

淡江大學 109 學年度日間部寒假轉學生招生考試試題

系別： 物理學系三年級

科目： 電磁學

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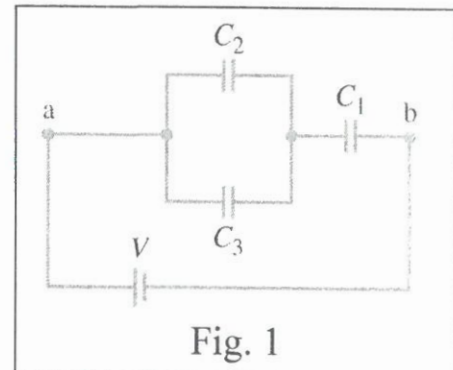
考試日期：1 月 18 日(星期一) 第 1 節

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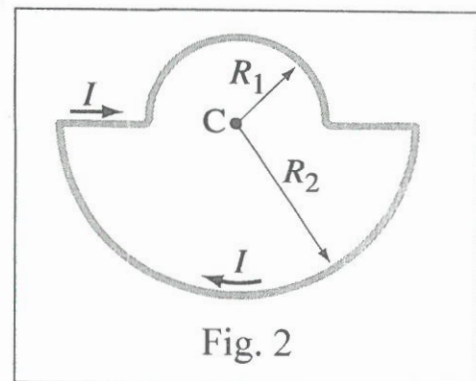
1: Suppose the charge density of the solid sphere with a radius r_o is given by $\rho_E = \alpha r^2$ where α is a constant. (a) Find α in terms of the total charge Q on the sphere and its radius r_o . (b) Find the electric field inside the sphere as a function of r . (20 %)

2: Determine the potential at a distance r from the center of a charged conducting sphere of radius r_o for (a) $r > r_o$ (b) $r < r_o$. The total charge on the sphere is Q . (20 %)

3: Determine the capacitance of a single capacitor that will have the same effect as the combination shown in the figure 1. Take $C_1 = C_2 = C_3 = C$. (10 %)



4: A wire is formed into the shape of two half circles connected by equal-length straight sections as shown in Fig. 2. A current I flows in the circuit clockwise as shown. Determine (a) the magnitude and direction of the magnetic field at the center, C , and (b) the magnetic dipole moment of the circuit. (20 %)



5: (a) Write down the “Faraday’s law of induction”, and explain. (10 %). (b) Write down “Maxwell’s equation”. (10 %)

6: If the resistance of the resistor in the figure 3 is slowly increased, what is the induced in the small circular loop inside the larger loop? (10 %)

