octant of the Cartesian coordinate system with one corner at the origin. (20 分)

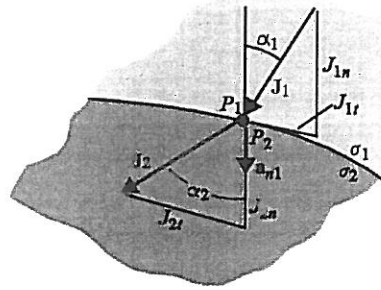


3. Find the energy required to assemble a uniform sphere of charge of radius b and volume charge density ρ . (20 分)



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4. Two conducting media with conductivities σ_1 and σ_2 are separated by an interface. The steady current density in medium 1 at point P_1 has a magnitude J_1 and makes an angle α_1 with the normal. Please determine the magnitude (J_2) and direction (α_2) of the current density at point P_2 in medium 2. (20 分)



5. Please determine the magnetic flux density inside a closely wound toroidal coil with an air core having N turns and carrying a current I . The toroid has a mean radius b , and the radius of each turn is a . (20 分)

