Relevant information:

1. Thermal neutron cross section for U-235: 570barns
2. 1 eV = 1.602E-19 J
3. Density of UO2: 10.97 g/cc

Explain the difference between fertile, fissile and fissionable. (5 pts)

What does TRISO stand for? Identify the layers in a TRISO particle. Provide an example of a reactor that utilizes TRISO-based fuel. (10 pts)

What is the compound that uranium is converted into for enrichment purposes? (5 pts)

Briefly describe the fabrication process of the fuel. (10pts)

Name two primary fission product species. Briefly explain your justification. (5pts)

What is the role of cladding in nuclear fuel? (5pts)

Which noble gas has a lower thermal conductivity, He or Xe? (5pts)

U3Si5 is a uranium silicide fuel being considered for use in light water reactors. It has

a thermal conductivity of 12.5 W/(m-K), an enrichment of 5% and a density of 8.97 g/cm3. Answer the following questions:

What is the heat generation rate for U3Si5 given a neutron flux of 3E13 n/cm2-s? (10 pts)

Given a fuel radius of 0.45 cm, what is the temperature drop over the fuel pellet? (10 pts)

What enrichment of UO2 would be required to obtain the same heat generation rate? (10 pts)

Which coolant sees a larger change in outlet to inlet temperature? 1) water: CPW = 4200 J/kg-K, mdot = 0.25 kg/s-rod, Z0 = 1.5 m; 2) sodium: CPW=1404 J/kg-K, mdot = 1.2 kg/s/rod, Z0=0.5 m. (20pts)

What are the three ways that space is discretized? (10 pts)

Given a rod of 2 m in length and an LHR0 = 150 W/cm, what is the LHR at z=1.6 m? (15 pts)