# 臺北市立大學

## 106 學年度第一學期學士班二、三年級轉學生招生考試試題

系　　　別：應用物理暨化學系（三年級）

科　　　目：普通物理學

考試時間：90 分鐘【10:30-12:00】

總　　　分：100 分

※　注意：不必抄題，作答時請將試題題號及答案依照順序寫在答案卷上；**限用藍色或黑色筆作答**，使用其他顏色或鉛筆作答者，所考科目以零分計算。(**於本試題紙上作答者，不予計分。**)

## 問答題（共 100 分）

一、A total charge $Q$ is distributed uniformly around a thin ring of radius $a$. Find the potential at a point P on the ring's axis. (Noted that the point P is $x$ meter away from the center of the ring.) (10%)

二、A series RLC circuit has R=10kΩ, L=1mH, and resonates at 1000 rad/s.
(a) What's the capacitance? (10%)
(b) Find the circuit's impedance at resonance. (10%)

三、A laser beam with wavelength λ is propagating through air in the +z-direction. Its electric field is parallel to the x-axis and has amplitude $A$ (V/m).
(a) Find the wave frequency and the amplitude. (10%)
(b) Find the direction of the magnetic field. (10%)

四、Two particles of masses $m_1$ and $m_2$ moving with initial velocities $v_{1i}$ and $v_{2i}$. Find the final velocities ($v_{1f}$ and $v_{2f}$) of the two particles if (a) the two particles collide head-on and stick together, (b) the two particles collide head-on and then leave the collision site. (25%)

五、List at least three differences between sound waves and light waves. (15%)

六、Explain why a capacitor acts as a short circuit at high frequencies? (10%)