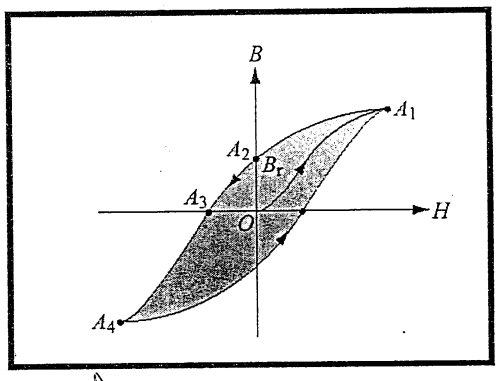
大同大學　九十　學年度　碩士班入學考　試題

考試科目：電磁學　　所別：通訊工程研究所　　第1/1頁

註：本次考試不可以參考自己的書籍及筆記；　不可以使用字典；　可以使用計算器。

1. The region between a very long coaxial cable is filled with a material of conductivity σ and permitivity ε. The radii of the inner and outer conductors are a and b, respectively. If the capacitance per unit length between the conductors is $2\pi\varepsilon/\ln(r)$, find r and the resistance per unit length. (b) Write down Maxwell's equations with units in M.K.S. system for all variables in those equations.

2. Referring to the figure at right, in which the hysteresis of a ferromagnetic material is shown, (a) please describe the physical meaning of the points A_1、A_2、A_3 and A_4. (b) What the roles played by the B and H in it? (c) As for this kind of material, how to define it as a 'soft' or a 'hard' one?



3. A plane wave in free space represented by the phasor

$$\vec{E} = 3(\vec{a}_x + j\vec{a}_y)e^{-j(2\pi z)}$$

incidents normally on a perfect conductor wall at z = 0.

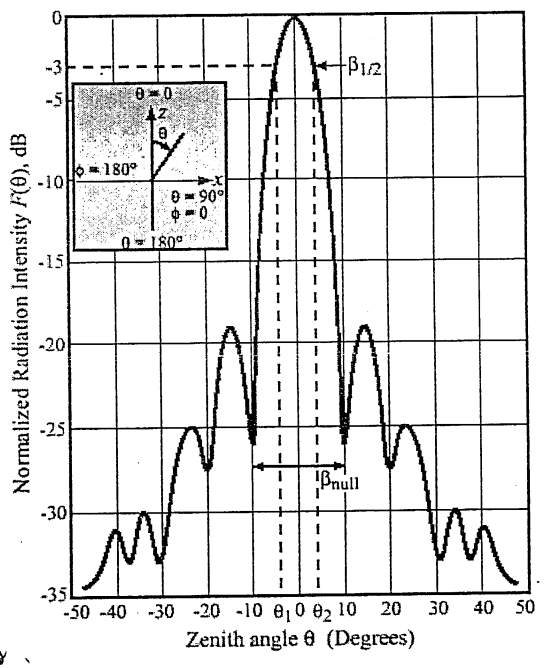
(1) Determine the reflected wave.

(2) Find the total electric field intensity at plane z = -1/3.

4. Considering an antenna with a radiation pattern shown right, answer the following questions.

(a) What is the meaning of the parameter $\beta_{1/2}$?

(b) Does this pattern show the wave polarization used by this antenna? If yes, what's it? If no, why?

(c) If the incoming wave from the angle 15^0, how much received power (in Watt) less is comparing with that from the angle 0^0 (received 1mW)?

(d) In terms of the rectangular coordinate system, on what plane is this pattern measured?