

國立清華大學 102 學年度碩士班考試入學試題

系所班組別：核子工程與科學研究所 甲組(工程組)

考試科目 (代碼)：核工原理(2702)

共__1__頁，第__1__頁 *請在【答案卷、卡】作答

1. Determine the critical thickness of a bare slab homogeneous reactor based on one group diffusion theory with the following composition:

$$\Sigma_a = 0.1 \text{ cm}^{-1} \quad \nu \Sigma_f = 0.13 \text{ cm}^{-1} \quad D = 3 \text{ cm}$$

(15%)

2. Nuclide A decays to nuclide B. If no atoms of B at $t = 0$, how long does it take for nuclide A and B have the same activity? Assume nuclide A has a half life of 15 min and nuclide B has a half life of 30 min. (20%)

3. An infinite planar source emitting S neutrons/cm²-sec is placed between infinite slab of graphite and water of thickness a and b , respectively. Write the equations and boundary conditions for the neutron flux distribution in the system. Do not need to solve the equation. (20%)

4. Fuel pellets of UO_2 have a density of 10 g/cm^3 . If the uranium is enriched to 25 w/o, what is the atomic density of the ^{235}U in the fuel pellet? Assume the atomic weight for ^{235}U and ^{238}U are 235 and 238 respectively. (15%)

5. Is it possible to use natural uranium in light water reactor or heavy water reactor and why? Is it possible to use ^{239}Pu or ^{233}U as a fuel for thermal breeder reactor and why? (15%)

6. 解釋名詞 (15%)

(a) burnup (b) activity (c) group flux