

# 元智大學 102 學年度研究所 碩士班 招生試題卷

系(所)別：光電工程學系碩  
士班

組別：不分組

科目：近代物理

用紙第 / 頁共 / 頁

●不可使用電子計算機

本科試題若有題意不清的地方，可以自行假設條件。若懷疑題目有錯誤時，可以修正之，但須寫出題目需要修正的理由或觀點。監試人員可以不做任何題意的說明。

1. (A) In special relativity, what assumptions are made by Albert Einstein? (B) Is light a wave or a particle? Support your answer by citing specific experimental evidence. (A) 6%, (B) 8%
2. (A) How to measure the maximum kinetic energy of the photoelectron? (B) How to determine the value of Planck constant  $h$ ? (A) 8% (B) 8%
3. The total energy of a proton is three times its rest energy. Mass of proton is  $1.67 \times 10^{-27}$  kg. (A) Find the proton's rest energy in electron volts. (B) With what speed is the proton moving? (C) What is the proton's momentum? (A) 6%, (B) 6%, (C) 8%
4. The allowed electron energies predicated by the Bohr model of the hydrogen atom are correct. (A) What are the assumptions of the Bohr model? (B) Determine the possible energies of the hydrogen. (C) In the Bohr model, what things are unsuccessful? Explain! (A) 8%, (B) 6%, (C) 6%
5. A particle of mass  $m$  moves in a three-dimensional box with sides  $L$ . If the particle is in the third excited level, corresponding to  $n^2=11$ , find (A) the energy of particle, (B) the combinations of  $n_1$ ,  $n_2$ , and  $n_3$  that would give this energy, and (C) the wavefunctions for these different states. (A) 4%, (B) 6%, (C) 6%
6. (A) What means "bremsstrahlung"? (B) What is "spin-orbit interaction"? (A) 6%, (B) 8%