長庚大學101學年度研究所碩士班(含在職專班)招生考試試題

系所：醫學影像暨放射科學系碩士班　　考試科目：放射化學

注意：請詳細閱讀下列試題，並請標明題號依試題順序將答案書寫於答案卷上。　　本試題共　頁：第　頁

問答、計算題 (10 題，計算題一定要列出計算過程，否則不予計分)

1. Please give two examples of induced natural radionuclides and describe in detail about each nuclear reaction involved. (10%)
2. Please define gamma radiation, bremsstrahlung radiation and characteristic X-ray; and compare the types of energy spectra among the radiations. (12%)
3. Please describe in detail about the annihilation radiation. (10%)
4. Please define excitation function for a nuclear reaction; and plot the excitation functions for thermal neutron and proton, respectively. (12%)
5. What nuclear reactions have long been used to produce F-18 fluoride and F-18 fluorine, respectively? Which production is practically carrier-added to enhance the yield of F-18 radioactivity? (12%)
6. Please calculate the mean life for a sample of Ar-37, if it takes 100 days for 86.3% of the atoms to decay. (12%)
7. Cs-137 (half-life 30.17 years) decays via β^- emission to Ba-137m (half-life 2.55 min). An experiment is begun with 5.00 MBq of pure Cs-137. How much activity (in mCi) is due to Ba-137m after a decay period of 50.00 min? Explain your estimation. (10%)
8. Please define and explain why the decay modes of Ga-67 and O-15, respectively. (12%)
9. Please calculate the energy (in MeV) that is released in a pure β^- decay, given that the mass of a neutron is 1.0086641 amu and the mass of a hydrogen atom is 1.0078250 amu. (10%)