

國立清華大學 100 學年度碩士班入學考試試題

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(3002)

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1. 解釋名詞：每子題 4 分共 20 分
  - A. cross section
  - B. criticality
  - C. reactivity
  - D.  $k_{\infty}$  four factor formula
  
2. Please derive the number density of U-235 in 5 % w/o enriched  $\text{UO}_2$  having a density of  $10 \text{ g/cm}^3$ . Assume the atomic weight for U-235 and U-238 are 235 and 238 respectively?

(15 %)
  
3. Assume nuclide A decays to nuclide B and nuclide B decays to nuclide C with decay constants  $\lambda_A$  and  $\lambda_B$  respectively; nuclide C is stable isotope. Please write down the time dependent balance equation for the number density  $N_A$ ,  $N_B$ ,  $N_C$  of nuclide A, B, and C.

(20 %)
  
4. What is the difference between geometric buckling and material buckling?  
Given geometric buckling, how do you find material buckling?  
Given material buckling, how do you find geometric buckling?  
Please explain it in detail.

(25 %)
  
5. A slab reactor with thickness  $a$  has a reflector on both sides with thickness  $d$ . Please write the one group neutron balance equation and associated boundary conditions. What is the advantage of having a reflector?

(20 %)