

國立臺北科技大學

九十四學年度電腦與通訊研究所碩士在職專班入學考試

丙組：電磁學 試題

填准考證號碼

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注意事項：

1. 本試題共【八】題，配分共 100 分。
2. 請按順序標明題號作答，不必抄題。
3. 全部答案均須答在試卷答案欄內，否則不予計分。

1. (60%) 是非題共 20 小題，對的答“○”，錯的答“×”，正確答案每一小題給分 3 分，提供錯誤答案者每一小題倒扣 3 分，空白者不計分，是非題總分最低分 0 分。
 - (1). There is a repulsive force between a point charge and a conductor which is located at a fixed distance away from the point charge.
 - (2). The static electric field is identically equal to zero in the interior of a perfect conductor.
 - (3). The static magnetic field is identically equal to zero in the interior of a perfect conductor.
 - (4). The time-varying electric field is identically equal to zero in the interior of a perfect conductor.
 - (5). The time-varying magnetic field is identically equal to zero in the interior of a perfect conductor.
 - (6). A particle, with static charges Q , is placed next to a permanent magnet. The both objects are fixed. There is a power flow under this situation.
 - (7). The unit of Poynting vector is watt (power).
 - (8). The unit of vector magnetic potential is Wb/m.
 - (9). The unit of electric field intensity is V/m.
 - (10). The unit of electric flux density is C/m.
 - (11). The electrostatic field of an infinite planar charge with uniform surface charge density is inversely proportional to the distance from the infinite planar charge.

- (12). The magnetic flux density at a distant point of a magnetic dipole is inversely proportional to the square of the distance from the magnetic dipole.
 - (13). The isolated magnetic charges do not exist physically. The fact causes that the law of conservation of magnetic flux ($\oint \vec{B} \cdot d\vec{s} = 0$).
 - (14). The tangential component of magnetic field intensity is discontinuous across the boundary of two different dielectrics when the surface current density exists at the interface.
 - (15). If a charge moves in a static magnetic field, there is work done by the magnetic force.
 - (16). A line is matched when the load impedance is equal to the complex conjugate of the characteristic impedance of the line.
 - (17). The skin depth of a conductor is inversely proportional to the square root of frequency.
 - (18). The phase velocity and the wave impedance for TEM waves propagated in a lossless coaxial cable are dependent of the frequency of the wave.
 - (19). Only lossless transmissions can be distortionless.
 - (20). Waveguide can be considered as a high-pass filter.
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2. The field created by (a) (4%) is called magnetostatic field. (b) (4%) What is the mathematical expression for describing the source condition?
 3. Write the mathematical form of a z-direction propagating TEM wave with the phasor form. (6%)
 4. What is the characteristic impedance of a transmission line? (4%)
 5. Express time varying \mathbf{E} and \mathbf{B} in terms of potential functions V and \mathbf{A} . (6%)
 6. A transmission line with characteristic impedance $50 \, (\Omega)$ and length $\lambda/4$ is terminated with a $50 \, (\Omega)$ load impedance. Find the input impedance. (4%)
 7. A transmission line with characteristic impedance $50 \, (\Omega)$ and length $\lambda/2$ is terminated with a $25 \, (\Omega)$ load impedance. Find the input impedance. (4%)
 8. Explain the principle of electrostatic shielding. (8%)