招生學年度	102	招生類別	碩士班
系所班別	光電電子碩士班聯合招生 (光電工程學系碩士班、電機工程學系 電子工程碩士班)		
科目	近代物理		
注意事項	本考科可使用掌上型計算機；內容以近代物理導論為主。		

1. (10%) Please plot the Fermi-Dirac distribution ($f_{FD}(E)$) at (a) T = 0K (b) T > 0K. Please remember to point out the position of Fermi-Level(E_F) in x-axis.
2. (10%) If we use metal A (high work function) and metal B (low work function), respectively, as the cathode material in "Photoelectric Effect" experiment. Which one will have the lower value of stopping potential?
3. (10%) A star is away from earth with a velocity of 5×10^{-3} c. Compute the wavelength change of the sodium D_2 line, 589nm, according to the Doppler Effect.
4. (10%) The energy of a particle is equal to 2.5×10^{-12} J, its momentum is 7.9×10^{-21} N s. What are its mass m and velocity v?
5. (10%) An electron is constrained to bounce between two reflecting walls placed at a distance $d = 10^{-9}$ m from each other. Assuming that, as in the case of a stationary electromagnetic wave confined between two parallel mirrors, the distance d be equal to n half wavelengths, determine the possible values of the electron energy as a function of n.
6. (10%) A monochromatic light with light intensity of I_0 normally impinges a material with absorption coefficient of α mm^{-1}. Assume that the intensity becomes $0.5I_0$ as the passing through the material with a thickness of 8mm. Find the absorption coefficient of the material, α.
7. (10%) Halogens have one fewer electron than the inert gases. Please write down the electron configurations of fluorine (F), chlorine(Cl) and bromine (Br).
8. (10%) An electron is trapped in a one-dimensional potential well with a barrier height of 3eV. Assume that the thickness of the well 1nm. Find the lowest energy state in the potential well.
9. (10%) (a) Please write down the 1-D time-dependent Schrödinger equation. (b) Please write down the 1-D time-independent Schrödinger equation.
10. (10%) For an electron in the hydrogen atom, if the angular momentum quantum number $l = 3$: (a) What are the possible values of L_Z(the z component of angular momentum)? (b) What is the magnitude L(the angular momentum) ?