

國立清華大學 101 學年度碩士班考試入學試題

系所班組別：生命科學院丙組

考試科目（代碼）：近代物理(0602)

共__1__頁，第__1__頁 *請在【答案卷】作答

1. (60%) Explain: (a) Isotope. (b) Beta decay. (c) Hubble's law in astronomy. (d) Definition of entropy in statistical mechanics. (e) Mirror nuclei. (f) Wien's displacement law. (g) Twin paradox in the special theory of relativity. (h) Neutrino. (i) Strangeness quantum number. (j) Nuclear chain reaction in a reactor. (k) Microwave background radiation. (l) Radiocarbon dating.
2. (10%) A particle with mass M decays at rest into another particle with mass m and two photons. Calculate the maximum kinetic energy of the particle with mass m .
3. (10%) How many quantum numbers are required to specify the quantum state of one electron in an atom? Write down the names of these quantum numbers.
4. (5%) Write down the time-dependent Schrodinger equation in one dimension for a particle with mass m and potential energy $U(x)$.
5. (5%) Write down the energy eigenvalues of a molecule with moment of inertial I rotating about an axis passing through the center of mass.
6. (2%) What is the spin of a photon?
7. (2%) What is the approximate age of the earth?
8. (2%) Is parity conserved in strong interaction?
9. (2%) What is wrong with the Rutherford model of atom where electrons circulate the nucleus?
10. (2%) What is the approximate half-life of a neutron?