

大同大學 100 學年度研究所碩士班入學考試試題

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. (25%) In vacuum, a point charge of 1 coulomb is located at (1, 0, 1) in the rectangular coordinate system. Find $\int_{P(1,0.5,1)}^{Q(1,1,1)} \vec{E} \cdot d\vec{\ell} = ?$ If we add one more point charge of 1 coulomb at (1, 1.5, 1), how will the result of the line integral be changed? (Points P and Q are on the same line and $d\vec{\ell}$ is along the direction from P to Q.)

2. (25%) In phasor form, the time-harmonic electric field intensity is expressed as $\vec{E} = (3\vec{a}_x + 4j\vec{a}_y) e^{jkz}$, where k is a constant. Find the corresponding magnetic field intensity in the instantaneous notation, assuming the angular frequency is ω .

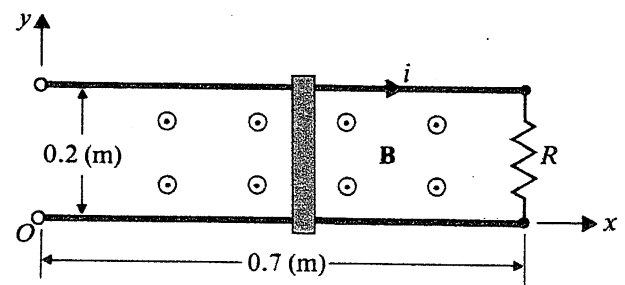
3. (25%) A conducting sliding bar oscillates over two parallel conducting rails in a sinusoidally varying magnetic field

$$\vec{B} = \vec{a}_z 5 \cos \omega t \quad (mT)$$

as shown in the right figure. The position of the sliding bar is given by

$$x = 0.35 (1 - \cos \omega t) (m), \text{ and the rails are terminated in a resistance } R = 0.2 (\Omega).$$

Find i .



4. (25%) Explain the following terms: a) wave polarization, b) antenna pattern, c) Lorentz's force, d) Gauss's Law and Gauss's surface, e) dielectric constant