

國 立 清 華 大 學 命 題 紙

98 學年度 生醫工程與環境科學 系(所) 丙(醫學物理與工程) 組碩士班入學考試

科目 放射物理學 科目代碼 2501 共 一 頁第 一 頁 *請在【答案卷卡】內作答

共十題 每題 10 分

1. Some nuclei, like $^{235}_{92}\text{U}$, split into medium heavy nuclei upon the impact of neutrons. The fission fragments are radioactive. Explain what will be the possible decays of the fission fragments? (What kind of radiation the fragment will emit?)
2. Describe Rutherford scattering experiment. What was his finding? What did he derive from the experiment?
3. Describe the operation theory of a cyclotron and explain why electrons can't be accelerated in a cyclotron?
4. Explain why mammography (breast imaging) needs to operate at very low kVp? What is the disadvantage of exposure at such a low kVp?
5. Explain why it is difficult to measure the absorbed dose for gamma radiation with energy greater than 3MeV using a standard air chamber?
6. An object (thickness t) is irradiated by an x-ray beam (kVp, mAs and field size F) from a distance (d). A film is placed behind the object. Describe how these parameters affect the amount of scattering on the film. Please design a way to measure the amount of scattering.
7. When an object is irradiated with a photon source, explain what is the penumbra and how it is generated?
8. In radiation therapy, under what situation do you need a wedge? What is the definition of a wedge angle?
9. What are the advantages of using brachytherapy? What need to be considered when choosing an isotope as the source?
10. When selecting a detector for a PET (positron emission tomography) system, what need to be considered?