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淡江大學 99 學年度碩士班招生考試試題

系別：物理學系

科目：近代物理

准帶項目請打「V」	
X	計算機

本試題共 1 頁，5 大題

1. Cosmic Microwave Background Radiation is a form of electromagnetic radiation filling the universe. It has a thermal black body spectrum at a temperature of 2.725K. What is the wavelength of peak of emission (10%)?
2. Describe
 - a. Bohr's postulate of the atom (5%).
 - b. Space quantization (5%).
 - c. Uncertainty Principle (5%).
 - d. Frank-Hertz experiment and its significance (5%).
3. The wave function for a particle is given by $\phi(x) = Ae^{-bx^2 + ikx}$
 - a. Find the normalization constant A (10%).
 - b. Find the expectation value of momentum p (10%).
 - c. Draw a graph of probability density that the particle can be found in the space (10%).
4. The shortest wavelength photon in the Balmer series for hydrogen is 364.6 nm.
 - a. Find the energy of photons corresponding to this wavelength (10%).
 - b. Find the longest wavelength photon in the Balmer series (10%).
5. A particle of mass m is bounded to a one-dimensional potential $V(x) = m\omega^2 x^2 / 2$.
 - a. Write down the time-independent Schrödinger equation (10%).
 - b. Calculate the energy corresponds to the eigenfunction $u_0(x) = Ae^{-\frac{m\omega}{2h}x^2}$ with A the normalization factor (10%).