

國立中央大學八十七學年度碩士班研究生入學試題卷

所別: 地球物理研究所

不分組 科目:

電磁學

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1. A nonconducting disk of radius  $a$  has a uniform surface charge density  $\sigma$   $\text{C/m}^2$ . What is the potential at a point on the axis of the disk at a distance  $y$  from its center? (25%)
2. A wire is bent into a semicircular loop of radius  $R$ . It carries a current  $I$ , and its plane is perpendicular to a uniform magnetic field  $\vec{B}$ , as shown in Fig. 1. Find the force on the loop. (25%)

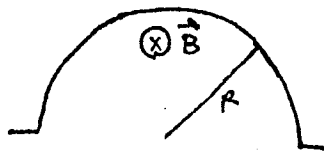


Fig. 1.

3. In an RLC series circuit  $L = 20.0$  mH,  $C = 50$   $\mu\text{F}$ , and  $R = 6.0$   $\Omega$ . Find: (a) the time taken for the amplitude to fall to half the initial value; (b) the damped angular frequency; (c) the number of oscillations in 20 ms. (25%)
4. An ac source of emf with frequency 50 Hz and a peak potential difference of 100 V is in an RLC series circuit with  $R = 9$   $\Omega$ ,  $L = 0.04$  H, and  $C = 100$   $\mu\text{F}$ . Find: (a) the impedance; (b) the phase angle; (c) the peak potential difference across each element. (25%)

