科目： 292001
知能類： K1.02 [3.0/3.1]
序號：B45

The term neutron generation time is defined as the average time between...
A. neutron absorption and the resulting fission.
B. the production of a delayed neutron and subsequent neutron thermalization.
C. neutron absorption producing a fission and absorption of resultant neutrons.
D. neutron thermalization and subsequent neutron absorption.
ANSWER: C.

中子生成時間的定義為_____的平均時間。
A. 中子吸收到分裂
B. 遲延中子的生成到中子熱化
C. 中子被吸收產生分裂到分裂後的中子被吸收
D. 中子熱化到中子吸收
答案：C.

科目： 292001
知能類： K1.02 [3.0/3.1]
序號： B174

Which one of the following is the definition of the term prompt neutron?
A. A high-energy neutron emitted from a neutron precursor, immediately after the fission process.
B. A neutron with an energy level greater than 0.1 MeV, emitted in less than 10^{-4} seconds following a nuclear fission.
C. A neutron emitted in less than 10^{-14} seconds following a nuclear fission.
D. A neutron emitted as a result of a gamma-n or alpha-n reaction.
ANSWER: C.

下列何者為瞬發中子的定義？
A. 分裂後立刻由中子母核發射出來的高能中子
B. 核分裂後10^{-4}秒內發射出能量大於0.1 MeV的中子
C. 核分裂後10^{-14}秒內發射出的中子
D. 伽瑪-中子（γ-n）或阿伐-中子（α-n）反應後發射的中子
答案：C.

科目： 292001
知能類： K1.02 [3.0/3.1]
序號： B245

Delayed neutrons are neutrons that...
A. have reached thermal equilibrium with the surrounding medium.
B. are born within 10^{-14} seconds of the fission event.
C. are born at the lowest average kinetic energy of all fission neutrons.
D. are responsible for the majority of U-235 fissions.
ANSWER: C.

遲延中子是____
A. 與周圍介質達到熱平衡的中子。
B. 在分裂發生10^{-14}秒內產生的中子。
C. 生成時的平均動能是所有分裂中子中最低的中子。
D. 造成大部分U-235分裂的中子。
答案： C.

科目： 292001
知能類： K1.02 [3.0/3.1]
序號： B1146 (P1945)

Which one of the following types of neutrons has an average neutron generation lifetime of 12.5 seconds?
A. Prompt
B. Delayed
C. Fast
D. Thermal
ANSWER: B.

下列何種中子的平均中子生成期為12.5秒？
A. 瞬發中子
B. 遲延中子
C. 快中子
D. 熱中子
答案：B.

科目： 292001
知能類： K1.02 [3.0/3.1]
序號： B1345 (P1445)

A neutron that is born 10^{-2} seconds after the associated fission event is a _____ neutron.
A. thermal
B. delayed
C. prompt
D. capture
ANSWER: B.

在分裂發生後10^{-2}秒生成的中子稱做____中子。
A. 熱
B. 遲延
C. 瞬發
D. 捕獲
答案：B.

科目： 292001
知能類： K1.02 [3.0/3.1]
序號： B1545 (P1145)

Which one of the following is a characteristic of a prompt neutron?
A. Born with an average kinetic energy of 0.5 MeV.
B. Usually emitted by the excited nucleus of a fission product.
C. Accounts for more than 99% of fission neutrons.
D. Released an average of 13 seconds after the fission event.
ANSWER: C.

下列何者為瞬發中子的特性？
A. 生成時具有平均動能0.5 MeV
B. 通常是由分裂產物中受激核子所發射出來的
C. 佔有超過99%的分裂中子
D. 在分裂發生平均13秒後釋出
答案： C.

科目： 292001
知能類： K1.02 [3.0/3.1]
序號： B1845

Delayed neutrons are neutrons that...
A. have reached thermal equilibrium with the surrounding medium.
B. are born as thermal neutrons.
C. are born at a lower average kinetic energy than most other fission neutrons.
D. are responsible for the majority of U-235 fissions.
ANSWER: C.

遲延中子____
A. 是與周圍介質達到熱平衡的中子。
B. 生成時為熱中子。
C. 生成時的平均動能較其他大部分的分裂中子低的中子。
D. 造成大部分U-235分裂的中子。
答案：C.

科目： 292001
知能類： K1.02 [3.0/3.1]
序號： B1945 (P845)

Delayed neutrons are neutrons that...
A. have reached thermal equilibrium with the surrounding medium.
B. are born within 10^{-14} seconds of the fission event.
C. are produced from the radioactive decay of specific fission fragments.
D. are responsible for the majority of U-235 fissions.
ANSWER: C.

遲延中子是____。
A. 與周圍介質達到熱平衡的中子
B. 在分裂發生後10^{-14}秒內生成的中子
C. 由某種特定分裂產物的輻射衰變所產生的中子
D. 構成大部分U-235分裂的中子
答案：C.

科目： 292001
知能類： K1.02 [3.0/3.1]
序號： B2046 (P2045)

In a comparison between a delayed neutron and a prompt neutron born from the same fission event, the prompt neutron is more likely to...
A. require a greater number of collisions to become a thermal neutron.
B. be captured by U-238 at a resonant energy peak between 1 eV and 1000 eV.
C. be born with a lower kinetic energy.
D. cause thermal fission of a U-235 nucleus.
ANSWER: A.

比較同一分裂中生成的遲延中子和瞬發中子，瞬發中子比較可能____。
A. 可能需要較多次的碰撞才能變成熱中子
B. 在1 eV 到 1000 eV的共振能峰之間比較可能被U-238捕獲
C. 所需的生成動能可能比較低
D. 比較可能會導致U-235熱分裂
答案：A.

科目： 292001
知能類： K1.02 [3.0/3.1]
序號： B2145 (P2145)

In a comparison between a delayed neutron and a prompt neutron born from the same fission event, the prompt neutron is more likely to...
A. cause fast fission of a U-238 nucleus.
B. be captured by a U-238 nucleus at a resonant energy between 1 eV and 1000 eV.
C. be captured by a Xe-135 nucleus.
D. cause thermal fission of a U-235 nucleus.
ANSWER: A.

比較同一分裂中生成的遲延中子和瞬發中子，瞬發中子比較可能____。
A. 會引起U-238快分裂
B. 在1 eV 到 1000 eV的共振能量之間被U-238捕獲
C. 會被Xe-135捕獲
D. 會導致U-235熱分裂
答案：A.

科目： 292001
知能類： K1.02 [3.0/3.1]
序號： B2245

In a comparison between a delayed neutron and a prompt neutron born from the same fission event, the delayed neutron is more likely to: (Assume both neutrons remain in the core unless otherwise stated.)
A. be absorbed in the moderator
B. cause fission of a U-238 nucleus.
C. be absorbed in a B-10 nucleus.
D. leak out of the core.
ANSWER: C.

比較同一分裂中生成的遲延中子和瞬發中子，遲延中子比較可能____。（假設兩個中子都停留在爐心，除非特別聲明。）
A. 被緩和劑吸收
B. 會引起U-238分裂
C. 被B-10吸收
D. 會從爐心外洩
答案：C.

科目： 292001
知能類： K1.02 [3.0/3.1]
序號： B2345 (P2345)

A neutron that is born 10^{-10}seconds after the associated fission event is classified as a _____ fission neutron.
A. spontaneous
B. delayed
C. prompt
D. thermal
ANSWER: B

在分裂後10^{-10}秒釋出的中子被歸類為____分裂中子。
A.自發
B.遲延
C.瞬發
D.熱
答案：B

科目： 292001
知能類： K1.02 [3.0/3.1]
序號： B2545 (P2545)

In a comparison between a delayed neutron and a prompt neutron born from the same fission event, the prompt neutron is more likely to...
A. be captured by a Xe-135 nucleus.
B. cause thermal fission of a U-235 nucleus.
C. leak out of the core while slowing down.
D. be captured by a U-238 nucleus at a resonant energy between 1 eV and 1000 eV.
ANSWER: C.

比較同一分裂中生成的遲延中子和瞬發中子，瞬發中子比較可能____。
A. 被Xe-135捕獲
B. 會導致U-235熱分裂
C. 會在減能時從爐心外洩
D. 在1 eV 到 1000 eV的共振能量之間被U-238捕獲
答案：C.

科目： 292001
知能類： K1.02 [3.0/3.1]
序號： B2645 (P2645)

In a comparison between a delayed neutron and a prompt neutron born from the same fission event, the delayed neutron is more likely to...
A. leak out of the core.
B. cause fission of a U-238 nucleus.
C. become a thermal neutron.
D. cause fission of a Pu-240 nucleus.
ANSWER: C.

比較同一分裂中生成的遲延中子和瞬發中子，遲延中子比較可能____。
A. 會從爐心外洩
B. 會引起U-238分裂
C. 會變成熱中子
D. 會引起Pu-240分裂
答案：C.

科目： 292001
知能類： K1.02 [3.0/3.1]
序號： B2846 (P1245)

In a comparison between a delayed neutron and a prompt neutron born from the same fission event, the delayed neutron is more likely to...
A. leak out of the core.
B. be absorbed in the moderator.
C. cause fission of a U-238 nucleus.
D. cause fission of a U-235 nucleus.
ANSWER: D.

比較同一分裂中生成的遲延中子和瞬發中子，遲延中子比較可能____。（假設兩個中子都停留在反應器爐心。）
A. 會從爐心外洩
B. 會被緩和劑吸收
C. 會引起U-238分裂
D. 會引起U-235分裂
答案：D.

科目： 292001
知能類： K1.02 [3.0/3.1]
序號： B2945 (P2945)

Which one of the following types of neutrons in a reactor is more likely to cause fission of a U-238 nucleus in the reactor fuel? (Assume that each type of neutron remains in the reactor core until it interacts with a U-238 nucleus.)
A. Thermal neutron
B. Prompt neutron at birth
C. Delayed neutron at birth
D. Neutron at a U-238 resonance energy
ANSWER: B.

反應器中那一種中子比較可能會在反應器燃料中引起U-238核子分裂？(假設每一種中子都停留在爐心，直到與U-238核子發生作用。)
A. 熱中子
B. 生成時為瞬發中子
C. 生成時為遲延中子
D. 具有U-238共振能量的中子
答案：B.

科目： 292001
知能類： K1.02 [3.0/3.1]
序號： B3145 (P2845)

During a brief time interval in a typical commercial nuclear reactor operating at the beginning of a fuel cycle, 10_3 delayed neutrons were emitted. Approximately how many prompt neutrons were emitted during this same time interval?
A. 1.5×10^5
B. 6.5×10^6
C. 1.5×10^7
D. 6.5×10^8
ANSWER: A.

一個典型商用核子反應器運轉於燃料週期的初期，在一很短的時間內，發射出10^3個遲延中子。在同一時段中，大約有多少個瞬發中子會在反應器中產生？
A. 1.5×10^5
B. 6.5×10^6
C. 1.5×10^7
D. 6.5×10^8
答案：A.

科目： 292001
知能類： K1.02 [3.0/3.1]
序號： B3345 (P2445)

As compared to a prompt neutron, a delayed neutron, born from the same fission event, requires _____ collisions in the moderator to become thermal and is _____ likely to cause fission of a U-238 nucleus. (Neglect the effects of neutron leakage.)
A. more; more
B. more; less
C. fewer; more
D. fewer; less
ANSWER: D.

和瞬發中子相比，在同一個分裂中生成的遲延中子，在緩和劑中需要較____的碰撞來變成熱中子，同時較____引起U-238分裂。
A. 多；可能
B. 多；不可能
C. 少；可能
D. 少；不可能
答案：D.

科目： 292001
知能類： K1.02 [3.0/3.1]
序號： B3545 (P3545)

During a brief time interval in a typical commercial nuclear reactor operating at the beginning of a fuel cycle, 10^5 delayed neutrons were emitted.
Approximately how many prompt neutrons were emitted in the reactor during this same time interval?
A. 1.5×10^5
B. 6.5×10^6
C. 1.5×10^7
D. 6.5×10^8
ANSWER: C.

一個典型商用核子反應器運轉於燃料週期的初期，在一很短的時間內，發射出10^5個遲延中子。
在同一時段中，大約有多少個瞬發中子會在反應器中產生？
A. 1.5×10^5
B. 6.5×10^6
C. 1.5×10^7
D. 6.5×10^8
答案：C.

科目： 292001
知能類： K1.03 [2.7/2.7]
序號： B345 (N/A)

A neutron that possesses the same kinetic energy as its surroundings is called a/an _____ neutron.
A. slow
B. intermediate
C. resonant
D. thermal
ANSWER: D.

一個和環境擁有相同動能的中子稱做____中子。
A. 慢
B. 中速
C. 共振
D. 熱
答案：D.

科目： 292001
知能類： K1.03 [2.7/2.7]
序號： B545

A neutron is "thermal" when...
A. its kinetic energy is in the 1 eV to 1,000 eV energy range.
B. it is in energy equilibrium with the moderating medium.
C. it is released from the fission of a U-235 atom.
D. its cross-section for absorption in the fuel undergoes a sudden decrease.
ANSWER: B.

中子在何種狀況下被稱為「熱」中子？
A. 當它的動能介於1 eV 到 1,000 eV 能量範圍內。
B. 當它的能量與緩和的介質達到平衡時。
C. 當它從U-235原子分裂釋放出來時。
D. 當它在燃料中的吸收截面突然減少時。
答案：B.

科目： 292001
知能類： K1.03 [2.7/2.7]
序號： B645

Which one of the following ranges contains the energy level of thermal neutrons in a reactor operating at full power?
A. less than 0.1 eV
B. 1 to 10 eV
C. 100 to 1,000 eV
D. greater than 1 MeV
ANSWER: A.

下列那一個能量範圍是反應器全功率運轉時的熱中子能階？
A. 小於 0.1 eV
B. 1 到 10 eV
C. 100 到 1,000 eV
D. 大於 1 MeV
答案：A.

科目： 292001
知能類： K1.03 [2.7/2.7]
序號： B846 (N/A)

Which one of the following describes the energy level of a thermal neutron in a reactor operating at full power?

A. The kinetic energy of the neutron has decreased until it is nearly in equilibrium with its surroundings.
B. The potential energy of the neutron has decreased to nearly zero as the neutron approaches equilibrium with its surroundings.
C. The kinetic energy of the neutron has decreased sufficiently to allow the neutron to be resonantly absorbed by U-238.
D. The potential energy of the neutron has decreased to a level that will allow the neutron to be absorbed by U-235.

ANSWER: A.

關於反應器全功率運轉時熱中子的能階，下列何者描述是正確的？

A. 中子的動能會一直降到幾乎和周遭環境達到平衡。
B. 當中子和它的環境達到平衡時，它的位能會降到接近零。
C. 中子的動能會降到足以被U-238共振吸收。
D. 中子的位能會降到足以被U-235吸收。

答案：A.

科目： 292001
知能類： K1.03 [2.7/2.7]
序號： B945 (N/A)

Regarding a thermal neutron, the word "thermal" indicates that the neutron...
A. was born greater than 10^{-14} seconds after the fission event.
B. is a product of a thermal fission reaction.
C. was released by the decay of fission fragments.
D. is at the same energy level as the surrounding atoms.
ANSWER: D.

熱中子的「熱」代表該中子____。
A. 是在分裂之後10^{-14}秒以上才生成的
B. 是熱分裂反應的產物
C. 是分裂產物衰變所釋放出來的
D. 和周遭的原子具有相同的能階
答案：D.

科目： 292001
知能類： K1.03 [2.7/2.7]
序號： B2446 (N/A)

A thermal neutron exists at an energy _____ the epithermal range and its cross section for absorption in U-235 _____ as the neutron energy decreases.
A. above; decreases
B. above; increases
C. below; decreases
D. below; increases
ANSWER: D.

熱中子的能量____於超熱（Epithermal）區域，而當中子能量降低時，U-235中的吸收截面會____。
A. 高；減少
B. 高；增加
C. 低；減少
D. 低；增加
答案：D.

科目： 292001
知能類： K1.04 [3.2/3.2]
序號： B246

The interaction in the reactor core that is most efficient in thermalizing neutrons occurs with the...
A. hydrogen atoms in the water molecules.
B. oxygen atoms in the water molecules.
C. helium atoms in the fuel pins.
D. zirconium atoms in the fuel cladding.
ANSWER: A.

爐心內最能有效熱化中子的是____。
A. 水分子內的氫原子
B. 水分子內的氧原子
C. 燃料棒內的氦原子
D. 燃料護套內的鋯原子
答案：A.

科目： 292001
知能類： K1.04 [3.2/3.2]
序號： B445

Which one of the following conditions will increase the amount of neutron moderation in a reactor operating at saturated conditions?
A. Increasing moderator temperature
B. Reducing feedwater inlet temperature
C. Reducing reactor pressure vessel pressure
D. Reducing reactor recirculation system flow
ANSWER: B.

在飽和狀態運轉的反應器中，下列何者可以增加中子緩和的數量？
A. 提高緩和劑溫度
B. 降低飼水進口溫度
C. 降低反應爐槽壓力
D. 降低反應器再循環系統流量
答案：B.

科目： 292001
知能類： K1.04 [3.2/3.2]
序號： B446

Neutron moderation describes...
A. a decrease in the core neutron population from thermal neutron absorption.
B. an increase in the neutron multiplication factor due to a reduction in neutron poisons.
C. the loss of fission neutrons from the core by leakage.
D. the reduction of neutron energy due to scattering reactions.
ANSWER: D.

中子緩和的意思是指____。
A. 因熱中子吸收而減少爐心內的中子數量
B. 因減少中子毒物而增加中子增殖因素
C. 因外洩而損失爐心內的分裂中子
D. 因散射反應而降低中子的能量
答案：D.

科目： 292001
知能類： K1.04 [3.2/3.2]
序號： B745

During neutron moderation, a neutron is most susceptible to resonant absorption when it is a/an _____ neutron.
A. slow
B. fast
C. epithermal
D. thermal
ANSWER: C.

中子在緩和過程時，下列何種中子最可能被共振吸收？
A. 慢中子
B. 快中子
C. 超熱中子（Epithermal Neutron）
D. 熱中子
答案：C.

科目： 292001
知能類： K1.04 [3.2/3.2]
序號： B1245

Which one of the following will increase the average distance traveled by a fission neutron to become thermal in an operating reactor? (Assume the neutron continues to migrate inside the reactor until it becomes a thermal neutron.)
A. Moderator temperature decreases
B. Average neutron energy decreases
C. Reactor coolant system pressure increases
D. Reactor coolant void percentage increases
ANSWER: D.

在運轉中的反應器內，下列何者會增加分裂中子變成熱中子的平均移動距離？（假設中子一直在反應器內遷移，直到變成熱中子。）
A. 降低緩和劑溫度
B. 降低平均中子能量
C. 提高反應器冷卻水系統壓力
D. 提高反應器冷卻水空泡分率
答案：D.

科目： 292001
知能類： K1.04 [3.2/3.2]
序號： B1646

Which one of the following will decrease the ability of the coolant to moderate neutrons in a reactor operating at saturated conditions?
A. Decreasing moderator temperature
B. Decreasing feedwater inlet temperature
C. Decreasing reactor pressure vessel pressure
D. Increasing reactor recirculation system flow
ANSWER: C.

在飽和狀態運轉中的反應器內，下列何者會降低冷卻水緩和中子的能力？
A. 降低緩和劑的溫度
B. 降低飼水的進口溫度
C. 降低反應爐槽的壓力
D. 提高反應器的再循環系統流量
答案：C.

科目： 292001
知能類： K1.04 [3.2/3.2]
序號： B2746

A fast neutron will lose the greatest amount of energy during a scattering reaction in the moderator if it interacts with...
A. an oxygen nucleus.
B. a hydrogen nucleus.
C. a deuterium nucleus.
D. an electron surrounding a nucleus.
ANSWER: B.

快中子會在緩和劑的散射反應中損失最大的能量，如果它和____產生反應。
A. 氧原子核
B. 氫原子核
C. 重氫原子核
D. 環繞核子的電子
答案：B.

科目： 292001
知能類： K1.05 [2.4/2.6]
序號： B346

The best neutron moderator is _____ and is composed of _____ atoms.
A. dense; large
B. not dense; large
C. dense; small
D. not dense; small
ANSWER: C.

最好的中子緩和劑密度要____，且原子量要____。
A. 大；大
B. 小；大
C. 大；小
D. 小；小
答案：C.

科目： 292001
知能類： K1.05 [2.4/2.6]
序號： B1046

The ideal moderator has a _____ macroscopic absorption cross section for themal neutrons and a _____ average logarithmic energy decrement.
A. large; small
B. large; large
C. small; small
D. small; large
ANSWER: D.

理想緩和劑的熱中子巨觀吸收截面要____，平均對數能量減少值要____。
A. 大；小
B. 大；大
C. 小；小
D. 小；大
答案：D.

科目： 292002
知能類： K1.07 [3.5/3.5]
知能類： K1.08 [2.7/2.8]
序號： B186 (P44)

Control rod withdrawal has increased K_{eff} from 0.998 to 1.002. The reactor currently is...
A. subcritical.
B. supercritical.
C. prompt critical.
D. exactly critical.
ANSWER: B.

抽出控制棒使得K_{eff} 從0.998增加到1.002，則反應器此時處於
A. 次臨界
B. 超臨界
C. 瞬發臨界
D. 臨界
答案： B.

科目： 292002
知能類： K1.07 [3.5/3.5]
序號： B247 (P445)

Which one of the following conditions describes a reactor that is exactly critical?
A. $K_{eff} = 1; \Delta K/K = 0$
B. $K_{eff} = 1; \Delta K/K = 1$
C. $K_{eff} = 0; \Delta K/K = 0$
D. $K_{eff} = 0; \Delta K/K = 1$
ANSWER: A.

下列何種情況描述一核子反應器處於臨界？
A. $K_{eff} = 1; \Delta K/K = 0$
B. $K_{eff} = 1; \Delta K/K = 1$
C. $K_{eff} = 0; \Delta K/K = 0$
D. $K_{eff} = 0; \Delta K/K = 1$
答案：A

科目： 292002
知能類： K1.08 [2.7/2.8]
序號： B46

Which one of the following does not affect K_{eff}?
A. core dimensions.
B. core burnup.
C. moderator-to-fuel ratio.
D. installed neutron sources.
ANSWER: D.

下列何者不影響K_{eff} ？
A. 爐心大小
B. 爐心燃耗
C. 緩和劑與燃料比值
D. 裝置中子源
答案： D.

科目： 292002
知能類： K1.08 [2.7/2.8]
序號： B348

Which one of the following, if decreased, will not affect K_{eff}?
A. Fuel enrichment
B. Control rod worth
C. Neutron contribution from neutron sources
D. Shutdown margin when the reactor is subcritical
ANSWER: C.

下列何者減小時不會影響K_{eff} ？
A. 燃料濃縮度
B. 控制棒本領
C. 來自中子源的中子數
D. 反應器處於次臨界時之停機餘裕
答案： C.

科目： 292002
知能類： K1.08 [2.7/2.8]
序號： B847 (P1846)

The effective multiplication factor (K_{eff}) describes the ratio of the number of fission neutrons at the end of one generation to the number of fission neutrons at the _____ of the _____ generation.
A. beginning; next
B. beginning; previous
C. end; next
D. end; previous
ANSWER: D.

有效增殖因數(K_{eff})是指這一代結束時之分裂中子數除以_____代_____時之分裂中子數。
A. 下一；開始
B. 前一；開始
C. 下一；結束
D. 前一；結束
答案： D.

科目： 292002
知能類： K1.08 [2.7/2.8]
序號： B1447 (P1346)

The effective multiplication factor (K_{eff}) can be determined by dividing the number of neutrons in the third generation by the number of neutrons in the _____ generation.
A. first
B. second
C. third
D. fourth
ANSWER: B.

有效增殖因數(K_{eff})可以由將第三代的中子數除以第_____的中子數而得。
A. 一
B. 二
C. 三
D. 四
答案： B.

科目： 292002
知能類： K1.08 [2.7/2.8]
序號： B2647 (P2647)

A thermal neutron is about to interact with a U-238 nucleus in an operating reactor core. Which one of the following describes the most likely interaction and the effect on core K_{eff}?

A. The neutron will be scattered, thereby leaving K_{eff} unchanged.
B. The neutron will be absorbed and U-238 will undergo fission, thereby decreasing K_{eff}.
C. The neutron will be absorbed and U-238 will undergo fission, thereby increasing K_{eff}.
D. The neutron will be absorbed and U-238 will undergo radioactive decay to Pu-239, thereby increasing K_{eff}.

ANSWER: A.

在一運轉中之反應器爐心中，一熱中子即將與U-238原子核發生反應。下列何者係此反應以及對爐心K_{eff}的影響？

A. 中子會被散射，因而對K_{eff}無影響。
B. 中子會被吸收，U-238會發生分裂，因而使得K_{eff}降低。
C. 中子會被吸收，U-238會發生分裂，因而使得K_{eff}增加。
D. 中子會被吸收，U-238會發生放射衰變而成為 Pu-239，因而使得K_{eff}增加。

答案： A.

科目： 292002
知能類： K1.08 [2.7/2.8]
序號： B3147 (P3046)

A reactor plant is currently operating at equilibrium 80% power near the end of its fuel cycle.
During the next 3 days of equilibrium power operation no operator action is taken.
How will core K_{eff} be affected during the 3-day period?
A. Core K_{eff} will gradually increase during the entire period.
B. Core K_{eff} will gradually decrease during the entire period.
C. Core K_{eff} will tend to increase, but inherent reactivity feedback will maintain K_{eff} at 1.0.
D. Core K_{eff} will tend to decrease, but inherent reactivity feedback will maintain K_{eff} at 1.0.
ANSWER: D.

一反應器目前於其燃料週期末期，以80%的功率運轉。在其後三天的功率運轉中，運轉員並未採取任何操作。則在此三天期間中，爐心K_{eff}會受到何種影響？
A. 爐心K_{eff}在整個期間會逐漸增加
B. 爐心K_{eff}在整個期間會逐漸減少
C. 爐心K_{eff}傾向增加，但因內在反應度回饋將會使K_{eff}維持在1.0
D. 爐心K_{eff}傾向減小，但因內在反應度回饋將會使K_{eff}維持在1.0
答案： D.

科目： 292002
知能類： K1.09 [2.4/2.6]
序號： B1147 (N/A)

Which one of the following combinations of core conditions at 30% power indicates the largest amount of excess reactivity exists in the core?

	CONTROL ROD REACTOR RECIRPOSITION	CULATION FLOW
A.	25% rod density	25%
B.	50% rod density	50%
C.	25% rod density	50%
D.	50% rod density	25%

ANSWER: D.

在爐心功率30%的情況下，下列何種組合使得爐心具有最大的過反應度？

	控制棒位置	反應器再循環流量
A.	25% 棒密度；	25%
B.	50% 棒密度；	50%
C.	25% 棒密度；	50%
D.	50% 棒密度；	25%

答案： D.

科目： 292002
知能類： K1.09 [2.4/2.6]
序號： B1247 (N/A)

Which one of the following combinations of core conditions at 35% power indicates the least amount of excess reactivity exists in the core?

	CONTROL REACTOR RECIRROD	POSITION CULATION FLOW
A.	50% inserted	50%
B.	50% inserted	25%
C.	25% inserted	50%
D.	25% inserted	25%

ANSWER: C.

在爐心功率35%的情況下，下列何種組合使得爐心具有最小的過反應度？

	控制棒位置	反應器再循環流量
A.	插入50%；	50%
B.	插入50%；	25%
C.	插入25%；	50%
D.	插入25%；	25%

答案： C.

科目： 292002
知能類： K1.09 [2.4/2.6]
序號： B1848 (P646)

Which one of the following defines K-excess?
A. K_{eff} - 1
B. K_{eff} + 1
C. (K_{eff}-1)/K_{eff}
D. (1-K_{eff})/K_{eff}
ANSWER: A.

下列何者為K-excess定義？
A. K_{eff} - 1
B. K_{eff} + 1
C. (K_{eff}-1)/K_{eff}
D. (1-K_{eff})/K_{eff}
答案： A.

科目： 292002
知能類： K1.09 [2.4/2.6]
序號： B2048 (P1246)

Which one of the following is a reason for installing excess reactivity (k_{excess}) in the core?
A. To compensate for burnout of Xe-135 and Sm-149 during power changes
B. To ensure the fuel temperature coefficient remains negative throughout core life
C. To compensate for the negative reactivity added by the power defect during a power increase
D. To compensate for the conversion of U-238 to Pu-239 over core life
ANSWER: C.

下列何者為加入爐心過反應度（K_{excess}）的原因之一？
A. 為了補償Xe-135與Sm-149在功率變化時的燃耗
B. 為了確保燃料溫度係數在整個爐心壽命中維持負值
C. 為了補償在功率增加時由功率欠缺（Power Defect）所增加的負反應度
D. 為了補償在爐心壽命中U-238轉換為Pu-239之影響
答案： C.

科目： 292002
知能類： K1.09 [2.4/2.6]
序號： B2747 (P2847)

A reactor is operating at full power at the beginning of a fuel cycle. A neutron has just been absorbed by a U-238 nucleus at a resonance energy of 6.7 electron volts.
Which one of the following describes the most likely reaction for the newly formed U-239 nucleus and the effect of this reaction on K_{excess}?
A. Decays over several days to Pu-239, which increases K_{excess}.
B. Decays over several days to Pu-240, which increases K_{excess}.
C. Immediately undergoes fast fission, which decreases K_{excess}.
D. Immediately undergoes thermal fission, which decreases K_{excess}.
ANSWER: A.

一反應器於燃料週期初期（BOC），在全功率下運轉。一中子於共振能量6.7eV下剛被一U-238之原子核吸收。下列何者對於新形成之U-239原子核的反應，以及此反應對於過反應度K_{excess}之影響的描述是最有可能發生的？
A. 幾天內衰變成為 Pu-239，而增加K_{excess}
B. 幾天內衰變成為 Pu-240，而增加K_{excess}
C. 立即進行快分裂，而降低K_{excess}
D. 立即進行熱分裂，而降低K_{excess}
答案： A.

科目： 292002
知能類： K1.09 [2.4/2.6]
序號： B2947 (N/A)

The following are combinations of critical conditions that may exist for the same reactor operating at 50% power at different times in core life. Which one of the following combinations indicates the largest amount of excess reactivity present in the reactor fuel?

	CONTROL ROD REACTOR RECIRPOSITION	CULATION FLOW
A.	25% rod density	75%
B.	50% rod density	50%
C.	25% rod density	50%
D.	50% rod density	75%

ANSWER: B.

同一爐心在不同階段時會有不同的臨界棒位與再循環流量的組合。下列何種組合使得反應器運轉在50%的功率下具有最大的過反應度？

	控制棒位置	反應器再循環流量
A.	25% 棒密度；	75%
B.	50% 棒密度；	50%
C.	25% 棒密度；	50%
D.	50% 棒密度；	75%

答案： B.

科目： 292002
知能類： K1.09 [2.4/2.6]
序號： B3447

The following are combinations of critical conditions that existed for the same reactor operating at 50% power at different times in core life. Which one of the following combinations indicates the smallest amount of excess reactivity present in the reactor fuel?

	CONTROL ROD REACTOR RECIRPOSITION	CULATION FLOW
A.	25% rod density	75%
B.	50% rod density	50%
C.	25% rod density	50%
D.	50% rod density	75%

ANSWER: A.

同一反應器在不同爐心壽命階段時會有不同的臨界棒位與再循環流量的組合。下列何種組合使得反應器運轉在50%的功率下具有最小的過反應度？

	控制棒位置	反應器再循環流量
A.	25% 棒密度	75%
B.	50% 棒密度	50%
C.	25% 棒密度	50%
D.	50% 棒密度	75%

答案： A.

科目： 292002
知能類： K1.09 [2.4/2.6]
序號： B3547 (P3547)

Which one of the following is a benefit of installing excess reactivity (K_{excess}) in a reactor core?
A. Ensures that sufficient control rod negative reactivity is available to shut down the reactor.
B. Ensures that the reactor can be made critical during a peak xenon condition after a reactor scram.
C. Ensures that positive reactivity additions result in controllable reactor power responses.
D. nsures that the U-235 fuel enrichment is the same at the beginning and the end of a fuel cycle..
ANSWER: B.

下列何者為反應器爐心加入過反應度（K_{excess}）的優點之一？
A. 確保具有足夠的控制棒負反應度以供反應器停機之用。
B. 確保反應器於急停後，能克服氙的最大值而仍可臨界。
C. 確保增加的正反應度可控制反應器功率反應。
D. 確保在燃料週期初期與末期時，U-235燃料濃縮度不變。
答案： B.

科目： 292002
知能類： K1.10 [3.2/3.5]
序號： B248 (P245)

When determining shutdown margin for an operating reactor, how many control rod assemblies are assumed to remain fully withdrawn?
A. A single control rod of the highest reactivity worth
B. A symmetrical pair of control rods of the highest reactivity worth
C. A single control rod of average reactivity worth
D. A symmetrical pair of control rods of average reactivity worth
ANSWER: A.

當決定一運轉中反應器的停機餘裕時，通常會假設有多少的控制棒維持在全出的狀態？
A. 具有最高本領的單一控制棒
B. 具有最高本領的一組對稱控制棒
C. 具有平均本領的單一控制棒
D. 具有平均本領的一組對稱控制棒
答案： A.

科目： 292002
知能類： K1.10 [3.2/3.5]
序號： B1348 (N/A)

Shutdown margin for an operating reactor is the amount of reactivity by which a xenon-free reactor at 68°F would be subcritical if all control rods were...
A. withdrawn, assuming an average worth rod remains fully inserted.
B. inserted, assuming an average worth rod remains fully withdrawn.
C. withdrawn, assuming the highest worth rod remains fully inserted.
D. inserted, assuming the highest worth rod remains fully withdrawn.
ANSWER: D.

對一運轉中之反應器，其停機餘裕的評估乃是根據在68°F、無氙毒的情況下，當所有控制棒處於下列何種狀況時所呈現的次臨界狀態？
A. 抽出，並假設一具有平均本領之控制棒維持全入
B. 插入，並假設一具有平均本領之控制棒維持全出
C. 抽出，並假設一具有最高本領之控制棒維持全入
D. 插入，並假設一具有最高本領之控制棒維持全出
答案： D.

科目： 292002
知能類： K1.11 [3.2/3.3]
序號： B47

The fractional change in neutron population from one generation to the next is called...
A. beta.
B. K_{eff}.
C. lambda.
D. reactivity.
ANSWER: D.

中子數量從這一代至下一代的改變分率稱為
A. 遲延中子分率（β）
B. 有效中子增殖因數（K_{eff}）
C. 衰變常數（λ）
D. 反應度（ρ）
答案： D.

科目： 292002
知能類： K1.12 [2.4/2.5]
序號： B648 (P1946)

In a subcritical reactor, K_{eff} was increased from 0.85 to 0.95 by rod withdrawal. Which one of the following is closest to the amount of reactivity that was added to the core?
A. 0.099 ΔK/K
B. 0.124 ΔK/K
C. 0.176 ΔK/K
D. 0.229 ΔK/K
ANSWER: B.

在一次臨界反應器中，K_{eff}因控制棒抽出而從0.85增加到0.95。下列何者最接近加入爐心的反應度？
A. 0.099 ΔK/K
B. 0.124 ΔK/K
C. 0.176 ΔK/K
D. 0.229 ΔK/K
答案： B.

科目： 292002
知能類： K1.12 [2.4/2.5]
序號： B748 (P3347)

With K_{eff} equal to 0.983, how much reactivity must be added to make the reactor exactly critical? (Round answer to nearest 0.01% ΔK/K.)
A. 1.70% ΔK/K
B. 1.73% ΔK/K
C. 3.40% ΔK/K
D. 3.43% ΔK/K
ANSWER: B.

在K_{eff}=0.983的情況下，欲使反應器達到臨界，則需加入的反應度為何？(答案要四捨五入至0.01%ΔK/K)
A. 1.70% ΔK/K
B. 1.73% ΔK/K
C. 3.40% ΔK/K
D. 3.43% ΔK/K
答案： B.

科目： 292002
知能類： K1.12 [2.4/2.5]
序號： B1548 (P446)

With core K_{eff} equal to 0.987, how much reactivity must be added to make a reactor exactly critical? (Answer options are rounded to the nearest 0.01% .K/K.)
A. 1.01% ΔK/K
B. 1.03% ΔK/K
C. 1.30% ΔK/K
D. 1.32% ΔK/K
ANSWER: D.

在K_{eff}=0.987的情況下，欲使反應器達到臨界，則需加入的反應度為何？(答案要四捨五入至0.01%ΔK/K)

A. 1.01% ΔK/K
B. 1.03% ΔK/K
C. 1.30% ΔK/K
D. 1.32% ΔK/K
答案： D.

科目： 292002
知能類： K1.12 [2.4/2.5]
序號： B1947 (P2447)

With K_{eff} = 0.985, how much positive reactivity is required to make the reactor exactly critical?
A. 1.487% ΔK/K
B. 1.500% ΔK/K
C. 1.523% ΔK/K
D. 1.545% ΔK/K
ANSWER: C.

在K_{eff}=0.985的情形況下，欲使反應器達到臨界，則所需之正反應度為何？
A. 1.487% ΔK/K
B. 1.500% ΔK/K
C. 1.523% ΔK/K
D. 1.545% ΔK/K
答案： C.

科目： 292002
知能類： K1.12 [2.4/2.5]
序號： B2848 (P2146)

With K_{eff} = 0.982, how much positive reactivity is required to make the reactor critical?
A. 1.720% ΔK/K
B. 1.767% ΔK/K
C. 1.800% ΔK/K
D. 1.833% ΔK/K
ANSWER: D.

於K_{eff}=0.982的情形況下，欲使反應器達到臨界，則所需之正反應度為何？
A. 1.720% ΔK/K
B. 1.767% ΔK/K
C. 1.800% ΔK/K
D. 1.833% ΔK/K
答案： D.

科目： 292002
知能類： K1.14 [2.6/2.9]
序號： B548

The shutdown margin (SDM), upon full insertion of all control rods following a reactor scram from full power, is _____ the SDM immediately prior to the scram.
A. equal to
B. less than
C. greater than
D. independent of
ANSWER: A.

反應器從全功率急停後，在所有控制棒完全插入的情況下，其停機餘裕_____急停前的停機餘裕。
A. 等於
B. 小於
C. 大於
D. 無關於
答案： A.

科目： 292002
知能類： K1.14 [2.6/2.9]
序號： B948

Which one of the following core changes will decrease shutdown margin?
A. Fuel depletion during reactor operation
B. Buildup of Sm-149 after a reactor scram
C. Increasing moderator temperature 10°F while shutdown
D. Depletion of gadolinium during reactor operation
ANSWER: D.

下列何種爐心變化將會導致停機餘裕的減少？
A. 在反應器運轉時燃料的燃耗
B. 在反應器急停後Sm-149的累積
C. 在停機時增加緩和劑溫度10°F
D. 在反應器運轉時釓（Gd）的消耗
答案： D.

科目： 292002
知能類： K1.14 [2.6/2.9]
序號： B1048

One hour ago, a reactor scrammed from 100% steady state power due to an instrument malfunction. All systems operated normally. Given the following absolute values of reactivities added since the scram, assign a (+) or (-) as appropriate and choose the current value of core reactivity.
Xenon = ( ) 1.0% ΔK/K
Fuel temperature = ( ) 2.0% ΔK/K
Control rods = ( ) 14.0% ΔK/K
Voids = ( ) 3.0% ΔK/K
A. -8.0% ΔK/K
B. -10.0% ΔK/K
C. -14.0% ΔK/K
D. -20.0% ΔK/K
ANSWER: B.

一小時前，一反應器因儀器故障而自100%穩態功率急停。所有系統均正常運轉。請判斷以下條件是加入(+)或(-)反應度，並計算目前爐心的反應度為何？
氙＝( ) 1.0% ΔK/K
燃料溫度＝ ( ) 2.0% ΔK/K
控制棒= ( ) 14.0% ΔK/K
空泡 = ( ) 3.0% ΔK/K
A. -8.0% ΔK/K
B. -10.0% ΔK/K
C. -14.0% ΔK/K
D. -20.0% ΔK/K
答案： B.

科目： 292002
知能類： K1.14 [2.6/2.9]
序號： B1248

Which one of the following will increase the reactivity margin to criticality in a subcritical reactor at 250°F?
A. Decay of Samarium-149
B. Increased core recirculation flow rate
C. Reactor coolant heatup
D. Control rod withdrawal
ANSWER: C.

對於一處於250°F、次臨界狀態的反應器，下列何者會增加其反應度餘裕至臨界值？
A. Sm-149的衰變
B. 增加爐心再循環流量
C. 反應器冷卻水升溫
D. 抽出控制棒
答案： C.

科目： 292002
知能類： K1.14 [2.6/2.9]
序號： B1648

A reactor scrammed from 100% steady state power due to an instrument malfunction 16 hours ago. All systems operated normally. Given the following absolute values of reactivities added since the scram, assign a (+) or (-) as appropriate and choose the current value of core reactivity.
Xenon = ( ) 1.5% ΔK/K
Fuel temperature = ( ) 2.5% ΔK/K
Control rods = ( ) 14.0% ΔK/K
Voids = ( ) 3.5% ΔK/K
A. -6.5% ΔK/K
B. -9.5% ΔK/K
C. -11.5% ΔK/K
D. -13.5% ΔK/K
ANSWER: B.

十六小時前，一反應器因儀器故障而自100%穩態功率急停。所有系統均正常運轉。請判斷以下條件是加入(+)或(-)反應度，並計算目前爐心的反應度為何？

氙＝( ) 1.5% ΔK/K
燃料溫度＝ ( ) 2.5% ΔK/K
控制棒= ( ) 14.0% Δ/K
空泡 = ( ) 3.5% ΔK/K
A. -6.5% ΔK/K
B. -9.5% ΔK/K
C. -11.5% ΔK/K
D. -13.5% ΔK/K
答案： B.

科目： 292002
知能類： K1.14 [2.6/2.9]
序號： B1748

Twelve (12) hours ago, a reactor scrammed from 100% steady state power due to an instrument malfunction. All systems operated normally. Given the following absolute values of reactivities added since the scram, assign a (+) or (-) as appropriate and choose the current value of core reactivity.
Xenon = ( ) 2.0% ΔK/K
Fuel temperature = ( ) 2.5% ΔK/K
Control rods = ( ) 14.0% ΔK/K
Voids = ( ) 4.5% ΔK/K
A. -5.0% ΔK/K
B. -9.0% ΔK/K
C. -14.0% ΔK/K
D. -23.0% ΔK/K
ANSWER: B.

十二小時前，一反應器因儀器故障而自100%穩態功率急停。所有系統均正常運轉。請判斷以下條件是加入(+)或(-)反應度，並計算目前爐心的反應度為何？
氙＝( ) 2.0% ΔK/K
燃料溫度＝ ( ) 2.5% ΔK/K
控制棒= ( ) 14.0% ΔK/K
空泡 = ( ) 4.5% ΔK/K
A. -5.0% ΔK/K
B. -9.0% ΔK/K
C. -14.0% ΔK/K
D. -23.0% ΔK/K
答案： B.

科目： 292002
知能類： K1.14 [2.6/2.9]
序號： B2148

A reactor scram from 100% steady-state power occurred 36 hours ago due to an instrument malfunction. All systems operated normally. Given the following absolute values of reactivities added since the scram, assign a (+) or (-) as appropriate and choose the current value of core reactivity.
Xenon = ( ) 1.0% ΔK/K
Fuel temperature = ( ) 2.0% ΔK/K
Control rods = ( ) 14.0% ΔK/K
Voids = ( ) 3.0% ΔK/K
A. -8.0% ΔK/K
B. -10.0% ΔK/K
C. -14.0% ΔK/K
D. -20.0% ΔK/K
ANSWER: A.

三十六小時前，一反應器因儀器故障而自100%穩態功率急停。所有系統均正常運轉。請判斷以下條件是加入(+)或(-)反應度，並計算目前爐心的反應度為何？

氙＝( ) 1.0% ΔK/K
燃料溫度＝ ( ) 2.0% ΔK/K
控制棒= ( ) 14.0% ΔK/K
空泡 = ( ) 3.0% ΔK/K
A. -8.0% ΔK/K
B. -10.0% ΔK/K
C. -14.0% ΔK/K
D. -20.0% ΔK/K
答案： A.

科目： 292002
知能類： K1.14 [2.6/2.9]
序號： B2248

Sixteen hours ago, a reactor scrammed from 100% steady state power due to an instrument malfunction. All systems operated normally. Given the following absolute values of reactivities added since the scram, assign a (+) or (-) as appropriate and choose the current value of core reactivity.
Xenon = ( ) 2.0% ΔK/K
Fuel temperature = ( ) 3.0% ΔK/K
Control rods = ( ) 12.0% ΔK/K
Voids = ( ) 4.0% ΔK/K
A. -5.0% ΔK/K
B. -7.0% ΔK/K
C. -9.0% ΔK/K
D. -11.0% ΔK/K
ANSWER: B.

十六小時前，一反應器因儀器故障而自100%穩態功率急停。所有系統均正常運轉。請判斷以下條件是加入(+)或(-)反應度，並計算目前爐心的反應度為何？

氙＝( ) 2.0% ΔK/K
燃料溫度＝ ( ) 3.0% ΔK/K
控制棒= ( ) 12.0% ΔK/K
空泡 = ( ) 4.0% ΔK/K
A. -5.0% ΔK/K
B. -7.0% ΔK/K
C. -9.0% ΔK/K
D. -11.0% ΔK/K
答案： B.

科目： 292002
知能類： K1.14 [2.6/2.9]
序號： B2348 (P2347)

Which one of the following core changes will decrease shutdown margin? Assume no operator actions.
A. Depletion of fuel during reactor operation
B. Depletion of burnable poisons during reactor operation
C. Buildup of Sm-149 following a reactor power transient
D. Buildup of Xe-135 following a reactor power transient
ANSWER: B.

假設在無運轉員運轉情況下，下列何者爐心變化會減少停機餘裕？
A. 在反應器運轉時燃料的燃耗
B. 在反應器運轉時可燃性毒物的燃耗
C. 在反應器功率變換後Sm-149的累積
D. 在反應器功率變換後Xe-135的累積
答案： B.

科目： 292002
知能類： K1.14 [2.6/2.9]
序號： B2448

A reactor scrammed from 100% steady state power due to an instrument malfunction 30 hours ago. All systems operated normally. Given the following absolute values of reactivities added since the scram, assign a (+) or (-) as appropriate and choose the current value of core reactivity.
Xenon = ( ) 1.5% ΔK/K
Fuel temperature = ( ) 2.5% ΔK/K
Control rods = ( ) 14.0% ΔK/K
Voids = ( ) 3.5% ΔK/K
A. -6.5% ΔK/K
B. -9.5% ΔK/K
C. -11.5% ΔK/K
D. -13.5% ΔK/K
ANSWER: A.

三十小時前，一反應器因儀器故障而自100%穩態功率急停。所有系統均正常運轉。請判斷以下條件是加入(+)或(-)反應度，並計算目前爐心的反應度為何？

氙＝( ) 1.5% ΔK/K
燃料溫度＝ ( ) 2.5% ΔK/K
控制棒= ( ) 14.0% ΔK/K
空泡 = ( ) 3.5% ΔK/K
A. -6.5% ΔK/K
B. -9.5% ΔK/K
C. -11.5% ΔK/K
D. -13.5% ΔK/K
答案： A.

科目： 292002
知能類： K1.14 [2.6/2.9]
序號： B3648 (P3647)

A reactor is initially operating at steady-state 60% power near the end of core life when a fully withdrawn control rod suddenly inserts completely into the core. No operator action is taken and the plant control systems stabilize the reactor at a power level in the power range. Compared to the initial shutdown margin (SDM), the new steady-state SDM is _____; compared to the initial 60% power core K_{eff}, the new steady-state core K_{eff} is _____.
A. the same; smaller
B. the same; the same
C. less negative; smaller
D. less negative; the same
ANSWER: B.

一反應器於爐心壽命末期時原本以60%穩態功率運轉，此時一全出之控制棒突然完全插入爐心中。在無運轉員運轉情況下，電廠控制系統自動將反應器穩定於另一功率。與初始停機餘裕相比，新的穩態停機餘裕會_____；而與初始60%功率爐心K_{eff}相比，新的穩態爐心K_{eff}會____。
A. 仍然相同；較小
B. 仍然相同；相同
C. 較少負值；較小
D. 較少負值；相同
答案： B.

科目： 292002
知能類： K1.14 [2.6/2.9]
序號： B3748 (P3747)

A nuclear plant has just completed a refueling outage. Reactor engineers have predicted a control rod configuration at which the reactor will become critical during the initial reactor startup following the refueling outage based on the expected core loading. However, the burnable poisons scheduled to be loaded were inadvertently omitted. Which one of the following describes the effect of the burnable poison omission on achieving reactor criticality during the initial reactor startup following the refueling outage?

A. The reactor will become critical before the predicted critical control rod configuration is achieved.
B. The reactor will become critical after the predicted critical control rod configuration is achieved.
C. The reactor will be unable to achieve criticality because the fuel assemblies contain insufficient positive reactivity to make the reactor critical.
D. The reactor will be unable to achieve criticality because the control rods contain insufficient positive reactivity to make the reactor critical.

ANSWER: A.

一核能電廠剛完成燃料更換。核子工程師根據新的爐心負載，預測一組反應器啟動時初始狀態的臨界控制棒棒位。然而，排定要裝填的可燃性毒物卻意外被忽略。對於忽略裝填可燃性毒物而造成對於反應器啟動時欲達臨界狀態的影響，下列何者描述是正確的？

A. 反應器將會在預測的臨界控制棒棒位達成之前臨界。
B. 反應器將會在預測的臨界控制棒棒位達成之後臨界。
C. 反應器無法達到臨界，因為燃料束包含之正反應度不足。
D. 反應器無法達到臨界，因為控制棒包含之正反應度不足。

答案： A.

科目： 292003
知能類： K1.01 [2.9/3.0]
序號： B124

A reactor startup is in progress. Which one of the following statements describes the response to control rod withdrawal when taking the reactor critical?
A. The nuclear instrumentation will take longer to stabilize at each new subcritical level.
B. The reactor will be critical when the period and power level remain constant, with no further rod withdrawal.
C. Each complete control rod withdrawal will result in the same amount of change in subcritical power level.
D. Each control rod withdrawal results in an initial negative period followed by a strong positive period.
ANSWER: A.

下列何者正確地描述了在反應器啟動時為達臨界而抽棒所造成的反應？
A. 中子偵測儀器會花費較長時間來穩定在每個新的次臨界位階。
B. 當週期與功率都維持不變，且無更進一步的抽棒動作時，反應器將會到達臨界。
C. 每次完成抽棒後會造成次臨界功率位階的等量變化。
D. 每次抽棒時會導致一個負的起始週期，隨後會跟著一個較大的正週期。
答案： A.

科目： 292003
知能類： K1.01 [2.9/3.0]
序號： B130

Which one of the following statements describes subcritical multiplication during a reactor startup?

A. Subcritical multiplication is the process of using source neutrons to maintain an equilibrium neutron population when K_{eff} is less than 1.
B. As K_{eff} approaches unity, a smaller change in neutron level occurs for a given change in K_{eff}.
C. The equilibrium subcritical neutron level is dependent on the source strength and the time between successive reactivity insertions.
D. As K_{eff} approaches unity, less time is required to reach the equilibrium neutron level for a given change in K_{eff}.

ANSWER: A.

下列何者正確地描述了在反應器啟動時次臨界增殖（Subcritical Multiplication）？

A. 次臨界增殖乃是在K_{eff}小於1的情況下，利用中子源來維持中子數的平衡。
B. 當K_{eff}越接近於1時，給定一ΔK_{eff}，其所造成中子位階的改變量就越小。
C. 次臨界中子平衡的位階取決於中子源的強度，以及反應度連續加入的間隔時間。
D. 當K_{eff}越接近於1時，給定一ΔK_{eff}，達到中子平衡所需的時間就越少。

答案： A.

科目： 292003
知能類： K1.01 [2.9/3.0]
序號： B176

A reactor is being taken critical by periodically withdrawing control rods in equal reactivity increments. Which one of the following statements describes reactor conditions as K_{eff} approaches unity?
A. The neutron level change for successive rod increment pulls becomes smaller.
B. A longer period of time is required to reach the equilibrium neutron level after each rod withdrawal.
C. A rod withdrawal will result in the reactor becoming slightly supercritical due to a "prompt jump" and then return to a subcritical level.
D. If the rod withdrawal is stopped for several hours the neutron level will decrease to source level.
ANSWER: B.

一反應器在增加相同反應度的情況下，藉由週期性地抽棒而達於臨界。下列何者正確地描述了當K_{eff}趨近於1時的反應器狀態？
A. 由連續抽棒所造成中子位階的變化會減小
B. 在每次抽棒後，達到中子平衡位階所需之時間會增長
C. 某一抽棒動作將會因為「瞬發跳升」（Prompt Jump）而導致反應器輕微超臨界，其後仍會回復到次臨界
D. 若抽棒停止數小時後，中子位階將會降到源階水平（Source Level）
答案： B.

科目： 292003
知能類： K1.01 [2.9/3.0]
序號： B349

Of the following conditions, which group is necessary for subcritical multiplication to occur?
A. Neutron source, moderator, and fissionable material
B. Moderator, fission product decay, and K_{eff} less than one
C. K_{eff} less than one, gamma source, and fissionable material
D. Fissionable material, gamma source, and K_{eff} greater than one
ANSWER: A.

下列何者是發生次臨界增殖（Subcritical Multiplication）所必須的？
A. 中子源，緩和劑，可分裂物質
B. 緩和劑，分裂產物衰變，K_{eff}小於1
C. K_{eff}小於1，伽瑪射源，可分裂物質
D. 可分裂物質，伽瑪射源，K_{eff}大於1
答案： A.

科目： 292003
知能類： K1.01 [2.9/3.0]
序號： B350 (P347)

Which one of the following is a characteristic of subcritical multiplication?
A. The subcritical neutron level is directly proportional to the neutron source strength.
B. Doubling the indicated count rate by reactivity additions will reduce the margin to criticality by approximately one quarter.
C. For equal reactivity additions, it takes less time for the new equilibrium source range count rate to be reached as K_{eff} approaches unity.
D. An incremental withdrawal of any given control rod will produce an equivalent equilibrium count rate increase, whether K_{eff} is 0.88 or 0.92.
ANSWER: A.

下列何者是次臨界增殖（Subcritical Multiplication）的特徵？
A. 次臨界中子位階正比於中子源強度
B. 如果增加反應度而將計數率加倍時，將會減少臨界餘裕約四分之一
C. 對於增加相同之反應度，當K_{eff}趨近於1時，則要達到新的平衡計數率所需之時間較少
D. 任一等量的控制棒抽出將會增加一相同的平衡計數率，不論K_{eff}是0.88或0.92
答案： A.

科目： 292003
知能類： K1.01 [2.9/3.0]
序號： B449

A reactor startup is being performed with xenon-free conditions. Rod withdrawal is stopped just prior to criticality and neutron count rate is allowed to stabilize. No additional operator actions are taken. During the next 30 minutes count rate will...
A. remain essentially constant.
B. slowly decrease and stabilize due to long-lived delayed neutron precursors.
C. slowly decrease to its prestartup level due to buildup of xenon-135.
D. slowly increase to criticality due to long-lived delayed neutron precursors.
ANSWER: A.

一反應器於無氙毒情況下啟動。在即將達成臨界前停止抽棒，而中子計數率達於穩定。運轉員未採取任何動作。在其後三十分鐘內計數率將會
A. 維持固定
B. 因具有長半衰期之中子母核衰變而緩慢減小並趨於穩定
C. 因Xe-135的累積而緩慢減小至啟動前的中子計數率
D. 因具有長半衰期之中子母核衰變而緩慢增加至臨界
答案： A.

科目： 292003
知能類： K1.01 [2.9/3.0]
序號： B967 (P3149)

Which one of the following describes the purpose of a neutron source that is installed in a reactor during refueling for the third fuel cycle?
A. Ensures shutdown neutron level is large enough to be detected by nuclear instrumentation.
B. Provides additional excess reactivity to increase the length of the fuel cycle.
C. Amplifies the electrical noise fluctuations observed in source/startup range instrumentation during shutdown.
D. Supplies the only shutdown source of neutrons available to begin a reactor startup.
ANSWER: A.

下列何者正確地描述了在第三個燃料週期更換燃料時，置入中子源的目的？
A. 確保停機時中子位階有足夠大小可以被中子偵測系統偵測到
B. 提供額外之過剩反應度，以增加燃料週期的長度
C. 放大停機期間在源階（Source/Startup Range）中子偵測儀器的電子雜訊
D. 提供停機時僅有的中子源，此中子源可於啟動時所用
答案： A.

科目： 292003
知能類： K1.01 [2.9/3.0]
序號： B1170 (P1848)

A reactor plant that has been operating at rated power for two months experiences a reactor scram. One month after the reactor scram, with all control rods still fully inserted, a stable count rate of 20 cps is indicated on the source range nuclear instruments.
The majority of the source range detector output is being caused by the interaction of _____ with the detector.
A. intrinsic source neutrons
B. fission gammas from previous power operation
C. fission neutrons from subcritical multiplication
D. delayed fission neutrons from previous power operation
ANSWER: C.

一核能電廠在額定功率下運轉兩個月，經歷了一次反應器急停。在急停一個月之後，所有控制棒仍完全插入，源階（Source Range）中子偵測系統顯示一穩定計數率為20cps。源階中子偵測系統輸出值主要是因為_____與偵測器的作用而產生。
A. 內部的源中子
B. 先前功率運轉所產生之分裂伽瑪
C. 次臨界增殖（Subcritical Multiplication）所產生之分裂中子
D. 先前功率運轉所產生之遲延分裂中子
答案： C.

科目： 292003
知能類： K1.01 [2.9/3.0]
序號： B1449 (P1348)

A reactor is shut down by 1.8% ΔK/K. Positive reactivity is added which increases stable neutron count rate from 15 to 300 cps.
What is the current value of K_{eff}?
A. 0.982
B. 0.990
C. 0.995
D. 0.999
ANSWER: D.

一反應器加入-1.8% ΔK/K停機。而後添加正反應度使穩定中子計數率從15cps增至300cps。則目前之K_{eff}為何？
A. 0.982
B. 0.990
C. 0.995
D. 0.999
答案： D.

科目： 292003
知能類： K1.01 [2.9/3.0]
序號： B1549 (P1549)

Which one of the following intrinsic/natural neutron sources undergoes the most significant source strength reduction during the 1-hour period immediately following a reactor scram from steady-state 100% power?
A. Spontaneous fission reactions
B. Photo-neutron reactions
C. Alpha-neutron reactions
D. Transuranic isotope decay
ANSWER: B.

一反應器從穩態100%功率運轉下急停，急停後的一小時內，下列那一種內在的或自然的中子源，其強度降低最顯著？
A. 自發的分裂反應
B. 光激中子（Photoneutron）（γ-n）反應
C. 阿伐-中子（α-n）反應
D. 超鈾同位素衰變
答案： B.

科目： 292003
知能類： K1.01 [2.9/3.0]
序號： B1849 (P1448)

A subcritical reactor has an initial source/startup range count rate of 150 cps with a shutdown reactivity of -2.0% ΔK/K. Approximately how much positive reactivity must be added to establish a stable count rate of 600 cps?
A. 0.5% ΔK/K
B. 1.0% ΔK/K
C. 1.5% ΔK/K
D. 2.0% ΔK/K
ANSWER: C.

一次臨界反應器在源階的中子計數率為150cps，其停機反應度為-2.0% ΔK/K。大約需要增加多少的正反應度方能使穩定計數率達到600cps？
A. 0.5% ΔK/K
B. 1.0% ΔK/K
C. 1.5% ΔK/K
D. 2.0% ΔK/K
答案： C.

科目： 292003
知能類： K1.01 [2.9/3.0]
序號： B1949 (P448)

A subcritical reactor has an initial source range count rate of 150 cps with a shutdown reactivity of -2.0% ΔK/K. How much positive reactivity must be added to establish a stable count rate of 300 cps?
A. 0.5% ΔK/K
B. 1.0% ΔK/K
C. 1.5% ΔK/K
D. 2.0% ΔK/K
ANSWER: B.

一次臨界反應器在源階（Source Range）的計數率為150cps，其停機反應度為-2.0% ΔK/K。大約需要增加多少的正反應度方能使穩定計數率達到300cps？
A. 0.5% ΔK/K
B. 1.0% ΔK/K
C. 1.5% ΔK/K
D. 2.0% ΔK/K
答案： B.

科目： 292003
知能類： K1.01 [2.9/3.0]
序號： B2149 (P848)

A subcritical reactor has an initial K_{eff} of 0.8 at a source range count rate of 100 cps. Positive reactivity is added until K_{eff} equals 0.95. What will be the final equilibrium source range count rate?
A. 150 cps
B. 200 cps
C. 300 cps
D. 400 cps
ANSWER: D.

一次臨界反應器具有起始K_{eff} 為0.8，源階（Source Range）的計數率為100cps。增加正反應度直到K_{eff}等於0.95。 則最終源階的平衡計數率為？
A. 150 cps
B. 200 cps
C. 300 cps
D. 400 cps
答案： D.

科目： 292003
知能類： K1.01 [2.9/3.0]
序號： B2150 (P2149)

After the first fuel cycle, subcritical multiplication can produce a visible neutron level indication on the source range nuclear instrumentation for a significant time period following a reactor shutdown without installed neutron sources. This is because a sufficient number of source neutrons is being produced by intrinsic sources, with the largest contributor during the first few days after shutdown being...
A. spontaneous neutron emission from control rods.
B. photo-neutron reactions in the moderator.
C. spontaneous fission in the fuel.
D. alpha-neutron reactions in the fuel.
ANSWER: B.

在經過第一個燃料週期後，反應器停機後並未置入任何中子源，而次臨界增殖（Subcritical Multiplication）仍可在源階（Source Range）之中子偵測器上產生可見的中子位階。這是因為內在中子源所產生足夠之中子數量所致。在停機之後最初幾天最大的中子來源是
A. 控制棒的自發中子放射
B. 緩和劑中之光激中子（Photoneutron）（γ-n）反應
C. 燃料中之自發分裂
D. 燃料中之阿伐-中子（α-n）反應
答案： B.

科目： 292003
知能類： K1.01 [2.9/3.0]
序號： B2249 (P2248)

Two reactors are currently shut down with a reactor startup in progress. The two reactors are identical except that reactor A has a source neutron strength of 100 neutrons per second and reactor B source neutron strength is 200 neutrons per second. Control rods are stationary and Keff is 0.98 in both reactors. Core neutron level has reached equilibrium in both reactors.
Which one of the following lists the core neutron level (neutrons per second) in reactors A and B?

Reactor A	Reactor B
A. 5,000	10,000
B. 10,000	20,000
C. 10,000	40,000
D. 20,000	40,000

ANSWER: A.

反應器A與B目前停機，準備進行啟動。兩反應器完全相同，反應器A的中子源強度為100 n/sec，而反應器B的中子源強度為200 n/sec。控制棒固定不動，同時兩反應器的K_{eff}皆為0.98。兩者爐心的中子位階都達到平衡。以下列出之反應器A與B爐心的中子位階（n/sec）何者是正確的？

反應器 A	反應器 B
A. 5,000	10,000
B. 10,000	20,000
C. 10,000	40,000
D. 20,000	40,000

答案： A.

科目： 292003
知能類： K1.01 [2.9/3.0]
序號： B2449

Two reactors are currently shut down with a reactor startup in progress. The two reactors are identical except that reactor A has a source neutron strength of 100 neutrons per second and reactor B source neutron strength is 80 neutrons per second. Control rods are stationary and K_{eff} is 0.98 in both reactors. Core neutron level has reached equilibrium in both reactors.
Which one of the following lists the core neutron level (neutrons per second) in reactors A and B?

Reactor A	Reactor B
A. 5,000	4,000
B. 5,000	1,600
C. 2,000	1,600
D. 2,000	400

ANSWER: A.

反應器A與B目前停機，準備進行啟動。兩反應器完全相同，反應器A的中子源強度為100 n/sec，而反應器B的中子源強度為80 n/sec。控制棒固定不動，同時兩反應器的K_{eff}皆為0.98。兩者爐心的中子位階都達到平衡。以下列出之反應器A與B爐心的中子位階（n/sec）何者是正確的？

反應器 A	反應器 B
A. 5,000	4,000
B. 5,000	1,600
C. 2,000	1,600
D. 2,000	400

答案： A.

科目： 292003
知能類： K1.01 [2.9/3.0]
序號： B2649 (P2448)

A reactor startup is being performed with xenon-free conditions. Control rod withdrawal is stopped when K_{eff} equals 0.995 and count rate stabilizes at 1000 cps. No additional operator actions are taken. Which one of the following describes the count rate 20 minutes after rod withdrawal is stopped?
A. Less than 1000 cps and decreasing toward the prestartup count rate.
B. Less than 1000 cps and stable above the prestartup count rate.
C. Greater than 1000 cps and increasing toward criticality.
D. 1000 cps and constant.
ANSWER: D.

一反應器在無氙的情況下啟動。抽棒直到K_{eff}等於 0.995時停止，而計數率穩定在1000cps。運轉員未採取任何動作。下列何者正確地描述了在停止抽棒二十分鐘後的計數率？
A. 小於1000cps，並朝向啟動前的計數率減小
B. 小於1000cps，並會穩定在高於啟動前的計數率下
C. 大於1000cps，並朝向臨界增加
D. 1000cps，並維持固定
答案： D.

科目： 292003
知能類： K1.01 [2.9/3.0]
序號： B2949

A reactor plant is being cooled down from 400EF to 250EF. Just prior to commencing the cooldown, readings for all source range nuclear instruments were 32 counts per second (cps). After two hours, with reactor coolant temperature at 300EF, source range count rate is 64 cps. Assuming that the moderator temperature coefficient remains constant throughout the cooldown, what will be the status of the reactor when reactor coolant temperature reaches 250EF?
A. Subcritical, with source range count rate below 150 cps
B. Subcritical, with source range count rate above 150 cps
C. Critical, with source range count rate below 150 cps
D. Critical, with source range count rate above 150 cps
ANSWER: A.

一反應器從400°F冷卻至250°F。在開始冷卻之前，所有的源階（Source Range）中子偵測系統讀數皆為32 cps。兩小時後，反應器冷卻水溫度為300°F，源階偵測器的計數率為64cps。假設緩和劑溫度係數在冷卻過程當中維持不變，則當反應器冷卻水溫度達到250°F時，反應器的狀態為何？
A. 次臨界，源階偵測器的計數率小於150cps
B. 次臨界，源階偵測器的計數率大於150cps
C. 臨界，源階偵測器的計數率小於150cps
D. 臨界，源階偵測器的計數率大於150cps
答案： A.

科目： 292003
知能類： K1.01 [2.9/3.0]
序號： B3049 (P3048)

A reactor startup is being commenced with initial source (startup) range count rate stable at 20 cps. After a period of control rod withdrawal, count rate stabilizes at 80 cps.
If the total reactivity added by the above control rod withdrawal is 4.5 %ΔK/K, how much additional positive reactivity must be inserted to make the reactor critical?
A. 1.5 %ΔK/K
B. 2.0 %ΔK/K
C. 2.5 %ΔK/K
D. 3.0 %ΔK/K
ANSWER: A.

一反應器於源階（Source Range）偵測器的計數率為20cps的穩定值下開始進行啟動。在經過一段時間的抽棒後，計數率穩定於80cps。若上述抽棒所增加之總反應度為4.5 %ΔK/K，則需增加多少的正反應度方能使反應器達於臨界？
A. 1.5 %ΔK/K
B. 2.0 %ΔK/K
C. 2.5 %ΔK/K
D. 3.0 %ΔK/K
答案： A.

科目： 292003
知能類： K1.01 [2.9/30]
序號： B3849 (P3848)

A reactor is shutdown with a K_{eff} of 0.8. The source range count rate is stable at 800 cps. What percentage of the core neutron population is being contributed directly by neutron sources other than neutron-induced fission?
A. 10%
B. 20%
C. 80%
D. 100%
ANSWER: B.

一反應器停機時的於K_{eff} 為0.8。源階（Source Range）偵測器的計數率穩定於800cps。爐心中子數中直接由中子源提供而非其它中子引發之分裂反應的百分比為何？
A. 10%
B. 20%
C. 80%
D. 100%
答案： B.

TOPIC: 292003
KNOWLEDGE: K1.01 [2.9/3.0]
QID: B3925 (P3925)

A reactor startup is in progress at a nuclear power plant with core K_{eff} equal to 0.90. By what factor will the core neutron level have increased when the reactor is stabilized with core K_{eff} equal to 0.99?

A. 10

B. 100

C. 1,000

D. 10,000

ANSWER: A.

一核能電廠反應器於爐心K_{eff}為0.9時進行啟動。當反應器爐心穩定在K_{eff}等於0.99時，則爐心中子位階增加多少倍？

A. 10
B. 100
C. 1,000
D. 10,000
答案： A.

科目： 292003
知能類： K1.04 [2.5/2.5]
序號： B48

Which one of the following is the definition for delayed neutron fraction?
A. Fraction of the total number of delayed neutrons produced from fission, born from delayed neutron precursors
B. Fraction of the total number of fast neutrons produced from fission, born from delayed neutron precursors
C. Fraction of the total number of neutrons produced from fission, born from delayed neutron precursors
D. Fraction of the total number of thermal neutrons produced from fission, born from delayed neutron precursors
ANSWER: C.

下列何者為遲延中子分率之定義？
A. 在由分裂產生之遲延中子總數中，來自於遲延中子母核的分率
B. 在由分裂產生之快中子總數中，來自於遲延中子母核的分率
C. 在由分裂產生之中子總數中，來自於遲延中子母核的分率
D. 在由分裂產生之熱中子總數中，來自於遲延中子母核的分率
答案： C.

科目： 292003
知能類： K1.04 [2.5/2.5]
序號： B351

Which one of the following describes how and why the effective delayed neutron fraction varies over core life?
A. Increases due to the burnup of U-238
B. Decreases due to the buildup of Pu-239
C. Increases due to the buildup of Pu-239
D. Decreases due to the burnup of U-238
ANSWER: B.

下列何者正確地描述了在爐心壽命中有效遲延中子分率（β_{eff}）如何以及為何變化？
A. 因為U-238之燃耗而增加
B. 因為Pu-239之累積而減小
C. 因為Pu-239之累積而增加
D. 因為U-238之燃耗而減小
答案：B.

科目： 292003
知能類： K1.04 [2.5/2.5]
序號： B371

At the end of core life, the majority of power is generated by fission of which of the following two isotopes?
A. U-235 and U-238
B. Pu-241 and U-238
C. Pu-239 and U-238
D. Pu-239 and U-235
ANSWER: D.

在爐心壽命末期時，大部分的能量是由下列那兩種同位素的分裂所產生？
A. U-235 和 U-238
B. Pu-241 和 U-238
C. Pu-239 和 U-238
D. Pu-239 和 U-235
答案： D.

科目： 292003
知能類： K1.04 [2.5/2.5]
序號： B850

The average effective delayed neutron fraction (&β_{eff}) can be defined as...
A. number of neutrons born delayed
total number of neutrons born from fission
B. number of neutrons born delayed
number of neutrons born prompt
C. number of fissions caused by delayed neutrons
total no. of fissions caused by fission neutrons
D. number of fissions caused by delayed neutrons
number of fissions caused by prompt neutrons
ANSWER: C.

平均有效遲延中子分率（β_{eff}）可定義為
A. 遲延中子數/由分裂所生之中子總數
B. 遲延中子數/瞬發中子數
C. 由遲延中子所引發之分裂數/由分裂中子所引發之分裂總數
D. 由遲延中子所引發之分裂數/由瞬發中子所引發之分裂數
答案： C.

科目： 292003
知能類： K1.04 [2.5/2.5]
序號： B1050

Compared to the effective delayed neutron fraction (β_{eff}), the delayed neutron fraction (β)...
A. changes due to fuel depletion, whereas β_{eff} will remain constant over core life.
B. is based on a finite-sized reactor, whereas β_{eff} is based on an infinite-sized reactor.
C. describes the fraction of fission neutrons born delayed, whereas β_{eff} describes the fraction of fissions caused by delayed neutrons.
D. considers only the decay constant of the longest lived delayed neutron precursors, whereas β_{eff} considers the weighted average of all the decay constants.
ANSWER: C.

與有效遲延中子分率（β_{eff}）相比，遲延中子分率（β）
A. 因為燃料燃耗而發生改變，然而β_{eff} 在爐心壽命中維持固定
B. 取決於有限大小的反應器，然而β_{eff} 取決於無限大小的反應器
C. 描述延遲生成之分裂中子分率，然而β_{eff} 描述由遲延中子所引發之分裂分率
D. 只考慮壽命最長之遲延中子母核的衰變常數，然而β_{eff}考慮所有的衰變常數的加權平均值
答案： C.

科目： 292003
知能類： K1.04 [2.5/2.5]
序號： B1172 (P2272)

A reactor is operating at 100% power at the end of core life. The greatest contribution to core heat production is being provided by the fission of...
A. U-235 and U-238.
B. U-238 and Pu-239.
C. U-235 and Pu-239.
D. U-238 and Pu-241.
ANSWER: C.

一反應器於燃料週期末期時以100%功率運轉。其爐心熱能最主要是由下列何者的分裂提供？
A. U-235 和 U-238.
B. U-238 和 Pu-239.
C. U-235 和 Pu-239.
D. U-238 和 Pu-241.
答案： C.

科目： 292003
知能類： K1.04 [2.5/2.5]
序號： B1251

The effective delayed neutron fraction (β_{eff}) takes into account two factors not considered in calculating the delayed neutron fraction (β). These factors consider that:
Delayed neutrons are _____ likely to cause fast fission than prompt neutrons;
delayed neutrons are _____ likely to leak from the core than prompt neutrons.
A. less; more
B. less; less
C. more; more
D. more; less
ANSWER: B.

有效遲延中子分率（β_{eff}）考慮了在計算遲延中子分率（β）中所不考慮的兩項因素。這兩項因素考慮了：遲延中子較瞬發中子_____導致快分裂；遲延中子較瞬發中子_____從爐心洩漏。
A. 不易；容易
B. 不易；不易
C. 容易；容易
D. 容易；不易
答案： B.

科目： 292003
知能類： K1.04 [2.5/2.5]
序號： B1671 (P1672)

A refueling outage has just been completed in which one-third of the core was replaced with new fuel assemblies. A reactor startup has been performed to mark the beginning of the sixth fuel cycle and power is being increased to 100%.
Which one of the following pairs of reactor fuels will be providing the greatest contribution to core heat production when the reactor reaches 100% power?
A. U-238 and Pu-239
B. U-238 and Pu-241
C. U-235 and U-238
D. U-235 and Pu-239
ANSWER: D.

一反應器剛完成燃料更換，其中三分之一的爐心以新的燃料束取代。當反應器啟動時，代表第六燃料週期的開始。當功率增加至100%時，下列何組燃料將會對爐心熱能提供最大貢獻？
A. U-238 和 Pu-239
B. U-238 和 Pu-241
C. U-235 和 U-238
D. U-235 和 Pu-239
答案： D.

科目： 292003
知能類： K1.04 [2.5/2.5]
序號： B2250 (P2249)

Which one of the following distributions of fission percentages in a reactor will result in the largest reactor core effective delayed neutron fraction?

	U-235	U-238	Pu-239
A.	90%	7%	3%
B.	80%	6%	14%
C.	70%	7%	23%
D.	60%	6%	34%

ANSWER: A.

下列何種分裂百分率的分配將會導致反應器爐心具有最大的有效遲延中子分率（β_{eff}）？

	U-235	U-238	Pu-239
A.	90%	7%	3%
B.	80%	6%	14%
C.	70%	7%	23%
D.	60%	6%	34%

答案： A.

科目： 292003
知能類： K1.04 [2.5/2.5]
序號： B2349 (P2348)

Which one of the following fission percentage distributions occurring in a reactor will result in the smallest effective delayed neutron fraction?

	U-235	U-238	Pu-239
A.	90%	7%	3%
B.	80%	6%	14%
C.	70%	7%	23%
D.	60%	6%	34%

ANSWER: D.

下列何種分裂百分率的分配將會導致反應器爐心具有最小的有效遲延中子分率（β_{eff}）？

	U-235	U-238	Pu-239
A.	90%	7%	3%
B.	80%	6%	14%
C.	70%	7%	23%
D.	60%	6%	34%

答案： D.

科目： 292003
知能類： K1.04 [2.5/2.5]
序號： B2469

A refueling outage has just been completed in which the entire core was offloaded and replaced with new fuel. A reactor startup has been performed to mark the beginning of the next fuel cycle and power is being increased to 100%.
Which one of the following pairs of reactor fuels will be providing the greatest contribution to core heat production when the reactor reaches 100% power?
A. U-235 and U-238
B. U-238 and Pu-239
C. U-235 and Pu-239
D. U-235 and Pu-241
ANSWER: A.

一反應器剛完成燃料更換，其中爐心全部移出，並更換為新燃料。當反應器啟動時，代表下一燃料週期的開始。當功率增加至100%時，下列何組燃料將會對爐心熱能提供最大貢獻？
A. U-235 和 U-238
B. U-238 和 Pu-239
C. U-235 和 Pu-239
D. U-235 和 Pu-241
答案： A.

科目： 292003
知能類： K1.04 [2.5/2.5]
序號： B2950 (P2948)

A typical BWR reactor plant is operating at equilibrium 50% power when a control rod is ejected from the core. Which one of the following combinations of fission percentages, by fuel, would result in the shortest reactor period? (Assume the reactivity worth of the ejected control rod is the same for each case.)
Percentage of Fissions by Fuel

	U-235	U-238	Pu-239
A.	90%	8%	2%
B.	80%	9%	11%
C.	70%	9%	21%
D.	60%	8%	32%

ANSWER: D.

一典型之沸水式反應器於50%平衡功率下運轉，其中某一控制棒突然從爐心掉出。下列何者分裂百分率的組合，將會導致最短的反應器週期？（假設射出的控制棒本領均相同）
燃料分裂百分率

	U-235	U-238	Pu-239
A.	90%	8%	2%
B.	80%	9%	11%
C.	70%	9%	21%
D.	60%	8%	32%

答案： D.

科目： 292003
知能類： K1.05 [3.7/3.7]
序號： B249

During a reactor startup, the intermediate range monitor readings go from 30% to 65% on the same range in 2 minutes with no operator action. Which one of the following is the average reactor period during the power increase?
A. 357 seconds
B. 173 seconds
C. 155 seconds
D. 120 seconds
ANSWER: C.

一反應器起動時，中程階（Intermediate Range）中子偵測器讀數在無運轉員操作的兩分鐘內，從30%增加至65%。在此功率增加中，下列何者是反應器平均週期？
A. 357 秒
B. 173 秒
C. 155 秒
D. 120 秒
答案： C.

科目： 292003
知能類： K1.05 [3.7/3.7]
序號： B851

If reactor power changes from 10^{-5}% to 10^{-6}% in 5 minutes, the average reactor period is:
A. negative 80 seconds.
B. positive 80 seconds.
C. negative 130 seconds.
D. positive 130 seconds.
ANSWER: C.

若反應器功率在五分鐘內從10^{-5}% 變成 10^{-6}%，則反應器平均週期為：
A. 負80秒
B. 正80秒
C. 負130秒
D. 正130秒
答案： C.

科目： 292003
知能類： K1.05 [3.7/3.7]
序號： B2751 (P2748)

A reactor is exactly critical at 10^{-8}% power during a reactor startup. β for this reactor is 0.0072. Which one of the following is the approximate amount of positive reactivity that must be added to the core by control rod withdrawal to initiate a reactor power increase toward the point of adding heat with a stable reactor period of 26 seconds?
A. 0.2% ΔK/K
B. 0.5% ΔK/K
C. 1.0% ΔK/K
D. 2.0% ΔK/K
ANSWER: A.

一反應器於起動時在10^{-8}%功率下達到臨界。此反應器的β值是0.0072。如欲增加反應器功率朝向加熱階段起始點，並具有一穩定反應器週期26秒，需抽棒加入大約多少的正反應度？
A. 0.2% ΔK/K
B. 0.5% ΔK/K
C. 1.0% ΔK/K
D. 2.0% ΔK/K
答案： A.

科目： 292003
知能類： K1.05 [3.7/3.7]
序號： B3151 (P3148)

A reactor is being started for the first time following a refueling outage. Reactor Engineering has determined that during the upcoming fuel cycle &β eff will range from a maximum of 0.007 to a minimum of 0.005. Once the reactor becomes critical, control rods are withdrawn to insert a net positive reactivity of 0.1% ΔK/K into the reactor core. Assuming no other reactivity additions, what will be the approximate stable reactor period for this reactor until the point of adding heat is reached?
A. 20 seconds
B. 40 seconds
C. 60 seconds
D. 80 seconds
ANSWER: C.

一反應器在大修後首次啟動。新燃料週期的β eff將會在最大值0.007及最小值0.005間變化。一旦反應器達到臨界時，將進行抽棒以加入一正反應度0.1% ΔK/K於爐心。假設沒有加入其它的反應度，此反應器到達加熱階段起始點之前，其穩定週期約為？
A. 20 秒
B. 40 秒
C. 60 秒
D. 80 秒
答案： C.

科目： 292003
知能類： K1.06 [3.7/3.7]
序號： B250

Without delayed neutrons in the neutron cycle, when positive reactivity is added to a critical reactor, the reactor will...
A. experience a prompt jump in power level followed by a decrease to the initial power level.
B. experience a rapid but controllable power increase.
C. begin an uncontrollable rapid power increase.
D. not be able to attain criticality.
ANSWER: C.

如果加入一正反應度到一個無遲延中子並處於臨界狀態的反應器時，此反應器將會
A. 發生功率位階的瞬發跳升（Prompt Jump），其後會減至其初始狀態的功率位階
B. 快速但可控制地增加功率
C. 無法控制地快速增加功率
D. 無法達到臨界
答案： C.

科目： 292003
知能類： K1.6 [3.7/3.7]
序號： B451 (P47)

A small amount of reactivity is added to a critical reactor in the source/startup range. The amount added is less than the average effective delayed neutron fraction.
Which one of the following will have a significant effect on the magnitude of the stable reactor period achieved for this reactivity addition?
A. Moderator temperature coefficient
B. Fuel temperature coefficient
C. Prompt neutron lifetime
D. Average effective decay constant
ANSWER: D.

將一小量的反應度加入至一處於源階（Source/Startup Range）之臨界反應器中。加入之反應度小於平均有效遲延中子分率（β_{eff}）。下列何者會因為此反應度之加入而對穩定反應器週期之大小有顯著影響？
A. 緩和劑溫度係數
B. 燃料溫度係數
C. 瞬發中子壽命
D. 平均有效衰變常數
答案： D.

科目： 292003
知能類： K1.06 [3.7/3.7]
序號： B1250 (P1548)

Two reactors are identical in every way except that reactor A is at end of core life and reactor B is at the beginning of core life. Both reactors are critical at 10^{-5}% power.
If the same amount of positive reactivity is added to each reactor at the same time, the point of adding heat will be reached first by reactor _____ because it has a _____ delayed neutron fraction.
A. A; larger
B. B; larger
C. A; smaller
D. B; smaller
ANSWER: C.

兩相同反應器A與B，其中反應器A處於爐心壽命末期，而反應器B處於爐心壽命初期。兩者皆處於10^{-5}%功率臨界狀態。若同一時間將等量之正反應度加入此二反應器，則反應器_____將會先達到加熱階段起始點，因為其有一_____的遲延中子分率。
A. A；較大
B. B；較大
C. A；較小
D. B；較小
答案： C.

科目： 292003
知能類： K1.06 [3.7/3.7]
序號： B1349 (P1248)

Two reactors are identical except that reactor A is at the end of core life and reactor B is at the beginning of core life. Both reactors are operating at 100% power when a reactor scram occurs at the same time on each reactor.
If the reactor systems for each reactor respond identically to the scram and no operator action is taken, reactor A will attain a negative _____ second stable period and reactor B will attain a negative _____second stable period. (Assume control rod worth equals -0.9700 ΔK/K and λ_{eff} equals 0.0124 seconds^{-1} for both reactors.)
A. 80; 56
B. 80; 80
C. 56; 56
D. 56; 80
ANSWER: B.

兩相同反應器A與B，其中反應器A處於爐心壽命末期，而反應器B處於爐心壽命初期。兩者於100%功率下運轉時發生急停。若反應器系統對於急停反應相同，同時沒有運轉員進行操作，則反應器A將會得到一負_____秒之穩定週期，而反應器B將得到一負_____秒之穩定週期。（假設兩反應器之控制棒本領等於-0.9700 ΔK/K 而 λ_{eff} 等於 0.0124 sec^{-1})。
A. 80; 56
B. 80; 80
C. 56; 56
D. 56; 80
答案： B.

科目： 292003
知能類： K1.06 [3.7/3.7]
序號： B1649 (P1649)

Two reactors are identical in every way except that reactor A is at the end of core life and reactor B is at the beginning of core life. Both reactors are operating at 100% power when a reactor scram occurs at the same time on each reactor.
If the reactor systems for each reactor respond identically to the scram and no operator action is taken, a power level of 10^{-5}% will be reached first by reactor _____ because it has a _____ delayed neutron fraction.
A. A; larger
B. B; larger
C. A; smaller
D. B; smaller
ANSWER: C.

兩相同反應器A與B，其中反應器A處於爐心壽命末期，而反應器B處於爐心壽命初期。兩者於100%功率下運轉時發生急停。若反應器系統對於急停反應相同，同時沒有運轉員進行操作，則反應器_____將會先達到功率位階10^{-5}%，因為其有一_____的遲延中子分率。
A. A；較大
B. B；較大
C. A；較小
D. B；較小
答案： C.

科目： 292003
知能類： K1.06 [3.7/3.7]
序號： B1751 (P1749)

Which one of the following is the reason that delayed neutrons are so effective at controlling the rate of reactor power changes?
A. Delayed neutrons make up a large fraction of the fission neutrons in the core compared to prompt neutrons.
B. Delayed neutrons have a long mean lifetime compared to prompt neutrons.
C. Delayed neutrons produce a large amount of fast fission compared to prompt neutrons.
D. Delayed neutrons are born with high kinetic energy compared to prompt neutrons.
ANSWER: B.

下列何者是遲延中子能夠有效控制反應器功率變化率的原因？
A. 與瞬發中子相較，遲延中子佔分裂中子中的大部分
B. 與瞬發中子相較，遲延中子具有較長的平均壽命
C. 與瞬發中子相較，遲延中子製造大量的快分裂
D. 與瞬發中子相較，遲延中子產生時便具有較高動能
答案： B.

科目： 292003
知能類： K1.06 [3.7/3.7]
序號： B1950 (P48)

Over core life, plutonium isotopes are produced with delayed neutron fractions that are _____ than uranium delayed neutron fractions, thereby causing reactor power transients to be _____ near the end of core life.
A. larger; slower
B. larger; faster
C. smaller; slower
D. smaller; faster
ANSWER: D.

在爐心壽命中，鈽同位素產生的遲延中子分率較鈾產生的遲延中子分率為_____，因而導致了在接近爐心壽命末期時反應器功率暫態變化_____。
A. 大；較慢
B. 大；較快
C. 小；較慢
D. 小；較快
答案： D.

科目： 292003
知能類： K1.06 [3.7/3.7]
序號： B2450 (P348)

Which one of the following statements describes the effect of changes in the delayed neutron fraction from beginning of core life (BOL) to end of core life (EOL)?

A. A given reactivity addition to a shutdown reactor at EOL yields a larger change in shutdown margin (SDM) than at BOL.
B. A given reactivity addition to a shutdown reactor at EOL yields a smaller change in SDM than at BOL.
C. A given reactivity addition to an operating reactor at EOL results in a longer reactor period than at BOL.
D. A given reactivity addition to an operating reactor at EOL results in a shorter reactor period than at BOL.

ANSWER: D.

關於遲延中子分率從爐心壽命初期（BOL）至爐心壽命末期（EOL）變化的效應，下列何者描述是正確的？

A. 在EOL時對於停機反應器所加入之反應度比在BOL時會產生較大的停機餘裕（SDM）的變化
B. 在EOL時對於停機反應器所加入之反應度比在BOL時會產生較小的停機餘裕的變化
C. 在EOL時對於運轉中反應器所加入之反應度比在BOL時會產生較長的反應器週期
D. 在EOL時對於運轉中反應器所加入之反應度比在BOL時會產生較短的反應器週期

答案： D.

科目： 292003
知能類： K1.06 [3.7/3.7]
序號： B2651 (P1149)

Delayed neutrons are important for reactor control because...
A. they are produced with higher average kinetic energy than prompt neutrons.
B. they prevent the moderator temperature coefficient from becoming positive.
C. they are the largest fraction of the neutrons produced from fission.
D. they greatly extend the average lifetime of each neutron generation.
ANSWER: D.

遲延中子對於反應器控制很重要，因為
A. 它們比瞬發中子具有較高的平均動能
B. 它們防止緩和劑溫度係數變成正值
C. 從分裂而生的中子中，它們佔了最大部分
D. 它們大大地延長了每一代中子的平均壽命
答案： D.

科目： 292003
知能類： K1.06 [3.7/3.7]
序號： B2850 (P2849)

Two reactors are identical in every way except that reactor A is at the beginning of core life and reactor B is at the end of core life. Both reactors are critical at 10^{-5}% power.
If the same amount of positive reactivity is added to each reactor at the same time, the point of adding heat will be reached first by reactor _____ because it has a _____ delayed neutron fraction.
A. A; smaller
B. A; larger
C. B; smaller
D. B; larger
ANSWER: C.

兩相同反應器A與B，其中反應器A處於爐心壽命初期，而反應器B處於爐心壽命末期。兩者皆處於10^{-5}%功率臨界狀態。若同一時間將等量之正反應度加入此二反應器，則反應器_____將會先達到加熱階段起始點，因為其有一_____的遲延中子分率。
A. A；較小
B. A；較大
C. B；較小
D. B；較大
答案： C.

科目： 292003
知能類： K1.06 [3.7/3.7]
序號： B3249 (P3248)

Two reactors are identical in every way except that reactor A is at the end of core life and reactor B is at the beginning of core life. Both reactors are operating at 100% power when a reactor scram occurs at the same time on each reactor. The reactor systems for each reactor respond identically to the scram and no operator action is taken.
Ten minutes after the scram, the higher fission rate will exist in reactor _____ because it has a _____ delayed neutron fraction.
A. A; larger
B. B; larger
C. A; smaller
D. B; smaller
ANSWER: B.

兩相同反應器A與B，其中反應器A接近爐心壽命末期，而反應器B則近於爐心壽命初期。兩反應器於100%功率下運轉時，同時發生反應器急停。若兩反應器系統對於急停反應相同，同時沒有運轉員進行操作。在急停十分鐘後，反應器_____將會有較高的分裂率，因為其有一_____的遲延中子分率。
A. A；較大
B. B；較大
C. A；較小
D. B；較小
答案： B.

816
科目：292003
知能類： K1.07 [3.3/3.3]
序號： B251
As the core ages, the amount of positive reactivity required to make the reactor prompt critical will _____ because the effective delayed neutron fraction _____.
A. increase; decreases
B. decrease; increases
C. decrease; decreases
D. increase; increases
ANSWER: C.

當爐心老化時，為使反應器達到瞬發臨界（Prompt Critical）所需的正反應度將會_____，因為有效遲延中子分率（β_{eff}）會_____。
A. 增加；減小
B. 減小；增加
C. 減小；減小
D. 增加；增加
答案： C.

科目： 292003
知能類： K1.07 [3.3/3.3]
序號： B551

A reactor is operating at 50% power with the following conditions:
Power defect = 0.03% ΔK/K
Shutdown margin = 0.05% ΔK/K
Effective delayed neutron fraction = 0.007
Effective prompt neutron fraction = 0.993
How much positive reactivity must be added to take this reactor "prompt critical"?
A. 0.03% ΔK/K
B. 0.05% ΔK/K
C. 0.7% ΔK/K
D. 0.993% ΔK/K
ANSWER: C.

一反應器於50%功率下運轉，並具有下列情況：
功率欠缺：0.03% ΔK/K
停機餘裕：0.05%ΔK/K
有效遲延中子分率（β_{eff}）＝0.007
有效瞬發中子分率＝0.993
若要使此反應器引發「瞬發臨界」（Prompt Critical）則需加入之正反應度為何？
A. 0.03%ΔK/K
B. 0.05%ΔK/K
C. 0.7%ΔK/K
D. 0.993%ΔK/K
答案： C.

科目： 292003
知能類： K1.07 [3.3/3.3]
序號： B664

A critical reactor will become prompt critical if the reactivity added is equal to the effective...
A. delayed neutron decay constant.
B. delayed neutron fraction.
C. prompt neutron decay constant.
D. prompt neutron fraction.
ANSWER: B.

一臨界反應器將會引發瞬發臨界（Prompt Critical），若加入之反應度等於有效
A. 遲延中子衰變常數
B. 遲延中子分率
C. 瞬發中子衰變常數
D. 瞬發中子分率
答案： B.

科目： 292003
知能類： K1.07 [3.3/3.3]
序號： B950

A reactor is operating at 75% power with the following conditions:
Total control rod worth = -0.0753 ΔK/K
Shutdown margin = 0.0042 ΔK/K
Effective delayed neutron fraction = 0.0058
Effective prompt neutron fraction = 0.9942
How much positive reactivity must be added to make the reactor "prompt critical"?
A. 0.0042 ΔK/K
B. 0.0058 ΔK/K
C. 0.0753 ΔK/K
D. 0.9942 ΔK/K
ANSWER: B.

一反應器於75%功率下運轉，並具有下列情況：
總控制棒本領：-0.0753ΔK/K
停機餘裕：0.0042ΔK/K
有效遲延中子分率（β_{eff}）＝0.0058
有效瞬發中子分率＝0.9942
若要使此反應器引發「瞬發臨界」（Prompt Critical）則需加入之正反應度為何？
A. 0.0042ΔK/K
B. 0.0058ΔK/K
C. 0.0753ΔK/K
D. 0.9942ΔK/K
答案： B.

科目： 292003
知能類： K1.07 [3.3/3.3]
序號： B1150 (P1948)

Positive reactivity is continuously added to a critical reactor. Which one of the following values of core K_{eff} will first result in a prompt critical reactor?
A. 1.0001
B. 1.001
C. 1.01
D. 1.1
ANSWER: C.

一反應器連續加入正反應度至臨界。下列那一個爐心K_{eff}值會最先引發反應器瞬發臨界（Prompt Critical）？
A. 1.0001
B. 1.001
C. 1.01
D. 1.1
答案： C.

科目： 292003
知能類： K1.07 [3.3/3.3]
序號： B1850 (P1449)

A reactor is critical at 10^{-5}% power with a xenon-free core. The operator continuously withdraws control rods until a 60-second reactor period is reached and then stops control rod motion.
Upon stopping rod withdrawal, reactor period will immediately...
A. stabilize at 60 seconds until power reaches the point of adding heat (POAH).
B. lengthen and then stabilize at a value greater than 60 seconds until power reaches the POAH.
C. shorten and then slowly and continuously lengthen until power reaches the POAH.
D. lengthen and then slowly and continuously shorten until power reaches the POAH.
ANSWER: B.

一爐心無氙的反應器於10^{-5}%功率達到臨界。運轉員持續抽出控制棒，直到週期到達60秒，然後停止控制棒動作。在停止抽棒時，反應器週期將會立刻
A. 穩定於60秒，直到功率達到加熱階段起始點為止。
B. 增長，並且穩定在一大於60秒的數值，直到功率達到加熱階段起始點為止。
C. 縮短，然後緩慢並持續增長直到功率達到加熱階段起始點為止。
D. 增長，然後緩慢並持續縮短直到功率達到加熱階段起始點為止。
答案： B.

科目： 292003
知能類： K1.07 [3.3/3.3]
序號： B2051

A reactor is exactly critical at the point of adding heat with a xenon-free core. Reactor vessel temperature is 175°F. The operator then inserts control rods until a negative 100 second period is attained and then stops control rod motion.
When rod motion is stopped, reactor period will immediately _____ until power approaches the equilibrium subcritical multiplication source range level and then approach _____.
A. stabilize at negative 100 seconds; infinity.
B. stabilize at negative 100 seconds; zero.
C. lengthen and then stabilize; infinity.
D. lengthen and then stabilize; zero.
ANSWER: C.

一爐心無氙的反應器於加熱階段起始點剛好達到臨界。反應爐槽溫度為175°F。運轉員插入控制棒直到週期到達負100秒，然後停止插棒動作。當控制棒動作停止時，反應器週期將會立即_____，直到功率接近穩定次臨界增殖源階（Source Range）中子位階，然後再趨近_____。
A. 於負100秒達於穩定；無限大
B. 於負100秒達於穩定；零
C. 增長然後穩定；無限大
D. 增長然後穩定；零
答案： C.

科目： 292003
知能類： K1.07 [3.3/3.3]
序號： B2550 (P2549)

A reactor was stable at 80% power when the reactor operator withdrew a control rod continuously for 2 seconds. Which one of the following affects the amount of “prompt jump” increase in reactor power for the control rod withdrawal?
A. The duration of control rod withdrawal
B. The differential control rod worth
C. The total control rod worth
D. The magnitude of the fuel temperature coefficient
ANSWER: B.

對一穩定在80%功率的反應器，運轉員連續抽出控制棒兩秒鐘。在控制棒抽出當中，下列何者會影響「瞬發跳升」（Prompt Jump）的增加量？
A. 控制棒抽出的時間長短
B. 控制棒本領的差值
C. 總控制棒本領
D. 燃料溫度係數的大小
答案： B.

科目： 292003
知能類： K1.07 [3.3/3.3]
序號： B2951 (P2949)

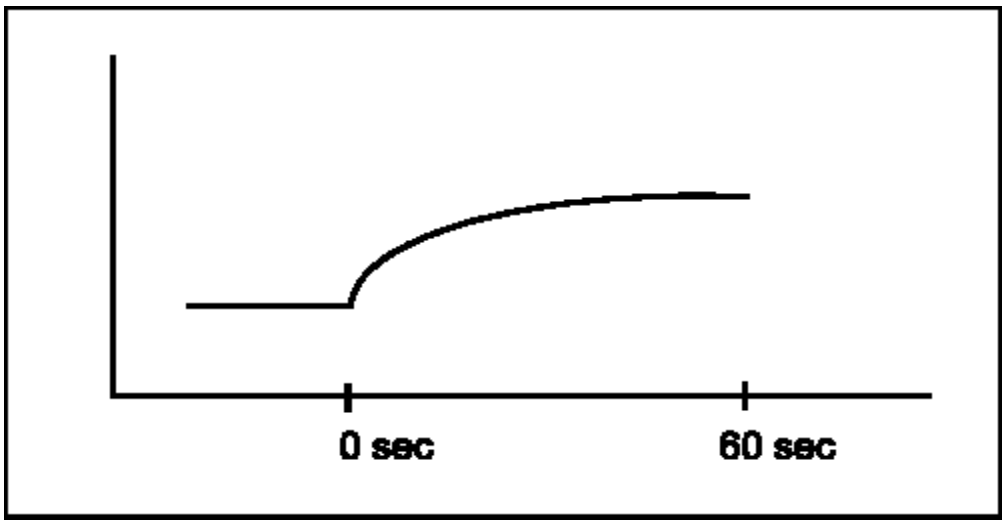
A reactor is operating at 75% power with the following conditions:
Power defect = -0.0185 ΔK/K
Shutdown margin = 0.0227 ΔK/K
Effective delayed neutron fraction = 0.0061
Effective prompt neutron fraction = 0.9939
How much positive reactivity must be added to make the reactor "prompt critical"?
A. 0.0061 ΔK/K
B. 0.0185 ΔK/K
C. 0.0227 ΔK/K
D. 0.9939 ΔK/K
ANSWER: A.

一反應器於75%功率下運轉，並具有下列情況：
功率欠缺：-0.0185 ΔK/K
停機餘裕：0.0227 ΔK/K
有效遲延中子分率（β_{eff}）＝0.0061
有效瞬發中子分率＝0.9939
若要使此反應器引發「瞬發臨界」（Prompt Critical）則需加入之正反應度為何？
A. 0.0061 ΔK/K
B. 0.0185 ΔK/K
C. 0.0227 ΔK/K
D. 0.9939 ΔK/K
答案： A.

科目： 292003
知能類： K1.07 [3.3/3.3]
序號： B3250 (P3249)

Refer to the unlabeled reactor response curve shown below for a reactor that was initially stable in the source range. A small amount of positive reactivity was added at time = 0 sec.
The response curve shows _____ versus time for a reactor that was initially _____.
A. reactor period; subcritical
B. reactor period; critical
C. reactor fission rate; subcritical
D. reactor fission rate; critical
ANSWER: C.

一反應器原本穩定在源階（Source Range）中子位階，其未標示之反應曲線如下圖。兩軸為線性尺度。在時間為0秒時加入一小量之正反應度。則此反應曲線代表了一原本處於_____狀態的反應器之_____對時間的關係圖。
A. 次臨界；反應器週期
B. 臨界；反應器週期
C. 次臨界；反應器分裂率
D. 臨界；反應器分裂率
答案： C.



科目： 292003
知能類： K1.07 [3.3/3.3]
序號： B3351 (P549)

Which one of the following describes a condition in which a reactor is prompt critical?
A. A very long reactor period makes reactor control very sluggish and unresponsive.
B. The fission process is occurring so rapidly that the delayed neutron fraction approaches zero.
C. Any increase in reactor power requires a reactivity addition equal to the fraction of prompt neutrons in the core.
D. The net positive reactivity in the core is greater than or equal to the magnitude of the average effective delayed neutron fraction.
ANSWER: D.

下列何者正確地描述了處於瞬發臨界（Prompt Critical）的反應器狀態？
A. 一非常長的反應器週期，使得反應器控制非常緩慢與不良
B. 分裂程序發生非常快，以致於遲延中子分率趨近於零
C. 任何反應器功率的增加需要加入一等於爐心瞬發中子分率的反應度
D. 爐心的淨正反應度大於或等於平均有效遲延中子分率（β_{eff}）的大小
答案： D.

科目： 292003
知能類： K1.07 [3.3/3.3]
序號： B3450 (P3449)

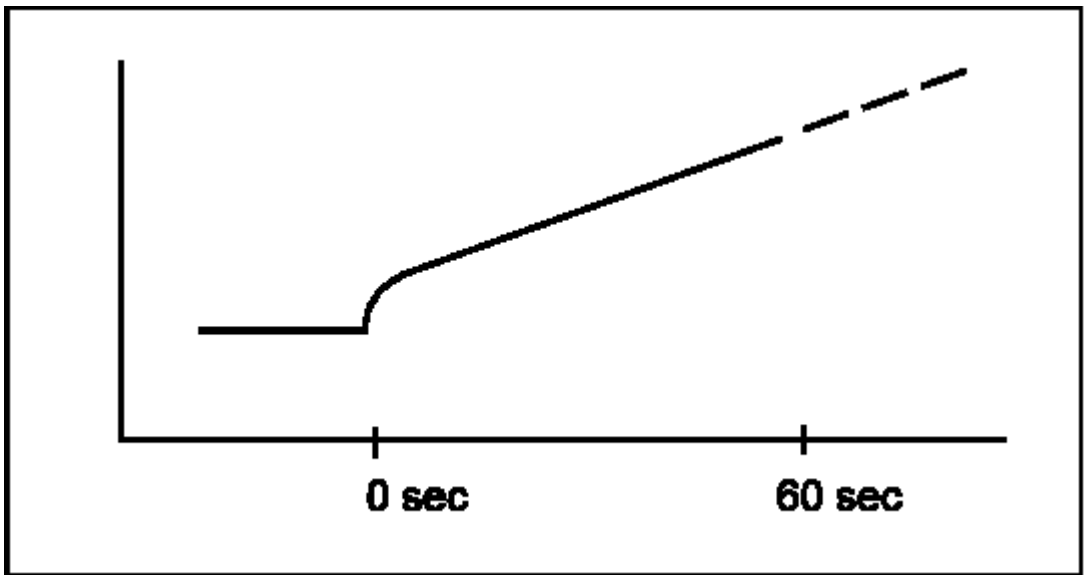
Two reactors are exactly critical low in the intermediate range (well below the point of adding heat). The reactors are identical except that reactor A is near the beginning of core life (BOL) and reactor B is near the end of core life (EOL). Assume that a step addition of positive reactivity (0.001 ΔK/K) is added to each reactor. Select the combination below that completes the following statement.
The size of the prompt jump in core power observed for reactor B (EOL) will be _____ than reactor A (BOL); and the stable reactor period observed for reactor B (EOL) will be _____ than reactor A (BOL).
A. smaller; longer
B. smaller; shorter
C. larger; longer
D. larger; shorter
ANSWER: D.

兩反應器A與B處於中程階（Intermediate Range）臨界（遠低於加熱階段起始點）。兩反應器幾乎完全相同，除了反應器A接近爐心壽命初期（BOL），反應器B接近爐心壽命末期（EOL）。假設兩反應器都加入一正反應度（0.001 ΔK/K）。則在反應器B所觀察到的瞬發跳升（Prompt Jump）大小將會_____反應器A；而在反應器B所觀察到的穩定反應器週期將會_____反應器A。
A. 小於；長於
B. 小於；短於
C. 大於；長於
D. 大於；短於
答案： D.

科目： 292003
知能類： K1.07 (3.3/3.3)
序號： B3651 (P3649)

Refer to the unlabeled reactor response curve shown below for a reactor that was initially subcritical in the source range. A small amount of positive reactivity was added at time = 0 sec. The response curve shows _____ versus time for a reactor that is currently (at time = 60 sec) _____.
A. reactor period; exactly critical
B. reactor period; supercritical
C. reactor fission rate; exactly critical
D. reactor fission rate; supercritical
ANSWER: D.

一反應器原本處於源階（Source Range）內的次臨界，其未標示之反應曲線如下圖。在時間為0秒時加入一小量之正反應度。則此反應曲線代表了目前（時間＝0秒）處於_____狀態的反應器，其_____對時間的關係圖。
A. 臨界；反應器週期
B. 超臨界；反應器週期
C. 臨界；反應器分裂率
D. 超臨界；反應器分裂率
答案： D.



科目： 292003
知能類： K1.07 [3.3/3.3]
序號： B3750 (P3749)

A reactor is operating at equilibrium 75% power with the following conditions:
Total power defect = -0.0176 ΔK/K
Shutdown margin = 0.0234 ΔK/K
Effective delayed neutron fraction = 0.0067
Effective prompt neutron fraction = 0.9933
How much positive reactivity must be added to make the reactor "prompt critical"?
A. 0.0067 ΔK/K
B. 0.0176 ΔK/K
C. 0.0234 ΔK/K
D. 0.9933 ΔK/K
ANSWER: A.

一反應器於75%平衡功率下運轉，並具有下列情況：
總功率欠缺：-0.0176 ΔK/K
停機餘裕：0.0234 ΔK/K
有效遲延中子分率（β_{eff}）＝0.0067
有效瞬發中子分率＝0.9933
若要使此反應器引發「瞬發臨界」（Prompt Critical）則需加入之正反應度為何？
A. 0.0067 ΔK/K
B. 0.0176 ΔK/K
C. 0.0234 ΔK/K
D. 0.9933 ΔK/K
答案： A.

科目： 292003
知能類： K1.08 [2.7/2.8]
序號： B49

After initial criticality, the reactor period is stabilized. The source range channels are repositioned so that the count rate is 100 cps. Sufficient positive reactivity is added to establish a 120-second period. How much time will it take for the count rate to increase to 10,000 cps with no additional operator action?
A. 1.2 minutes
B. 4 minutes
C. 9.21 minutes
D. 15.82 minutes
ANSWER: C.

在初始臨界之後，反應器週期達於穩定。源階（Source Range）儀器控道重新定位，使得計數率為100cps。加入足夠的正反應度使週期達到120秒。則在沒有運轉員採取任何動作，計數率要增加到10,000cps所需的時間為何？
A. 1.2 分
B. 4 分
C. 9.21 分
D. 15.82 分
答案： C.

科目： 292003
知能類： K1.08 [2.7/2.8]
序號： B127

A reactor is operating at a power level of 120 watts. A control rod is inserted, which results in a stable negative 80-second period. Which one of the following is closest to the reactor power level 2 minutes after rod insertion? (Assume the period stabilized immediately after rod insertion.)
A. 27 watts
B. 32 watts
C. 49 watts
D. 54 watts
ANSWER: A.

一反應器於功率階120watts下運轉。一控制棒被插入，導致一穩定負80秒之週期。在控制棒插入兩分鐘後，下列何者最接近反應器功率？（假設在控制棒插入後週期立即到達穩定。）
A. 27 watts
B. 32 watts
C. 49 watts
D. 54 watts
答案： A.

科目： 292003
知能類： K1.08 [2.7/2.8]
K1.05 [3.7/3.7]
序號： B1651 (P2648)

During a reactor startup, the intermediate range monitor readings increase from 30% to 50% on the same range in 2 minutes with no operator action. Which one of the following is the average reactor period during the power increase?
A. 357 seconds
B. 235 seconds
C. 155 seconds
D. 61 seconds
ANSWER: B.

一反應器啟動時，在無運轉員操作下，中程階（Intermediate Range）中子偵測器讀數在兩分鐘內從30%增加到50%。則在功率增加期間，下列何者為反應器平均週期？
A. 357 秒
B. 235 秒
C. 155 秒
D. 61 秒
答案： B.

科目： 292003
知能類： K1.05 [3.7/3.7]
K1.06 [3.7/3.7]
序號： B3551 (P3548)

Reactors A and B are identical except that the reactor cores are at different times in core life. The reactor A effective delayed neutron fraction is 0.007, and the reactor B effective delayed neutron fraction is 0.005. Both reactors are currently subcritical and stable with neutron flux level in the source range.
Given:
Reactor A K_{eff} = 0.999
Reactor B K_{eff} = 0.998
If positive 0.003 ΔK/K is suddenly added to each reactor, how will the resulting stable periods compare? (Consider only the reactor response while power is below the point of adding heat.)
A. Reactor A stable period will be shorter because it will have the higher positive reactivity in the core.
B. Reactor B stable period will be shorter because it has the smaller effective delayed neutron fraction.
C. Reactors A and B will have the same stable period because both reactors will remain subcritical.
D. Reactors A and B will have the same stable period because both reactors received the same amount of positive reactivity.
ANSWER: A.

除了反應器爐心處於爐心壽命的不同階段外，反應器A與B完全相同。反應器A之有效遲延中子分率（β_{eff}）為0.007，而反應器B之有效遲延中子分率為0.005。兩反應器目前處於次臨界穩定狀態，其中子通率位階位於源階（Source Range）內。假設：
反應器A K_{eff} = 0.999；反應器B K_{eff} = 0.998
若將正反應度0.003 ΔK/K突然加入兩反應器，比較兩者的穩定週期，下列何者正確？
A. 反應器A的穩定週期將會比較短，因為其爐心的正反應度較高
B. 反應器B的穩定週期將會比較短，因為其具有較小之有效遲延中子分率
C. 反應器A與B的穩定週期相同，因為兩反應器將會維持在次臨界
D. 反應器A與B的穩定週期相同，因為兩反應器將會接受到同量的正反應度
答案： A.

科目： 292003
知能類： K1.06 [3.7/3.7]
序號： B3650 (P3648)

Two reactors are identical in every way except that reactor A is at the beginning of core life and reactor B is near the end of core life. Both reactors are operating at 100% power when a reactor scram occurs at the same time on each reactor. The reactor systems for each reactor respond identically to the scram and no operator action is taken.
Ten minutes after the scram, the higher shutdown fission rate will exist in reactor _____ because it has a _____ delayed neutron fraction.
A. A; larger
B. B; larger
C. A; smaller
D. B; smaller
ANSWER: A.

兩相同反應器A與B，其中反應器A處於爐心壽命初期，而反應器B處於爐心壽命末期。兩反應器於100%功率下運轉時，同時發生反應器急停。若反應器系統對於急停反應相同，同時沒有運轉員進行操作。在急停十分鐘後，反應器_____將會有較高的分裂率，因為其有一_____的遲延中子分率。
A. A；較大
B. B；較大
C. A；較小
D. B；較小
答案： A.

科目： 292003
知能類： K1.06 [3.7/3.7]
序號： B3749 (P3748)

A step positive reactivity addition of 0.001 ΔK/K is made to a reactor with a stable neutron population and an initial core K_{eff} of 0.99. Consider the following two cases:
Case 1: The reactor is near the beginning of core life.
Case 2: The reactor is near the end of core life.
Assume the initial core neutron population is the same for each case. Which one of the following correctly compares the prompt jump in core neutron population and the final stable core neutron population for the two cases?

A. The prompt jump will be greater for case 1, but the final stable neutron population will be the same for both cases.
B. The prompt jump will be greater for case 2, but the final stable neutron population will be the same for both cases.
C. The prompt jump will be the same for both cases, but the final stable neutron population will be greater for case 1.
D. The prompt jump will be the same for both cases, but the final stable neutron population will be greater for case 2.

ANSWER: B.

將一正反應度0.001 ΔK/K加入一具有穩定中子數與初始爐心K_{eff}為0.99的反應器。考慮下列兩種情況：
情況一：反應器接近爐心壽命初期
情況二：反應器接近爐心壽命末期
假設兩情況初始爐心中子數相等。比較兩情況中爐心中子數的瞬發跳升（Prompt Jump）與最終穩定爐心中子數，下列何者正確？

A. 情況一的瞬發跳升較大，但兩情況的最終穩定中子數會相等
B. 情況二的瞬發跳升較大，但兩情況的最終穩定中子數會相等
C. 兩情況的瞬發跳升相等，但情況一的最終穩定中子數較大
D. 兩情況的瞬發跳升相等，但情況二的最終穩定中子數較大

答案： B.

科目： 292003
知能類： K1.06 [3.7/3.7]
序號： B3851

A reactor is critical in the source range during the initial reactor startup immediately following a refueling outage. The core average delayed neutron fraction is 0.007. The operator adds positive reactivity to establish a stable positive 60-second reactor period.
If the reactor had been at the end of core life with a core average delayed neutron fraction of 0.005, what would be the approximate stable reactor period after the addition of the same amount of positive reactivity?
A. 28 seconds
B. 32 seconds
C. 36 seconds
D. 40 seconds
ANSWER: D.

一反應器在大修後，初始啟動時，處於源階（Source Range）的臨界。爐心平均遲延中子分率為0.007。運轉員加入一正反應度以建立一穩定正60秒反應器週期。當反應器處於爐心壽命末期時，其爐心平均遲延中子分率為0.005，若加入了等量的正反應度之後，其穩定反應週期約是多少？
A. 28 秒
B. 32 秒
C. 36 秒
D. 40 秒
答案： D.

科目： 292003
知能類： K1.08 [2.7/2.8]
序號： B1252

During a continuous rod withdrawal accident, reactor power has increased from 387 MW to 553 MW in 10 seconds. What was the average reactor period for this power increase?
A. 3 seconds
B. 24 seconds
C. 28 seconds
D. 35 seconds
ANSWER: C.

在一連續抽棒事件中，反應器功率在十秒內從387MW增加到553MW。則此功率增加期間的反應器平均週期為多少？
A. 3 秒
B. 24 秒
C. 28 秒
D. 35 秒
答案： C.

科目： 292003
知能類： K1.08 [2.7/2.8]
序號： B2351 (P2349)

During a reactor startup, the intermediate range monitor readings increase from 20% to 40% on the same range in 2 minutes with no operator action. Which one of the following is the average reactor period during the power increase?
A. 173 seconds
B. 235 seconds
C. 300 seconds
D. 399 seconds
ANSWER: A.

一反應器啟動時，在沒有運轉員操作的情況下，兩分鐘內中程階（Intermediate Range）中子偵測器讀數從20%增加到40%。則在功率增加當中，其反應器平均週期為多少？
A. 173 秒
B. 235 秒
C. 300 秒
D. 399 秒
答案： A.

科目： 292003
知能類： K1.08 [2.7/2.8]
序號： B3051 (P3050)

A reactor startup is in progress with the reactor at normal operating temperature and pressure. With reactor power stable at the point of adding heat, a control rod malfunction causes an inadvertent rod withdrawal that results in adding 0.3 %ΔK/K reactivity.
Given:
All rod motion has been stopped.
No automatic system or operator actions occur to inhibit the power increase.
Power coefficient = -0.04 %ΔK/K / % power
Average effective delayed neutron fraction = 0.006
What is the approximate power level increase required to offset the reactivity added by the inadvertent rod withdrawal?
A. 3.0%
B. 5.0%
C. 6.7%
D. 7.5%
ANSWER: D.

一處於正常運轉之溫度與壓力的反應器正在進行啟動。當反應器功率穩定於加熱階段起始點時，一控制棒故障導致意外抽棒，而造成反應器增加0.3 %ΔK/K的反應度。系統狀況如下：
所有控制棒動作停止
沒有自動系統或是運轉員進行操作以抑制功率增加
功率係數＝-0.04 %ΔK/K / % 功率
平均有效遲延中子分率＝0.006
若要對此意外抽棒所導致之反應度增加進行補償，則功率約需增加多少？
A. 3.0%
B. 5.0%
C. 6.7%
D. 7.5%
答案： D.

科目： 292003
知能類： K1.08 [2.7/2.8]
序號： B3451 (P3467)

A reactor core is exactly critical well below the point of adding heat during a plant startup. A small amount of positive reactivity is then added to the core, and a stable positive reactor period is established.
With the stable positive reactor period, the following is observed:
Time Power Level
0 sec 3.16 x 10^{-7}%
90 sec 1.0 x 10^{-5}%
Which one of the following will be the reactor power at time = 120 seconds?
A. 3.16 x 10^{-5}%
B. 5.0 x 10^{-5}%
C. 6.32 x 10^{-5}%
D. 1.0 x 10^{-4}%
ANSWER: A.

一核電廠啟動時，其反應器爐心在遠低於加熱階段起始點處達到臨界。其後加入一小量之正反應度於爐心，並建立一穩定的正反應器週期。在穩定正反應器週期下，觀察到數據如下：
時間 功率
0 sec 3.16 x 10^{-7}%
90 sec 1.0 x 10^{-5}%
則在時間為120秒時，反應器之功率為何？
A. 3.16 x 10^{-5}%
B. 5.0 x 10^{-5}%
C. 6.32 x 10^{-5}%
D. 1.0 x 10^{-4}%
答案： A.

科目： 292003
知能類： K1.09 [2.5/2.6]
序號： B50

During a reactor startup, the reactor is critical at 3,000 counts per second (cps). A control rod is notched out, resulting in a doubling time of 85 seconds. How much time is required for the reactor to reach 888,000 cps?
A. 341 seconds
B. 483 seconds
C. 697 seconds
D. 965 seconds
ANSWER: C.

一反應器啟動時在3000cps下達到臨界。一控制棒被抽出一節，導致功率倍增時間為85秒。則此反應器要達到888,000cps所需的時間為多少？
A. 341 秒
B. 483 秒
C. 697 秒
D. 965 秒
答案： C.

科目： 292003
知能類： K1.09 [2.5/2.6]
序號： B352

Reactor power is increased from 50 kW to 370 kW in 2 minutes. Select the doubling time.
A. 42 seconds
B. 60 seconds
C. 86 seconds
D. 120 seconds
ANSWER: A.

反應器功率在兩分鐘內從50kW增加到370kW。則其功率倍增時間是多少？
A. 42 秒
B. 60 秒
C. 86 秒
D. 120 秒
答案： A.

科目： 292003
知能類： K1.09 [2.5/2.6]
序號： B1451

During a startup, the reactor is critical at 3000 cps. A control rod is notched out, resulting in a doubling time of 115.2 seconds. Which one of the following is the approximate reactor period?
A. 56 seconds
B. 80 seconds
C. 126 seconds
D. 166 seconds
ANSWER: D.

一反應器啟動時在3000cps下達到臨界。一控制棒被抽出一節，導致功率倍增時間為115.2秒。則此反應器週期約為多少？
A. 56 秒
B. 80 秒
C. 126 秒
D. 166 秒
答案： D.

科目： 292004
知能類： K1.01 [3.2/3.2]
序號： B252

The moderator temperature coefficient describes a change in _____ resulting from a change in _____.
A. reactivity; moderator temperature
B. K_{eff}; moderator temperature
C. moderator temperature; reactivity
D. moderator temperature; K_{eff}
ANSWER: A.

緩和劑溫度係數是描述因_____變化而產生的_____變化。
A. 緩和劑溫度；反應度
B. 緩和劑溫度；K_{eff}
C. 反應度；緩和劑溫度
D. 緩和劑溫度；K_{eff}
答案： A.

科目： 292004
知能類： K1.02 [2.5/2.6]
序號： B353 (P350)

Which one of the following will directly result in a less negative fuel temperature coefficient? (Consider only the effect of the change in the listed parameters.)
A. Increase in fuel burnup
B. Decrease in fuel temperature
C. Increase in void fraction
D. Decrease in moderator temperature
ANSWER: D.

下列何者會直接導致一較小的負燃料溫度係數？（只考慮所列參數變化產生的直接影響。）
A. 燃料燃耗的增加
B. 燃料溫度的降低
C. 空泡分率的增加
D. 緩和劑溫度的降低
答案： D.

科目： 292004
知能類： K1.02 [2.5/2.6]
序號： B651 (P751)

A reactor is currently at end-of-life in its fuel cycle, and it will be refueled next month. In comparison to the current moderator temperature coefficient （MTC）, the MTC after refueling will be...

A. less negative at all coolant temperatures.
B. more negative at all coolant temperatures.
C. less negative below approximately 350 ^{o}F coolant temperature and more negative above approximately 350 ^{o}F coolant temperature.
D. more negative below approximately 350 ^{o}F coolant temperature and less negative above approximately 350 ^{o}F coolant temperature.

ANSWER: B.

一反應器目前處於燃料週期的末期，下個月將會更換燃料。與目前緩和劑溫度係數（MTC）相比較，更換燃料之後的MTC將會

A. 在所有的冷卻水溫度下，負值均較小
B. 在所有的冷卻水溫度下，負值均較大
C. 在冷卻水溫度約350°F以下時，負值較小；在冷卻水溫度約350°F以上時，負值較大
D. 在冷卻水溫度約350°F以下時，負值較大；在冷卻水溫度約350°F以上時，負值較小

答案： B.

科目： 292004
知能類： K1.02 [2.5/2.6]
序號： B752 (N/A)

A reactor is operating at full power following a refueling outage. In comparison to the current moderator temperature coefficient （MTC）, the MTC just prior to the refueling was...

A. more negative below approximately 350^{o}F coolant temperature and less negative above approximately 350^{o}F coolant temperature.
B. less negative below approximately 350^{o}F coolant temperature and more negative above approximately 350^{o}F coolant temperature.
C. more negative at all coolant temperatures.
D. less negative at all coolant temperatures.

ANSWER: D.

一反應器在大修後於全功率下運轉。與目前的緩和劑溫度係數（MTC）相較，更換燃料前的MTC

A. 在冷卻水溫度約350^{o}F以下時，負值較大；在冷卻水溫度約350^{o}F以上時，負值較小
B. 在冷卻水溫度約350^{o}F以下時，負值較小；在冷卻水溫度約350^{o}F以上時，負值較大
C. 在所有的冷卻水溫度下，負值均較大
D. 在所有的冷卻水溫度下，負值均較小

答案： D.

科目： 292004
知能類： K1.02 [2.5/2.6]
序號： B852

Which one of the following conditions will cause the moderator temperature coefficient （MTC） to become more negative? (Consider only the direct effect of the indicated change on MTC.)
A. Control rods are inserted from 50% rod density to 75% rod density.
B. Fuel temperature decreases from 1500°F to 1200°F.
C. Recirculation flow increases by 10%.
D. Moderator temperature decreases from 500°F to 450°F.
ANSWER: A.

下列何種情況將會導致緩和劑溫度係數（MTC）變成較大負值？（只考慮下列因素對於MTC所產生的直接影響。）
A. 控制棒插入密度從50%增加到75%
B. 燃料溫度從1500°F降低至1200°F
C. 再循環流量增加10%
D. 緩和劑溫度從500°F降低至450°F
答案： A.

科目： 292004
知能類： K1.02 [2.5/2.6]
序號： B1152

Which one of the following describes the change in the moderator temperature coefficient （MTC） of reactivity over core life? (Assume 100% power for all cases.)

A. Control rod withdrawal results in increased thermal neutron utilization, which results in a less negative MTC at end of fuel cycle （EOC）.
B. Fission product poison buildup results in decreased thermal neutron utilization, which results in a more negative MTC at EOC.
C. Burnup of U-235 results in decreased thermal neutron utilization, which results in a more negative MTC at EOC.
D. Decreased voiding in the core results in increased thermal neutron utilization, which results in a less negative MTC at EOC.

ANSWER: A.

下列何者正確地描述了在爐心壽命中緩和劑溫度係數（MTC）的變化？（假設所有情況均為100%功率。）

A. 抽控制棒會增加熱中子利用因數，因而導致了在燃料週期末期（EOC）時MTC的負值較小
B. 分裂產物毒物累積會降低熱中子利用因數，因而導致了在EOC時MTC的負值較大
C. U-235燃耗會降低熱中子利用因數，因而導致了在EOC時MTC的負值較大
D. 爐心空泡減少會增加熱中子利用因數，因而導致了在EOC時MTC的負值較小

答案： A.

科目： 292004
知能類： K1.02 [2.5/2.6]
序號： B1253

The moderator temperature coefficient of reactivity is _____ negative at end of core life because, over core life, the utilization of thermal neutrons _____.
A. more; decreases
B. less; decreases
C. more; increases
D. less; increases
ANSWER: D.

緩和劑溫度係數在爐心壽命末期時負值_____，因為在爐心壽命過程中，熱中子利用因數_____。
A. 較大；降低
B. 較小；降低
C. 較大；增加
D. 較小；增加
答案： D.

科目： 292004
知能類： K1.02 [2.5/2.6]
序號： B1752 (P1752)

Which one of the following describes the net reactivity effect of a decrease in moderator temperature in an undermoderated reactor core?

A. Negative reactivity will be added because more thermal neutrons will be captured by the moderator.
B. Negative reactivity will be added because more neutron leakage will occur.
C. Positive reactivity will be added because less neutron leakage will occur.
D. Positive reactivity will be added because less thermal neutrons will be captured by the moderator.

ANSWER: C.

下列何者正確地描述了在一欠緩和（undermoderated）反應器爐心中，因緩和劑溫度下降而造成淨反應度的影響？

A. 會加入負反應度，因為更多的熱中子將被緩和劑捕獲
B. 會加入負反應度，因為更多的中子洩漏將會發生
C. 會加入正反應度，因為較少的中子洩漏將會發生
D. 會加入正反應度，因為較少的熱中子將被緩和劑捕獲

答案： C.

科目： 292004
知能類： K1.02 [2.5/2.6]
序號： B2052 (N/A)

A reactor is shut down with the reactor vessel head removed for refueling. The core is covered by 23 feet of water with a temperature of 100^{o}F.
Which one of the following can both increase and decrease Keff depending on core burnup?
A. A spent fuel assembly is removed from the core.
B. Refueling water temperature decreases to 95^{o}F.
C. A fresh neutron source is installed in the core.
D. Movable incore source range instrumentation is repositioned to increase source range count rate.
ANSWER: B.

一反應器將反應爐槽蓋取下，進行更換燃料而停機。爐心以溫度100°F深度23呎的水覆蓋。根據爐心燃耗的不同，下列何者既能增加亦能降低K_{eff}？
A. 從爐心移出一用過的燃料束。
B. 更換燃料水溫降低至95°F。
C. 於爐心中安裝一新的中子源。
D. 可移動式爐內（incore）源階（source range）中子偵測儀器重新定位，以增加源階內的計數率。
答案： B.

科目： 292004
知能類： K1.02 [2.5/2.6]
序號： B2252 (N/A)

Under which one of the following conditions is a reactor core most likely to have a positive moderator temperature coefficient?
A. Low coolant temperature at beginning-of-life
B. Low coolant temperature at end-of-life
C. High coolant temperature at beginning-of-life
D. High coolant temperature at end-of-life
ANSWER: B.

在下列何種情況下，反應器爐心最可能有一正的緩和劑溫度係數？
A. 在壽命初期時冷卻水溫度低
B. 在壽命末期時冷卻水溫度低
C. 在壽命初期時冷卻水溫度高
D. 在壽命末期時冷卻水溫度高
答案： B.

科目： 292004
知能類： K1.02 [2.5/2.6]
序號： B2452 (P951)

During a reactor vessel cooldown, positive reactivity is added to the core (assuming a negative moderator temperature coefficient). This is partially due to...
A. a decrease in the thermal utilization factor.
B. an increase in the thermal utilization factor.
C. a decrease in the resonance escape probability.
D. an increase in the resonance escape probability.
ANSWER: D.

在反應爐槽冷卻時，正反應度被加入爐心當中（假設緩和劑溫度係數為負值）。部分原因是因為
A. 熱中子利用因數（thermal utilization factor）下降
B. 熱中子利用因數增加
C. 共振逃逸機率（resonance escape probability）下降
D. 共振逃逸機率增加
答案： D.

科目： 292004
知能類： K1.02 [2.5/2.6]
序號： B2652 (P2650)

Which one of the following describes the net reactivity effect of a moderator temperature decrease in an overmoderated reactor core?
A. Negative reactivity will be added because more neutron leakage will occur.
B. Negative reactivity will be added because more neutrons will be captured by the moderator.
C. Positive reactivity will be added because less neutron leakage will occur.
D. Positive reactivity will be added because fewer neutrons will be captured by the moderator.
ANSWER: B.

下列何者正確地描述了在一過緩和（overmoderated）反應器爐心中，因緩和劑溫度下降而造成淨反應度的影響？
A. 會加入負反應度，因為更多的中子洩漏將會發生
B. 會加入負反應度，因為更多的熱中子將被緩和劑捕獲
C. 會加入正反應度，因為較少的中子洩漏將會發生
D. 會加入正反應度，因為較少的熱中子將被緩和劑捕獲
答案： B.

科目： 292004
知能類： K1.02 [2.5/2.6]
序號： B2853

Which one of the following describes the change in the moderator temperature coefficient （MTC） of reactivity over core life? (Assume 100% power for all cases.)

A. MTC becomes less negative because as control rods are withdrawn from the core, the increase in the number of neutrons leaking from the core for a 1^{o}F increase in moderator temperature is smaller.
B. MTC becomes less negative because as U-238 depletes, a 1 ^{o}F increase in moderator temperature results in fewer neutrons escaping resonance capture.
C. MTC becomes more negative because as U-235 depletes, a 1 ^{o}F increase in moderator temperature permits more neutrons to leak out of the core.
D. MTC becomes more negative because as fission product poisons build up, the increase in the number of neutrons being absorbed by fission product poisons for a 1 ^{o}F increase in moderator temperature is larger.

ANSWER: A.

下列何者正確地描述了在爐心壽命中，緩和劑溫度係數（MTC）的變化？(假設所有情況功率均為100%)

A. 當控制棒被抽出時，緩和劑溫度增加1°F造成中子洩漏數目的增加量會變得比較小，因此MTC負值會變少。
B. 當U-238消耗時，緩和劑溫度增加1°F導致中子逃離共振捕獲的數量會變得比較少，因此MTC負值會變少。
C. 當U-235消耗時，緩和劑溫度增加1°F導致中子從爐心洩漏的數量變得比較多，因此MTC負值會變多。
D. 當分裂產物毒物累積時，緩和劑溫度增加1°F造成被分裂產物毒物吸收中子數目的增加量會變得比較大，因此MTC負值會變多。

答案： A.

科目： 292004
知能類： K1.02 [2.5/2.6]
序號： B2952 (P2950)

Which one of the following describes the net reactivity effect of a moderator temperature increase in an overmoderated reactor core?
A. Negative reactivity will be added because more neutron leakage will occur.
B. Negative reactivity will be added because more neutrons will be captured by the moderator.
C. Positive reactivity will be added because less neutron leakage will occur.
D. Positive reactivity will be added because fewer neutrons will be captured by the moderator.
ANSWER: D.

下列何者正確地描述了在一過緩和（overmoderated）反應器爐心中，緩和劑溫度增加的淨反應度效應？
A. 會加入負反應度，因為更多的中子洩漏將會發生
B. 會加入負反應度，因為更多的熱中子將被緩和劑捕獲
C. 會加入正反應度，因為較少的中子洩漏將會發生
D. 會加入正反應度，因為較少的熱中子將被緩和劑捕獲
答案： D.

科目： 292004
知能類： K1.02 [2.5/2.6]
序號： B3152 (P3151)

How does control rod withdrawal affect the moderator temperature coefficient in an undermoderated reactor core?
A. The initially negative MTC becomes more negative.
B. The initially negative MTC becomes less negative.
C. The initially positive MTC becomes more positive.
D. The initially positive MTC becomes less positive.
ANSWER: B.

在一欠緩和（undermoderated）反應器爐心中，抽控制棒對緩和劑溫度係數的影響為
A. 原本為負值的MTC，負值變多。
B. 原本為負值的MTC，負值變少。
C. 原本為正值的MTC，負值變多。
D. 原本為正值的MTC，負值變少。
答案： B.

科目： 292004
知能類： K1.02 [2.5/2.6]
序號： B3652 (P3650)

Which one of the following describes the overall core reactivity effect of a moderator temperature increase in an undermoderated reactor core?

A. Negative reactivity will be added because more neutrons will be absorbed by U-238 at resonance energies while slowing down.
B. Negative reactivity will be added because more neutrons will be captured by the moderator while slowing down.
C. Positive reactivity will be added because fewer neutrons will be absorbed by U-238 at resonance energies while slowing down.
D. Positive reactivity will be added because fewer neutrons will be captured by the moderator while slowing down.

ANSWER: A.

在一欠緩和（undermoderated）反應器爐心中，下列何者正確地描述了緩和劑溫度增加對整體爐心反應度的效應？

A. 會加入負反應度，因為更多的中子在減速時將會被U-238在共振能量下吸收
B. 會加入負反應度，因為更多的中子在減速時將會被緩和劑捕獲
C. 會加入正反應度，因為較少的中子在減速時將會被U-238在共振能量下吸收
D. 會加入正反應度，因為較少的中子在減速時將會被緩和劑捕獲

答案： A.

科目： 292004
知能類： K1.03 [2.6/2.7]
序號： B753 (P1950)

Factors that affect resonance absorption of a neutron into a nucleus include...
A. kinetic energy of the nucleus, kinetic energy of the neutron, and excitation energy of the nucleus.
B. kinetic energy of the neutron, excitation energy of the nucleus, and excitation energy of the neutron.
C. excitation energy of the nucleus, excitation energy of the neutron, and kinetic energy of the nucleus.
D. excitation energy of the neutron, kinetic energy of the nucleus, and kinetic energy of the neutron.
ANSWER: A.

影響中子被原子核共振吸收的因素包括
A. 原子核的動能，中子的動能，和原子核的激動能量
B. 中子的動能，原子核的激動能量，和中子的激動能量
C. 原子核的激動能量，中子的激動能量，和原子核的動能
D. 中子的激動能量，原子核的動能，和中子的動能
答案： A.

科目： 292004
知能類： K1.03 [2.6/2.7]
序號： B1052

As fuel temperature increases, the effective resonant absorption peaks exhibited by U-238 will _____ in height and will _____ in width.
A. decrease; increase
B. decrease; decrease
C. increase; increase
D. increase; decrease
ANSWER: A.

當燃料溫度增加時，U-238的有效共振吸收峰（effective resonance absorption peak）在高度上會_____在寬度上會_____。
A. 減小；增加
B. 減小；減小
C. 增加；增加
D. 增加；減小
答案： A.

科目： 292004
知能類： K1.03 [2.6/2.7]
序號： B3153 (P3150)

Which one of the following exhibits the smallest microscopic cross section for absorption of a thermal neutron in an operating reactor?
A. Uranium-235
B. Uranium-238
C. Samarium-149
D. Xenon-135
ANSWER: B.

在一運轉中的反應器內，下列何者具有最小的熱中子微觀吸收截面（microscopic absorption cross section）？
A. U-235
B. U-238
C. Sm-149
D. Xe-135
答案： B.

科目： 292004
知能類： K1.04 [2.6/2.7]
序號： B652 (P1650)

Which one of the following contains the pair of nuclides that are the most significant contributors to the total resonance capture in the core near the end of a fuel cycle?
A. Pu-239 and U-235
B. Pu-239 and Pu-240
C. U-238 and Pu-240
D. U-238 and Pu-239
ANSWER: C.

對於一接近燃料週期末期時的爐心，下列何組核種是所有共振捕獲的最重要貢獻者？
A. Pu-239 和 U-235
B. Pu-239 和 Pu-240
C. U-238 和 Pu-240
D. U-238 和 Pu-239
答案： C.

科目： 292004
知能類： K1.04 [2.6/2.7]
序號： B1553 (P1951)

A reactor plant is operating at 70% power. Which one of the following will result in a less negative fuel temperature coefficient? (Consider only the direct effect of the change in each listed parameter.)
A. Increase in Pu-240 inventory in the core
B. Increase in moderator temperature
C. Increase in fuel temperature
D. Increase in void fraction
ANSWER: C.

一反應器於70%功率下運轉。下列何者將會使得燃料溫度係數的負值減小？（只考慮下列各參數變化的直接效應。）
A. 在爐心中增加Pu-240的含量
B. 提高緩和劑溫度
C. 提高燃料溫度
D. 提高空泡分率
答案： C.

科目： 292004
知能類： K1.04 [2.6/2.7]
序號： B1852

Which one of the following is a characteristic of Doppler broadening?
A. As reactor coolant temperature increases, less moderator molecules will be present in the core to thermalize neutrons.
B. As reactor fuel temperature increases, neutrons from a wider energy spectrum will be captured in the fuel.
C. As moderator void percentage increases, neutrons will travel farther in the core before being absorbed or scattered.
D. As control rods are withdrawn, additional reactor fuel will be exposed and result in a power increase.
ANSWER: B.

下列何者是都卜勒擴張（Doppler broadening）的特徵？
A. 當反應器冷卻水溫度增加時，在爐心用以熱化中子的緩和劑分子數會減少
B. 當反應器燃料溫度增加時，更寬能譜的中子將會在燃料中被捕獲
C. 當緩和劑空泡分率增加時，爐心內的中子在被吸收或散射前移動的距離會更遠
D. 當控制棒抽出時，將露出更多的反應器燃料，而導致功率增加
答案： B.

科目： 292004
知能類： K1.04 [2.6/2.7]
序號： B1952 (P650)

Which one of the following isotopes is the most significant contributor to resonance capture of fission neutrons in the reactor core at the beginning of core life?
A. U-238
B. U-233
C. Pu-240
D. Pu-239
ANSWER: A.

對於一處於燃料週期初期的反應器爐心，下列哪一個同位素是最主要的分裂中子共振捕獲者？
A. U-238
B. U-233
C. Pu-240
D. Pu-239
答案： A.

科目： 292004
知能類： K1.04 [2.6/2.7]
序號： B3352 (P2050)

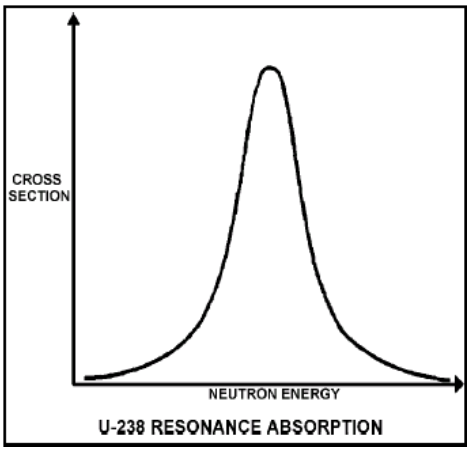
Which one of the following isotopes is the most significant contributor to resonance capture of fission neutrons in the reactor core at the end of a fuel cycle?
A. U-235
B. U-238
C. Pu-239
D. Pu-240
ANSWER: B.

對於一處於燃料週期末期的反應器爐心，下列哪一個同位素是最主要的分裂中子共振捕獲者？
A. U-235
B. U-238
C. Pu-239
D. Pu-240
答案： B.

科目： 292004
知能類： K1.04 [2.6/2.7]
序號： B3753 (P3750)

Refer to the drawing of a curve showing the neutron absorption characteristics of a typical U-238 nucleus at a resonance neutron energy (see figure below). The associated reactor is currently operating at steady-state 80% power.
During a subsequent reactor power decrease to 70%, the curve will become _____; and the percentage of the core neutron population lost to resonance capture by U-238 will _____.
A. taller and more narrow; decrease
B. taller and more narrow; increase
C. shorter and broader; decrease
D. shorter and broader; increase
ANSWER: A.

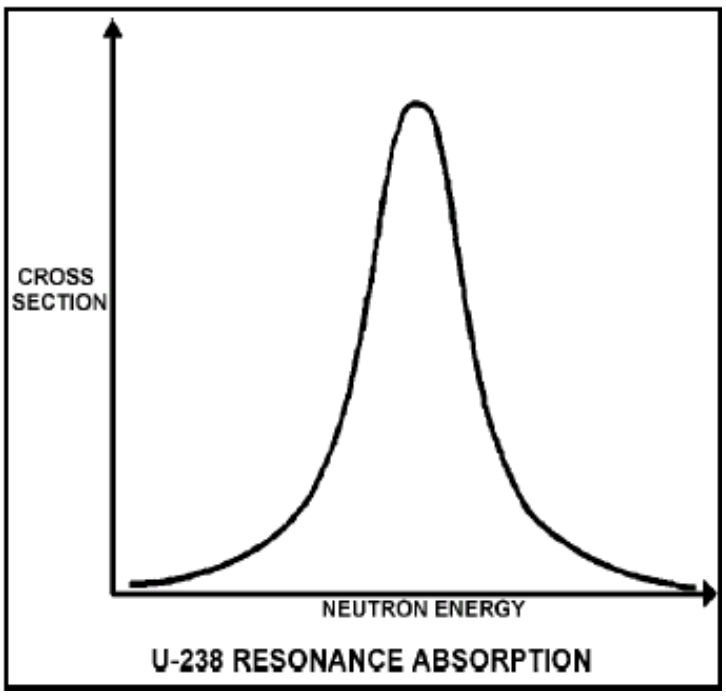
在共振中子能量下，一典型U-238原子核的中子吸收特徵曲線如下圖所示。相關的反應器目前在80%功率的穩態下運轉。其後反應器功率降低至70%，此曲線將變得_____；而爐心中子因被U-238共振捕獲而損耗的百分率將會_____。
A. 較高且較窄；減少
B. 較高且較窄；增加
C. 較矮且較寬；減少
D. 較矮且較寬；增加
答案： A.



科目： 292004
知能類： K1.04 [2.9/2.9]
序號： B3852 (P3850)

Refer to the drawing of microscopic cross section for absorption versus neutron energy for a resonance peak in U-238 in a reactor operating at 80% power (see figure below).
If reactor power is decreased to 60%, the height of the curve will _____ and the area under the curve will _____.
A. increase; increase
B. increase; remain the same
C. decrease; decrease
D. decrease; remain the same
ANSWER: B.

一反應器在80%功率的穩態下運轉，在U-238共振峰下，微觀吸收截面(microcopic cross section)與中子能量的關係曲線如下圖所示。若反應器功率降低至60%，則曲線的高度會_____，而曲線下的面積會_____。
A. 增加；增加
B. 增加；維持不變
C. 減少；減少
D. 減少；維持不變
答案： B.



科目： 292004
知能類： K1.05 [2.9/2.9]
序號： B452 (P2251)

Which one of the following pairs of isotopes is responsible for the negative reactivity associated with a fuel temperature increase near the end of core life?
A. U-235 and Pu-239
B. U-235 and Pu-240
C. U-238 and Pu-239
D. U-238 and Pu-240
ANSWER: D.

在接近爐心壽命末期時，下列哪一組同位素會造成因燃料溫度上升引起的負反應度？
A. U-235 和 Pu-239
B. U-235 和 Pu-240
C. U-238 和 Pu-239
D. U-238 和 Pu-240
答案： D.

科目： 292004
知能類： K1.05 [2.9/2.9]
序號： B552 (P2451)

Which one of the following describes how the magnitude of the Doppler coefficient of reactivity is affected over core life?
A. It becomes more negative due to the buildup of Pu-240.
B. It becomes less negative due to the buildup of fission products.
C. It becomes more negative initially due to gadolinium burnout, then less negative due to fuel depletion.
D. It remains essentially constant.
ANSWER: A.

下列何者正確地描述了都卜勒係數所對應之反應度的大小在爐心壽命中受到影響？
A. 因為Pu-240的累積而使得其負值更大
B. 因為分裂產物的累積而使得其負值變少
C. 開始時因為釓（Gd）的消耗而使得其負值增加，其後因為燃料的消耗而負值減少
D. 基本上維持不變
答案： A.

科目： 292004
知能類： K1.05 [2.9/2.9]
序號： B1353

Compared to beginning of core life, the Doppler coefficient of reactivity is _____ negative at end of core life due to _____. (Assume the same initial fuel temperature.)
A. less; depletion of U-238
B. more; burnout of gadolinium
C. less; buildup of fission products
D. more; buildup of Pu-240
ANSWER: D.

與爐心壽命初期相比，在爐心壽命末期時，都卜勒係數的負值_____，因為_____。（假設起始的燃料溫度相同。）
A. 較小；U-238的消耗
B. 較大；釓（Gd）的消耗
C. 較小；分裂產物的累積
D. 較大；Pu-240的累積
答案： D.

科目： 292004
知能類： K1.05 [2.9/2.9]
序號： B2053 (P2052)

Compared to operating at a low power level, the fuel temperature (Doppler) coefficient of reactivity at a high power level is _____ negative due to _____. (Assume the same core age.)
A. less; buildup of fission product poisons
B. more; improved pellet-to-clad heat transfer
C. less; higher fuel temperature
D. more; increased neutron flux
ANSWER: C.

與在低功率運轉相比，在高功率運轉下的燃料溫度（都卜勒）係數有_____負值，因為_____。（假設爐心年齡相同。）
A. 較小；分裂產物毒物的累積
B. 較大；燃料丸至護套熱傳導的改善
C. 較小；較高的燃料溫度
D. 較大；中子通率的增加
答案： C.

科目： 292004
知能類： K1.05 [2.9/2.9]
序號： B2152 (P2151)

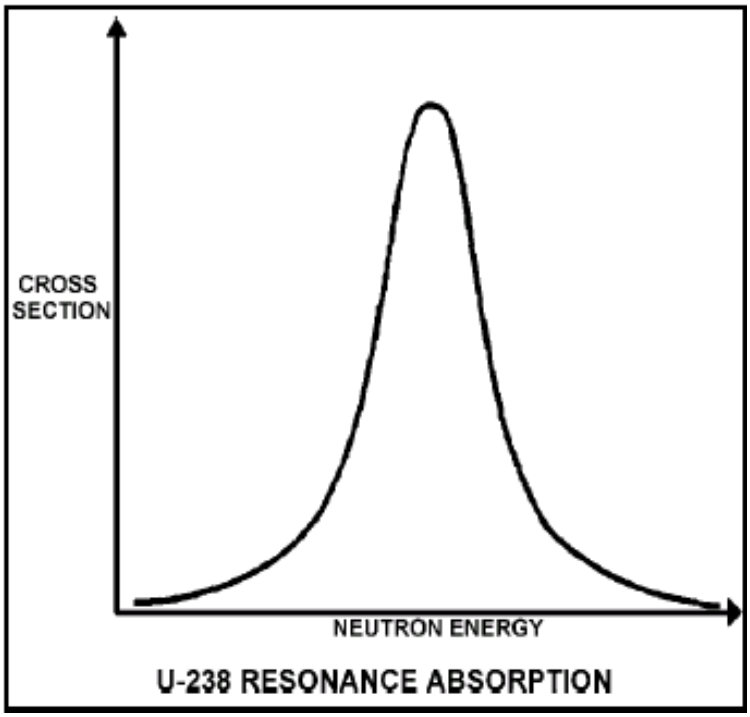
Which one of the following contains the nuclides responsible for most of the resonance capture of fission neutrons in the core at the beginning of the sixth fuel cycle? (Assume that each refueling replaces one-third of the fuel.)
A. U-235 and Pu-239
B. U-235 and U-238
C. U-238 and Pu-240
D. U-238 and Pu-239
ANSWER: C.

對於一在第六燃料週期初期時的反應器爐心，下列哪一組核種造成了大部分的分裂中子共振捕獲？
A. U-235 和 Pu-239
B. U-235 和 U-238
C. U-238 和 Pu-240
D. U-238 和 Pu-239
答案：C

科目： 292004
知能類： K1.05 [2.9/2.9]
序號： B2453 (P2352)

Refer to the drawing of microscopic cross section for absorption versus neutron energy for a resonance peak in U-238 (see figure below).
If fuel temperature increases, the area under the curve will _____ and negative reactivity will be added to the core because _____.
A. increase; neutrons of a wider range of energies will be absorbed by U-238
B. increase; more neutrons will be absorbed by U-238 at the resonance neutron energy
C. remain the same; neutrons of a wider range of energies will be absorbed by U-238
D. remain the same; more neutrons will be absorbed by U-238 at the resonance neutron energy
ANSWER: C.

在U-238共振峰下，微觀吸收截面與中子能量的關係曲線如下圖所示。若燃料溫度增加，則曲線下的面積會_____，同時會有負反應度加入爐心，因為_____。
A. 增加；有更廣泛能量範圍的中子會被U-238吸收
B. 增加；有更多的中子會被U-238在共振中子能量下吸收
C. 維持不變；有更廣泛能量範圍的中子會被U-238吸收
D. 維持不變；有更多的中子會被U-238在共振中子能量下吸收
答案： C.



科目： 292004
知能類： K1.05 [2.9/2.9]
序號： B2553 (P2651)

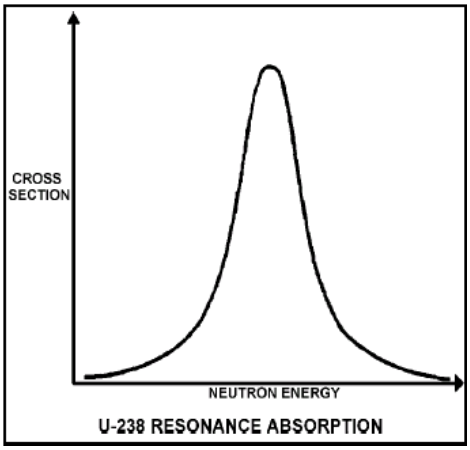
The fuel temperature (Doppler) coefficient of reactivity is more negative at the _____ of a fuel cycle because _____. (Assume the same initial fuel temperature throughout the fuel cycle.)
A. end; more Pu-240 is in the core
B. end; more fission products are in the core
C. beginning; more U-238 is in the core
D. beginning; less fission products are in the core
ANSWER: A.

燃料溫度（都卜勒）係數的負值在燃料週期_____時會增加，因為_____。（假設在整個燃料週期中有同樣的起始燃料溫度。）
A. 末期；爐心的Pu-240較多
B. 末期；爐心中的分裂產物較多
C. 初期；爐心中的U-238較多
D. 初期；爐心的分裂產物較少
答案： A.

科目： 292004
知能類： K1.05 [2.9/2.9]
序號： B2753 (P2751)

Refer to the drawing of microscopic cross section for absorption versus neutron energy for a 6.7 electron volt (ev) resonance peak in U-238 for a reactor operating at 50% power (see figure below). If fuel temperature decreases by 50 ^{o}F, the area under the curve will _____ and positive reactivity will be added to the core because _____.
A. decrease; fewer neutrons will be absorbed by U-238 overall
B. decrease; fewer 6.7 ev neutrons will be absorbed by U-238 at the resonance energy
C. remain the same; fewer neutrons will be absorbed by U-238 overall
D. remain the same; fewer 6.7 ev neutrons will be absorbed by U-238 at the resonance energy
ANSWER: C.

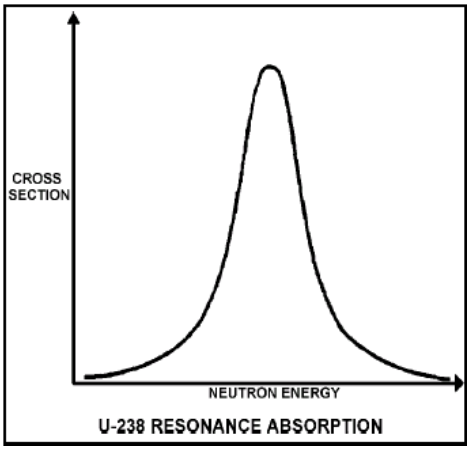
一反應器在50%功率下運轉，於U-238共振尖峰值6.7電子伏特下，其微觀吸收截面與中子能量的關係如下圖所示。若燃料溫度降低50°F，則曲線下的面積會_____，同時正反應度會因為_____而加入爐心。
A. 減小；被U-238所吸收的中子總數較少
B. 減小；在共振能量下，被U-238所吸收的6.7電子伏特中子較少
C. 維持不變；被U-238所吸收的中子總數較少
D. 維持不變；在共振能量下，被U-238所吸收的6.7電子伏特中子較少
答案： C.



科目： 292004
知能類： K1.05 [2.9/2.9]
序號： B2852 (P2850)

Refer to the drawing of microscopic cross section for absorption versus neutron energy for a resonance peak in U-238 in a reactor operating at 80% power (see figure below).
If reactor power is increased to 100%, the height of the curve will _____ and the area under the curve will _____.
A. increase; increase
B. increase; remain the same
C. decrease; decrease
D. decrease; remain the same
ANSWER: D

一反應器在穩態80%功率下運轉，於U-238共振尖峰下，其微觀吸收截面與中子能量的關係如下圖所示。若反應器功率增加至100%，則曲線的高度會_____，而曲線下的面積會_____。
A. 增加；增加
B. 增加；維持不變
C. 減少；減少
D. 減少；維持不變
答案： D



科目： 292004
知能類： K1.10 [3.2/3.2]
序號： B125

Which one of the following will cause the void coefficient to become less negative? (Consider only the indicated changes.)
A. Core void fraction increases.
B. Fuel temperature decreases.
C. Gadolinium burns out.
D. Control rods are partially inserted.
ANSWER: B.

下列何者會導致空泡係數負值減少？（只考慮所列出參數的改變。）
A. 爐心空泡分率增加
B. 燃料溫度下降
C. 釓（Gd）消耗
D. 控制棒部分插入
答案： B.

科目： 292004
知能類： K1.10 [3.2/3.2]
序號： B354

Which one of the following is the primary reason the void coefficient becomes less negative with core burnup toward the end of core life?
A. The thermal neutron flux increases.
B. The thermal diffusion length decreases.
C. The fuel centerline temperature increases.
D. The control rod density decreases.
ANSWER: D.

在爐心壽命接近末期燃耗時，下列何者是空泡係數負值減少的主要原因？
A. 熱中子通率增加
B. 熱擴散長度減小
C. 燃料中心線溫度增加
D. 控制棒密度減小
答案： D.

科目： 292004
知能類： K1.10 [3.2/3.2]
序號： B2153

Which one of the following describes why most reactor power is produced in the lower half of a core (versus the upper half) that has been operating at 100% power for several weeks at the beginning of a fuel cycle?
A. Xenon concentration is higher in the upper half of the core.
B. The moderator-to-fuel ratio is higher in the upper half of the core.
C. The void coefficient is adding more negative reactivity in the upper half of the core.
D. Control rods are adding more negative reactivity in the upper half of the core.
ANSWER: C.

於燃料週期初期的數週內，下列何者正確地描述了反應器在100%功率下運轉時，大部分的功率乃是由爐心的下半部（相對於上半部）所產生？
A. 在爐心上半部氙濃度較高
B. 在爐心上半部緩和劑對燃料（Moderator-to-Fuel）的比率較高
C. 在爐心上半部空泡係數所加入的負反應度較大
D. 在爐心上半部控制棒加入的負反應度較大
答案： C.

科目： 292004
知能類： K1.11 [2.5/2.6]
序號： B175

Assume a BWR plant is at 20% power. Power is increased to 30% by control rod withdrawal. Which one of the following statements describes the change in void fraction?
A. Void fraction initially decreases, then linearly increases with rod worth increase.
B. Void fraction increases.
C. Void fraction decreases.
D. Void fraction remains the same.
ANSWER: B.

假設一於20%功率運轉之BWR電廠，藉由抽控制棒抽出而使功率增加至30%。下列何者敘述正確地描述了空泡分率的變化？
A. 空泡分率最初減少，然後隨著控制棒本領增加而線性地增加
B. 空泡分率增加
C. 空泡分率減小
D. 空泡分率維持不變
答案： B.

科目： 292004
知能類： K1.11 [2.5/2.6]
序號： B953

Which one of the following describes how and why the void coefficient changes as void fraction increases during a control rod withdrawal at power?

A. Becomes more negative due to a greater fractional loss of moderator for a 1% void increase at higher void fractions
B. Becomes more negative due to the reduction in the fast fission contribution to the neutron population
C. Becomes less negative due to a greater fraction of neutrons lost to leakage from the core
D. Becomes less negative due to the increased absorption of neutrons by U-238

ANSWER: A.

下列何者正確地描述在控制棒抽出時，空泡係數的變化及其原因？

A. 負值變大，因為在較高空泡分率下，增加1%的空泡會導致緩和劑產生較大的損失分率
B. 負值變大，因為快分裂減少導致中子數量減少
C. 負值變小，因為較多的中子由爐心洩漏而損失
D. 負值變小，因為被U-238所吸收的中子增加

答案：A.

科目： 292004
知能類： K1.14 [3.3/3.3]
序號： B52

A reactor has been shut down for a shift and shutdown cooling is in service. Upon a loss of cooling water to the shutdown cooling heat exchangers, which of the following coefficients of reactivity will act first to change core reactivity? (Assume continued forced circulation through the core.)
A. Moderator temperature coefficient
B. Doppler coefficient
C. Void coefficient
D. Pressure coefficient
ANSWER: A.

一反應器停機一值(約八小時)，並進行停機冷卻（Shutdown Cooling）中。由於供應停機冷卻之熱交換器的冷卻水流失，下列哪一個反應度係數會最先改變爐心的反應度？（假設爐心有持續的強制循環。）
A. 緩和劑溫度係數
B. 燃料溫度係數
C. 空泡係數
D. 壓力係數
答案： A.

科目： 292004
知能類： K1.14 [3.3/3.3]
序號： B253

During a hot reactor startup with the reactor coolant at 520˚F, excessive rod withdrawal results in a 10 second reactor period with reactor power low in the intermediate range. Without any further operator action, the _____ coefficient will respond first to reduce the rate of the power increase.
A. pressure
B. void
C. moderator
D. Doppler
ANSWER: D.

一熱反應器於冷卻水溫為520˚F啟動，因過量的控制棒抽出而導致10秒的反應器週期，而反應器功率在中程階（Intermediate Range）的低值附近。在沒有任何的運轉員操作下，_____係數將會首先降低功率的增加速率。
A. 壓力
B. 空泡
C. 緩和劑
D. 都卜勒
答案： D.

科目： 292004
知能類： K1.14 [3.3/3.3]
序號： B272

For a normal reactor power increase from 20% to 100%, the smallest change in negative reactivity at steady-state conditions will be caused by...
A. void content.
B. fuel temperature.
C. xenon concentration.
D. moderator temperature.
ANSWER: D.

當一正常反應器，其功率從20%增加至100%時，下列哪一項將會導致在穩態下負反應度的改變量最小？
A. 空泡含量
B. 燃料溫度
C. 氙濃度
D. 緩和劑溫度
答案： D.

科目： 292004
知能類： K1.14 [3.3/3.3]
序號： B1653

Which one of the following lists the moderator temperature coefficient (MTC), fuel temperature coefficient (FTC), and void coefficient (VC) in typical order of magnitude from most negative to least negative at 50% power at the middle of core life?
A. FTC, VC, MTC
B. FTC, MTC, VC
C. VC, MTC, FTC
D. VC, FTC, MTC
ANSWER: C.

在50%功率、爐心壽命中期時，將緩和劑溫度係數（MTC）、燃料溫度係數（FTC）以及空泡係數（VC）從負值最多到負值最少的排列，下列何者是正確的？
A. FTC, VC, MTC
B. FTC, MTC, VC
C. VC, MTC, FTC
D. VC, FTC, MTC
答案： C.

科目： 292004
知能類： K1.14 [3.3/3.3]
序號： B2353

During a normal power decrease from 100% to 20%, the smallest positive reactivity addition will be caused by the change in...
A. void percentage.
B. fuel temperature.
C. xenon concentration.
D. moderator temperature.
ANSWER: D.

當一正常功率從100%降至20%時，下列哪一項的改變將會導致最小的正反應度加入？
A. 空泡百分比
B. 燃料溫度
C. 氙濃度
D. 緩和劑溫度
答案： D.

科目： 292005
知能類： K1.01 [3.2/3.3]
序號： B854

Rod position indications indicate that a control rod is at position 16. When the control rod is moved to position 22, it is being...
A. inserted 18 inches.
B. withdrawn 18 inches.
C. inserted 36 inches.
D. withdrawn 36 inches.
ANSWER: B.

控制棒位置指示顯示控制棒位於位置16。當控制棒移動至位置22，則其被
A. 插入18吋
B. 抽出18吋
C. 插入36吋
D. 抽出36吋
答案： B.

科目： 292005
知能類： K1.01 [3.2/3.3]
序號： B1255

A core consists of fuel bundles and control rods that are 12 feet in length. A new rod position is indicated for every 3 inches of rod motion.
If a control rod is inserted 75% into the core, it will be located at rod position...
A. 9.
B. 12.
C. 27.
D. 36.
ANSWER: B.

一爐心內的燃料束與控制棒長度皆為12呎。控制棒每移動3吋，便會指示新的位置。若控制棒插入爐心75%，則其所指示的位置為
A. 9.
B. 12.
C. 27.
D. 36.
答案： B.

科目： 292005
知能類： K1.01 [3.2/3.3]
序號： B3054

Rod position indication shows that a control rod is at position 22. If the control rod is then moved to position 12, it is being...
A. inserted 30 inches.
B. withdrawn 30 inches.
C. inserted 60 inches.
D. withdrawn 60 inches.
ANSWER: A.

控制棒位置指示顯示控制棒位置為22。若控制棒後來移動至位置12，則此棒
A. 插入30吋
B. 抽出30吋
C. 插入60吋
D. 抽出60吋
答案： A.

科目： 292005
知能類： K1.01 [3.2/3.3]
K1.11 [2.4/2.5]
序號： B3554

A group of control rods, initially at position 06 are withdrawn three notches. After withdrawal, this group of rods is classified as _____ rods; and the blade tips for this group of rods are positioned 36 inches from the _____ of the reactor core.
A. shallow; top
B. shallow; bottom
C. deep; top
D. deep; bottom
ANSWER: C.

一組控制棒，起始位置為06，抽出三節。在抽出之後，此組棒經分類為_____棒；而此組棒的葉梢位置在離反應器爐心_____部36吋處。
A. 淺；頂
B. 淺；底
C. 深；頂
D. 深；底
答案： C.

科目： 292005
知能類： K1.02 [2.5/2.6]
序號： B754

Which one of the following materials is used in control rods primarily for thermal neutron absorption?
A. B-10.
B. C-12.
C. Xe-135.
D. U-235.
ANSWER: A.

下列何者用於控制棒中主要為了吸收熱中子？
A. B-10.
B. C-12.
C. Xe-135.
D. U-235.
答案： A.

科目： 292005
知能類： K1.04 [3.5/3.5]
序號： B54

The reverse power effect (or reverse reactivity effect) occasionally observed when a shallow control rod is withdrawn one or two notches is due to a relatively...
A. small local power decrease due to increased local Doppler effects.
B. small local power decrease due to the shadowing effect of nearby control rods.
C. large local power increase being offset by a void-related power decrease.
D. large local power increase being offset by a moderator temperature-related power decrease.
ANSWER: C.

當一淺控制棒抽出一或二節時，偶而會發生逆功率效應（或逆反應度效應），此乃因為
A. 區域都卜勒效應增加導致區域功率微量的減少
B. 鄰近控制棒之陰影效應導致區域功率微量的減少
C. 區域功率大量的增加卻被空泡造成之功率減少所抵銷
D. 區域功率大量的增加卻被緩和劑溫度造成之功率減少所抵銷
答案： C.

科目： 292005
知能類： K1.04 [3.5/3.5]
K1.12 [2.6/2.9]
序號： B134

Withdrawal of a deep control rod will significantly affect which one of the following?
A. Axial flux shape
B. Rod shadowing
C. Radial power distribution
D. Reverse power effect
ANSWER: C.

抽出一深控制棒將會顯著影響下列何者？
A. 軸向通量形狀
B. 控制棒陰影效應
C. 徑向功率分佈
D. 逆功率效應
答案： C.

科目： 292005
知能類： K1.04 [3.5/3.5]
序號： B254

A reactor is operating at steady-state 50% power. A control rod is inserted a short distance (from 08 to 02 notches). Assuming that recirculation flow remains constant, reactor power will...
A. increase and stabilize at a higher value.
B. increase temporarily, then return to the original value.
C. decrease and stabilize at a lower value.
D. decrease temporarily, then return to the original value.
ANSWER: C.

一反應器於50%功率穩態下運轉。一控制棒插入一短距離（從節距08至02）。假設再循環流量維持固定，則反應器功率將
A. 增加，並在一較高功率達到穩定
B. 暫時增加，然後回復到初始功率
C. 減少，並在一較低功率達到穩定
D. 暫時減少，然後回復到初始功率
答案： C.

科目： 292005
知能類： K1.04 [3.5/3.5]
序號： B356 (P354)

A reactor is critical below the point of adding heat. If control rods are manually inserted for 5 seconds, reactor power will decrease...
A. to a shutdown power level determined by subcritical multiplication.
B. temporarily, then return to the original value due to the resulting decrease in moderator temperature.
C. until inherent positive reactivity feedback causes the reactor to become critical at a lower neutron level.
D. temporarily, then return to the original value due to subcritical multiplication.
ANSWER: A.

一反應器達到臨界但未到加熱階段，若控制棒手動插入5秒，則反應器功率將減少
A. 至一由次臨界增殖所決定之停機功率位階
B. 一短暫時間，其後回復至原來功率，因為緩和劑溫度下降
C. 一直到其內在的正反應度回饋導致反應器在較低中子位階下達到臨界
D. 一短暫時間，其後回復至原來功率，此乃因為次臨界增殖所致
答案： A.

科目： 292005
知能類： K1.04 [3.5/3.5]
序號： B755 (P754)

A reactor is exactly critical below the point of adding heat (POAH) during a normal reactor startup. If a control rod is manually withdrawn for 5 seconds, reactor power will...
A. increase to a stable critical power level below the POAH.
B. increase temporarily, then decrease and stabilize at the original value.
C. increase to a stable critical power level at the POAH.
D. increase temporarily, then decrease and stabilize below the original value.
ANSWER: C.

一反應器在正常啟動中，於不到加熱階段即達到臨界。若一控制棒手動抽出5秒，則反應器功率將
A. 增加至一不到加熱階段之穩定臨界功率位階
B. 暫時增加，其後減少並在原來數值達到穩定
C. 增加至一在加熱階段之穩定臨界功率位階
D. 暫時增加，其後減少並在小於原來功率達到穩定
答案： C.

科目： 292005
知能類： K1.04 [3.5/3.5]
序號： B954 (P1955)

A reactor has been shut down for three weeks with all control rods fully inserted. If a center control rod is fully withdrawn from the core, neutron population will: (Assume the reactor remains subcritical.)
A. remain the same.
B. increase and stabilize at a new higher level.
C. increase temporarily then return to the original value.
D. increase exponentially until the operator inserts the control rod.
ANSWER: B.

一反應器停機三週，所有控制棒完全插入。若一位於中心的控制棒從爐心被完全抽出，則中子數將：（假設反應器維持在次臨界。）
A. 維持不變
B. 增加並在一較高中子數達到穩定
C. 暫時增加，其後回復原來中子數
D. 呈指數增加直到運轉員插入控制棒
答案： B.

科目： 292005
知能類： K1.04 [3.5/3.5]
序號： B1954

A reactor is exactly critical at the point of adding heat during a reactor startup. Reactor pressure is stable at 600 psig and main steam isolation valves are open. Then, control rods are manually withdrawn for 5 seconds.
Assuming the reactor does not scram, when conditions stabilize, reactor power will be _____ and reactor vessel temperature will be _____.
A. the same; the same
B. the same; higher
C. higher; the same
D. higher; higher
ANSWER: D.

一反應器在正常啟動中，於加熱階段起始點處達到臨界。反應器壓力穩定於600psig，同時主蒸汽隔離閥開啟。其後，控制棒被手動抽出5秒。假設反應器並未急停，當狀況穩定時，反應器功率將會_____，而反應爐槽溫度將會_____。
A. 維持不變；維持不變
B. 維持不變；增加
C. 增加；維持不變
D. 增加；增加
答案： D.

科目： 292005
知能類： K1.04 [3.5/3.5]
序號： B2155 (P1854)

A reactor has been shut down for three weeks with all control rods fully inserted. If a center control rod is fully and continuously withdrawn from the core, neutron population will: (Assume the reactor remains subcritical.)
A. increase and stabilize above the original level.
B. increase, then decrease and stabilize at the original level.
C. increase, then decrease and stabilize above the original level.
D. remain the same during and after the withdrawal.
ANSWER: A.

一反應器停機三週，所有控制棒完全插入。若一位於中心的控制棒從爐心被持續抽至全出的位置，則中子數將：（假設反應器維持在次臨界。）
A. 增加並在一高於原中子數處達到穩定
B. 增加，其後減少並在原中子數處達到穩定
C. 增加，其後減少並在一高於原中子數處達到穩定
D. 維持不變
答案： A.

科目： 292005
知能類： K1.04 [3.5/3.5]
序號： B2254

A reactor is critical below the point of adding heat (POAH) during a hot reactor startup in the middle of a fuel cycle. Control rods are withdrawn for 20 seconds to establish a positive 30- second reactor period.
Reactor power will increase...
A. continuously until control rods are reinserted.
B. and stabilize at a value slightly below the POAH.
C. temporarily, and then stabilize at the original value.
D. and stabilize at a value equal to or above the POAH.
ANSWER: D.

一反應器於燃料週期中期，在熱爐啟動中，於加熱階段起始點處達到臨界。控制棒被抽出20秒，並建立一正30秒之反應器週期。則反應器功率將會增加
A. 直到控制棒被重新插入
B. 同時將在一低於加熱階段起始點處達到穩定
C. 一短暫時間，然後於加熱階段起始點處達到穩定
D. 同時將在一等於或高於加熱階段起始點處達到穩定
答案： D.

科目： 292005
知能類： K1.04 [3.5/3.5]
序號： B2354

A reactor is operating at equilibrium 20% power. Then reactor power is increased to 40%. As compared to operating conditions at 20%, when the plant stabilizes at 40% power, reactor vessel pressure will be _____ and reactor vessel water temperature will be _____.
A. the same; the same
B. the same; higher
C. higher; the same
D. higher; higher
ANSWER: D.

一反應器在穩態20%功率下運轉。其後反應器功率增加至40%，與在20%功率運轉狀況下相比，當電廠穩定運轉在40%功率時，反應器壓力將會_____，而反應器水溫將會_____。
A. 維持不變；維持不變
B. 維持不變；增加
C. 增加；維持不變
D. 增加；增加
答案： D.

科目： 292005
知能類： K1.04 [3.5/3.5]
序號： B2554

A reactor is operating steady state at the point of adding heat (POAH) during a reactor startup near the beginning of core life. Reactor pressure is stable at 600 psig and main steam isolation valves are closed (no steam flow from reactor).
If a control rod is manually inserted for 5 seconds, and the reactor does not scram, when conditions stabilize, reactor power will be _____ and reactor vessel pressure will be _____.
A. at the POAH; 600 psig
B. at the POAH; less than 600 psig
C. less than the POAH; 600 psig
D. less than the POAH; less than 600 psig
ANSWER: B.

一反應器在爐心壽命初期啟動時，於加熱階段起始點處穩定運轉。反應器壓力穩定於600psig，同時主蒸汽隔離閥關閉（沒有蒸汽自反應器流出）。若控制棒被手動插入5秒, 反應器並未急停，當狀況穩定時，反應器功率將會_____，而反應器壓力將會_____。
A. 處於加熱階段起始點；600psig
B. 處於加熱階段起始點；小於600psig
C. 小於加熱階段起始點；600psig
D. 小於加熱階段起始點；小於600psig
答案： B.

科目： 292005
知能類： K1.04 [2.6/2.7]
序號： B3352 (P2050)

Which one of the following isotopes is the most significant contributor to resonance capture of fission neutrons in the reactor core at the end of a fuel cycle?
A. U-235
B. U-238
C. Pu-239
D. Pu-240
ANSWER: B.

於一燃料週期末期之反應器爐心中，下列何種同位素乃是分裂中子共振捕獲的最主要貢獻者？
A. U-235
B. U-238
C. Pu-239
D. Pu-240
答案： B.

科目： 292005
知能類： K1.04 [3.5/3.5]
序號： B3856

Criticality has been achieved during a xenon-free reactor startup. The core neutron flux level is low in the intermediate range and a stable positive 60-second reactor period has been established. The operator begins inserting control rods in an effort to stabilize the core neutron flux level near its current value. The operator stops inserting control rods exactly when the reactor period indicates infinity. Immediately after the operator stops inserting the control rods, the reactor period will become _____ ; then the core neutron flux level will _____.
A. positive; increase exponentially
B. positive; increase linearly
C. negative; decrease exponentially
D. negative; decrease linearly
ANSWER: A.

於一無氙反應器啟動中，當達到臨界時，爐心中子通量在中程階的低值附近，並產生正60秒之反應器週期。為了要將爐心中子通量穩定在目前的數值，運轉員開始插入控制棒。正當反應器週期指示無限大時，運轉員停止插入控制棒。在運轉員停止之後瞬間，反應器週期將會變為_____；而爐心中子通量將會_____。
A. 正值；呈指數增加
B. 正值；呈線性增加
C. 負值；呈指數減少
D. 負值；呈線性減少
答案： A.

科目： 292005
知能類： K1.05 [2.5/2.6]
序號： B555

Rod density is a measure of the total number of control rod notches _____ the core divided by the total number of control rod notches _____ the core.
A. inserted into; available in
B. inserted into; withdrawn from
C. withdrawn from; available in
D. withdrawn from; inserted into
ANSWER: A.

控制棒密度是控制棒_____爐心的總節數除以_____控制棒的總節數。
A. 插入；全部
B. 插入；抽出爐心的
C. 抽出；全部
D. 抽出；插入爐心的
答案： A.

科目： 292005
知能類： K1.05 [2.5/2.6]
序號： B955

How is control rod density affected as control rods are inserted during a reactor shutdown?
A. Increases continuously during rod insertion
B. Decreases continuously during rod insertion
C. Increases initially, then decreases after 50% of the rods are inserted
D. Decreases initially, then increases after 50% of the rods are inserted
ANSWER: A.

在反應器停機的過程中插入控制棒，則對控制棒密度有何影響？
A. 在控制棒插入時持續增加
B. 在控制棒插入時持續減小
C. 最初增加，而在50%控制棒插入後減少
D. 最初減少，而在50%控制棒插入後增加
答案： A.

科目： 292005
知能類： K1.05 [2.5/2.6]
序號： B1055

Rod density is a measure of the...
A. percentage of control rods inserted into the core.
B. percentage of control rods withdrawn from the core.
C. number of control rods fully inserted divided by the number of control rods fully withdrawn.
D. number of control rods fully withdrawn divided by the number of control rods fully inserted.
ANSWER: A.

控制棒密度為何？
A. 插入爐心的控制棒百分率
B. 抽出爐心的控制棒百分率
C. 完全插入的控制棒數量除以完全抽出的控制棒數量
D. 完全抽出的控制棒數量除以完全插入的控制棒數量
答案： A.

科目： 292005
知能類： K1.05 [2.5/2.6]
序號： B1355

During a reactor startup, as control rods are being withdrawn, control rod density...
A. decreases until 50% of the rods are withdrawn, then increases.
B. increases until 50% of the rods are withdrawn, then decreases.
C. decreases whenever any of the rods are withdrawn.
D. increases whenever any of the rods are withdrawn.
ANSWER: C.

在反應器啟動時，當控制棒被抽出時，控制棒密度將
A. 減小，直到50%控制棒被抽出，其後增加
B. 增加，直到50%控制棒被抽出，其後減小
C. 在控制棒抽出時持續減小
D. 在控制棒抽出時持續增加
答案： C.

科目： 292005
知能類： K1.07 [2.5/2.6]
序號： B756 (P755)

A control rod is positioned in a reactor with the following neutron flux parameters:
Core average thermal neutron flux = 1 x 10^{12} n/cm^2-sec
Control rod tip thermal neutron flux = 5 x 10^{12} n/cm^2-sec
If the control rod is slightly withdrawn such that the control rod tip is located in a thermal neutron flux of 1 x 10^{13} n/cm^2-sec, then the differential control rod worth will increase by a factor of _____. (Assume the core average thermal neutron flux is constant.)
A. 0.5
B. 1.4
C. 2.0
D. 4.0
ANSWER: D.

在反應器中一控制棒位置之相關中子通量參數如下：
爐心平均熱中子通量＝1 x 10^{12} n/cm^2-sec
控制棒頂端熱中子通量＝5 x 10^{12} n/cm^2-sec
若控制棒稍微抽出，使得控制棒頂端的熱中子通量為1 x 10^{13} n/cm^2-sec，則微分控制棒本領將會增加____倍。（假設爐心平均熱中子通量維持固定。）
A. 0.5
B. 1.4
C. 2.0
D. 4.0
答案： D.

科目： 292005
知能類： K1.07 [2.4/2.6]
序號： B856 (P555)

The total amount of reactivity added by a control rod position change from a reference point to any other rod height is called...
A. differential rod worth.
B. excess reactivity.
C. integral rod worth.
D. reference reactivity.
ANSWER: C.

因控制棒位置從一參考點移動至任何其他高度而加入之反應度總量稱為
A. 微分控制棒本領
B. 過剩反應度
C. 積分控制棒本領
D. 參考反應度
答案： C.

科目： 292005
知能類： K1.07 [2.4/2.6]
序號： B1057 (P1554)

A control rod is positioned in a reactor with the following neutron flux parameters:
Core average thermal neutron flux = 1 x 10^{12} n/cm^2-sec
Control rod tip thermal neutron flux = 5 x 10^{12} n/cm^2-sec
If the control rod is slightly inserted such that the control rod tip is located in a thermal neutron flux of 1 x 10^{13} n/cm^2-sec, then the differential control rod worth will increase by a factor of _____. (Assume the average flux is constant.)
A. 2
B. 4
C. 10
D. 100
ANSWER: B.

在反應器中一控制棒位置之相關中子通量參數如下：
爐心平均熱中子通量＝1 x 10^{12} n/cm^2-sec
控制棒頂端熱中子通量＝5 x 10^{12} n/cm^2-sec
若控制棒稍微插入，使得控制棒頂端的熱中子通量為1 x 10^{13} n/cm^2-sec ，則微分控制棒本領將會增加____倍。（假設爐心平均熱中子通量維持固定。）
A. 2
B. 4
C. 10
D. 100
答案： B.

科目： 292005
知能類： K1.07 [2.4/2.6]
序號： B1555

As a control rod is withdrawn from notch position 00 to notch position 48, the absolute value of integral rod worth will...
A. decrease, then increase.
B. increase, then decrease.
C. decrease continuously.
D. increase continuously.
ANSWER: D.

一控制棒從位置00抽出至48，則積分控制棒本領之絕對值將會
A. 減小，然後增加
B. 增加，然後減小
C. 持續減小
D. 持續增加
答案： D.

科目： 292005
知能類： K1.07 [2.4/2.6]
序號： B1657 (P1555)

Which one of the following expresses the relationship between differential rod worth (DRW) and integral rod worth (IRW)?
A. IRW is the slope of the DRW curve.
B. IRW is the inverse of the DRW curve.
C. IRW is the sum of the DRWs between the initial and final control rod positions.
D. IRW is the sum of the DRWs of all control rods at any specific control rod position.
ANSWER: C.

下列何者表示微分控制棒本領（DRW）與積分控制棒本領（IRW）的關係？
A. IRW是DRW曲線的斜率
B. IRW是DRW曲線的倒數
C. IRW是控制棒從起始位置至最終位置之DRW的總和
D. IRW是所有控制棒在任何特定控制棒位置時DRW的總和
答案： C.

科目： 292005
知能類： K1.07 [2.4/2.6]
序號： B1755 (P134)

Which one of the following expresses the relationship between differential rod worth (DRW) and integral rod worth (IRW)?
A. DRW is the area under the IRW curve at a given rod position.
B. DRW is the slope of the IRW curve at a given rod position.
C. DRW is the IRW at a given rod position.
D. DRW is the square root of the IRW at a given rod position.
ANSWER: B.

下列何者表示微分控制棒本領（DRW）與積分控制棒本領（IRW）的關係？
A. DRW是任一控制棒位置之IRW曲線下的面積
B. DRW是任一控制棒位置之IRW曲線的斜率
C. DRW是任一控制棒位置之IRW
D. DRW是任一控制棒位置之IRW的平方根
答案： B.

科目： 292005
知能類： K1.07 [2.4/2.6]
序號： B1855 (P1755)

A control rod is positioned in a reactor with the following neutron flux parameters:
Core average thermal neutron flux = 1.0 x 10^{12} n/cm^2-sec
Control rod tip thermal neutron flux = 4.0 x 10^{12} n/cm^2-sec
If the control rod is slightly inserted such that the control rod tip is located in a thermal neutron flux of 1.2 x 10^{13} n/cm^2-sec, then the differential control rod worth will be increased by a factor of _____. (Assume the core average thermal neutron flux is constant.)
A. 1/3
B. 3
C. 9
D. 27
ANSWER: C.

在反應器中一控制棒位置之相關中子通量參數如下：
爐心平均熱中子通量＝1 x 10^{12}n/cm^2-sec
控制棒頂端熱中子通量＝4 x 10^{12}n/cm^2-sec
若控制棒稍微插入，使控制棒頂端的熱中子通量為1.2 x 10^{13}n/cm^2-sec ，則微分控制棒本領將會增加____倍。（假設爐心平均熱中子通量維持固定。）
A. 1/3
B. 3
C. 9
D. 27
答案： C.

科目： 292005
知能類： K1.07 [2.4/2.6]
序號： B1955

Which one of the following describes the change in magnitude (absolute value) of integral rod worth during the complete withdrawal of a fully-inserted control rod?
A. Increases, then decreases
B. Decreases, then increases
C. Increases continuously
D. Decreases continuously
ANSWER: C.

一控制棒從全入到全出的過程中，其積分控制棒本領（絕對值）的變化情形？
A. 增加，然後減小
B. 減小；然後增加
C. 持續增加
D. 持續減小
答案： C.

科目： 292005
知能類： K1.07 [2.4/2.6]
序號： B2055

Which one of the following describes the change in magnitude (absolute value) of differential control rod worth during the complete withdrawal of a fully-inserted control rod?
A. Increases, then decreases
B. Decreases, then increases
C. Increases continuously
D. Decreases continuously
ANSWER: A.

一控制棒從全入到全出的過程中，其微分控制棒本領（絕對值）的變化情形？
A. 增加，然後減小
B. 減小；然後增加
C. 持續增加
D. 持續減小
答案： A.

科目： 292005
知能類： K1.07 [2.4/2.6]
序號： B2255 (P655)

Which one of the following parameters typically has the greatest influence on the shape of a differential rod worth curve?
A. Core radial neutron flux distribution
B. Core axial neutron flux distribution
C. Core xenon distribution
D. Burnable poison distribution
ANSWER: B.

下列那一個參數通常對於微分控制棒本領曲線的形狀具有最大的影響？
A. 爐心徑向中子通量分佈
B. 爐心軸向中子通量分佈
C. 爐心氙毒分佈
D. 可燃毒物分佈
答案： B.

科目： 292005
知能類： K1.07 [2.4/2.6]
序號： B2655 (P2554)

A control rod is positioned in a reactor with the following neutron flux parameters:
Core average thermal neutron flux = 1.0 x 10^{12} n/cm^2-sec
Control rod tip thermal neutron flux = 4.0 x 10^{12} n/cm^2-sec
If the control rod is slightly inserted such that the control rod tip is located in a thermal neutron flux of 1.6 x 10^{13} n/cm^2-sec, then the differential control rod worth will increase by a factor of _____. (Assume the core average thermal neutron flux is constant.)
A. 2
B. 4
C. 8
D. 16
ANSWER: D.

在反應器中一控制棒位置之相關中子通量參數如下：
爐心平均熱中子通量＝1 x 10^{12}n/cm^2-sec
控制棒頂端熱中子通量＝4 x 10^{12}n/cm^2-sec
若控制棒稍微插入，使得控制棒頂端的熱中子通量為1.6 x10^{13}n/cm^2-sec，則微分控制棒本領將會增加____倍。（假設爐心平均熱中子通量維持固定。）
A. 2
B. 4
C. 8
D. 16
答案： D.

科目： 292005
知能類： K1.07 [2.4/2.6]
序號： B2755 (P1384)

Integral rod worth is the...
A. change in reactivity per unit change in rod position.
B. rod worth associated with the most reactive control rod.
C. change in worth of a control rod per unit change in reactor power.
D. reactivity added by moving a control rod from a reference point to another point.
ANSWER: D.

積分控制棒本領乃是
A. 控制棒位置每單位變化所產生之反應度變化
B. 反應度最高之控制棒之控制棒本領
C. 反應器功率每單位變化所產生之控制棒本領變化
D. 將一控制棒從一參考位置移動至任何其他位置時所增加之反應度
答案： D.

科目： 292005
知能類： K1.07 [2.4/2.6]
序號： B2855 (P1354)

Integral rod worth is the...
A. change in reactivity per unit change in rod position.
B. reactivity inserted by moving a control rod from a reference position to another position.
C. change in worth of a control rod per unit change in reactor power.
D. rod worth associated with the most reactive control rod.
ANSWER: B.

積分控制棒本領乃是
A. 控制棒位置每單位變化所產生之反應度變化
B. 將一控制棒從一參考位置移動至任何其他位置時所增加之反應度
C. 反應器功率每單位變化所產生之控制棒本領變化
D. 反應度最高之控制棒之控制棒本領
答案： B.

科目： 292005
知能類： K1.07 [2.4/2.6]
序號： B2856 (P856)

During normal full power operation, the differential control rod worth is small near the top and bottom of the core compared to the center regions due to the effects of...
A. fuel enrichment.
B. neutron flux distribution.
C. xenon concentration.
D. fuel temperature distribution.
ANSWER: B.

在正常全功率運轉下，在接近爐心頂部與底部處的微分控制棒本領比中央區域小，此乃因為何種效應所致？
A. 燃料濃縮
B. 中子通量分佈
C. 氙毒濃度
D. 燃料溫度分佈
答案： B.

科目： 292005
知能類： K1.07 [2.4/2.6]
序號： B2956

A reactor is operating at steady-state 50% power at the end of core life with all control systems in manual. The radial power distribution is symmetric and peaked in the center of the core, and the axial power distribution peak is slightly below the core midplane.
The tip of the most centrally-located control rod is currently located at the core midplane. The control rod is constructed of a homogeneous neutron absorber and the active neutron absorber length is exactly as long as the adjacent fuel assembly. The rod is manually inserted fully into the core, no other operator action is taken, and reactor power stabilizes at 42%.
If, instead, the control rod had been withdrawn fully from its core midplane position, the reactor would have experienced**...**
A. a larger absolute change in integral control rod reactivity.
B. a smaller absolute change in integral control rod reactivity.
C. a larger absolute change in reactor shutdown margin.
D. a smaller absolute change in reactor shutdown margin.
ANSWER: A.

一反應器於爐心壽命末期，在穩態50%功率下運轉，所有控制系統均為手動。徑向功率分佈對稱，且峰值位於爐心中央，而軸向功率分佈峰值在稍微低於爐心中間的高度。位於最中央之控制棒其頂端則在爐心中間的高度。此控制棒係由一均質中子吸收體所組成，其活性中子吸收體的長度與鄰近燃料元件等長。此控制棒手動完全插入爐心，且無其他運轉員操作時，反應器功率穩定在42%。反之，若此控制棒從其中間的高度位置被完全抽出，則反應器將會
A. 在積分控制棒反應度上產生較大之絕對值變化量
B. 在積分控制棒反應度上產生較小之絕對值變化量
C. 反應器停機餘裕上產生較大之絕對值變化量
D. 反應器停機餘裕上產生較小之絕對值變化量
答案： A.

科目： 292005
知能類： K1.09 [2.5/2.6]
序號： B53

Which one of the following statements describes how changes in core parameters affect control rod worth (CRW)?
A. CRW decreases when the temperature of the fuel decreases.
B. CRW increases with an increase in voids.
C. CRW increases with an increase in fast neutron flux.
D. CRW decreases when approaching end of core life.
ANSWER: D.

下列何者正確地描述了爐心參數變化對於控制棒本領（CRW）之影響？
A. 當燃料溫度減小時，CRW減小
B. 當空泡增加時，CRW增加
C. 當快中子通量增加時，CRW增加
D. 當接近爐心壽命末期時，CRW減小
答案： D.

科目： 292005
知能類： K1.09 [2.5/2.6]
序號： B1157

Which one of the following conditions will cause the associated individual control rod worth(s) to become more negative?
A. During a small power change, fuel temperature increases.
B. With the reactor shut down, reactor coolant temperature increases from 100^{o}F to 200^{o}F.
C. During a small power change, the percentage of voids increases.
D. During a control pattern adjust, the local thermal neutron flux surrounding a control rod decreases while the core average thermal neutron flux remains the same.
ANSWER: B.

下列何者將會導致個別控制棒本領變大？
A. 在小功率變化時，燃料溫度增加
B. 反應器停機，反應器冷卻水溫度從100^{o}F增加至200^{o}F
C. 在小功率變化時，空泡百分率增加
D. 控制棒佈局調整時，在爐心平均熱中子通量維持不變下，環繞控制棒之區域熱中子通量減少
答案： B.

科目： 292005
知能類： K1.09 [2.5/2.6]
序號： B1556

If the void fraction surrounding centrally located fuel bundles decreases, the worth of the associated control rod(s) will...

A. increase, because the average neutron energy in the area of the affected control rod(s) increases.
B. increase, because less neutrons are resonantly absorbed in the fuel while they are being thermalized, resulting in more thermal neutrons available to be absorbed by the affected control rod(s).
C. decrease, because the diffusion length of the thermal neutrons decreases, resulting in fewer thermal neutrons reaching the affected control rod(s).
D. decrease, because neutrons will experience a shorter slowing down length, resulting in a larger fraction of thermal neutrons being absorbed by the fuel and less thermal neutrons available to be absorbed by the affected control rod(s).

ANSWER: B.

若圍繞在中央位置燃料束之空泡百分率減少，則相應之控制棒本領將會

A. 增加，因為在該控制棒附近區域附近平均中子能量增加
B. 增加，因為被熱化之中子被共振吸收之數量較少，導致能被該控制棒所吸收之熱中子較多
C. 減小，因為熱中子的擴散長度減小，導致到達該控制棒之熱中子數量較少
D. 減小，因為中子經歷之減速長度較短，導致被燃料吸收之熱中子分率較大，而能被該控制棒所吸收的熱中子數量較少

答案： B.

科目： 292005
知能類： K1.09 [2.5/2.6]
序號： B2656 (P1556)

As moderator temperature increases, the magnitude of differential rod worth will...
A. increase due to longer neutron migration length.
B. decrease due to reduced moderation of neutrons.
C. increase due to decreased resonance absorption of neutrons.
D. decrease due to decreased moderator absorption of neutrons.
ANSWER: A.

當緩和劑溫度增加時，微分控制棒本領的大小將會
A. 增加，因為中子遷移長度較長
B. 減小，因為中子的緩和減小
C. 增加，因為中子的共振吸收減小
D. 減小，因為緩和劑的中子數吸收量減小
答案： A.

科目： 292005
知能類： K1.09 [2.5/2.6]
序號： B2857

The reactor is operating at 85% power with control rod X-Y inserted 20%. Which one of the following will cause the differential control rod worth of control rod X-Y to become more negative? (Assume that control rod X-Y remains 20% inserted for each case.)
A. Core Xe-135 builds up in the lower half of the core.
B. An adjacent control rod is fully withdrawn from the core.
C. Reactor vessel pressure drifts from 900 psig to 880 psig.
D. Fuel temperature increases as fission product gases accumulate in nearby fuel rods.
ANSWER: B.

一反應器在85%功率運轉，X-Y位置的控制棒插入20%。下列何者將會導致該控制棒的微分控制棒本領變大？（假設X-Y位置的控制棒在每個狀況下均維持20%插入。）
A. 爐心Xe-135累積在爐心的下半部
B. 鄰近控制棒被抽出
C. 反應爐槽壓力從900psig變化到880psig
D. 燃料溫度增加，因為分裂產物氣體累積在燃料棒附近
答案： B.

科目： 292005
知能類： K1.09 [2.5/2.6]
序號： B2957 (N/A)

If the void fraction surrounding several centrally located fuel bundles increases, the worth of the associated control rod(s) will...

A. decrease, because the average neutron energy in the fuel bundles decreases, resulting in fewer neutrons traveling from within the fuel bundles to the affected control rod(s).
B. decrease, because more neutrons are resonantly absorbed in the fuel while they are being thermalized, resulting in fewer thermal neutrons available to be absorbed by the affected control rod(s).
C. increase, because the diffusion length of the thermal neutrons increases, resulting in more thermal neutrons traveling from within the fuel bundles to the affected control rod(s).
D. increase, because neutrons will experience a longer slowing down length, resulting in a smaller fraction of thermal neutrons being absorbed by the fuel and more thermal neutrons available to be absorbed by the affected control rod(s).

ANSWER: B.

若圍繞在中央位置燃料束之空泡百分率增加，則相應之控制棒本領將會

A. 減小，因為在燃料束內的中子平均能量減小，導致從燃料束內部遷移至該控制棒之中子數減少
B. 減小，因為熱中子在燃料內被共振吸收之數量增加，導致能被該控制棒所吸收之熱中子較少
C. 增加，因為熱中子的擴散長度增加，導致從燃料束內部遷移至該控制棒熱中子數量較多
D. 增加，因為中子經歷之減速長度較長，導致被燃料吸收之熱中子分率較小，而能被該控制棒所吸收的熱中子數量較多

答案： B.

科目： 292005
知能類： K1.10
序號： B179

Which one of the following is a reason for flux shaping?
A. To minimize the worth of individual control rods by evenly distributing the flux radially
B. To reduce the reverse power effect during rod withdrawal by peaking the flux at the top of the core
C. To equalize control rod drive mechanism wear and control rod blade neutron burnout
D. To increase the effectiveness of power control rods by peaking the flux at the bottom of the core
ANSWER: A.

下列何者是中子通量塑形（flux shaping）的原因？
A. 藉由徑向通量的均勻分佈而減小個別控制棒的本領
B. 在控制棒抽出時藉由爐心頂部形成峰值通量而降低逆功率效應
C. 使控制棒驅動機構磨損與控制棒葉片中子燃耗達到相等
D. 藉由爐心底部形成峰值通量而增加控制棒之功率控制的效能
答案： A.

科目： 292005
知能類： K1.10 [2.8/3.3]
序號： B255

Neutron flux shaping within a reactor core is designed to...
A. prevent the effects of rod shadowing during control rod motion.
B. generate more power in the top portion of the core early in core life.
C. ensure that local core thermal power limits are not exceeded.
D. minimize the reverse power effect during control rod motion.
ANSWER: C.

在反應器爐心內的中子通量塑形（flux shaping）是為了
A. 預防在控制棒移動時之控制棒陰影效應
B. 在爐心壽命初期，在爐心頂部產生較多之功率
C. 確保不超過區域爐心熱功率限值
D. 在控制棒移動時，將逆功率效應降至最小
答案： C.

科目： 292005
知能類： K1.10 [2.8/3.3]
序號： B1557

Which one of the following is a reason for neutron flux shaping?
A. To minimize local power peaking by more evenly distributing the core thermal neutron flux
B. To reduce the reverse power effect during rod withdrawal by peaking the thermal neutron flux at the top of the core
C. To equalize control rod drive mechanism wear and control rod blade thermal neutron burnout
D. To increase control rod worth by peaking the thermal neutron flux at the bottom of the core
ANSWER: A.

下列何者是中子通量塑形（flux shaping）的原因？
A. 藉由徑向通量均勻分佈而減小區域功率尖峰
B. 在控制棒抽出時藉由爐心頂部形成峰值通量而降低逆功率效應
C. 使控制棒驅動機構磨損與控制棒葉片中子燃耗達到相等
D. 藉由爐心底部形成峰值通量而增加控制棒之功率控制的效能
答案： A.

科目： 292005
知能類： K1.10 [2.8/3.3]
序號： B1656

The primary purpose for performing control rod program changes is to...
A. evenly burn up the fuel.
B. evenly burn up the control rods.
C. reduce excessive localized reactor vessel neutron irradiation.
D. reduce control rod shadowing.
ANSWER: A.

進行控制棒程式（control rod program）改變的主要目的是
A. 均勻燃燒燃料
B. 均勻燃燒控制棒
C. 降低反應爐槽局部過量之中子照射
D. 降低控制棒陰影效應
答案： A.

科目： 292005
知能類： K1.10 [2.8/3.3]
序號： B2457 (P2456)

Which one of the following is a reason for neutron flux shaping in a reactor core?
A. To minimize local power peaking by more evenly distributing the core thermal neutron flux
B. To reduce thermal neutron leakage by decreasing the neutron flux at the edge of the reactor core
C. To reduce the size and number of control rods needed to shutdown the reactor following a reactor scram
D. To increase control rod worth by peaking the thermal neutron flux at the top of the reactor core
ANSWER: A.

下列何者是反應器爐心中子通量塑形（flux shaping）的原因？
A.藉由更均勻分佈的熱中子通量而減小區域功率尖峰
B.藉由降低爐心邊緣中子通量而減少熱中子洩漏
C.減少反應爐急停後停機所需要之控制棒數量
D.藉由爐心頂部形成峰值通量而增加控制棒本領
答案： A.

科目： 292005
知能類： K1.10 [2.8/3.3]
序號： B3356 (P857)

The main reason for designing and operating a reactor with a flattened neutron flux distribution is to...
A. provide even burnup of control rods.
B. reduce neutron leakage from the core.
C. allow a higher average power density.
D. provide more accurate nuclear power indication.
ANSWER: C.

反應器設計與運轉在平坦的中子通量分佈之主要原因是
A. 提供均勻的控制棒燃耗
B. 降低來自爐心的中子洩漏
C. 允許較高的平均功率密度
D. 提供更正確的功率指示
答案： C.

科目： 292005
知能類： K1.11 [2.4/2.5]
序號： B557

A control rod located at notch position _____ in the core would be considered a _____ control rod.
A. 36; deep
B. 36; intermediate
C. 12; intermediate
D. 12; deep
ANSWER: D.

一爐心控制棒棒位在位置____會被認為是____控制棒。
A. 36；深
B. 36；中間
C. 12；中間
D. 12；深
答案： D.

科目： 292005
知能類： K1.12 [2.6/2.9]
序號： B358 (P356)

A reactor is operating at equilibrium full power when a single control rod fully inserts (from the fully withdrawn position). Reactor power is returned to full power with the control rod still fully inserted.
Compared to the initial axial neutron flux shape, the current flux shape will have a...
A. minor distortion, because a fully inserted control rod has zero reactivity worth.
B. minor distortion, because the fully inserted control rod is an axially uniform poison.
C. major distortion, because the upper and lower core halves are loosely coupled.
D. major distortion, because power production along the length of the rod drastically decreases.
ANSWER: B.

一反應器在平衡全功率下運轉時，一控制棒被完全插入（從完全抽出位置）。反應器功率在該控制棒仍然完全插入下，回復到全功率。與最初軸向中子通量形狀相比，目前通量形狀將會有
A. 輕微扭曲，因為完全插入的控制棒的控制棒本領為零
B. 輕微扭曲，因為完全插入的控制棒是一軸向均勻毒素
C. 嚴重扭曲，因為爐心上下兩部分鬆散耦合
D. 嚴重扭曲，因為沿著控制棒長度的功率產生大幅減少
答案： B.

科目： 292005
知能類： K1.12 [2.6/2.9]
序號： B454

Which one of the following control rods, when repositioned, will have the largest effect on axial flux shape?
A. Deep rods at the center of the core
B. Deep rods at the periphery of the core
C. Shallow rods at the center of the core
D Shallow rods at the periphery of the core
ANSWER: C.

下列何種控制棒當重新定位時，將會對於軸向通量形狀有最大的影響？
A. 位於爐心中央的深棒
B.位於爐心邊緣的深棒
C.位於爐心中央的淺棒
D.位於爐心邊緣的淺棒
答案： C.

科目： 292005
知能類： K1.12 [2.6/2.9]
序號： B656

During reactor power operations, the axial neutron flux shape is affected most by withdrawal of _____ control rods and the radial neutron flux shape is affected most by withdrawal of _____ control rods.
A. shallow; shallow
B. deep; shallow
C. shallow; deep
D. deep; deep
ANSWER: C

在反應器功率運轉當中，軸向中子通量形狀受到_____控制棒抽出的影響最大，而徑向中子通量形狀則是受到_____控制棒抽出的影響最大。
A. 淺；淺
B. 深；淺
C. 淺；深
D. 深；深
答案： C

科目： 292005
知能類： K1.12 [2.6/2.9]
序號： B1357

Which one of the following control rods, if withdrawn two notches, typically will have the greatest effect on radial neutron flux shape?
A. Shallow rod
B. Deep rod
C. Peripheral rod
D. Intermediate rod
ANSWER: B.

下列那一種控制棒抽出兩節時，將會對於徑向通量形狀有最大的影響？
A. 淺棒
B. 深棒
C. 邊緣棒
D. 中間棒
答案： B.

科目： 292005
知能類： K1.12 [2.6/2.9]
序號： B1457

A reactor is operating at 60% power with thermal neutron flux peaked in the bottom half of the core. Partial withdrawal of a deep control rod will generally affect total (versus local) core power because _____ is relatively high in the area of withdrawal.
A. fuel enrichment
B. thermal neutron flux
C. void content
D. moderator temperature
ANSWER: C.

一反應器於60%功率下運轉，熱中子通量峰值位於爐心下半部。將一深控制棒部分抽出將影響總（相對於區域）爐心功率，此乃因為在抽出區域的_____處於相對高值。
A. 燃料濃縮度
B. 熱中子通量
C. 空泡含量
D. 緩和劑溫度
答案： C.

科目： 292005
知能類： K1.12 [2.6/2.9]
序號： B1757

Which one of the following control rods, when repositioned by 2 notches, will have the smallest effect on axial flux shape?
A. Deep rods at the center of the core
B. Deep rods at the periphery of the core
C. Shallow rods at the center of the core
D Shallow rods at the periphery of the core
ANSWER: B.

下列何種控制棒在移動2節時，對軸向通量形狀的影響最小？
A. 位於爐心中央的深棒
B.位於爐心邊緣的深棒
C.位於爐心中央的淺棒
D.位於爐心邊緣的淺棒
答案： B.

科目： 292005
知能類： K1.12 [2.6/2.9]
序號： B1856

A reactor is operating at 50% power at the beginning of a fuel cycle. Assuming the reactor does not scram, which one of the following compares the effects of dropping a deep control rod to the effects of dropping the same control rod if it is shallow?
A. Dropping a deep control rod causes a greater change in shutdown margin.
B. Dropping a deep control rod causes a smaller change in shutdown margin.
C. Dropping a deep control rod causes a greater change in axial power distribution.
D. Dropping a deep control rod causes a greater change in radial power distribution.
ANSWER: D.

一反應器在燃料週期初期，於50%功率運轉。假設此反應器並無急停，掉落一深控制棒的影響與掉落同樣的淺控制棒，則兩者之比較為何？
A.掉落深控制棒造成的停機餘裕改變較大
B.掉落深控制棒造成的停機餘裕改變較小
C.掉落深控制棒造成的軸向功率分佈改變較大
D.掉落深控制棒造成的徑向功率分佈改變較大
答案： D.

945
TOPIC: 292006
KNOWLEDGE: K1.01 [2.7/2.8]
QID: B558
Fission fragments or daughters that have a substantial neutron absorption cross section and are not fissionable are called...
A. fissile materials.
B. fission product poisons.
C. fissionable nuclides.
D. burnable poisons.
ANSWER: B.

科目： 292006
知能類： K1.01 [2.7/2.8]
序號： B558

具有相當大的中子吸收截面且不是可分裂的分裂產物或子核稱為
A. 易裂（Fissile）材料
B. 分裂產物毒素
C. 可分裂（Fissionable）核種
D. 可燃毒素
答案： B.

科目： 292006
知能類： K1.01 [2.7/2.8]
序號： B1558 (P2858)

A fission product poison can be differentiated from all other fission products because a fission product poison...
A. has a higher microscopic cross section for thermal neutron capture.
B. has a longer half-life.
C. is produced in a greater percentage of thermal fissions.
D. is formed as a gas and is contained in the fuel pellets.
ANSWER: A.

分裂產物毒素能與所有其它分裂產物區別，係因為分裂產物毒素
A. 有較高之熱中子捕獲微觀截面
B. 有較長之半衰期
C. 在較大的熱分裂百分率下所產生
D. 形成為氣體，同時被吸收於燃料丸內
答案： A.

科目： 292006
知能類： K1.01 [2.7/2.8]
序號： B1858 (P858)

Fission product poisons can be differentiated from other fission products in that fission product poisons...
A. have a longer half-life.
B. are stronger absorbers of thermal neutrons.
C. are produced in a larger percentage of fissions.
D. have a higher fission cross section for thermal neutrons.
ANSWER: B.

分裂產物毒素能與其它分裂產物區別，係因為分裂產物毒素
A. 有較長之半衰期
B. 是較強的熱中子吸收體
A. 在較大的熱分裂百分率下所產生
B. 有較高之熱中子分裂截面
答案： B.

科目： 292006
知能類： K1.01 [2.7/2.8]
序號： B2061 (P2058)

A fission product poison can be differentiated from all other fission products in that a fission product poison will...
A. be produced in direct proportion to the fission rate in the core.
B. remain radioactive for thousands of years after the final reactor criticality.
C. depress the power production in some core locations and cause peaking in others.
D. migrate out of the fuel pellets and into the reactor coolant via pinhole defects in the clad.
ANSWER: C.

分裂產物毒素能與所有其它分裂產物區別，係因為分裂產物毒素
A. 其生成與爐心分裂率成正比
B. 在最終反應器臨界後數千年仍維持其放射性
C. 在某些爐心位置會抑制功率，而在其它位置會導致尖峰功率
D. 從燃料丸中散逸出來，並且透過護套上的穿透性針孔而進入反應器冷卻水
答案： C.

科目： 292006
知能類： K1.02 [3.1/3.1]
序號： B55

Which one of the following lists the proper order of substances from the largest to the smallest microscopic cross sections for absorption of thermal neutrons?
A. Gadolinium, U-235, Xe-135, U-238
B. Gadolinium, Xe-135, U-235, U-238
C. Xe-135, U-235, gadolinium, U-238
D. Xe-135, gadolinium, U-235, U-238
ANSWER: D.

由大到小列出熱中子的微觀吸收截面，下列何者正確?
A. 釓（Gd）, U-235, Xe-135, U-238
B. 釓, Xe-135, U-235, U-238
C. Xe-135, U-235, 釓, U-238
D. Xe-135, 釓, U-235, U-238
答案： D.

科目： 292006
知能類： K1.02 [3.1/3.1]
序號： B256 (P2658)

Compared to other poisons in the core, the two characteristics that cause Xe-135 to be a major reactor poison are its relatively _____ absorption cross section and its relatively _____ variation in concentration for large reactor power changes.
A. small; large
B. small; small
C. large; small
D. large; large
ANSWER: D.

與爐心中其它毒素比較，會使Xe-135成為反應器中主要毒素的兩個特徵，一是因為它擁有較_____的吸收截面，二是當反應器功率發生大的變化時，它會產生較_____的濃度變動。
A. 小；大
B. 小；小
C. 大；小
D. 大；大
答案： D.

科目： 292006
知能類： K1.02 [3.1/3.1]
序號： B1058 (P1858)

Which one of the following is a characteristic of xenon-135 in a reactor core?
A. Thermal neutron flux level affects both the production and removal of xenon-135.
B. Thermal neutrons interact with xenon-135 primarily through scattering reactions.
C. Xenon-135 is primarily a resonant absorber of epithermal neutrons.
D. Xenon-135 is produced from the radioactive decay of barium-135.
ANSWER: A.

下列何者是反應器爐心中Xe-135的特徵？
A. 熱中子通量位階對Xe-135的產生與移除均會造成影響
B. 熱中子與Xe-135的交互作用主要是散射反應
C. Xe-135是超熱中子的主要共振吸收物
D. Xe-135乃是由Ba-135的放射衰變所產生
答案： A.

科目： 292006
知能類： K1.02 [3.1/3.1]
序號： B1259

Which one of the following exhibits the greatest microscopic cross section for absorption of a thermal neutron in an operating reactor?
A. Uranium-235
B. Uranium-238
C. Plutonium-239
D. Xenon-135
ANSWER: D.

對於運轉中反應器之熱中子吸收，下列何者具有最大之微觀截面？
A. U-235
B. U-238
C. Pu-239
D. Xe-135
答案： D.

科目： 292006
知能類： K1.02 [3.1/3.1]
序號： B1658 (P2458)

Which one of the following exhibits the greatest microscopic cross section for absorption of a thermal neutron in an operating reactor core?
A. Uranium-235
B. Boron-10
C. Samarium-149
D. Xenon-135
ANSWER: D.

對於運轉中反應器爐心之熱中子吸收，下列何者具有最大之微觀截面？
A. U-235
B. B-10
C. Sm-149
D. Xe-135
答案： D.

科目： 292006
知能類： K1.02 [3.1/3.1]
序號： B3458

Reactors A and B are operating at steady-state 100% power with equilibrium core Xe-135. The reactors are identical except that reactor A is operating at end of core life (EOL) and reactor B is operating at beginning of core life (BOL).
Which reactor has the smaller concentration of core Xe-135?
A. Reactor A (EOL) due to the smaller 100% power thermal neutron flux
B. Reactor A (EOL) due to the larger 100% power thermal neutron flux
C. Reactor B (BOL) due to the smaller 100% power thermal neutron flux
D. Reactor B (BOL) due to the larger 100% power thermal neutron flux
ANSWER: B.

反應器A與B在100%穩態功率下運轉，爐心內的Xe-135皆已達到平衡。兩反應器完全相同，唯反應器A在爐心壽命末期（EOL），而反應器B在爐心壽命初期（BOL）。下列何反應器爐心的Xe-135濃度較小？
A. 反應器A（EOL），因為其100%功率之熱中子通量較小
B. 反應器A（EOL），因為其100%功率之熱中子通量較大
C. 反應器B（BOL），因為其100%功率之熱中子通量較小
D. 反應器B（BOL），因為其100%功率之熱中子通量較大
答案： B.

科目： 292006
知能類： K1.03 [2.9/2.9]
序號： B257 (P1859)

The major contributor to the production of Xe-135 in a reactor that has been operating at full power for 2 weeks is...
A. the radioactive decay of iodine.
B. the radioactive decay of promethium.
C. direct production from fission of U-235.
D. direct production from fission of U-238.
ANSWER: A.

在全功率下運轉兩週的反應器，其Xe-135產生的主要來源為
A. 碘的放射衰變
B. 鉕（Pm）的放射衰變
C. 由U-235分裂直接生成
D. 由U-238分裂直接生成
答案： A.

科目： 292006
知能類： K1.03 [2.9/2.9]
序號： B362 (P358)

Xenon-135 is produced in the reactor by two methods. One is directly from fission, the other is from the decay of...
A. xenon-136.
B. iodine-135.
C. cesium-135.
D. barium-135.
ANSWER: B.

在核子反應器中有兩種方式可產生Xe-135。其中之一直接來自於分裂反應，另外一種是下列何者的衰變？
A. Xe-136
B. I-135
C. Cs-135
D. Ba-136
答案： B.

科目： 292006
知能類： K1.03 [2.9/2.9]
序號： B458 (P1359)

A reactor has been operating at full power for several weeks. Xenon-135 is being directly produced as a fission product in approximately _____% of all fissions.
A. 100%
B. 30%
C. 3%
D. 0.3%
ANSWER: D.

一反應器於全功率下運轉數週。直接產生Xe-135成為分裂產物約佔總分裂的_____。
A. 100%
B. 30%
C. 3%
D. 0.3%
答案： D.

科目： 292006
知能類： K1.03 [2.9/2.9]
序號： B859 (P1559)

Which one of the following lists the production mechanisms of Xe-135 in an operating power reactor?
A. Primarily from fission, secondarily from iodine decay
B. Primarily from fission, secondarily from promethium decay
C. Primarily from iodine decay, secondarily from fission
D. Primarily from promethium decay, secondarily from fission
ANSWER: C.

下列何者為運轉中反應器之Xe-135的產生機制？
A. 主要來自分裂，其次來自碘衰變
B. 主要來自分裂，其次來自鉕（Pm）衰變
C. 主要來自碘衰變，其次來自分裂
D. 主要來自鉕衰變，其次來自分裂
答案： C.

科目： 292006
知能類： K1.03 [2.9/2.9]
序號： B2558 (P2558)

Reactors A and B are operating at steady-state 100% power with equilibrium core Xe-135. The reactors are identical except that reactor A is operating at the end of core life (EOL) and reactor B is operating at the beginning of core life (BOL).
Which reactor has the greater concentration of core Xe-135?
A. Reactor A (EOL) due to the smaller 100% power thermal neutron flux
B. Reactor A (EOL) due to the larger 100% power thermal neutron flux
C. Reactor B (BOL) due to the smaller 100% power thermal neutron flux
D. Reactor B (BOL) due to the larger 100% power thermal neutron flux
ANSWER: C.

反應器A與B在100%穩態功率下運轉，爐心內的Xe-135皆已達到平衡。兩反應器完全相同，唯反應器A在爐心壽命末期（EOL），而反應器B在爐心壽命初期（BOL）。下列何反應器爐心有較大之Xe-135濃度？
A. 反應器A（EOL），因為其100%功率之熱中子通量較小
B. 反應器A（EOL），因為其100%功率之熱中子通量較大
C. 反應器B（BOL），因為其100%功率之熱中子通量較小
D. 反應器B（BOL），因為其100%功率之熱中子通量較大
答案： C.

科目： 292006
知能類： K1.04 [2.9/2.9]
序號： B128

Which one of the following describes the change in core xenon-135 concentration immediately following a power increase from equilibrium conditions?
A. Initially decrease due to the decreased rate of xenon-135 production from fission.
B. Initially decrease due to the increased rate of thermal neutron absorption by xenon-135.
C. Initially increase due to the increased rate of xenon-135 production from fission.
D. Initially increase due to the decreased rate of thermal neutron absorption by xenon-135.
ANSWER: B.

下列何者正確地描述了在平衡狀況下，功率增加後爐心內Xe-135濃度的立即變化？
A. 起初降低，因為由分裂而來的Xe-135產生率降低
B. 起初降低，因為Xe-135的熱中子吸收率增加
C. 起初增加，因為由分裂而來的Xe-135產生率增加
D. 起初增加，因為Xe-135的熱中子吸收率降低
答案： B.

科目： 292006
知能類： K1.04 [2.9/2.9]
序號： B258

The two methods of Xe-135 removal from a reactor operating at full power are...
A. gamma decay and beta decay.
B. neutron absorption and fission.
C. fission and gamma decay.
D. beta decay and neutron absorption.
ANSWER: D.

從全功率運轉下的反應器移除Xe-135的兩種方式為
A. 伽瑪衰變與貝他衰變
B. 中子吸收與分裂
C. 分裂與伽瑪衰變
D. 貝他衰變與中子吸收
答案： D.

科目： 292006
知能類： K1.04 [2.9/2.9]
序號： B359 (P1059)

Xenon-135 undergoes radioactive decay to...
A. iodine-135.
B. cesium-135.
C. tellurium-135.
D. lanthanum-135.
ANSWER: B.

Xe-135進行放射衰變而成為
A. I-135
B. Cs-135
C. Te-135（碲）
D. La-135（鑭）
答案： B.

科目： 292006
知能類： K1.04 [2.9/2.9]
序號： B462 (P460)

Reactor power is increased from 50% to 60% in 1 hour. The most significant contributor to the initial change in xenon reactivity is the increase in xenon...
A. production from iodine decay.
B. production from fission.
C. absorption of neutrons.
D. decay to cesium.
ANSWER: C.

反應器功率在一小時內從50%增加至60%。對於氙反應度最初變化的主要是因為增加的氙
A. 來自於碘衰變的產量
B. 來自於分裂反應的產量
C. 對中子的吸收
D. 衰變成為銫
答案： C.

科目： 292006
知能類： K1.04 [2.9/2.9]
序號： B860

Which one of the following values is the approximate half-life of Xe-135?
A. 19 seconds
B. 6.6 hours
C. 9.1 hours
D. 30 hours
ANSWER: C.

下列何者最接近Xe-135的半衰期？
A. 19 秒
B. 6.6 小時
C. 9.1 小時
D. 30 小時
答案： C.

科目： 292006
知能類： K1.04 [2.9/2.9]
序號： B959

Which one of the following describes the primary method of xenon-135 removal at the indicated steady state power level?
A. Decay of xenon-135 to cesium-135 at full power
B. Decay of xenon-135 to iodine-135 at the point of adding heat
C. Absorption of neutrons by xenon-135 at the point of adding heat
D. Absorption of neutrons by xenon-135 at full power
ANSWER: D.

在以下的穩態功率，何者正確地描述了移除Xe-135的主要方式？
A. 在全功率時，Xe-135衰變成為銫-135
B. 在加熱階段起始點時，Xe-135衰變成為I-135
C. 在加熱階段起始點時，Xe-135吸收中子
D. 在全功率時，Xe-135吸收中子
答案： D.

科目： 292006
知能類： K1.04 [2.9/2.9]
序號： B3358 (P2659)

A nuclear plant has been operating at 100% power for several months. Which one of the following describes the relative contributions of beta decay and neutron capture to Xe-135 removal from the reactor core?
A. Beta decay and neutron capture contribute equally
B. Primary - beta decay; secondary - neutron capture
C. Primary - neutron capture; secondary - beta decay
D. Not enough information given to make a comparison
ANSWER: C.

核能電廠在100%功率下運轉數月。下列何者正確地描述了貝他衰變與中子捕獲，對於從反應器爐心移除Xe-135的貢獻程度？
A. 貝他衰變與中子捕獲的貢獻相同
B. 主要—貝他衰變；次要—中子捕獲
C. 主要—中子捕獲；次要—貝他衰變
D. 資訊不足無法做比較
答案： C.

科目： 292006
知能類： K1.05 [2.9/2.9]
序號： B58 (P61)

A reactor has been operating at 50% power for one week when power is ramped in 4 hours to 100%. Which one of the following describes the new equilibrium xenon concentration?
A. Twice the 50% value
B. Less than twice the 50% value
C. More than twice the 50% value
D. Remains the same because it is independent of power
ANSWER: B.

一反應器在50％功率下運轉一週，此時在四小時內迅速提升至100％功率。下列何者正確地描述了新的氙毒平衡濃度？
A. 等於50％時的兩倍
B. 小於50％時的兩倍
C. 大於50％時的兩倍
D. 維持不變，因為與功率無關
答案： B.

科目： 292006
知能類： K1.05 [2.9/2.9]
序號： B259 (P1459)

Following a two-week shutdown, a reactor is taken critical and ramped to full power in 6 hours. How long will it take to achieve an equilibrium xenon condition after the reactor reaches full power?
A. 70 to 80 hours
B. 40 to 50 hours
C. 8 to 10 hours
D. 1 to 2 hours
ANSWER: B.

在停機兩週後，反應器達於臨界並且在六小時內迅速提升至全功率。在反應器到達全功率後，需要多少時間能達到氙毒的平衡狀態？
A. 70 到 80 小時
B. 40 到 50 小時
C. 8 到 10 小時
D. 1 到 2 小時
答案： B.

科目： 292006
知能類： K1.05 [2.9/2.9]
序號： B658 (P660)

A nuclear reactor has been operating at 100% power for one week when power is ramped in 4 hours to 50%. Which one of the following describes the new equilibrium core xenon-135 concentration?
A. Remains the same because it is independent of power
B. More than one-half the 100% value
C. Less than one-half the 100% value
D. One-half the 100% value
ANSWER: B.

反應器在100%功率下運轉一週，此時功率在四小時內迅速減至50%。下列何者正確地描述了新的氙毒平衡濃度？
A. 維持不變，因為其與功率無關
B. 大於100%時的一半
C. 小於100%時的一半
D. 等於100%時的一半
答案： B.

科目： 292006
知能類： K1.05 [2.9/2.9]
序號： B1160 (P1158)

A reactor has been operating at 25% power for 24 hours following a 2-hour power reduction from steady-state full power. Which one of the following describes the current status of core xenon-135 concentration?
A. At equilibrium
B. Decreasing toward an upturn
C. Decreasing toward an equilibrium value
D. Increasing toward a peak value
ANSWER: C.

反應器從穩態全功率經過兩小時的降載後，並在25%功率下運轉24小時。下列何者正確地描述了目前爐心的Xe-135濃度？
A. 處於平衡
B. 朝向回升減小
C. 朝向一平衡值減小
D. 朝向一峰值增加
答案： C.

科目： 292006
知能類： K1.05 [2.9/2.9]
序號： B1363

Which one of the following indicates that core Xe-135 is in equilibrium?
A. Xe-135 is being removed equally by neutron capture and decay.
B. The reactor has been operated at a steady-state power level for five days.
C. Xe-135 is being produced equally by fission and I-135 decay.
D. The reactor is currently operating at 100% power.
ANSWER: B.

下列何者說明爐心的Xe-135為平衡狀態？
A. Xe-135被中子捕獲移除的量等於其衰變的量
B. 反應器在穩態功率下運轉五天
C. Xe-135由分裂產生的量等於I-135衰變的量
D. 反應器目前在100%功率下運轉
答案： B.

科目： 292006
知能類： K1.05 [2.9/2.9]
序號： B1859

A reactor was operating for 42 weeks at a stable reduced power level when a reactor scram occurred. The reactor was returned to critical after 12 hours and then ramped to 60% power in 6 hours.
How much time at steady state 60% power will be required to reach equilibrium core xenon-135?
A. 20 to 30 hours
B. 40 to 50 hours
C. 70 to 80 hours
D. 90 to 100 hours
ANSWER: B.

反應器在穩定低功率運轉42週，此時發生反應器急停。在12小時後反應器回復臨界，並且在六小時內迅速提升至60%功率。在60%穩態功率下，要達到爐心氙毒的平衡狀態，需要多少時間？
A. 20 到 30 小時
B. 40 到 50 小時
C. 70 到 80 小時
D. 90 到 100 小時
答案： B.

科目： 292006
知能類： K1.05 [2.9/2.9]
序號： B1960 (P1360)

A reactor has been operating at a steady-state power level for 15 hours following a rapid power reduction from 100% to 80%. Which one of the following describes the current core xenon concentration?
A. Increasing toward equilibrium
B. Decreasing toward equilibrium
C. Increasing toward a peak
D. Decreasing toward a valley
ANSWER: B.

從100%功率快速降低至80%後，反應器在穩態功率下運轉15小時。下列何者正確地描述了爐心目前的氙毒濃度？
A. 朝平衡方向增加
B. 朝平衡方向減小
C. 朝向峰值增加
D. 朝向谷值減小
答案： B.

科目： 292006
知能類： K1.05 [2.9/2.9]
序號： B2659 (P2159)

Which one of the following indicates that core Xe-135 is in equilibrium?
A. Xe-135 production and removal rates are momentarily equal five hours after a power increase.
B. A reactor has been operated at 80% power for five days.
C. Xe-135 is being produced equally by fission and I-135 decay.
D. A reactor is currently operating at 100% power.
ANSWER: B.

下列那一個爐心的Xe-135處於平衡狀態？
A. 在功率增加之後五小時，Xe-135的產生與移除率暫時相等
B. 反應器在80％功率下運轉五天
C. 由分裂產生的Xe-135與I-135衰變之數量相等
D. 反應器目前在100％功率下運轉
答案： B.

科目： 292006
知能類： K1.05 [2.9/2.9]
序號： B2760 (P2859)

Reactors A and B are operating at steady-state 100% power with equilibrium core Xe-135. The reactors are identical except that reactor A is operating near the end of core life and reactor B is operating near the beginning of core life.
Which reactor is experiencing the most negative reactivity from equilibrium core Xe-135?
A. Reactor A due to a greater concentration of equilibrium core Xe-135
B. Reactor A due to lower competition from the fuel for thermal neutrons
C. Reactor B due to a greater thermal neutron flux in the core
D. Reactor B due to a smaller accumulation of stable fission product poisons
ANSWER: B.

反應器A與B在100%穩態功率下運轉，爐心內的Xe-135皆已達到平衡。兩反應器完全相同，唯反應器A接近爐心壽命末期，而反應器B接近爐心壽命初期。下列那一個反應器會有因Xe-135平衡濃度造成最大的負反應度？
A. 反應器A，因為其爐心Xe-135的平衡濃度較大
B. 反應器A，因為燃料對熱中子的利用較低
C. 反應器B，因為爐心的熱中子通量較大
D. 反應器B，因為穩定分裂產物毒素的累積量較小
答案： B.

科目： 292006
知能類： K1.06 [2.7/2.7]
序號： B59

A reactor has been operating at 50% power for one week when power is ramped over 4 hours to 100% power. How will the core xenon-135 concentration respond?
A. Decrease, and then build up to a higher equilibrium concentration
B. Increase, and then build up to a higher equilibrium concentration
C. Decrease, and then return to the same equilibrium concentration
D. Increase, and then return to the same equilibrium concentration
ANSWER: A.

反應器在50%功率下運轉一週，在四小時後迅速增加至100%功率。爐心Xe-135濃度將會如何反應？
A. 減小，然後增加至一較高的平衡濃度
B. 增加，然後增加至一較高的平衡濃度
C. 減小，然後回復至原本的平衡濃度
D. 增加，然後回復至原本的平衡濃度
答案： A.

科目： 292006
知能類： K1.06 [2.7/2.7]
序號： B660

A reactor has been operating at 75% power for one week when power is decreased to 50% over a 1 hour period. Which one of the following statements explains how xenon concentration will initially change?
A. Decreases, because the xenon production rate from fission has decreased
B. Increases, because of the reduced rate of xenon burnout
C. Decreases, because the rate of xenon decay exceeds the rate of production from fission
D. Increases, because the concentration of iodine-135 increases
ANSWER: B.

反應器在75%功率下運轉一週，在一小時期間內降低至50%功率。下列何者敘述解釋了氙毒濃度的初始變化？
A. 減小，因為從分裂而來的氙毒產生率減小
B. 增加，因為氙毒的燃耗率下降
C. 減小，因為氙毒的衰變率超過分裂的產生率
D. 增加，因為碘-135的濃度增加
答案： B.

科目： 292006
知能類： K1.06 [2.7/2.7]
序號： B961

A reactor has been operating at 100% power for two weeks when power is reduced to 50% in 1 hour. How will the amount of core xenon change over the next 24 hours?
A. Increase and stabilize at a new higher value
B. Increase initially, then decrease and stabilize at a lower value
C. Decrease and stabilize at a new lower value
D. Decrease initially, then increase and stabilize at a higher value
ANSWER: B.

反應器在100%功率下運轉兩週，在一小時期間內降低至50%功率。在未來24小時內，爐心氙毒的含量將如何變化？
A. 增加，並且在一新的較高數值達到穩定
B. 起初增加，然後在一較低數值達到穩定
C. 降低，然後在一新的較低數值達到穩定
D. 起初降低，然後在一較高數值達到穩定
答案： B.

科目： 292006
知能類： K1.06 [2.7/2.7]
序號： B1262 (P1960)

A reactor has been operating at 100% power for two weeks when power is decreased to 10% in 1 hour. Immediately following the power decrease, core xenon-135 concentration will _____ for a period of _____.
A. decrease; 4 to 6 hours
B. increase; 4 to 6 hours
C. decrease; 8 to 11 hours
D. increase; 8 to 11 hours
ANSWER: D.

反應器在100%功率下運轉兩週，在一小時期間內降低至10%功率。緊接著功率下降之後，爐心Xe-135的濃度將會_____並持續_____。
A. 降低；4至6小時
B. 增加；4至6小時
C. 降低；8至11小時
D. 增加；8至11小時
答案： D.

科目： 292006
知能類： K1.06 [2.7/2.7]
序號： B1860

A reactor has been operating at a steady-state power level for 15 hours following a rapid power reduction from 100% to 50%. Which one of the following describes the current core xenon-135 concentration?
A. Increasing toward a peak
B. Decreasing toward an upturn
C. Increasing toward equilibrium
D. Decreasing toward equilibrium
ANSWER: D.

從100%功率快速降低至50%後，反應器在穩態功率運轉15小時。下列何者正確地描述了目前爐心Xe-135的濃度？
A. 朝向峰值增加
B. 朝向回升減少
C. 朝向平衡增加
D. 朝向平衡減小
答案： D.

科目： 292006
知能類： K1.06 [2.7/2.7]
序號： B2559 (P3362)

A reactor has been operating at 70% power for 26 hours following a one-hour power reduction from steady-state 100% power. Which one of the following describes the current core xenon-135 concentration?
A. Increasing toward a peak
B. Decreasing toward an upturn
C. Decreasing toward equilibrium
D. At equilibrium
ANSWER: C.

反應器從100%穩態功率下降一小時後，在70%功率下運轉26小時。下列何者正確地描述了目前爐心Xe-135的濃度？
A. 朝向峰值增加
B. 朝向回升減少
C. 朝向平衡減小
D. 處於平衡
答案： C.

科目： 292006
知能類： K1.06 [2.7/2.7]
序號： B2761 (P2261)

A reactor has been operating at steady-state 50% power for 12 hours following a one-hour power reduction from steady-state 100% power. Which one of the following describes the current core xenon-135 concentration?
A. Increasing toward a peak
B. Decreasing toward an upturn
C. Increasing toward equilibrium
D. Decreasing toward equilibrium
ANSWER: D.

反應器從100%穩態功率下降一小時後，在50%功率下運轉12小時。下列何者正確地描述了目前爐心Xe-135的濃度？
A. 朝向峰值增加
B. 朝向回升減少
C. 朝向平衡增加
D. 朝向平衡減小
答案： D.

科目： 292006
知能類： K1.06 [2.7/2.7]
序號： B2960 (P2961)

A reactor has been operating at steady-state 30% power for 3 hours following a one-hour power reduction from steady-state 100% power. Which one of the following describes the current core xenon-135 concentration?
A. Increasing toward a peak
B. Increasing toward equilibrium
C. Decreasing toward an upturn
D. Decreasing toward equilibrium
ANSWER: A.

反應器從100%穩態功率下降一小時後，在30%功率下運轉3小時。下列何者正確地描述了目前爐心Xe-135的濃度？
A. 朝向峰值增加
B. 朝向平衡增加
C. 朝向回升減少
D. 朝向平衡減小
答案： A.

科目： 292006
知能類： K1.07 [3.2/3.2]
序號： B132

What is the difference in peak xenon concentration following a reactor scram after one week at 100% power as compared to a scram after one week at 50% power?

A. The time to reach the peak is shorter after 100% power than after 50% power, due to the higher iodine decay rate.
B. The peak from 50% is of a smaller magnitude due to the lower xenon burnout rate.
C. The peaks are equal because the decay rate of iodine remains constant.
D. The peak from 100% power is of a larger magnitude, due to the larger initial iodine concentration.

ANSWER: D.

反應器以100%功率運轉一週後急停，相較於以50%功率運轉一週後急停，兩者氙毒濃度峰值的差異為何？

A. 達到峰值的時間前者較後者為短，因為碘衰變率較高
B. 後者的峰值較小，因為氙毒燃耗率較低
C. 峰值相等，因為碘衰變率維持固定
D. 前者的峰值較大，因為碘的初始濃度較高

答案： D.

科目： 292006
知能類： K1.07 [3.2/3.2]
序號： B260

A reactor has been operating at 25% power for five days when a scram occurs. Xe-135 will peak in approximately...
A. 2 hours.
B. 5 hours.
C. 10 hours.
D. 20 hours.
ANSWER: B.

反應器在25%功率下運轉五天，此時發生急停。Xe-135達到峰值約需要
A. 2小時
B. 5小時
C. 10小時
D. 20小時
答案： B.

科目： 292006
知能類： K1.07 [3.2/3.2]
序號： B861

Which one of the following equilibrium reactor prescram conditions requires the greater amount of control rod withdrawal to perform a reactor startup during peak xenon conditions after a reactor scram? (BOL = beginning of core life. EOL = end of core life.)
A. BOL and 100% power
B. EOL and 100% power
C. BOL and 20% power
D. EOL and 20% power
ANSWER: B.

下列何種反應器急停前的平衡狀況，需要抽出較多的控制棒，使得反應器在急停後能於氙毒峰值期間進行啟動？（BOL＝爐心壽命初期。EOL＝爐心壽命末期）
A. BOL及100%功率
B. EOL及100%功率
C. BOL及20%功率
D. EOL及20%功率
答案： B.

科目： 292006
知能類： K1.07 [3.2/3.2]
序號： B1561 (P1561)

Select the combination below that completes the following statement.
The amount of control rod withdrawal needed to compensate for peak core xenon-135 negative reactivity will be smallest after a reactor scram from equilibrium _____ reactor power at the _____ of core life.
A. 20%; beginning
B. 20%; end
C. 100%; beginning
D. 100%; end
ANSWER: A.

選出適當的組合完成下列陳述。
在爐心壽命____，反應器從____平衡功率發生急停後，為補償爐心Xe-135峰值的負反應度所需要抽出的控制棒最少。
A. 初期，20%
B. 末期，20%
C. 初期，100%
D. 末期，100%
答案： A.

科目： 292006
知能類： K1.08 [2.8/3.2]
序號： B135

When comparing control rod worth (CRW) during a reactor startup from 100% peak xenon-135 and a reactor startup from xenon-free conditions...
A. center CRW will be higher during the peak xenon startup than during the xenon-free startup.
B. peripheral CRW will be higher during the peak xenon startup than during the xenon-free startup.
C. center and peripheral CRWs will be the same regardless of core xenon conditions.
D. it is impossible to determine how xenon will affect the worth of center and peripheral control rods.
ANSWER: B.

從100%峰值的Xe-135下啟動反應器，與無氙毒狀況下的反應器啟動，比較此兩者的控制棒本領（CRW）
A. 在峰值氙毒啟動時的中央CRW較無氙毒啟動時為高
B. 在峰值氙毒啟動時的邊緣CRW較無氙毒啟動時為高
C. 不論爐心的氙毒情況為何，中央與邊緣CRW相同
D. 無法判斷氙毒如何影響中央與邊緣的控制棒本領
答案： B.

科目： 292006
知能類： K1.08 [2.8/3.2]
序號： B261

A reactor has been operating at full power for several weeks when a scram occurs. When the reactor is brought critical 5 hours later, Xe-135 concentration will be highest in the _____ of the core, which causes thermal neutron flux to shift toward the _____ of the core.
A. center; periphery
B. periphery; periphery
C. center; center
D. periphery; center
ANSWER: A.

反應器在全功率下運轉數週時發生急停。當反應器在五小時後回到臨界，在爐心____的Xe-135濃度將會最高，如此將導致熱中子通量朝著爐心的____轉移
A. 中央；邊緣
B. 邊緣；邊緣
C. 中央；中央
D. 邊緣；中央
答案： A.

科目： 292006
知能類： K1.08 [2.8/3.2]
序號： B1062

A reactor is operating at the beginning of core life, 100% power, and equilibrium xenon concentration when a scram occurs. When the reactor is taken critical 5 hours later, xenon distribution will be maximum at the _____ of the core.
A. bottom and center
B. bottom and outer circumference
C. top and center
D. top and outer circumference
ANSWER: A.

反應器在爐心壽命初期，100%功率下運轉，在氙毒平衡濃度下發生急停。當反應器在五個小時後達到臨界時，在爐心____處氙毒的濃度最大。
A. 底部與中央
B. 底部與外圍邊緣
C. 頂部與中央
D. 頂部與外圍邊緣
答案： A.

科目： 292006
知能類： K1.08 [2.8/3.2]
序號： B2454

Sustained operation at 100% power requires periodic withdrawal of control rods to compensate for...
A. buildup of fission product poisons and decreasing control rod worth.
B. fuel depletion and buildup of fission product poisons.
C. decreasing control rod worth and burnable poison burnout.
D. burnable poison burnout and fuel depletion.
ANSWER: B.

在100%功率下持續運轉，需要週期性地抽出控制棒，以補償
A. 分裂產物毒素的累積，以及控制棒本領的降低
B. 燃料的燃耗，以及分裂產物毒素的累積
C. 控制棒本領的降低，以及可燃毒素的燃耗
D. 可燃毒素的燃耗，以及燃料的燃耗
答案： B.

科目： 292006
知能類： K1.08 [2.8/3.2]
序號： B2660 (P2359)

Which one of the following explains why core Xe-135 oscillations are a concern in a reactor?
A. They can adversely affect core power distribution and can require operation below full rated power.
B. They can adversely affect core power distribution and can prevent a reactor startup following a reactor scram.
C. They can cause excessively short reactor periods during power operation and can require operation below full rated power.
D. They can cause excessively short reactor periods during power operation and can prevent a reactor startup following a reactor scram.
ANSWER: A.

下列何者能解釋為何在反應器中，爐心的Xe-135振盪是重要的事？
A. 它們對爐心功率分佈有不利影響，並且會迫使運轉在低於全功率下進行
B. 它們對爐心功率分佈有不利影響，並且在反應器急停後，使反應器啟動不易進行
C. 它們會導致在功率運轉中過短的反應器週期，並且會迫使運轉在低於全功率下進行
D. 它們會導致在功率運轉中過短的反應器週期，並且在反應器急停後，使反應器啟動不易進行
答案： A.

科目： 292006
知能類： K1.08 [2.8/3.2]
序號： B2860

A reactor has been operating at 50% power for several weeks near the middle of core life with core axial power distribution evenly divided above and below the core midplane. Reactor power is to be increased to 65% over a two-hour period using shallow control rods only.
During the power increase, core axial power distribution will...
A. shift toward the top of the core.
B. shift toward the bottom of the core.
C. remain evenly divided above and below the core midplane.
D. have peaks near the top and the bottom of the core.
ANSWER: B.

反應器於接近爐心壽命中期，在50%功率下運轉數週，其爐心軸向功率分佈均勻分配於爐心上半部與下半部。反應器功率將在兩小時內，僅利用淺控制棒而增加到65%。在功率增加期間，爐心軸向功率分佈將
A. 朝向爐心頂部轉移
B. 朝向爐心底部轉移
C. 在爐心中央面上下維持均勻分佈
D. 在靠近爐心的頂部與底部處產生峰值
答案： B.

科目： 292006
知能類： K1.08 [2.8/3.2]
序號： B3061 (P3060)

A reactor has been operating at full power for one month following a refueling outage with core axial neutron flux distribution peaked in the bottom half of the core. An inadvertent reactor scram occurs. The reactor is restarted, with criticality occurring 6 hours after the scram. Reactor power is increased to 60% over the next 4 hours and stabilized.
How will core axial neutron flux distribution be affected during the 1-hour period immediately following the return to 60% power?
The core axial neutron flux peak will be located _____ in the core than the pre-scram peak location, and the flux peak will be moving _____.
A. higher; upward
B. higher; downward
C. lower; upward
D. lower; downward
ANSWER: B.

在大修後反應器在全功率下運轉一個月，其爐心軸向中子通量分佈在爐心的下半部達於峰值。此時反應器發生意外的急停，然後重新啟動並在急停後六小時達到臨界。反應器功率在接下來的四小時增加到60%並且穩定運轉。在反應器功率達60%後緊接著的一小時內，爐心軸向中子通量的分佈如何受到影響？爐心軸向中子通量峰值將會____急停前的峰值位置，而中子通量峰值將會____移動。
A. 高於；往上
B. 高於；往下
C. 低於；往上
D. 低於；往下
答案： B.

科目： 292006
知能類： K1.09 [2.5/2.5]
序號： B262

A reactor is being started up and taken to rated power using a constant ramp rate following an extended outage. To compensate for the effect of core xenon-135 while increasing reactor power, it will be necessary to _____ rods and _____ recirculation flow.
A. insert; decrease
B. insert; increase
C. withdraw; increase
D. withdraw; decrease
ANSWER: C.

反應器在長期大修後進行啟動，以穩定速率提昇到額定功率。在增加反應器功率時為補償爐心Xe-135的影響，所以需要____控制棒，同時____再循環流量。
A. 插入；減小
B. 插入；增加
C. 抽出；增加
D. 抽出；減小
答案： C.

科目： 292006
知能類： K1.09 [2.5/2.5]
序號： B355 (P353)

A plant is being returned to operation following a refueling outage. Fuel preconditioning requires reactor power to be increased from 10% to full power gradually over a one week period. During this slow power increase, most of the positive reactivity added by the operator is required to overcome the negative reactivity from...
A. fuel burnup.
B. xenon buildup.
C. fuel temperature increase.
D. moderator temperature increase.
ANSWER: B.

在大修後電廠重新回復運轉。因燃料預調節要求反應器功率在一週內從10%逐漸增加到全功率。在功率緩慢增加期間，運轉員所加入之大部分的正反應度，乃是為了克服來自於何處的負反應度？
A. 燃料燃耗
B. 氙毒累積
C. 燃料溫度增加
D. 緩和劑溫度增加
答案： B.

科目： 292006
知能類： K1.09 [2.5/2.5]
序號： B562 (P561)
Following a seven day shutdown, a reactor startup is performed and a plant is taken to 100% power over a 16-hour period. After reaching 100% power, what type of reactivity will the operator need to add to compensate for core xenon-135 changes over the next 24 hours?
A. Negative only
B. Negative, then positive
C. Positive only
D. Positive, then negative
ANSWER: C.

在停機七天後，啟動反應器並且要在16小時期間達到100％功率。在達到100％功率後，為補償之後24小時爐心Xe-135的變化，運轉員將需要加入何種反應度？
A. 只有負反應度
B. 負反應度，然後正反應度
C. 只有正反應度
D. 正反應度，然後負反應度
答案： C.

科目： 292006
知能類： K1.09 [2.5/2.5]
序號： B2861 (P2260)

A reactor is initially shut down with no xenon in the core. Over the next four hours, the reactor is made critical and power level is increased to the point of adding heat. The shift supervisor has directed that power be maintained constant at this level for 12 hours for testing.
To accomplish this, control rods will have to be...
A. withdrawn periodically for the duration of the 12 hours.
B. inserted periodically for the duration of the 12 hours.
C. withdrawn periodically for 4 to 6 hours, then inserted periodically.
D. inserted periodically for 4 to 6 hours, then withdrawn periodically.
ANSWER: A.

反應器於停機初期爐心無氙毒。在其後四小時內，反應器達於臨界且功率增加到加熱階段起始點。值工師指示將功率穩定維持於該功率12小時以執行測試，為了達到此目的，控制棒必須
A. 在此12小時內週期性地抽出
B. 在此12小時內週期性地插入
C. 在4至6小時內週期性地抽出，然後週期性地插入
D. 在4至6小時內週期性地插入，然後週期性地抽出
答案： A

科目： 292006
知能類： K1.10 [2.9/2.9]
序號： B57

Following a reactor scram from a long-term, steady-state, 100% power run, a reactor is to be taken critical. The calculated estimated critical conditions (position) are based on a xenon-free core. Which one of the following is the shortest time after the initial scram that a xenon-free core will exist?
A. 8 to 10 hours
B. 15 to 25 hours
C. 40 to 50 hours
D. 70 to 80 hours
ANSWER: D.

反應器從長期穩態100%功率運轉下發生急停後，準備再重新達到臨界。根據無氙毒爐心計算得到臨界預估狀況（棒位）。在最初急停後，爐心無氙毒存在的最短時間是下列何者？
A. 8至10小時
B. 15至25小時
C. 40至50小時
D. 70至80小時
答案： D.

科目： 292006
知能類： K1.10 [2.9/2.9]
序號： B1162

A reactor scram occurred from steady state 100% power and a startup is currently in progress. Which one of the following sets of initial startup conditions will require the most control rod withdrawal to achieve criticality? (BOC = beginning of fuel cycle; EOC = end of fuel cycle.)

	CORE AGE	TIME SINCE REACTOR SCRAM
A.	BOC	12 hours
B.	BOC	40 hours
C.	EOC	12 hours
D.	EOC	40 hours

ANSWER: C.

反應器從100%穩態功率運轉狀態下發生急停，然後進行啟動。下列何種啟動時的初始狀況，需要抽出最多的控制棒才能達到臨界？（BOC＝燃料週期初期；EOC＝燃料週期末期）

	爐心壽命	自反應器急停後時間
A.	BOC	12小時
B.	BOC	40小時
C.	EOC	12小時
D.	EOC	40小時

答案： C.

科目： 292006
知能類： K1.10 [2.9/2.9]
序號： B1361 (P1358)

A reactor has been operating at 75% power for two months. A manual reactor scram is required for a test. The scram will be followed immediately by a reactor startup with criticality scheduled to occur 12 hours after the scram.
The greatest assurance that xenon reactivity will permit criticality during the startup will be attained if the reactor is operated at _____ power for 48 hours prior to the scram and if criticality is rescheduled for _____ hours after the scram.
A. 100%; 8
B. 100%; 16
C. 50%; 8
D. 50%; 16
ANSWER: D.

反應器在75%功率下運轉兩個月，為了測試要求以手動方式急停。急停後需要立即進行反應器啟動，並且預計在急停後12小時達到臨界。若此反應器在急停前於____功率下運轉48小時，同時若預計於急停後____小時臨界，則最能確保氙毒的反應度不會影響反應器在啟動期間可以達到臨界。
A. 100%; 8
B. 100%; 16
C. 50%; 8
D. 50%; 16
答案： D.

科目： 292006
知能類： K1.10 [2.9/2.9]
序號： B1461 (P1462)

A reactor has been operating at 100% power for two months when a reactor scram occurs. Four hours later, the reactor is critical and stable at 10% power.
Which one of the following operator actions is required to maintain reactor power at 10% over the next 24 hours?
A. Add positive reactivity during the entire period
B. Add negative reactivity during the entire period
C. Add positive reactivity, then negative reactivity
D. Add negative reactivity, then positive reactivity
ANSWER: C.

反應器在100%功率下運轉兩個月，此時發生急停。四小時後，反應器達到臨界，並穩定在10%功率。為了在之後24小時內，維持反應器功率在10%，則運轉員需要採取下列何種動作？
A. 在整個期間中加入正反應度
B. 在整個期間中加入負反應度
C. 先加入正反應度，然後加入負反應度
D. 先加入負反應度，然後加入正反應度
答案： C.

科目： 292006
知能類： K1.10 [2.9/2.9]
序號： B1763 (P1762)

A reactor startup is being conducted and criticality has been achieved 15 hours after a reactor scram from two months of operation at full power. After 1 additional hour, reactor power is stabilized at 10^{-4}% power and all control rod motion is stopped.
Which one of the following describes the response of reactor power over the next 2 hours without any further operator actions?
A. Power increases toward the point of adding heat due to the decay of Xe-135.
B. Power increases toward the point of adding heat due to the decay of Sm-149.
C. Power decreases toward the shutdown neutron level due to the buildup of Xe-135.
D. Power decreases toward the shutdown neutron level due to the buildup of Sm-149.
ANSWER: A.

反應器全功率運轉兩個月後發生急停，在急停後15小時達到臨界，然後準備進行啟動。在臨界後的一小時後，反應器功率穩定於10^{-4}%功率，同時所有控制棒均停止動作。下列何者正確地描述了運轉員沒有採取任何動作下，在其後2小時反應器功率的反應？
A. 功率朝著加熱階段起始點增加，因為Xe-135的衰變
B. 功率朝著加熱階段起始點增加，因為Sm-149的衰變
C. 功率朝著停機中子位階減小，因為Xe-135的累積
D. 功率朝著停機中子位階減小，因為Sm-149的累積
答案： A.

科目： 292006
知能類： K1.10 [2.9/2.9]
序號： B3861 (P3860)

A reactor has been operating at 80% power for two months. A manual reactor scram is required for a test. The scram will be followed by a reactor startup with criticality scheduled to occur 24 hours after the scram.
The greatest assurance that xenon reactivity will permit criticality during the reactor startup will be attained if the reactor is operated at _____ power for 48 hours prior to the scram and if criticality is rescheduled for _____ hours after the scram.
A. 60%; 18
B. 60%; 30
C. 100%; 18
D. 100%; 30
ANSWER: B.

反應器在80%功率下運轉兩個月，為了測試需要以手動方式急停。急停後進行反應器啟動，並且預計在急停24小時後達到臨界。若此反應器在急停前於____功率下運轉48小時，同時若預計於急停後____小時臨界，則最能確保氙毒的反應度不會影響反應器在啟動期間可以達到臨界。
A. 60%; 18
B. 60%; 30
C. 100%; 18
D. 100%; 30
答案： B.

科目： 292006
知能類： K1.11 [2.6/2.7]
序號： B173

A reactor has been operating at 50% power for four days. Power is then increased to 100% over a 1 hour period. How much time will be required for core xenon-135 concentration to reach its minimum value after the power increase?
A. 4 to 8 hours
B. 10 to 15 hours
C. 40 to 50 hours
D. 70 to 80 hours
ANSWER: A.

反應器在50%功率下運轉四天，其後在一小時內增加到100%功率。在功率增加後約需多少時間，爐心Xe-135濃度會降低到其最小值？
A. 4至8小時
B. 10至15小時
C. 40至50小時
D. 70至80小時
答案： A.

科目： 292006
知能類： K1.11 [2.6/2.7]
序號： B459 (P260)

Two identical reactors have been operating at a constant power level for one week. Reactor A is at 50% power and reactor B is at 100% power. If both reactors scram at the same time, xenon- 135 will peak first in reactor _____ and the highest xenon-135 reactivity peak will occur in reactor _____.
A. B; B
B. B; A
C. A; B
D. A; A
ANSWER: C.

兩相同之反應器在固定功率下運轉一週。反應器A在50%功率，而反應器B在100%功率下運轉。若兩反應器同時發生急停，在反應器____的Xe-135會先達到峰值，而Xe-135反應度峰值最高會發生在反應器____。
A. B；B
B. B；A
C. A；B
D. A；A
答案： C.

科目： 292006
知能類： K1.11 [2.6/2.7]
序號： B1362

A reactor has been operating at 100% power for two weeks when power is reduced to 50%. During the next 2 hours, what must the operator do to compensate for a change in core Xe-135?
A. The operator must add positive reactivity because Xe-135 is decaying.
B. The operator must add negative reactivity because Xe-135 is decaying.
C. The operator must add positive reactivity because Xe-135 is building in.
D. The operator must add negative reactivity because Xe-135 is building in.
ANSWER: C.

反應器在100%功率下運轉兩週，然後降至50%功率。在其後2小時內，運轉員需要怎麼做以補償爐心Xe-135的改變？
A. 運轉員必須要加入正反應度，因為Xe-135在衰變中
B. 運轉員必須要加入負反應度，因為Xe-135在衰變中
C. 運轉員必須要加入正反應度，因為Xe-135在累積中
D. 運轉員必須要加入負反應度，因為Xe-135在累積中
答案： C.

科目： 292006
知能類： K1.11 [2.6/2.7]
序號： B1759

Which one of the following describes the change in core xenon-135 concentration immediately following a 10% power increase from equilibrium 70% power over a two-hour period?

A. Xe-135 concentration will initially decrease due to the increased rate of decay of Xe-135 to Cs-135.
B. Xe-135 concentration will initially decrease due to the increased absorption of thermal neutrons by xenon-135.
C. Xe-135 concentration will initially increase due to the increased I-135 production rate directly from fission.
D. Xe-135 concentration will initially increase due to the increased production rate directly from fission.

ANSWER: B.

從70%平衡功率在兩小時內增加10%後，下列何者正確地描述了爐心內Xe-135的濃度變化？

A. Xe-135濃度起初減小，因為Xe-135衰變至銫-135的速率增加
B. Xe-135濃度起初減小，因為被Xe-135吸收的熱中子增加
C. Xe-135濃度起初增加，因為直接從分裂而生的碘-135增加
D. Xe-135濃度起初增加，因為直接從分裂而生的Xe-135增加

答案： B.

科目： 292006
知能類： K1.11 [2.6/2.7]
序號： B1761 (P1159)

Two identical reactors have been operating at a constant power level for one week. Reactor A is at 100% power and reactor B is at 50% power. If both reactors scram at the same time, xenon- 135 concentration will peak first in reactor _____ and the highest peak xenon-135 concentration will occur in reactor _____.
A. B; B
B. B; A
C. A; B
D. A; A
ANSWER: B.

兩相同反應器在固定功率下運轉一週。反應器A在100%功率，反應器B在50%功率下運轉。若兩反應器同時發生急停，則反應器____將先出現Xe-135濃度的峰值，而最高的Xe-135濃度將會出現在反應器____中。
A. B；B
B. B；A
C. A；B
D. A；A
答案： B.

科目： 292006
知能類： K1.11 [2.6/2.7]
序號： B2063

A reactor had been operating at 50% power for two weeks when power was increased to 100% over a 3-hour period. To maintain reactor power stable during the next 24 hours, which one of the following incremental control rod manipulations will be required?
A. Withdraw rods slowly during the entire period
B. Withdraw rods slowly at first, then insert rods slowly
C. Insert rods slowly during the entire period
D. Insert rods slowly at first, then withdraw rods slowly
ANSWER: D.

反應器於50%功率下運轉兩週，在3小時內將功率增加至100%。為了在之後24小時內維持反應器功率穩定，則控制棒需要以下列何種方式操作？
A. 在整個階段當中緩慢抽出控制棒
B. 最初緩慢抽出控制棒，然後緩慢插入控制棒
C. 在整個階段當中緩慢插入控制棒
D. 最初緩慢插入控制棒，然後緩慢抽出控制棒
答案： D.

科目： 292006
知能類： K1.11 [2.6/2.7]
序號： B2158 (P2061)

A reactor had been operating at 100% power for two weeks when power was reduced to 50% over a 1-hour period. In order to maintain reactor power stable during the next 24 hours, which one of the following incremental control rod manipulations will be required?
A. Withdraw rods slowly during the entire period.
B. Withdraw rods slowly at first, then insert rods slowly.
C. Insert rods slowly during the entire period.
D. Insert rods slowly at first, then withdraw rods slowly.
ANSWER: B.

反應器在100%功率下運轉兩週，在一小時內降低為50%功率。為了在之後24小時內維持反應器功率穩定，則控制棒需要以下列何種方式操作？
A. 在整個階段當中緩慢抽出控制棒
B. 最初緩慢抽出控制棒，然後緩慢插入控制棒
C. 在整個階段當中緩慢插入控制棒
D. 最初緩慢插入控制棒，然後緩慢抽出控制棒
答案： B.

科目： 292006
知能類： K1.11 [2.6/2.7]
序號： B2259

Which one of the following describes the change in core xenon-135 concentration immediately following a power increase from 50% power equilibrium conditions?
A. Initially decreases due to the increased rate of xenon-135 radioactive decay.
B. Initially decreases due to the increased absorption of thermal neutrons by xenon-135.
C. Initially increases due to the increased xenon-135 production from fission.
D. Initially increases due to the increased iodine-135 production from fission.
ANSWER: B.

下列何者正確地描述了從50%功率平衡狀態下，增加功率後爐心內Xe-135的濃度變化？
A. 起初減少，因為Xe-135放射衰變率增加
B. 起初減少，因為Xe-135的熱中子吸收增加
C. 起初增加，因為由分裂而生的Xe-135增加
D. 起初增加，因為由分裂而生的碘-135增加
答案： B.

科目： 292006
知能類： K1.11 [2.6/2.7]
序號： B2361 (P2360)

A reactor had been operating at 70% power for two weeks when power was increased to 100% over a 2-hour period. To offset core Xe-135 reactivity changes during the next 12 hours, which one of the following incremental control rod manipulations will be required?
A. Withdraw rods slowly during the entire period.
B. Withdraw rods slowly at first, then insert rods slowly.
C. Insert rods slowly during the entire period.
D. Insert rods slowly at first, then withdraw rods slowly.
ANSWER: D.

反應器於70%功率運轉兩週，在兩小時內增加至100%功率。為了補償在之後12小時內爐心Xe-135的反應度變化，則控制棒需要以下列何種方式操作？
A. 在整個階段當中緩慢抽出控制棒
B. 最初緩慢抽出控制棒，然後緩慢插入控制棒
C. 在整個階段當中緩慢插入控制棒
D. 最初緩慢插入控制棒，然後緩慢抽出控制棒
答案： D.

科目： 292006
知能類： K1.11 [2.6/2.7]
序號： B2561 (P2559)

A reactor is initially operating at 100% power with equilibrium core xenon-135. Power is decreased to 50% over a 2 hour period. No subsequent operator actions are taken. Considering only the reactivity effects of core xenon-135 changes, which one of the following describes reactor power 10 hours after the power change is completed?
A. Less than 50% and decreasing slowly
B. Less than 50% and increasing slowly
C. Greater than 50% and decreasing slowly
D. Greater than 50% and increasing slowly
ANSWER: B.

反應器爐心起初在平衡Xe-135條件下，於100%功率運轉。功率在兩小時內減少至50%。沒有採取任何運轉員動作，只考慮爐心內Xe-135改變所產生的反應度效應，下列何者正確地描述了在功率改變完成經10小時後之反應器功率？
A. 小於50%，並且緩慢減小
B. 小於50%，並且緩慢增加
C. 大於50%，並且緩慢減小
D. 大於50%，並且緩慢增加
答案： B.

科目： 292006
知能類： K1.11 [2.6/2.7]
序號： B2762

A reactor is initially operating at 60% power with equilibrium core xenon-135. Power is increased to 80% over a 2-hour period. No subsequent operator actions are taken.
Considering only the reactivity effects of core xenon-135 changes, which one of the following describes reactor power 24 hours after the power change is completed?
A. Greater than 80% and decreasing slowly
B. Greater than 80% and increasing slowly
C. Less than 80% and decreasing slowly
D. Less than 80% and increasing slowly
ANSWER: C.

反應器爐心起初在平衡Xe-135條件下，於60％功率運轉。功率在兩小時內增加至80％。沒有採取任何運轉員動作。只考慮爐心內Xe-135改變所產生的反應度效應，下列何者正確地描述了在功率改變完成經24小時後之反應器功率？
A. 大於80％，並且緩慢減小
B. 大於80％，並且緩慢增加
C. 小於80％，並且緩慢減小
D. 小於80％，並且緩慢增加
答案： C.

科目： 292006
知能類： K1.11 [2.6/2.7]
序號： B2862

A reactor has been operating at 50% power for 3 hours following a one-hour power reduction from steady-state 100% power. Which one of the following describes the current core xenon-135 concentration?
A. Increasing toward a peak
B. Decreasing toward an upturn
C. Increasing toward equilibrium
D. Decreasing toward equilibrium
ANSWER: A.

反應器功率於一小時內從100%穩態功率降至50%功率，並運轉三小時。下列何者正確地描述了目前爐心內Xe-135之濃度？
A. 朝向峰值增加
B. 朝向回升減小
C. 朝向平衡增加
D. 朝向平衡減小
答案： A.

科目： 292006
知能類： K1.11 [2.6/2.7]
序號： B3259

A reactor is initially operating at equilibrium 100% power. An operator inserts control rods intermittently over a period of 30 minutes. At the end of this time period, reactor power is 70%. Assuming no additional operator actions are taken, what will reactor power be after an additional 60 minutes?
A. 70% and stable
B. Less than 70% and slowly increasing
C. Less than 70% and slowly decreasing
D. Less than 70% and stable
ANSWER: C.

反應器起初於100%平衡功率運轉。運轉員在30分鐘的期間內間歇地插入控制棒。在此期間結束時，反應器功率為70%。假設運轉員未再採取任何動作，則之後的60分鐘後，反應器的功率將會如何？
A. 70%，且維持穩定
B. 小於70%，且緩慢增加
C. 小於70%，且緩慢減小
D. 小於70%，且維持穩定
答案： C.

科目： 292006
知能類： K1.12 [2.8/2.3]
序號： B463

A reactor has been operating at 100% power for several weeks. Following a reactor scram/trip the reactor first will be considered xenon-free after...
A. 40 to 50 hours.
B. 70 to 80 hours.
C. 100 to 110 hours.
D. 130 to 140 hours.
ANSWER: B.

反應器在100%功率下運轉數週。在反應器急停之後需經過多少時間，反應器才被認為已處於無氙毒狀況？
A. 40至50小時
B. 70至80小時
C. 100至110小時
D. 130至140小時
答案： B.

科目： 292006
知能類： K1.12 [2.8/2.3]
序號： B1462

A reactor scram has occurred following two months operation at steady-state 100% power. How soon after the scram will the reactor first be considered xenon-free?
A. 8 to 10 hours
B. 24 to 30 hours
C. 40 to 50 hours
D. 70 to 80 hours
ANSWER: D.

反應器在100%穩態功率下運轉兩個月後發生急停，在急停後需經多少時間反應器才被認為處於無氙毒狀況？
A. 8至10小時
B. 24至30小時
C. 40至50小時
D. 70至80小時
答案： D.

科目： 292006
知能類： K1.12 [2.8/2.3]
序號： B2159 (P1063)

A reactor has been operating at 100% power for three weeks when a reactor scram occurs. Which one of the following describes the concentration of Xe-135 in the core 24 hours after the scram?
A. At least 2 times the concentration at the time of the scram and decreasing
B. Less than 1/2 the concentration at the time of the scram and decreasing
C. At or approaching a peak value
D. Approximately the same as at the time of the scram
ANSWER: D.

反應器在100%功率下運轉三週，發生反應器急停。下列何者正確地描述了在急停24小時後，爐心內的Xe-135濃度？
A. 至少是急停時的兩倍，並且逐漸減小
B. 不到急停時的二分之一，並且逐漸減小
C. 位於或接近峰值
D. 大約與急停時相等
答案： D.

科目： 292006
知能類： K1.12 [2.8/2.3]
序號： B2262 (P2462)

Twenty-four hours after a reactor scram from a long-term, steady-state, 100% power run, the core xenon-135 concentration will be approximately...
A. the same as at the time of the scram and decreasing.
B. the same as at the time of the scram and increasing.
C. 50% lower than at the time of the scram and decreasing.
D. 50% higher than at the time of the scram and increasing.
ANSWER: A.

反應器在長期穩態100%功率下運轉後發生急停，之後24小時爐心的Xe-135濃度大約
A. 與急停時相等，並且逐漸減小
B. 與急停時相等，並且逐漸增加
C. 較急停時小50%，並且逐漸減小
D. 較急停時大50%，並且逐漸增加
答案： A.

科目： 292006
知能類： K1.12 [2.8/2.3]
序號： B2461 (P2262)

Fourteen hours after a reactor scram from 100% power equilibrium xenon conditions, the amount of core xenon-135 will be...

A. lower than 100% equilibrium xenon, and will have added a net positive reactivity since the scram.
B. lower than 100% equilibrium xenon, and will have added a net negative reactivity since the scram.
C. higher than 100% equilibrium xenon, and will have added a net positive reactivity since the scram.
D. higher than 100% equilibrium xenon, and will have added a net negative reactivity since the scram.

ANSWER: D.

反應器在100%功率平衡氙毒狀況下發生急停，之後14小時爐心內Xe-135的含量將會

A. 小於100%平衡氙毒，並且自急停之後加入淨正反應度
B. 小於100%平衡氙毒，並且自急停之後加入淨負反應度
C. 大於100%平衡氙毒，並且自急停之後加入淨正反應度
D. 大於100%平衡氙毒，並且自急停之後加入淨負反應度

答案： D.

科目： 292006
知能類： K1.12 [2.8/2.3]
序號： B2662 (P2662)

Given:
A reactor had been operating at 100% power for six weeks when a scram occurred.
A reactor startup was performed and criticality was reached 16 hours after the scram.
Two hours later, the reactor is stable at 30% power.
If no operator actions occur during the next hour, reactor power will _____ because core Xe-135 concentration is _____.
A. increase; decreasing
B. increase; increasing
C. decrease; decreasing
D. decrease; increasing
ANSWER: A.

反應器於100%功率運轉六週，此時發生急停。其後進行反應器啟動，並於急停16小時後達到臨界。兩小時後，反應器於30%功率達到穩定。若在之後一小時內運轉員未採取任何動作，則反應器功率將會____，因為爐心Xe-135濃度正在____。
A. 增加；減小
B. 增加；增加
C. 減小；減小
D. 減小；增加
答案： A.

科目： 292006
知能類： K1.12 [2.8/2.3]
序號： B2763 (P2762)

A reactor that had been operating at 100% power for about two months was shutdown over a 2-hour period. Following the shutdown, core xenon-135 will reach a long-term steady-stateconcentration in _____ hours.
A. 8 to 10
B. 20 to 25
C. 40 to 50
D. 70 to 80
ANSWER: D.

反應器於100%功率下運轉兩個月，然後在兩小時內進行停機。在停機之後，爐心內Xe-135將會在____小時後達到長期穩態濃度。
A. 8至10
B. 20至25
C. 40至50
D. 70至80
答案： D.

科目： 292006
知能類： K1.13 [2.6/2.6]
序號： B63

If a reactor that has operated at 100% power for 10 days is shut down rapidly, xenon concentration will...
A. slowly decay away to almost zero in 3 days.
B. increase to a new equilibrium in 3 days.
C. peak in about a half day, then decay to almost zero in 3 days.
D. ramp down with reactor power.
ANSWER: C.

若反應器於100%功率運轉10天，然後快速停機，氙毒濃度將會
A. 在3天內緩慢衰退至接近零
B. 在3天內增加到新平衡值
C. 在半天內達到峰值，然後在3天內衰退至接近零
D. 隨反應器功率平滑降低
答案： C.

科目： 292006
知能類： K1.13 [2.6/2.6]
序號： B1463

Which one of the following describes a reason for the direction of change in core xenon-135 reactivity immediately after a reactor shutdown from long-term power operation?
A. The production rate of Xe-135 from I-135 decay significantly decreases.
B. The production rate of Xe-135 from fission significantly decreases.
C. The removal rate of Xe-135 by decay to I-135 significantly decreases.
D. The removal rate of Xe-135 by neutron absorption significantly decreases.
ANSWER: D.

反應器在長期功率運轉後停機，下列何者正確地描述了停機後爐心內Xe-135反應度立即變化的原因？
A. 由碘-135衰變而生之Xe-135的產生率顯著減小
B. 由分裂而生之Xe-135的產生率顯著減小
C. Xe-135衰變至碘-135之Xe-135移除率顯著減小
D. 被中子吸收之Xe-135移除率顯著減小
答案： D.

科目： 292006
知能類： K1.14 [3.1/3.2]
序號： B56

A reactor has been shut down for two weeks after six months of full power operation. A reactor startup is performed and reactor power is stabilized at 10%. What control rod movement is required to maintain 10% stable power over the next 2 hours?
A. Small amounts of rod insertion to compensate for samarium depletion.
B. Small amounts of rod withdrawal to compensate for samarium buildup.
C. Small amounts of rod insertion to compensate for xenon burnout.
D. Small amounts of rod withdrawal to compensate for xenon buildup.
ANSWER: D.

反應器在六個月全功率運轉後，停機兩週。而後反應器啟動，同時反應器穩定在10%功率。欲在之後2小時內維持10%的穩定功率，則需要如何移動控制棒？
A. 小量的控制棒插入，以補償Sm的燃耗
B. 小量的控制棒抽出，以補償Sm的累積
C. 小量的控制棒插入，以補償Xe的燃耗
D. 小量的控制棒抽出，以補償Xe的累積
答案： D.

科目： 292006
知能類： K1.14 [3.1/3.2]
序號： B62

A reactor that has been operating at 100% power for about two weeks has power reduced to 50% in 1 hour. To compensate for the change in xenon-135 during the next 4 hours, the operator must add...
A. negative reactivity to compensate for xenon building in.
B. negative reactivity because xenon is rapidly decaying away.
C. positive reactivity to compensate for xenon building in.
D. positive reactivity because xenon is rapidly decaying away.
ANSWER: C.

反應器在100%功率下運轉兩週，然後在1小時內下降至50%功率。為了補償Xe-135在之後4小時內的改變，運轉員應該加入
A. 負反應度，以補償氙毒的累積
B. 負反應度，因為氙的迅速衰變
C. 正反應度，以補償氙的累積
D. 正反應度，因為氙的快速衰變
答案： C.

科目： 292006
知能類： K1.14 [3.1/3.2]
序號： B263

A reactor has been operating at full power for 10 weeks when a scram occurs. The reactor is made critical 24 hours later, and power level is maintained low in the intermediate range. To maintain a constant power level for the next several hours, control rods must be...
A. inserted, because xenon burnout will cause increased neutron flux peaking near the periphery of the core.
B. maintained at the present height as xenon establishes its equilibrium value for this power level.
C. inserted, because xenon will approximately follow its normal decay curve.
D. withdrawn, because xenon concentration is increasing toward equilibrium.
ANSWER: C.

反應器在全功率下運轉10週後發生急停。此反應器在24小時後達到臨界，而功率維持在中程階低值附近。為了在之後數小時內維持穩定功率，控制棒應該
A. 插入，因為氙毒燃耗將會導致在爐心邊緣附近的中子通量峰值增加
B. 維持在目前的高度，因為氙毒在此功率下建立其平衡值
C. 插入，因為氙毒將會約略遵循其正常衰變曲線減少
D. 抽出，因為氙毒濃度正朝著平衡增加
答案： C.

科目： 292006
知能類： K1.14 [3.1/3.2]
序號： B363 (P2260)

A reactor is initially shut down with no xenon in the core. The reactor is taken critical and 4 hours later power is in the middle of the intermediate range monitors, range 8. The maintenance department has asked that power be maintained constant at this level for approximately 12 hours. To accomplish this, control rods will have to be...
A. withdrawn slowly for the duration of the 12 hours.
B. inserted slowly for the duration of the 12 hours.
C. withdrawn slowly for 4 to 6 hours, then inserted slowly.
D. inserted slowly for 4 to 6 hours, then withdrawn slowly.
ANSWER: A.

反應器一開始處於停機狀態，且爐心無氙毒。然後將反應器啟動達到臨界，4小時後功率在中程階中子偵檢器的中央第8階。維修部門要求穩定維持在此功率約12小時。為了達成此目標，控制棒必須
A. 於此12小時中緩慢抽出
B. 於此12小時中緩慢插入
C. 於4至6小時中緩慢抽出，然後緩慢插入
D. 於4至6小時中緩慢插入，然後緩慢抽出
答案： A.

科目： 292006
知能類： K1.14 [3.1/3.2]
序號： B461

Four hours after a reactor scram from a long-term, steady-state, 100% power run, the reactor has been taken critical and is to be maintained at 1% to 2% power. Which one of the following operator actions is required?
A. Add positive reactivity because xenon is building in
B. Add negative reactivity because xenon is building in
C. Add negative reactivity because xenon is decaying away
D. Add positive reactivity because xenon is decaying away
ANSWER: A.

反應器於100%長期穩態功率運轉後發生急停，其後四小時此反應器達到臨界，並維持在1%至2%功率。運轉員必須採取下列何種動作？
A. 加入正反應度，因為氙毒正在累積
B. 加入負反應度，因為氙毒正在累積
C. 加入負反應度，因為氙毒正在衰變
D. 加入正反應度，因為氙毒正在衰變
答案： A.

科目： 292006
知能類： K1.14 [3.1/3.2]
序號： B964 (P2262)

Sixteen hours after a reactor scram from 100% power, equilibrium xenon condition, the amount of core xenon will be...

A. lower than 100% equilibrium xenon, and will have added a net positive reactivity since the scram.
B. higher than 100% equilibrium xenon, and will have added a net positive reactivity since the scram.
C. lower than 100% equilibrium xenon, and will have added a net negative reactivity since the scram.
D. higher than 100% equilibrium xenon, and will have added a net negative reactivity since the scram.

ANSWER: D.

反應器在100%功率、平衡氙毒狀況下發生急停，之後16小時，爐心氙毒含量將會

A. 小於100%平衡氙毒，並且自急停之後，加入淨正反應度
B. 大於100%平衡氙毒，並且自急停之後，加入淨正反應度
C. 小於100%平衡氙毒，並且自急停之後，加入淨負反應度
D. 大於100%平衡氙毒，並且自急停之後，加入淨負反應度

答案： D.

科目： 292006
知能類： K1.14 [3.1/3.2]
序號： B1164

A reactor is operating at 100% power with equilibrium xenon conditions at the beginning of a fuel cycle when a reactor scram occurs. The reactor is taken critical 4 hours later. Which one of the following describes the effect of xenon on control rod worth when the reactor becomes critical?

A. Increasing xenon concentration at the periphery of the core will cause periphery rods to exhibit high-worth characteristics.
B. Peak thermal flux at the periphery of the core will cause periphery rods to exhibit high-worth characteristics.
C. Peak thermal flux at the center of the core will cause center rods to exhibit high-worth characteristics.
D. Decreasing xenon concentration at the center of the core will cause center control rods to exhibit high-worth characteristics.

ANSWER: B.

反應器在燃料週期初期、平衡氙毒狀況下於100%功率運轉，此時發生反應器急停。此反應器4小時後達到臨界。下列何者正確地描述了在反應器臨界時，氙毒對控制棒本領的影響？

A. 增加爐心邊緣氙毒濃度將會導致邊緣控制棒呈現高本領特徵
B. 在爐心邊緣的峰值熱通量將會導致邊緣控制棒呈現高本領特徵
C. 在爐心中央的峰值熱通量將會導致中央控制棒呈現高本領特徵
D. 降低爐心中央氙毒濃度將會導致中央控制棒呈現高本領特徵

答案： B.

科目： 292006
知能類： K1.14 [3.1/3.2]
序號： B1663

A reactor is initially operating at 50% power with equilibrium core xenon-135. Power is increased to 75% over a 1 hour period with no subsequent operator actions. Considering only the reactivity effects of core xenon-135 changes, which one of the following describes reactor power 8 hours after the power change?
A. Greater than 75% and decreasing slowly
B. Greater than 75% and increasing slowly
C. Lower than 75% and decreasing slowly
D. Lower than 75% and increasing slowly
ANSWER: A.

反應器起初在50%功率之爐心Xe-135平衡狀況下運轉。在一小時期間內增加至75%功率，運轉員未採取任何動作。只考慮爐心內Xe-135改變所產生的反應度效應，下列何者正確地描述了在功率改變完成經8小時後之反應器功率？
A. 大於75%，並且緩慢減小
B. 大於75%，並且緩慢增加
C. 小於75%，並且緩慢減小
D. 小於75%，並且緩慢增加
答案： A.

科目： 292006
知能類： K1.14 [3.1/3.2]
序號： B1762

A reactor is operating at 100% power with equilibrium xenon conditions at the beginning of a fuel cycle when a reactor scram occurs. The reactor is taken critical 4 hours later. Which one of the following describes the effect of core xenon-135 on control rod worth when the reactor becomes critical?

A. High xenon-135 concentration at the periphery of the core will cause periphery rods to exhibit relatively high-worth characteristics.
B. High xenon-135 concentration at the periphery of the core will cause central rods to exhibit relatively high-worth characteristics.
C. High xenon-135 concentration at the center of the core will cause peripheral rods to exhibit relatively high-worth characteristics.
D. High xenon-135 concentration at the center of the core will cause central rods to exhibit relatively high-worth characteristics.

ANSWER: C.

反應器在燃料週期初期、平衡氙毒狀況下於100％功率運轉，此時發生反應器急停。此反應器4小時後達到臨界。下列何者正確地描述了反應器臨界時，爐心Xe-135對控制棒本領的影響？

A. 爐心邊緣Xe-135的高濃度將會導致邊緣控制棒呈現相對的高本領特徵
B. 爐心邊緣Xe-135的高濃度將會導致中央控制棒呈現相對的高本領特徵
C. 爐心中央Xe-135的高濃度將會導致邊緣控制棒呈現相對的高本領特徵
D. 爐心中央Xe-135的高濃度將會導致中央控制棒呈現相對的高本領特徵

答案： C.

科目： 292006
知能類： K1.14 [3.1/3.2]
序號： B1862 (P361)

A plant has been operating at 100% power for two months when a reactor scram occurs. Shortly after the reactor scram a reactor startup is commenced. Six hours after the scram, reactor power is at 2%. To maintain power stable at 2% over the next hour, the operator must add...
A. positive reactivity because core xenon-135 is building up.
B. negative reactivity because core xenon-135 is building up.
C. positive reactivity because core xenon-135 is decaying away.
D. negative reactivity because core xenon-135 is decaying away.
ANSWER: A.

反應器於100%功率下運轉兩個月，此時發生急停。急停發生不久此反應器準備進行啟動，急停後六小時，反應器功率為2%。為了在之後一小時內維持功率穩定於2%，則運轉員應該加入
A. 正反應度，因為爐心Xe-135正在累積
B. 負反應度，因為爐心Xe-135正在累積
C. 正反應度，因為爐心Xe-135正在衰變
D. 負反應度，因為爐心Xe-135正在衰變
答案： A.

科目： 292006
知能類： K1.14 [3.1/3.2]
序號： B2062

A reactor is initially operating at 100% power with equilibrium core xenon-135. Power is decreased to 75% over a 1-hour period and stabilized. No subsequent operator actions are taken. Considering only the reactivity effects of core xenon-135 changes, which one of the following describes reactor power 10 hours after the power change?
A. Greater than 75% and decreasing slowly
B. Greater than 75% and increasing slowly
C. Less than 75% and decreasing slowly
D. Less than 75% and increasing slowly
ANSWER: D.

反應器起初在100%功率之爐心Xe-135平衡狀況下運轉，功率在一小時內降低至75%並達到穩定，且運轉員未採取任何動作。只考慮爐心內Xe-135改變所產生的反應度效應，下列何者正確地描述了在功率改變完成經10小時後之反應器功率？
A. 大於75%，並且緩慢減小
B. 大於75%，並且緩慢增加
C. 小於75%，並且緩慢減小
D. 小於75%，並且緩慢增加
答案： D.

科目： 292006
知能類： K1.14 [3.1/3.2]
序號： B2263 (N/A)

A reactor is operating at 80% power following a power reduction from 100% over a one-hour period. To keep reactor power at 80% over the next three hours, the operator must _____ control rods or _____ reactor recirculation flow rate.
A. insert; increase
B. insert; decrease
C. withdraw; increase
D. withdraw; decrease
ANSWER: C.

反應器在一小時內從100%功率降載至80%功率運轉。為了之後三小時維持反應器功率在80%，運轉員應該_____控制棒或者_____反應器再循環流量。
A. 插入；增加
B. 插入；減小
C. 抽出；增加
D. 抽出；減小
答案： C.

科目： 292006
知能類： K1.14 [3.1/3.2]
序號： B2964 (P2963)

A reactor is operating at 60% power immediately after a one-hour power increase from equilibrium 40% power. To keep reactor power at 60% over the next two hours, the operator must _____ control rods or _____ reactor recirculation flow rate.
A. insert; increase
B. insert; decrease
C. withdraw; increase
D. withdraw; decrease
ANSWER: B.

反應器在一小時內，從40%平衡功率瞬速增加至60%功率運轉。為了之後兩小時內維持反應器功率在60%，運轉員應該_____控制棒或者_____反應器再循環流量。
A. 插入；增加
B. 插入；減小
C. 抽出；增加
D. 抽出；減小
答案： B.

科目： 292006
知能類： K1.14 [3.1/3.2]
序號： B3063

A reactor is initially operating at 100% power with equilibrium core xenon-135. Power is decreased to 75% over a 1-hour period and stabilized. No subsequent operator actions are taken. Considering only the reactivity effects of core xenon-135 changes, which one of the following describes reactor power 30 hours after the power change?
A. Less than 75% and increasing slowly
B. Less than 75% and decreasing slowly
C. Greater than 75% and increasing slowly
D. Greater than 75% and decreasing slowly
ANSWER: C.

反應器起初在100%功率之爐心Xe-135平衡狀況下運轉，功率在一小時內降低至75%並達到穩定，且運轉員未採取任何動作。只考慮爐心內Xe-135改變所產生的反應度效應，下列何者正確地描述了在功率改變完成經30小時後之反應器功率？
A. 小於75%，並且緩慢增加
B. 小於75%，並且緩慢減小
C. 大於75%，並且緩慢增加
D. 大於75%，並且緩慢減小
答案： C.

科目： 292006
知能類： K1.14 [3.1/3.2]
序號： B3563 (P3563)

A plant had been operating at 100% power for two months when a reactor scram occurred. Soon afterward, a reactor startup was performed. Twelve hours after the scram, the startup has been paused with reactor power at 2%.
To maintain reactor power stable at 2% over the next hour, the operator must add _____ reactivity because core xenon-135 concentration will be _____.
A. positive; increasing.
B. negative; increasing.
C. positive; decreasing.
D. negative; decreasing.
ANSWER: D.

電廠在100%功率下運轉兩個月，此時發生反應器急停。不久之後，反應器進行啟動，急停後12小時反應器功率為2%。為了維持之後一小時內反應器功率仍穩定於2%，運轉員應該加入_____反應度，因為爐心Xe-135濃度將會_____。
A. 正；增加
B. 負；增加
C. 正；減少
D. 負；減少
答案： D.

科目： 292006
知能類： K1.14 [3.1/3.2]
序號： B3863

A nuclear power plant has been operating at steady-state 100% reactor power for three weeks when the operator slowly adds negative reactivity to the core over a period of 15 minutes to lower power level to 90%. Which one of the following describes reactor power 60 minutes later if no additional operator action is taken?
A. Higher than 90% and increasing slowly.
B. Higher than 90% and decreasing slowly.
C. Lower than 90% and increasing slowly.
D. Lower than 90% and decreasing slowly.
ANSWER: D.

核能電廠在100％穩態功率下運轉三週，此時運轉員在15分鐘內對爐心緩慢加入負反應度，將功率降低至90％。若運轉員未採取任何動作，則下列何者正確地描述了60分鐘後的反應器功率？
A. 高於90％，並緩慢增加
B. 高於90％，並緩慢減少
C. 低於90％，並緩慢增加
D. 低於90％，並緩慢減少
答案： D.

科目： 292007
知能類： K1.01 [2.9/3.1]
序號： B64

What is the definition of a "burnable poison?"
A. Isotopes manufactured into the fuel with large-scatter macroscopic cross sections to improve neutron thermalization.
B. Thermal neutron absorbing material added to the fuel during manufacturing to increase initial core fuel load.
C. Thermal neutron absorbing material produced in the non-fissionable fuel isotopes by fast neutron absorption.
D. Fast neutron absorbing material loaded into the upper one-third of the core to aid in flattening the thermal neutron flux.
ANSWER: B.

「可燃毒物」的定義為何？
A. 加入燃料中具有大散射巨觀截面的同位素，以提升中子熱化能力。
B. 在製造燃料時所加入的熱中子吸收材料，以增加初始爐心裝填的燃料量。
C. 在非可分裂燃料同位素中，因快中子吸收而產生的熱中子吸收材料。
D. 加在爐心上層三分之一的快中子吸收材料，用來平坦熱中子通量。
答案：B.

科目： 292007
知能類： K1.01 [2.9/3.1]
序號： B136
Burnable poisons are placed in a reactor core to...
A. increase the amount of fuel that can be loaded into the core.
B. accommodate control rod depletion that occurs over core life.
C. compensate for the buildup of xenon-135 that occurs over core life.
D. ensure that the reactor will always operate in an undermoderated condition.
ANSWER: A.

在反應爐爐心中加入可燃毒物可以____。
A. 增加加入爐心中的燃料量
B. 補償在爐心壽命中燃耗的控制棒
C. 抵銷在爐心壽命中累積的氙-135
D. 確保反應爐會一直在欠緩和(undermoderated)狀態下運轉
答案：A.

科目： 292007
知能類： K1.01 [2.9/3.1]
序號： B264
Burnable poisons are loaded into the core to...
A. reduce the rod shadowing effect between shallow rods early in core life.
B. provide for flux shaping in areas of deep rods during high power operation.
C. increase the excess reactivity that can be loaded into the core during refueling.
D. ensure the moderator coefficient of reactivity remains negative throughout core life.
ANSWER: C.

在反應爐心加入可燃毒物可以____。
A. 在爐心壽命初期降低淺棒間的棒影屏效應(rod shadowing effect)
B. 在高功率運轉期間提供深棒區的中子通量整形(flux shaping)
C. 提高在更換燃料時加入爐心的過剩反應度
D. 確保在爐心壽命週期，反應度中的緩和劑係數會保持在負值
答案： C.

科目： 292007
知能類： K1.01 [2.9/3.1]
序號： B364 (P362)
Which one of the following is not a function performed by burnable poisons in an operating reactor?
A. Provide neutron flux shaping.
B. Provide more uniform power density.
C. Counteract the effects of control rod burnout.
D. Allow higher fuel enrichment of initial core load.
ANSWER: C.

下列何者並非可燃毒物在運轉中反應爐內的功用？
A. 提供中子通量整形(flux shaping)
B. 提供更均勻的功率密度
C. 抵消控制棒的燃耗
D. 讓初始爐心裝填較高濃縮度的燃料
答案：C.

科目： 292007
知能類： K1.01 [2.9/3.1]
序號： B1265
Gadolinium (Gd-155 and -157) is used instead of boron (B-10) as the _____ material; and, as compared to gadolinium, boron has a much _____ cross section for absorbing thermal neutrons.
A. control rod; larger
B. burnable poison; larger
C. control rod; smaller
D. burnable poison; smaller
ANSWER: D.

鎘元素 (Gd-155和-157)是用來取代硼(B-10)，成為____的原料；和鎘相比，硼的熱中子吸收截面比較____。
A. 控制棒；大
B. 可燃毒物；大
C. 控制棒；小
D. 可燃毒物；小
答案：D.

科目： 292007
知能類： K1.01 [2.9/3.1]
序號： B2564 (P2164)
Why are burnable poisons installed in a reactor core?
A. To shield reactor fuel from thermal neutron flux until later in core life
B. To compensate for control rod burnout that occurs over core life
C. To flatten the radial thermal neutron flux distribution at the end of core life
D. To ensure a negative moderator temperature coefficient early in core life
ANSWER: A.

為何要在反應爐爐心中安裝可燃毒物？
A. 提供反應爐燃料熱中子屏障，直到爐心壽命末期
B. 抵消爐心壽命中發生的控制棒燃耗
C. 要在爐心壽命末期平坦徑向熱中子的通量分布
D. 要確保爐心壽命初期的緩和劑溫度係數為負
答案：A.

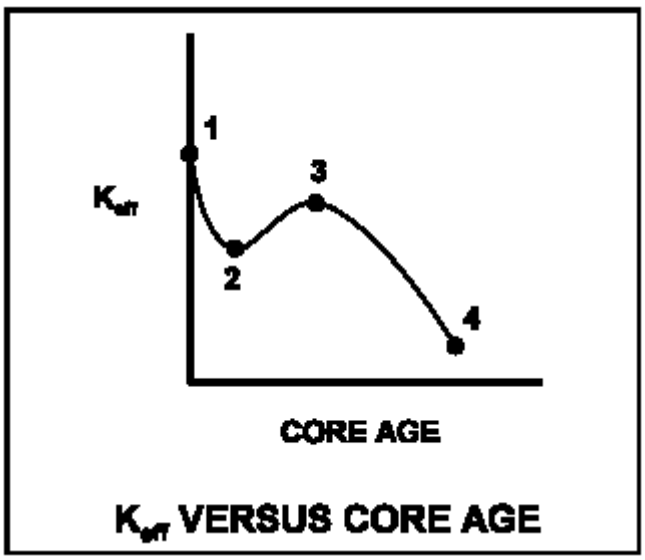
科目： 292007
知能類： K1.03 [2.4/2.7]
序號： B564 (P264)
Just prior to refueling, control rods are nearly fully withdrawn at 100% power. After refueling, the control rods are inserted much farther into the core at 100% power.
Which one of the following is the primary reason for the change in full power control rod position?
A. Reactivity from power defect at beginning of core life (BOL) is much greater than at end of core life (EOL).
B. Reactivity from void coefficient at EOL is much greater than at BOL.
C. The excess reactivity in the core at BOL is much greater than at EOL.
D. The integral control rod worth at EOL is much greater than at BOL.
ANSWER: C.

填換燃料之前，在100%功率時要將控制棒接近完全抽出。填換燃料之後，在100%功率時，要將控制棒更加深入的插入爐心內。
下列何者為上述兩種全功率運轉時控制棒位置改變的主要原因？
A. 來自功率欠缺的反應度在爐心壽命初期（BOL）比在爐心壽命末期（EOL）大的多。
B. 來自空泡係數的反應度在爐心壽命末期比在爐心壽命初期大的多。
C. 爐心的過剩反應度在爐心壽命初期比在爐心壽命末期大的多。
D. 積分控制棒本領在爐心壽命末期比在爐心壽命初期大的多。
答案：C.

科目： 292007
知能類： K1.03 [2.4/2.7]
序號： B1163 (P1264)
Refer to the drawing of K_{eff} versus core age for a reactor core following a refueling outage (see figure below).
Which one of the following is responsible for the majority of the decrease in K_{eff} from point 1 to point 2?
A. Depletion of fuel
B. Burnout of burnable poisons
C. Initial heat-up of the reactor
D. Buildup of fission product poisons
ANSWER: D.

在填換燃料之後，參考K_{eff}對反應爐爐心壽命圖（見下圖）。
下列何者為導致K_{eff}從點1降到點2的主要原因？
A. 燃料的燃耗
B. 可燃毒物的燃耗
C. 反應爐的起始升溫
D. 分裂產物毒物的累積

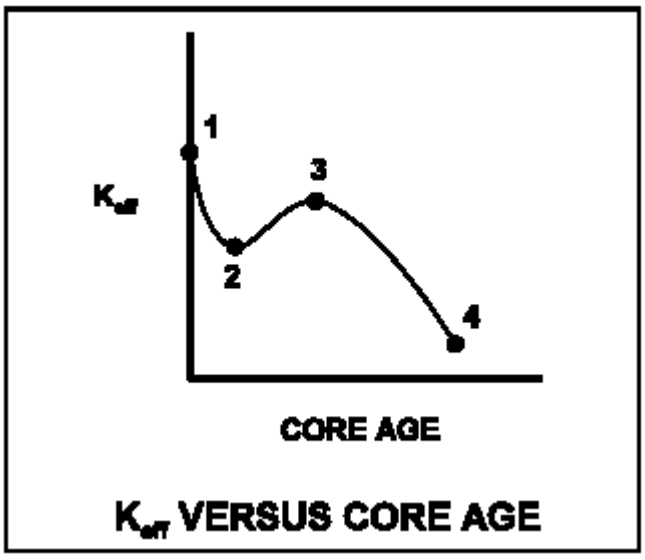
答案：D.



科目： 292007
知能類： K1.03 [2.4/2.7]
序號： B1364 (P1864)
Refer to the drawing of K_{eff} versus core age (see figure below).
The change in K_{eff} from point 2 to point 3 is caused by...
A. depletion of fuel.
B. depletion of control rods.
C. burnout of burnable poisons.
D. burnout of fission product poisons.
ANSWER: C.

參考K_{eff}對爐心壽命圖（見下圖）。
K_{eff}從點2到點3的變化是因____而引起的。
A. 燃料的燃耗
B. 控制棒的燃耗
C. 可燃毒物的燃耗
D. 分裂產物毒物的燃耗

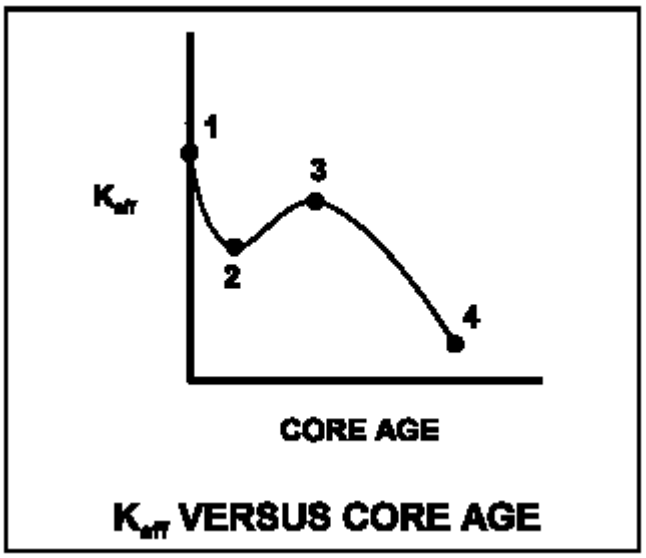
答案：C.



科目： 292007
知能類： K1.03 [2.4/2.7]
序號： B1563 (P1563)
Refer to the drawing of K_{eff} versus core age (see figure below).
The major cause for the change in K_{eff} from point 3 to point 4 is...
A. depletion of U-235.
B. depletion of U-238.
C. burnout of burnable poisons.
D. buildup of fission product poisons.
ANSWER: A.

參考K_{eff}對爐心壽命圖（見下圖）。
K_{eff}從點3到點4的變化主要是因____而引起的。
A. U-235的燃耗
B. U-238的燃耗
C. 可燃毒物的燃耗
D. 分裂產物毒物的累積

答案：A.



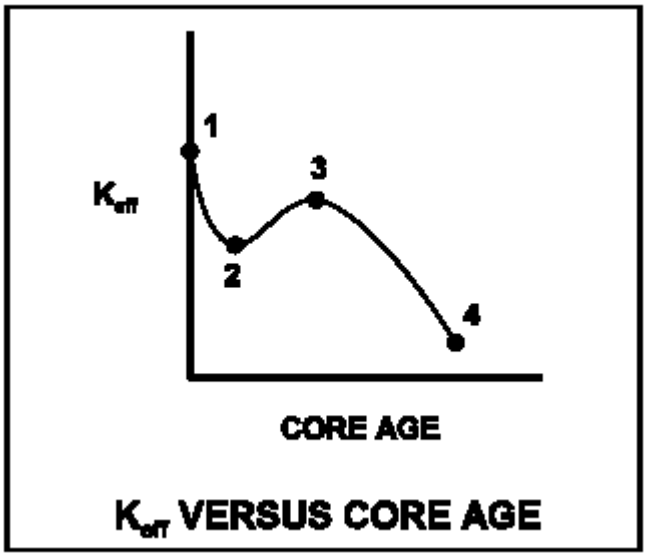
K_{eff} VERSUS CORE AGE

科目： 292007
知能類： K1.03 [2.4/2.7]
序號： B3264

Refer to the curve of K_{eff} versus core age for an operating reactor (see figure below).
The reactor has been operating at 100% power for several weeks and is currently operating between points 2 and 3 on the curve.
Assuming reactor recirculation flow rate remains the same, what general control rod operation will be necessary to maintain the reactor operating at 100% power until point 3 is reached?
A. Withdrawal for the entire period.
B. Withdrawal at first, then insertion.
C. Insertion for the entire period.
D. Insertion at first, then withdrawal.
ANSWER: C.

參考運轉中反應爐的K_{eff}對爐心壽命曲線圖（見下圖）。
該反應爐以100%功率運轉了幾個星期，目前的運轉處於曲線上點2到點3之間。
假設反應爐再循環流量維持不變，要保持反應爐以100%功率運轉一直到點3，需要那一種控制棒操作方式？
A. 整段期間均抽出
B. 先抽出，再插入
C. 整段期間均插入
D. 先插入，再抽出

答案：C.



科目： 292008
知能類： K1.01 [3.8/3.9]
序號： B3365

A nuclear power plant was operating at steady-state 100% power near the end of a fuel cycle when a reactor scram occurred. Reactor pressure is being maintained at 600 psig in anticipation of commencing a reactor startup.
Four hours after the scram, with reactor pressure still at 600 psig, which one of the following will cause the fission rate in the reactor core to increase?
A. Reactor vessel pressure is allowed to increase by 20 psig.
B. Reactor coolant temperature is allowed to increase by $3^{o}F$.
C. The operator fully withdraws the first group of control rods.
D. An additional two hours is allowed to pass with no other changes in plant parameters.
ANSWER: C.

一核能電廠於接近燃料週期末期以100%功率穩定運轉，此時發生反應爐急停。反應爐預期隨即啟動反應爐，反應爐壓力維持在600psig。急停四小時後，反應爐壓力仍然在600psig，下列何者將導致反應爐爐心分裂速率增加？
A. 反應爐壓力增加20psig
B. 反應爐冷卻水溫度增加$3^{o}F$
C. 運轉員將第一群組控制棒完全抽出
D. 在電廠參數無其他改變下，再經過兩小時
答案： C.

科目： 292008
知能類： K1.01 [3.8/3.9]
序號： B3465 (P3464)
A nuclear power plant was operating at steady-state 100% power near the end of a fuel cycle when a reactor scram occurred. Four hours after the scram, reactor pressure is being maintained at 600 psig in anticipation of commencing a reactor startup.
At this time, which one of the following will cause the fission rate in the reactor core to decrease?
A. Core void fraction is decreased by 2%.
B. Reactor coolant temperature is allowed to decrease by $3^{o}F$.
C. The operator fully withdraws the first group of control rods.
D. An additional two hours is allowed to pass with no other changes in plant parameters.
ANSWER: D.

一核能電廠於接近燃料週期末期以100%功率穩定運轉，此時發生反應爐急停。急停四小時後，預期隨即啟動反應爐，反應爐壓力維持在600psig。下列何者將導致反應爐爐心分裂速率降低？
A. 爐心空泡分率減少20%
B. 反應爐冷卻水溫度下降$3^{o}F$
C. 運轉員將第一群組控制棒完全抽出
D. 在電廠參數無其他改變下，再經過兩小時
答案： D.

科目： 292008
知能類： K1.02 [3.8/3.8]
序號： B1065 (N/A)

A refueling outage has just been completed and a reactor startup is being commenced. Which one of the following lists the method(s) used to add positive reactivity during the startup to criticality?
A. Control rods only
B. Recirculation pump flow only
C. Control rods and recirculation pump flow
D. Recirculation pump flow and steaming rate
ANSWER: A.

一反應爐剛完成燃料填換，並開始啟動。下列何者通常用來增加正反應度以達到臨界的方法？
A. 只用控制棒
B. 只用再循環泵流量
C. 控制棒與再循環泵流量
D. 再循環泵流量與蒸汽流量
答案： A.

科目： 292008
知能類： K1.03 [4.1/4.0]
序號： B266 (P65)

While withdrawing control rods during a reactor startup, the count rate doubles. If the same amount of reactivity that caused the first doubling is added again, the count rate will _____ and the reactor will be _____.
A. more than double; subcritical
B. more than double; critical
C. double; subcritical
D. double; critical
ANSWER: B.

當一反應爐啟動時抽出控制棒，其計數率倍增。若再加入同樣的反應度，則計數率將會____，而反應爐將會____。
A. 大於倍增；次臨界
B. 大於倍增；臨界
C. 倍增；次臨界
D. 倍增；臨界
答案： B.

科目： 292008
知能類： K1.03 [4.1/4.0]
序號： B1565 (P1065)

During a reactor startup, equal increments of positive reactivity are being sequentially added and the count rate is allowed to reach equilibrium after each addition. Which one of the following statements concerning the equilibrium count rate applies after each successive reactivity addition?
A. The time required to reach equilibrium count rate is the same.
B. The time required to reach equilibrium count rate is shorter.
C. The numerical change in equilibrium count rate increases.
D. The numerical change in equilibrium count rate is the same.
ANSWER: C.

在一反應爐啟動時，相等增量之正反應度被漸次加入，而在每次加入後均使計數率達到平衡。在漸次加入反應度之後，下列何者是關於平衡計數率的正確說明？
A. 需要達到平衡計數率的時間均相等
B. 需要達到平衡計數率的時間均將漸次縮短
C. 平衡計數率的改變數值漸次增加
D. 平衡計數率的改變數值不變
答案： C.

科目： 292008
知能類： K1.03 [4.1/4.0]
序號： B1766 (P2468)

A reactor startup is in progress with a current K_{eff} of 0.95 and a current equilibrium source range count rate of 150 cps. Which one of the following equilibrium count rates will occur when K_{eff} becomes 0.98?
A. 210 cps
B. 245 cps
C. 300 cps
D. 375 cps
ANSWER: D.

一反應爐正進行啟動，目前K_{eff} 為0.95，平衡源階計數率為150cps。當K_{eff}變成0.98時，平衡計數率將是多少？
A. 210 cps
B. 245 cps
C. 300 cps
D. 375 cps
答案： D.

科目： 292008
知能類： K1.03 [4.1/4.0]
序號： B1964
A reactor startup is in progress and the reactor is slightly subcritical. Assuming the reactor remains subcritical, a short control rod withdrawal will cause the reactor period to initially shorten, and then...
A. gradually lengthen and stabilize at a negative 80 second period.
B. gradually lengthen and stabilize at infinity.
C. gradually lengthen until reactor power reaches the point of adding heat, then stabilize at infinity.
D. gradually lengthen until the neutron population reaches equilibrium, then stabilize at a negative 80 second period.
ANSWER: B.

一反應爐正進行啟動，並處於次臨界。假設反應爐維持次臨界，一控制棒抽出一小段將會導致反應爐週期起初縮短，然後
A. 慢慢延長，並且在負80秒週期達到穩定
B. 慢慢延長，並且在無限大達到穩定
C. 慢慢延長，直到反應爐功率達到加熱點，然後在無限大達到穩定
D. 慢慢延長，直到中子數量達到平衡，然後在負80秒週期達到穩定
答案： B.

科目： 292008
知能類： K1.03 [4.1/4.0]
序號： B2069

A reactor startup is in progress with a current K_{eff} of 0.95 and a current equilibrium source range count rate of 120 cps. Which one of the following equilibrium count rates will occur when K_{eff} becomes 0.98?
A. 210 cps
B. 245 cps
C. 300 cps
D. 375 cps
ANSWER: C.

一反應爐正進行啟動，目前K_{eff} 為0.95，平衡源階計數率為120cps。當K_{eff}變成0.98時，平衡計數率將是多少？
A. 210 cps
B. 245 cps
C. 300 cps
D. 375 cps
答案： C.

科目： 292008
知能類： K1.03 [4.1/4.0]
序號： B2165 (P1766)

A reactor startup is in progress with the reactor currently subcritical.
Which one of the following describes the change in count rate resulting from a short control rod withdrawal with K_{eff} at 0.95 as compared to an identical control rod withdrawal with K_{eff} at 0.99? (Assume reactivity additions are equal, and the reactor remains subcritical.)

A. Both the prompt jump in count rate and the increase in stable count rate will be the same.
B. Both the prompt jump in count rate and the increase in stable count rate will be smaller with K_{eff} at 0.95.
C. The prompt jump in count rate will be smaller with K_{eff} at 0.95, but the increase in stable count rate will be the same.
D. The prompt jump in count rate will be the same, but the increase in stable count rate will be smaller with K_{eff} at 0.95.

ANSWER: B.

一反應爐正進行啟動，並處於次臨界。下列何者描述了在K_{eff} 為0.95時控制棒抽出一小段所導致的計數率變化與K_{eff} 為0.99時進行相同的控制棒抽出的結果相比？（假設反應度加入量均相同，同時反應爐維持次臨界）

A. 計數率的瞬間跳升與穩定計數率的增加均相同
B. K_{eff} 為0.95時之計數率的瞬間跳升與穩定計數率的增加均較小
C. K_{eff} 為0.95時之計數率的瞬間跳升較小，但穩定計數率的增加均相同
D. 計數率的瞬間跳升均相同，但K_{eff} 為0.95時之穩定計數率的增加較小

答案： B.

科目： 292008
知能類： K1.03 [4.1/4.0]
序號： B2365 (P2366)

A reactor startup is in progress with a current K_{eff} of 0.95 and a current stable source range count rate of 120 cps. Which one of the following equilibrium count rates will occur when K_{eff} becomes 0.97?
A. 200 cps
B. 245 cps
C. 300 cps
D. 375 cps
ANSWER: A.

一反應爐正進行啟動，目前K_{eff} 為0.95，穩定之源階計數率為120cps。當K_{eff}變成0.97時，平衡計數率將是多少？
A. 200 cps
B. 245 cps
C. 300 cps
D. 375 cps
答案： A.

科目： 292008
知能類： K1.03 [4.1/4.0]
序號： B2465 (P2466)
A reactor startup is being performed by adding equal amounts of positive reactivity and waiting for neutron population to stabilize. As the reactor approaches criticality, the numerical change in stable neutron population after each reactivity addition _____, and the time required for the neutron population to stabilize after each reactivity addition _____.
A. increases; remains the same
B. increases; increases
C. remains the same; remains the same
D. remains the same; increases
ANSWER： B.

一反應爐正進行啟動，每次加入等量之正反應度，同時等待中子數達到穩定。當反應爐趨近臨界，每次反應度添加後之穩定中子數的數值變化會_____，而每次反應度添加後中子數達到穩定所需的時間會_____。
A. 增加；維持不變
B. 增加；增加
C. 維持不變；維持不變
D. 維持不變；增加
答案： B.

科目： 292008
知能類： K1.03 [4.1/4.0]
序號： B2566

A reactor startup is in progress with a current K_{eff} of 0.95 and a current equilibrium source range count rate of 120 cps. Which one of the following equilibrium count rates will occur when K_{eff} becomes 0.985?
A. 250 cps
B. 300 cps
C. 350 cps
D. 400 cps
ANSWER: D.

一反應爐正進行啟動，目前K_{eff} 為0.95，穩定之源階計數率為120cps。當K_{eff}變成0.985時，平衡計數率將是多少？
A. 250 cps
B. 300 cps
C. 350 cps
D. 400 cps
答案： D.

科目： 292008
知能類： K1.04 [3.3/3.4]
序號： B67

As a reactor approaches criticality during a reactor startup it takes longer to reach an equilibrium neutron count rate after each control rod withdrawal due to the increased...
A. fraction of fission neutrons leaking from the core.
B. number of neutron generations required to reach a stable level.
C. length of time from neutron generation to absorption.
D. fraction of delayed neutrons appearing as criticality is approached.
ANSWER： B.

一反應爐啟動階段接近臨界時，在每次控制棒抽出後，要達到到平衡中子計數率所需要的時間越來越長，其原因是何者的增加？
A. 由爐心洩漏出的分裂中子的分率
B. 為達到到穩定能階所需產生的中子數
C. 中子從產生到吸收的時間長度
D. 當接近臨界時所出現的延遲中子的分率
答案： B.

科目： 292008
知能類： K1.04 [3.3/3.4]
序號： B365 (P365)

A reactor startup is in progress with a stable source range count rate and the reactor is near criticality. Which one of the following statements describes count rate characteristics during and after a 5-second control rod withdrawal? (Assume the reactor remains subcritical.)
A. There will be no change in count rate until criticality is achieved.
B. The count rate will rapidly increase (prompt jump) to a stable higher value.
C. The count rate will rapidly increase (prompt jump) then gradually increase and stabilize at a higher value.
D. The count rate will rapidly increase (prompt jump) then gradually decrease and stabilize at the previous value.
ANSWER： C.

一反應爐於穩定源階計數率下進行啟動，同時反應爐接近臨界。下列何者描述了在控制棒抽出過程中與抽出後五秒之計數率特徵？
A. 計數率沒有改變，直到達到臨界
B. 計數率將會快速增加（瞬間躍升）至穩定的較高值
C. 計數率將會快速增加（瞬間躍升），然後緩慢增加並穩定於一較高值
D. 計數率將會快速增加（瞬間躍升），然後緩慢降低並穩定於其原值
答案： C.

科目： 292008
知能類： K1.04 [3.3/3.4]
序號： B366 (P2265)
During a reactor startup, source range monitors (SRMs) indicate a stable count rate of 100 cps, and K_{eff} is 0.95. After a number of control rods have been withdrawn, SRM indication stabilizes at 270 cps. Which one of the following is the new K_{eff}? (Assume reactor period is infinity before and after the rod withdrawal.)
A. 0.963
B. 0.972
C. 0.981
D. 0.990
ANSWER: C.

在反應爐啟動中，源階偵測器(SRM)指示穩定計數率100cps而K_{eff} 為0.95。在數根控制棒被抽出後，SRM指示穩定於270cps。下列何者乃是新的K_{eff}值？（假設反應爐週期在控制棒抽出前後均為無限大）
A. 0.963
B. 0.972
C. 0.981
D. 0.990
答案： C.

科目： 292008
知能類： K1.04 [3.3/3.4]
序號： B865

During reactor startup, critical rod position is affected by...
A. core flow rate.
B. source range initial count rate.
C. recirculation ratio.
D. core age.
ANSWER： D.

在反應爐啟動中，臨界棒位受到何者的影響？
A. 爐心流量
B. 源階初始計數率
C. 再循環比率
D. 爐心年齡
答案： D.

科目： 292008
知能類： K1.04 [3.3/3.4]
序號： B966

During an initial reactor fuel load, the 1/M factor decreases from 1.0 to 0.5 after the first 100 fuel assemblies are loaded. What is the current value of K_{eff}?
A. 0.2
B. 0.5
C. 0.875
D. 1.0
ANSWER: B.

在反應爐初始燃料裝填中，在最初100個燃料元件裝填後，其1/M 因子從1.0減小至0.5。下列何者是目前的K_{eff}值？
A. 0.2
B. 0.5
C. 0.875
D. 1.0
答案： B.

科目： 292008
知能類： K1.04 [3.3/3.4]
序號： B1067 (P1972)

At one point during a reactor startup and approach to criticality, count rate is noted to be 780 cps, and K_{eff} is calculated to be 0.92. Later in the same startup, count rate is 4160 cps. What is the new K_{eff}?
A. 0.945
B. 0.950
C. 0.975
D. 0.985
ANSWER: D.

在反應爐啟動並趨近臨界時，某點的計數率為780cps，而K_{eff} 計算值為0.92。若稍後計數率達4160cps，下列何者乃是新的K_{eff}值？
A. 0.945
B. 0.950
C. 0.975
D. 0.985
答案： D.

科目： 292008
知能類： K1.04 [3.3/3.4]
序號： B1566 (P266)

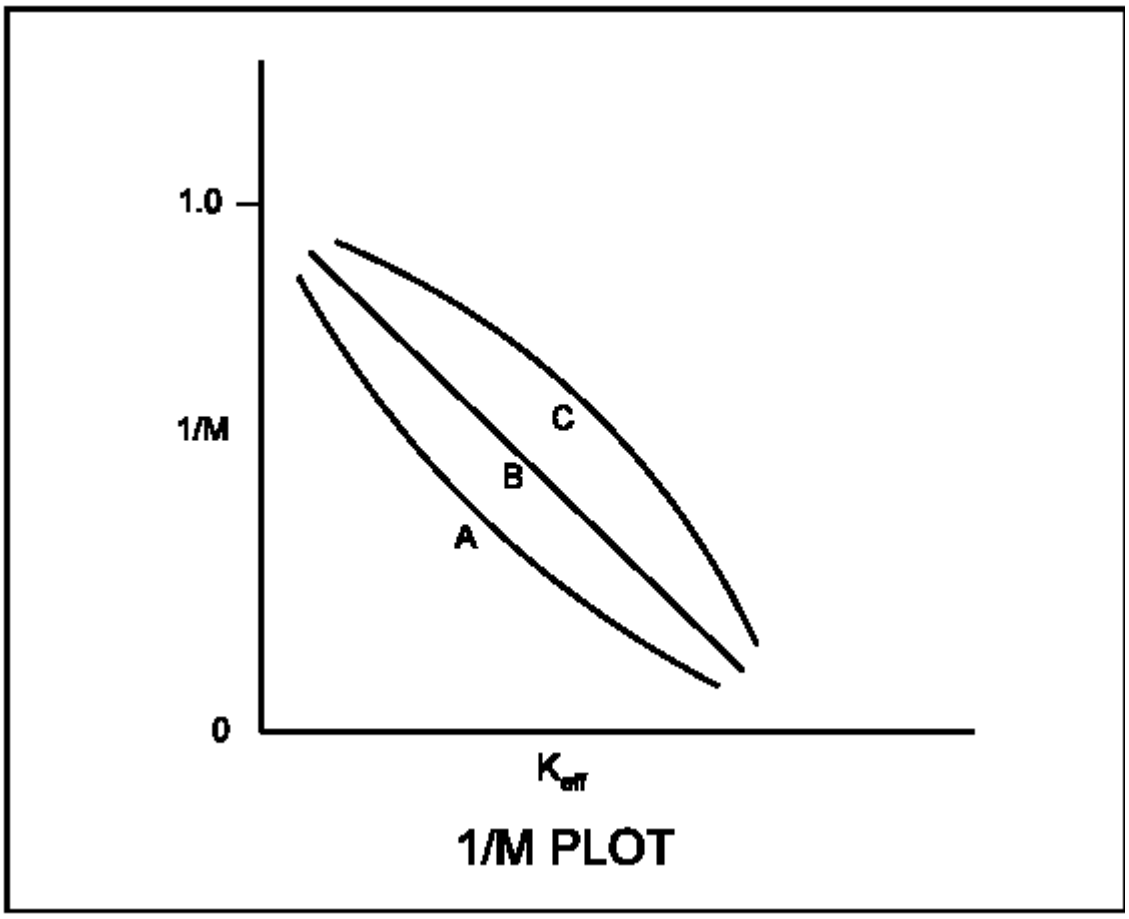
During a reactor startup, the operator adds 1.0%ΔK/K of positive reactivity by withdrawing control rods, thereby increasing equilibrium source range neutron level from 220 cps to 440 cps. Approximately how much additional positive reactivity is required to raise the equilibrium source range neutron level to 880 cps?
A. 4.0% ΔK/K
B. 2.0% ΔK/K
C. 1.0% ΔK/K
D. 0.5% ΔK/K
ANSWER: D.

在反應爐啟動時，運轉員藉由抽出控制棒而加入1.0%ΔK/K的正反應度，因而將平衡源階中子計數率從220cps增加到440cps。則將源階中子計數率增加到880cps所需要再加入之正反應度約為多少？
A. 4.0% ΔK/K
B. 2.0% ΔK/K
C. 1.0% ΔK/K
D. 0.5% ΔK/K
答案： D.

科目： 292008
知能類： K1.04 [3.3/3.4]
序號： B1665 (P1770)

Refer to the drawing of three 1/M plots labeled A, B, and C (see figure below).
The least conservative approach to criticality is represented by plot _____ and could possibly be the result of recording count rates at _____ time intervals after incremental fuel loading steps compared to the situations represented by the other plots.
A. A; shorter
B. A; longer
C. C; shorter
D. C; longer
ANSWER： C.

參考標示為A，B，C的三條1/M曲線圖（見下圖）。圖____表示達到臨界的最不保守方式，而與其他圖所表示的狀況相比，可能是因進行燃料裝填步驟之後以____的時間間隔記錄計數率所致。
A. A；較短
B. A；較長
C. C；較短
D. C；較長
答案： C.



1/M PLOT

科目： 292008
知能類： K1.04 [3.3/3.4]
序號： B1967 (P1265)
During an initial fuel load, the subcritical multiplication factor increases from 1.0 to 4.0 as the first 100 fuel assemblies are loaded. What is the corresponding final k_{eff}?
A. 0.25
B. 0.5
C. 0.75
D. 1.0
ANSWER: C.

燃料裝填時，在最初100個燃料元件裝填後，其次臨界增殖因數從1.0增加至4.0。下列何者是相對應的最終K_{eff}值？
A. 0.25
B. 0.5
C. 0.75
D. 1.0
答案： C.

科目： 292008
知能類： K1.04 [3.3/3.4]
序號： B2167 (P1867)

During a reactor startup, the first reactivity addition caused the count rate to increase from 20 to 40 cps. The second reactivity addition caused the count rate to increase from 40 to 80 cps. Assume k_{eff} was 0.92 prior to the first reactivity addition.
Which one of the following statements describes the magnitude of the reactivity additions?
A. The first reactivity addition was approximately twice as large as the second.
B. The second reactivity addition was approximately twice as large as the first.
C. The first and second reactivity additions were approximately the same.
D. There is not enough data given to determine the relationship between reactivity values.
ANSWER： A.

在一反應爐啟動時，第一次反應度添加導致計數率從20增加至40cps。第二次反應度添加導致計數率從40增加至80cps。假設在第一次反應度添加之前k_{eff}是0.92。下列何者描述了上述兩次反應度添加的大小？
A. 第一次反應度添加量約是第二次的兩倍
B. 第二次反應度添加量約是第一次的兩倍
C. 第一次與第二次反應度添加量大約相等
D. 數據不足無法決定兩次反應度值間的關係
答案： A.

科目： 292008
知能類： K1.04 [3.3/3.4]
序號： B2266
As a reactor approaches criticality during a reactor startup it takes longer to reach an equilibrium neutron count rate after each control rod withdrawal due to the increased...
A. length of time required to complete a neutron generation.
B. number of neutron generations required to reach a stable neutron level.
C. length of time from neutron birth to absorption.
D. fraction of delayed neutrons being produced as criticality is approached.

一反應爐啟動階段接近臨界時，在每次控制棒抽出後，要達到平衡中子計數率所需要的時間越來越長，其原因是何者的增加？
A. 中子產生所需的時間
B. 為達到到穩定中子計數率所需的中子世代數
C. 從中子誕生到被吸收的時間
D. 當接近臨界時所產生的延遲中子分率
答案： B.

科目： 292008
知能類： K1.04 [3.3/3.4]
序號： B2765 (P2766)

During a reactor startup, source range indication is stable at 120 cps with K_{eff} at 0.95. After a period of control rod withdrawal, source range indication stabilizes at 600 cps.
Which one of the following is the approximate new K_{eff}?
A. 0.96
B. 0.97
C. 0.98
D. 0.99
ANSWER: D.

在反應爐啟動中，源階計數穩定於120cps，而K_{eff} 為0.95。在控制棒抽出一段時間後，源階計數穩定於600cps。下列何者乃是新的K_{eff}大約值？
A. 0.96
B. 0.97
C. 0.98
D. 0.99
答案： D.

科目： 292008
知能類： K1.04 [3.3/3.4]
序號： B2966 (P2968)

A reactor startup is in progress; control rod withdrawal has just been stopped to assess criticality. Which one of the following is a combination of indications in which each listed indication supports a declaration that the reactor is critical?

A. Period stabilizes at +200 sec; source range count rate is slowly increasing; inverse multiplication (1/M) value equals 0.000.
B. Period is approaching infinity; source range count rate increases and then stabilizes; inverse multiplication (1/M) value equals 0.111.
C. Period stabilizes at +200 sec; source range count rate is slowly increasing; inverse multiplication (1/M) value equals 1.000.
D. Period is approaching infinity; source range count rate increases and then stabilizes; inverse multiplication (1/M) value equals 1.111.

ANSWER： A.

一反應爐正進行啟動，停止控制棒抽出以評估距離臨界的程度。下列何種組合可用以宣布反應爐已達到臨界？

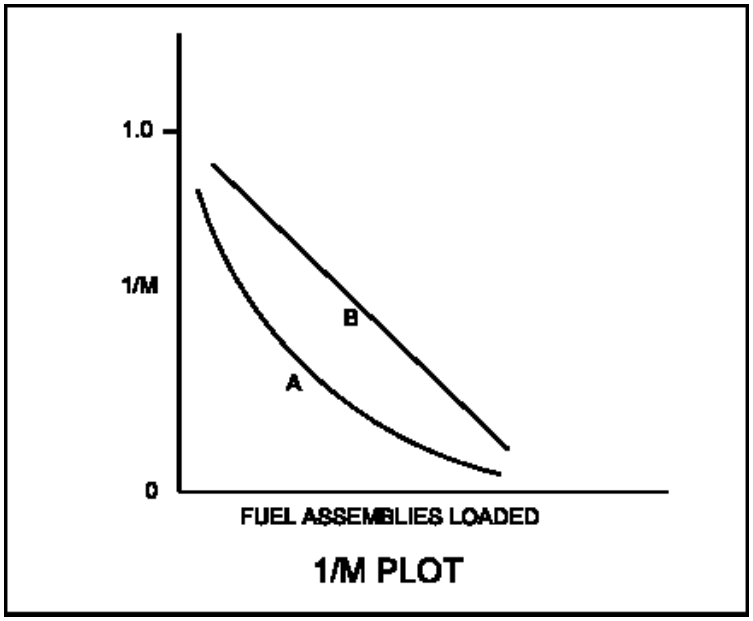
A. 週期穩定於＋200秒；源階計數率緩慢增加；增殖倒數(1/M)值等於0.000
B. 週期趨近於無限大；源階計數率增加並達到穩定；增殖倒數(1/M)值等於0.111
C. 週期穩定於＋200秒；源階計數率緩慢增加；增殖倒數(1/M)值等於1.000
D. 週期趨近於無限大；源階計數率增加並達到穩定；增殖倒數(1/M)值等於1.111

答案： A.

科目： 292008
知能類： K1.04 [3.3/3.4]
序號： B3665 (P3665)

Refer to the drawing of a 1/M plot with curves A and B (see figure below). Assume that each axis has linear units. Curve A would result if each fuel assembly loaded during the early stages of the refueling caused a relatively _____ fractional change in source range count rate compared to the later stages of the refueling; curve B would result if each fuel assembly contained equal _____.
A. small; fuel enrichment
B. small; reactivity
C. large; fuel enrichment
D. large; reactivity
AMSWER： D.

A. 參考具有曲線A與B之1/M 圖（見下圖）。假設兩座標軸均為線性單位。與燃料填換晚期相比較，若在燃料填換初期每個燃料元件的裝填，造成源階計數率較____比例的改變，則會得到曲線A；若每個燃料元件包含相等之____，則會得到曲線B。小；燃料濃縮度
B. 小；反應度
C. 大；燃料濃縮度
D. 大；反應度
答案： D.



科目： 292008
知能類： K1.05 [4.3/4.3]
序號： B267

A reactor startup is in progress with K_{eff} at 0.995 and stable source range indication. If K_{eff} is increased to 0.997 by control rod withdrawal, reactor period will initially become _____ and then _____.
A. positive; approach infinity
B. positive; stabilize at a positive value
C. negative; approach infinity
D. negative; stabilize at a negative value
ANSWER： A.

一反應爐在K_{eff} 為0.995與穩定源階計數狀況下進行啟動。若K_{eff} 藉由控制棒抽出而增加至0.997，則反應週期起初會變為_____，其後會_____。
A. 正；趨近無限大
B. 正；在正值達到穩定
C. 負；趨近無限小
D. 負；在負值達到穩定
答案： A.

科目： 292008
知能類： K1.05 [4.3/4.3]
序號： B1365 (P267)

As criticality is approached during a reactor startup, equal insertions of positive reactivity result in a _____ change in equilibrium count rate and a _____ time to reach each new equilibrium.
A. larger; longer
B. larger; shorter
C. smaller; longer
D. smaller; shorter
ANSWER： A.

於反應爐啟動中趨於臨界時，加入等量的正反應度會導致_____平衡計數率的改變，同時每次達到新平衡所需時間_____。
A. 較大；較長
B. 較大；較短
C. 較小；較長
D. 較小；較短
答案： A.

科目： 292008
知能類： K1.05 [4.3/4.3]
序號： B3566 (P3567)
A reactor startup is in progress for a reactor that is in the middle of a fuel cycle. The reactor is at normal operating temperature and pressure. The main steam isolation valves are open and the main turbine bypass (also called steam dump) valves are closed. The reactor is near criticality. Reactor period is stable at infinity when, suddenly, a turbine bypass valve fails open and remains stuck open, dumping steam to the main condenser. The operator immediately ensures no control motion is occurring and takes no further action. Assume that the reactor vessel water level remains stable, the reactor does not scram, and no other protective actions occur. As a result of the valve failure, reactor period will initially become _____; and reactor power will stabilize _____ the point of adding heat.
A. positive; at
B. positive; above
C. negative, but soon turn; at
D. negative, but soon turn; above
ANSWER： D.

一處於燃料循環週期中期的反應爐進行啟動。此反應爐在正常溫度壓力下運轉。主蒸汽隔離閥開啟，而主汽機旁通閥關閉。此反應爐接近臨界，反應爐週期穩定於無限大，此時突然間，汽機旁通閥因故障無法開啟而卡在開啟位置，將蒸汽排入主冷凝器；運轉員立即確認無控制動作正在進行，並且未採取額外動作。假設反應爐水位維持穩定，反應爐並未急停，同時沒有其他保護動作發生。因閥失效而產生的結果，反應爐週期將會先變成_____；而反應爐功率將會_____加熱點處達到穩定。
A. 正值；在
B. 正值；在高於
C. 負值，但是很快會反轉；在
D. 負值，但是很快會反轉；在高於
答案： D.

科目： 292008
知能類： K1.06 [4.2/4.2]
序號： B1267

A reactor is exactly critical during a reactor startup. Which one of the following must be closely monitored and controlled to ensure safe operation of the reactor as power is raised to the point of adding heat?
A. Reactor period
B. Reactor temperature
C. Source range count rate
D. Power peaking factors
ANSWER： A.

一反應爐於啟動階段正處於臨界。下列何者需要仔細監控，以確保功率提高至加熱點時反應爐能安全運轉？
A. 反應爐週期
B. 反應爐溫度
C. 源階計數率
D. 功率尖峰因數
答案： A.

科目： 292008
知能類： K1.06 [4.2/4.2]
序號： B1567 (P1667)
The following data was obtained at steady-state conditions during a reactor startup:

ROD POSITION (UNITS WITHDRAWN)	COUNT RATE (CPS)
0	180
5	200
10	225
15	257
20	300
25	360
30	450

Assuming uniform differential rod worth, at what approximate rod position should criticality occur?
A. Approximately 40 units withdrawn
B. Approximately 50 units withdrawn
C. Approximately 60 units withdrawn
D. Approximately 70 units withdrawn
ANSWER： B.

一反應爐在啟動過程中，得到如下穩態數據

控制棒位置（單位抽出）	計數率（CPS）
0	180
5	200
10	225
15	257
20	300
25	360
30	450

假設微分控制棒本領平均分佈，則臨界時控制棒之位置為何？
A. 約40單位抽出
B. 約50單位抽出
C. 約60單位抽出
D. 約70單位抽出
答案： B.
科目： 292008
知能類： K1.06 [4.2/4.2]
序號： B1767 (P1966)

The following data was obtained at steady-state conditions during a reactor startup:

ROD POSITION (UNITS WITHDRAWN)	COUNT RATE (CPS)
10	360
15	400
20	450
25	514
30	600
35	720
40	900

Assuming uniform differential rod worth, at what approximate rod position will criticality occur?

A. 50 units withdrawn

B. 60 units withdrawn

C. 70 units withdrawn

D. 80 units withdrawn

ANSWER： B.

在一反應爐於啟動過程中，得到如下穩態數據

控制棒位置（單位抽出）	計數率（CPS）
10	360
15	400
20	450
25	514
30	600
35	720
40	900

假設微分控制棒本領平均分佈，則臨界時控制棒之位置為何？

A. 約50單位抽出

B. 約60單位抽出

C. 約70單位抽出

D. 約80單位抽出

答案： B.

科目： 292008
知能類： K1.06 [4.2/4.2]
序號： B1866

A reactor has just achieved criticality during a xenon-free reactor startup. Instead of stabilizing power at 10_3 cps per the startup procedure, the operator inadvertently allows reactor power to increase to 10_4 cps as indicated on the source range monitors.
Assuming reactor vessel coolant temperature and pressure do not change, the critical rod height at 10_4 cps will be _____ the critical rod height at 10_3 cps. (Neglect any effects of changes in fission product poisons.)
A. different but unpredictable compared to
B. less than
C. greater than
D. equal to
ANSWER： D.

一反應爐在無氙反應爐啟動中達到臨界。運轉員並沒有依啟動程序使功率穩定於10^3 cps之數值，而在不小心情況下，使反應爐功率增加至源階偵測器上所顯示之10^4 cps。假設反應爐冷卻水溫度與壓力不變，則10^4 cps時之臨界控制棒抽出位置會_____10^3 cps時之臨界控制棒抽出位置。（忽略分裂產物毒物改變而產生的任何效應。）
A. 不同於，但卻無法比較
B. 小於
C. 大於
D. 等於
答案： D.

科目： 292008
知能類： K1.06 [4.2/4.2]
序號： B2767 (P1167)

The following data was obtained during a reactor startup:

ROD POSITION (UNITS WITHDRAWN)	COUNT RATE (CPS)
0	180
10	210
15	250
20	300
25	360
30	420

Assuming uniform differential rod worth, at what approximate rod height will criticality occur?
A. 35 to 45 units withdrawn
B. 46 to 55 units withdrawn
C. 56 to 65 units withdrawn
D. 66 to 75 units withdrawn
ANSWER： B.

在一反應爐於啟動過程中，得到如下數據

控制棒位置（單位抽出）	計數率（CPS）
0	180
10	210
15	250
20	300
25	360
30	420

假設微分控制棒本領平均分佈，則臨界發生時之控制棒位置為何？
A. 35至45單位抽出
B. 46至55單位抽出
C. 56至65單位抽出
D. 66至75單位抽出
答案： B.

科目： 292008
知能類： K1.06 [4.2/4.2]
序號： B2867 (P1167)

The following data was obtained during a reactor startup:

ROD POSITION (UNITS COUNT WITHDRAWN)	RATE (CPS)
0	180
10	210
15	250
20	300
25	360
30	420

Assuming uniform differential rod worth, at what approximate rod height will criticality occur?
A. 31 to 45 units withdrawn
B. 46 to 60 units withdrawn
C. 61 to 75 units withdrawn
D. 76 to 90 units withdrawn
ANSWER： B.

在一反應爐於啟動過程中，得到如下數據

控制棒位置（單位抽出）	計數率（CPS）
0	180
10	210
15	250
20	300
25	360
30	420

假設微分控制棒本領平均分佈，則臨界發生時之控制棒位置為何？
A. 31至45單位抽出
B. 46至60單位抽出
C. 61至75單位抽出
D. 76至90單位抽出
答案： B.

科目： 292008
知能類： K1.07 [3.9/3.9]
序號： B123 (P68)

With K_{eff}= 0.985, how much reactivity must be added to make a reactor exactly critical?
A. 1.54% ΔK/K
B. 1.52% ΔK/K
C. 1.50% ΔK/K
D. 1.48% ΔK/K
ANSWER： B.

當K_{eff}= 0.985時，需要加入多少的反應度方能使反應爐恰好達到到臨界？
A. 1.54% ΔK/K
B. 1.52% ΔK/K
C. 1.50% ΔK/K
D. 1.48% ΔK/K
答案： B.

科目： 292008
知能類： K1.07 [3.9/3.9]
序號： B667

When a reactor is exactly critical, reactivity is...
A. greater than 1.0% ΔK/K.
B. equal to 1.0% ΔK/K.
C. less than 1.0% ΔK/K.
D. undefined.
ANSWER： C.

當一反應爐正處於臨界，其反應度
A. 大於1.0% ΔK/K
B. 等於1.0% ΔK/K
C. 小於1.0% ΔK/K
D. 無定義
答案： C.

科目： 292008
知能類： K1.07 [3.9/3.9]
序號： B867 (P2267)

When a reactor is exactly critical, reactivity is...
A. infinity.
B. undefined.
C. 0.0 ΔK/K.
D. 1.0 ΔK/K.
ANSWER： C.

當一反應爐正處於臨界，其反應度為
A. 無限大
B. 無定義
C. 0.0ΔK/K
D. 1.0ΔK/K
答案： C.

科目： 292008
知能類： K1.08 [4.1/4.1]
序號： B269 (P69)

During a reactor startup, a stable positive 30 second reactor period is achieved with no further reactivity addition. The reactor is...
A. exactly critical.
B. supercritical.
C. subcritical.
D. prompt critical.
ANSWER： B.

反應爐啟動時，在沒有額外反應度加入情況下，其反應爐週期達到穩定在正30秒。則此反應爐處於
A. 恰好臨界
B. 超臨界
C. 次臨界
D. 瞬發臨界
答案： B.

科目： 292008
知能類： K1.08 [4.1/4.1]
序號： B868 (P868)

Which one of the following indicates that a reactor has achieved criticality during a normal reactor startup?
A. Constant positive period with no rod motion
B. Increasing positive period with no rod motion
C. Constant positive period during rod withdrawal
D. Increasing positive period during rod withdrawal
ANSWER： A.

下列何者描述了反應爐在正常啟動中已達到臨界？
A. 固定正週期，沒有控制棒抽動
B. 逐漸增加之正週期，沒有控制棒抽動
C. 在控制棒抽出中具有固定正週期
D. 在控制棒抽出中具有逐漸增加之正週期
答案： A.

科目： 292008
知能類： K1.08 [4.1/4.1]
序號： B1069

A reactor is critical just below the point of adding heat (POAH) at a temperature of 160°F. Which one of the following will result in reactor power increasing and stabilizing at the POAH? (Assume a negative moderator temperature coefficient.)
A. Reactor recirculation flow increases 10%.
B. Reactor coolant temperature increases 3°F.
C. A single control rod moves in one notch.
D. Core xenon-135 concentration decreases.
ANSWER： D.

一反應爐在溫度160°F且未達到加熱點處達到臨界。下列何者會導致反應爐功率增加，並且在加熱點處達到穩定？（假設緩和劑溫度係數為負。）
A. 反應爐再循環流量增加10%
B. 反應爐冷卻水溫度增加3°F
C. 單一控制棒移動一節
D. 爐心內氙-135濃度降低
答案： D.

科目： 292008
知能類： K1.08 [4.1/4.1]
序號： B2668 (P2667)

A nuclear reactor is critical at 10^{-6}% power. Control rods are withdrawn for 5 seconds and then stopped, resulting in a stable reactor period of positive 100 seconds.
If control rods had been inserted (instead of withdrawn) for 5 seconds with the reactor initially critical at 10^{-6}% power, the stable reactor period would have been: (Assume equal absolute values of reactivity are added in both cases.)

A. longer than negative 100 seconds because, compared to power increases, reactor power decreases are more limited by delayed neutrons.
B. shorter than negative 100 seconds because, compared to power increases, reactor power decreases are less limited by delayed neutrons.
C. longer than negative 100 seconds because, compared to power increases, reactor power decreases result in smaller delayed neutron fractions.
D. shorter than negative 100 seconds because, compared to power increases, reactor power decreases result in larger delayed neutron fractions.

answer： A.

一核子反應爐在功率10^{-6}%達到到臨界。控制棒抽出5秒，然後停止，導致一穩定反應爐週期為正100秒。若控制棒在功率10^{-6}% 達到到臨界時插入（而非抽出）5秒，則穩定反應爐週期將會是：（假設在兩狀況中所加入的反應度絕對值均相等。）

A. 較負100秒長，因為與功率增加相比，反應爐功率減少受到延遲中子之限制較大
B. 較負100秒短，因為與功率增加相比，反應爐功率減少受到延遲中子之限制較小
C. 較負100秒長，因為與功率增加相比，反應爐功率減少所導致的延遲中子分率較小
D. 較負100秒短，因為與功率增加相比，反應爐功率減少所導致的延遲中子分率較大

答案： A.

科目： 292008
知能類： K1.10 [3.6/3.6]
序號： B468

A reactor is being started up from cold shutdown conditions with a stable positive 100-second period and power is entering the intermediate range. Assuming no operator action is taken that affects reactivity, which one of the following will occur?
A. Reactor period remains constant until saturation conditions are reached.
B. Reactor period increases to infinity as heat production in the reactor exceeds ambient losses.
C. Reactor period remains constant until void production begins in the core.
D. Reactor period decreases to zero as the fuel temperature increase adds negative reactivity to the core.
ANSWER： B.

一反應爐從冷停機狀況下啟動，具有正100秒的穩定週期，同時其功率正進入中程能階範圍。假設無影響反應度之運轉員操作，則下列何者會發生？
A. 反應爐週期維持固定，直到飽和狀況達到
B. 因為反應爐產生的熱大於散失至環境中的熱，反應爐週期增加至無窮大
C. 反應爐週期維持固定，直到爐心開始產生空泡
D. 因為燃料溫度增加而對爐心添加了負反應度，反應爐週期降低至零
答案： B.

科目： 292008
知能類： K1.10 [3.6/3.6]
序號： B669

A reactor is being started up with a stable positive 100-second period and power is entering the intermediate range (below the point of adding heat). Assuming no operator action, which one of the following describes the response of reactor period?

A. Prior to reaching the point of adding heat, the fuel temperature increase will add negative reactivity and reactor period will approach infinity.
B. As heat production in the reactor exceeds ambient losses, the temperature of the fuel and moderator will increase, adding negative reactivity, and reactor period will approach infinity.
C. The heat produced by the reactor through all ranges of the intermediate range indication, is insufficient to raise the fuel or moderator temperatures, and reactor period remains constant throughout the intermediate range.
D. As heat production in the reactor exceeds ambient losses, positive reactivity added by the fuel temperature increase counteracts the negative reactivity added by the moderator temperature increase, and reactor period remains constant throughout the intermediate range.

ANSWER： B.

一反應爐進行啟動達到正100秒的穩定週期，其功率正進入中程能階範圍（未達加熱點）。假設沒有運轉員操作，下列何者描述了反應爐週期反應？

A. 在達到加熱點之前，燃料溫度增加將會添加負反應度，而反應爐週期將趨近無限大
B. 因為反應爐產生的熱大於散失至環境中的熱，燃料溫度以及緩和劑溫度將增加，增添負反應度，而反應爐週期將會趨近無限大
C. 在中程能階範圍中所有區段的反應爐產生的熱，不足以提高燃料以及緩和劑溫度，而反應爐週期在整個中程能階範圍中維持不變
D. 因為反應爐產生的熱大於散失至環境中的熱，由燃料溫度升高所添加之正反應度與由緩和劑溫度增加所添加之負反應度抵消，而反應爐週期在整個中程能階範圍中維持不變

答案： B.

科目： 292008
知能類： K1.10 [3.6/3.6]
序號： B2168 (P1870)

A reactor startup is in progress following a one-month shutdown. Upon reaching criticality, the operator establishes a positive 80-second period and stops rod motion.
After an additional 30 seconds, reactor power will be _____ and reactor period will be _____. (Assume reactor power remains below the point of adding heat.)
A. increasing; increasing
B. increasing; constant
C. constant; increasing
D. constant; constant
ANSWER： B.

一反應爐在經過一個月的停機後，正進行啟動。當達到臨界時，運轉員建立一正80秒之週期，並且停止控制棒移動。在30秒後，反應爐功率將會____而反應爐週期將會____。（假設反應爐功率維持在加熱點之下。）
A. 增加；增加
B. 增加；維持不變
C. 維持不變；增加
D. 維持不變；維持不變
答案： B.

科目： 292008
知能類： K1.10 [3.6/3.6]
序號： B2671 (P2668)

A reactor is being started up under cold shutdown conditions with a stable positive 100-second period and power is entering the intermediate range. Assuming no operator action is taken that affects reactivity, reactor period will remain constant until...
A. void production begins in the core, then reactor period will increase toward infinity.
B. core heat production exceeds ambient losses, then reactor period will increase toward infinity.
C. xenon-135 production becomes significant, then reactor period will decrease toward zero.
D. fuel temperature begins to increase, then reactor period will decrease toward zero.
ANSWER： B.

一反應爐在冷停機情況下進行啟動，週期為正100秒，同時功率正進入中程能階範圍。假設沒有影響反應度的運轉員操作進行，反應爐的週期將會維持固定，直到
A. 爐心開始產生空泡，然後反應爐週期將會朝無限大增加
B. 爐心產生的熱大於散失至環境中的熱，然後反應爐週期將會朝無限大增加
C. 氙-135生成變為顯著，然後反應爐週期將會朝零減小
D. 燃料溫度開始增加，然後反應爐週期將會朝零減小
答案： B.

科目： 292008
知能類： K1.11 [3.7/3.8]
序號： B568

After recording critical data during a cold reactor startup with main steam isolation valves open, the operator withdraws the control rods to continue the startup. Which one of the following pairs of parameters will provide the first indication of reaching the point of adding heat?
A. Reactor pressure and reactor water level
B. Reactor power and reactor period
C. Reactor pressure and turbine load
D. Reactor water level and core flow rate
ANSWER： B.

在主蒸汽隔離閥開啟情況下，進行反應爐冷爐啟動，於記錄其臨界資料後，運轉員抽出控制棒以繼續其啟動。下列何組參數將會最早表示加熱點已經達到？
A. 反應爐壓力與反應爐水位
B. 反應爐功率與反應爐週期
C. 反應爐壓力與汽機負載
D. 反應爐水位與爐心流量
答案： B.

科目： 292008
知能類： K1.11 [3.7/3.8]
序號： B3934 (P3935)

After taking critical data during a reactor startup, the operator establishes a stable 50-second reactor period to increase power to the point of adding heat (POAH). Which one of the following is the approximate amount of reactivity that must be added to stabilize reactor power at the POAH? (Assume $\bar{\beta}_{eff} = 0.006$.)
A. -0.01 %ΔK/K
B. -0.06 %ΔK/K
C. -0.10 %ΔK/K
D. -0.60 %ΔK/K
ANSWER： C.

在一反應爐啟動中，擷取臨界資料後，運轉員建立起一穩定之50秒反應爐週期，以增加功率至加熱起始點。為使反應爐功率在加熱起始點達到穩定，則所需加之反應度約是下列何者？（假設$\bar{\beta}_{eff} = 0.006$）

A. -0.01 %ΔK/K
B. -0.06 %ΔK/K
C. -0.10 %ΔK/K
D. -0.60 %ΔK/K
答案： C.

科目： 292008
知能類： K1.12 [3.6/3.7]
序號： B133 (P1169)

A reactor is critical well below the point of adding heat when a small amount of positive reactivity is added to the core. If the same amount of negative reactivity is added to the core approximately 1 minute later, reactor power will stabilize at...
A. the initial power level.
B. somewhat higher than the initial power level.
C. somewhat lower than the initial power level.
D. the subcritical multiplication equilibrium level.
ANSWER： B.

一反應爐於一小量之正反應度加入爐心情況下，在低於加熱起始點相當遠處達到臨界。若一分鐘後對爐心加入同樣的負反應度，則反應爐功率將會達到穩定在
A. 初始功率
B. 稍高於初始功率
C. 稍低於初始功率
D. 次臨界增殖平衡功率
答案： B.

科目： 292008
知能類： K1.12 [3.6/3.7]
序號： B2467

Criticality has just been achieved during a reactor startup at 160°F. The operator withdraws control rods as necessary to establish a stable positive 30-second reactor period. No additional operator actions are taken.
How will reactor period and reactor power respond? (Assume a negative moderator temperature coefficient.)

A. Reactor power will increase and stabilize at the POAH; reactor period will remain constant until the POAH is reached and then stabilize at infinity.
B. Reactor power will increase and stabilize at the POAH; reactor period will decrease slowly until the POAH is reached and then stabilize at infinity.
C. Reactor power will increase and stabilize above the POAH; reactor period will remain constant until the POAH is reached and then stabilize at infinity.
D. Reactor power will increase and stabilize above the POAH; reactor period will decrease slowly until the POAH is reached and then stabilize at infinity.

ANSWER： A.

一反應爐於160°F啟動並達到臨界，運轉員將控制棒抽出以建立正30秒之穩定週期，無額外之運轉員操作進行。反應爐週期以及功率之反應為何？（假設緩和劑溫度係數為負。）

A. 反應爐功率將增加並於加熱起始點達到穩定；反應爐週期將維持固定，直到達到加熱起始點，其後穩定於無限大
B. 反應爐功率將增加並於加熱起始點達到到穩定；反應爐週期將緩慢減小，直到達到加熱起始點，其後穩定於無限大
C. 反應爐功率將增加並在高於加熱起始點處達到到穩定；反應爐週期將維持固定直到達到加熱起始點，其後穩定於無限大
D. 反應爐功率將增加並在高於加熱點起始處達到到穩定；反應爐週期將緩慢減小直到達到加熱起始點，其後穩定於無限大

答案： A.

科目： 292008
知能類： K1.12 [3.6/3.7]
序號： B1467 (P2269)

A reactor is critical at the point of adding heat when a small amount of negative reactivity is added to the core. If the same amount of positive reactivity is added to the core approximately 5 minutes later, reactor power will...
A. stabilize at the subcritical multiplication equilibrium neutron level.
B. stabilize at a level lower than the initial power level.
C. continue to decrease on a negative 80 second period.
D. stabilize at the initial power level.
ANSWER： B.

一反應爐於一小量之負反應度加入爐心情況下，在加熱起始點達到臨界。若五分鐘後對爐心加入同量的正反應度，則反應爐功率將會
A. 在次臨界增殖中子平衡計數率達到到穩定
B. 在低於初始功率處達到到穩定
C. 在負80秒週期下持續減少
D. 在初始功率處達到到穩定
答案： B.

科目： 292008
知能類： K1.12 [3.6/3.7]
序號： B2268 (P571)

A reactor startup is in progress and criticality has just been achieved. After recording critical rod height, the operator withdraws control rods for 20 seconds to establish a positive 30-second reactor period. One minute later (prior to the point of adding heat) the operator inserts the same control rods for 25 seconds. (Assume the control rod withdrawal and insertion rates are the same.)
During the rod insertion, the reactor period will become...
A. negative during the entire period of control rod insertion.
B. negative shortly after the control rods pass through the critical rod height.
C. negative just as the control rods pass through the critical rod height.
D. negative shortly before the control rods pass through the critical rod height.
ANSWER： D.

一反應爐正在啟動，並且達到臨界。在記錄臨界控制棒棒位後，運轉員抽出控制棒20秒以建立正30秒之反應爐週期。一分鐘後（在未達加熱起始點前）運轉員將同樣的控制棒插入25秒。（假設控制棒抽出與插入速率相同。）在控制棒插入當中，此反應爐週期將會
A. 在整個控制棒插入期間變為負值
B. 在控制棒通過臨界棒位後不久變為負值
C. 在正當控制棒通過臨界棒位時變為負值
D. 在控制棒通過臨界棒位之前不久變為負值
答案： D.

科目： 292008
知能類： K1.12 [3.6/3.7]
序號： B2568 (P2568)

A reactor is currently at 10^{-3}% power with a positive 60 second reactor period. An amount of negative reactivity is added to the core that places the reactor on a negative 40 second reactor period.
If the same amount of positive reactivity is added to the core approximately 5 minutes later, reactor power will...
A. increase and stabilize at the point of adding heat.
B. increase and stabilize at 10^{-3}% power.
C. continue to decrease on a negative 40 second period until the equilibrium source neutron level is reached.
D. continue to decrease with an unknown period until the equilibrium source neutron level is reached.
ANSWER： A.

一反應爐目前功率為10^{-3}%，並具有正60秒之週期。一負反應度加入爐心，使得反應爐具有負40秒之週期。若五分鐘後，對爐心加入同樣的正反應度，則反應爐功率將
A. 增加並於加熱起始點達到穩定
B. 增加並於10^{-3}% 功率處達到穩定
C. 在負40秒週期下持續減小，直到平衡源階中子計數率達到為止
D. 在不確定的週期下持續減小，直到平衡源階中子計數率達到為止
答案： A.

科目： 292008
知能類： K1.12 [3.6/3.7]
序號： B2969 (P2970)

A reactor startup is in progress and criticality has just been achieved. After recording the critical rod heights, the operator withdraws a control rod for 20 seconds to establish a stable positive 30- second reactor period. One minute later (prior to reaching the point of adding heat), the operator inserts the same control rod for 25 seconds. During the insertion, when will the reactor period become negative?
A. Immediately when the control rod insertion is initiated.
B. After the control rod passes through the critical rod height.
C. Just as the control rod passes through the critical rod height.
D. Prior to the control rod passing through the critical rod height.
ANSWER： D.

一反應爐正在啟動，並且達到臨界。在記錄臨界控制棒棒位後，運轉員抽出控制棒20秒以建立正30秒之週期。一分鐘後（在未達加熱起始點前）運轉員將同樣的控制棒插入25秒。在控制棒插入當中，此反應爐週期何時將成為負值？
A. 在控制棒插入開始之後立刻變化
B. 在控制棒通過臨界控制棒棒位後
C. 正當控制棒通過臨界控制棒棒位時
D. 在控制棒通過臨界控制棒棒位之前
答案： D.

科目： 292008
知能類： K1.12 [3.6/3.7]
序號： B3668 (P3668)

A reactor is slightly supercritical during a reactor startup. A short control rod withdrawal is performed to establish the desired reactor period. Assume that the reactor remains slightly supercritical after the control rod withdrawal, and that reactor power remains well below the point of adding heat.
Immediately after the control rod withdrawal is stopped, the reactor period will initially lengthen and then...
A. stabilize at a positive value.
B. turn and slowly shorten.
C. stabilize at infinity.
D. continue to slowly lengthen.
ANSWER： A.

一反應爐在啟動中達到稍微超臨界。一小段控制棒抽出以建立所需之反應爐週期。假設反應爐在控制棒抽出後仍維持稍微超臨界，同時反應爐功率維持在加熱起始點之下相當距離。當控制棒抽出停止後，反應爐週期一開始將會增長，然後
A. 穩定於一正值
B. 反轉並且緩慢縮短
C. 穩定在無限大
D. 持續緩慢增長
答案： A.

科目： 292008
知能類： K1.12 [3.6/3.7]
序號： B4034

A nuclear reactor is initially critical in the source range. Then a constant rate addition of positive reactivity commences and lasts for 120 seconds. Assume reactor power remains below the point of adding heat for the entire 120 second time interval.
During the 120 second time interval, reactor period will initially shorten and then _____; and reactor power will initially increase and then _____.
A. continue to shorten at a decreasing rate; continue to increase at an increasing rate
B. continue to shorten at a decreasing rate; continue to increase at a decreasing rate
C. continue to shorten at a increasing rate; continue to increase at an increasing rate
D. continue to shorten at an increasing rate; continue to increase at a decreasing rate
ANSWER： A.

一反應爐在源階達到臨界。然後開始以固定速率加入正的反應度，並且持續120秒。假設於此120秒期間內反應爐功率維持在加熱起始點之下。在此120秒期間當中，反應爐週期起初將會縮短然後_____；而反應爐功率起初將會增加然後_____。
A. 持續以遞減速率縮短；持續以遞增速率增加
B. 持續以遞減速率縮短；持續以遞減速率增加
C. 持續以遞增速率縮短；持續以遞增速率增加
D. 持續以遞增速率縮短；持續以遞減速率增加
答案： A.

科目： 292008
知能類： K1.13 [3.8/3.9]
序號： B271

Upon reaching criticality during a reactor startup, the operator establishes a positive reactor period. Upon reaching the point of adding heat, the period will become _____ due to the _____ reactivity feedback of moderator and fuel temperature.
A. shorter; negative
B. shorter; positive
C. longer; negative
D. longer; positive
ANSWER： C.

當反應爐於啟動中達到臨界，運轉員建立起一正反應度週期。在到達加熱起始點時，此週期將會變得_____，因為緩和劑與燃料溫度回饋之_____反應度。
A. 較短；負
B. 較短；正
C. 較長；負
D. 較長；正
答案： C.

科目： 292008
知能類： K1.13
序號： B670 (P670)

After taking critical data during a reactor startup, the operator establishes a 26-second reactor period to increase power to the point of adding heat (POAH). How much negative reactivity feedback must be added at the POAH to stop the power increase?
Assume:
$\bar{\beta}$ = 0.00579
l^* = 1 x 10^{-5}seconds
λ_{eff} = 0.1 $seconds^{-1}$
A. 0.16% ΔK/K
B. 0.19% ΔK/K
C. 0.23% ΔK/K
D. 0.29% ΔK/K
ANSWER： A.

在擷取了反應爐啟動的臨界資料後，運轉員建立起一26秒的週期，以增加功率達到加熱起始點。在加熱起始點要停止功率增加，則需加入多少的負反應度回饋？假設
$\bar{\beta}$ = 0.00579
l^* = 1 x 10^{-5}seconds
λ_{eff} = 0.1 $seconds^{-1}$
A. 0.16% ΔK/K
B. 0.19% ΔK/K
C. 0.23% ΔK/K
D. 0.29% ΔK/K
答案： A.

科目： 292008
知能類： K1.13 [3.8/3.9]
序號： B968

After taking critical data during a reactor startup, the operator establishes a positive 26-second reactor period to increase power to the point of adding heat (POAH). How much negative reactivity must be added to stabilize power at the POAH? (Assume $\bar{\beta}_{eff}$ = 0.00579.)
A. 0.10% ΔK/K
B. 0.16% ΔK/K
C. 1.0% ΔK/K
D. 1.6% ΔK/K
ANSWER： B.

在擷取了反應爐啟動的臨界資料後，運轉員建立起一26秒的週期，以增加功率達到加熱起始點。為使功率穩定於加熱起始點，則需加入多少的負反應度？（假設$\bar{\beta}_{eff}$ = 0.00579）

A. 0.10% ΔK/K
B. 0.16% ΔK/K
C. 1.0% ΔK/K
D. 1.6% ΔK/K
答案： B.

科目： 292008
知能類： K1.13 [3.8/3.9]
序號： B1667

After taking critical data during a reactor startup, the operator establishes a stable 38-second reactor period to increase power to the point of adding heat (POAH). Which one of the following is the approximate negative reactivity required to stop the power increase at the POAH? (Assume that $\bar{\beta}_{eff}$ = 0.00579.)
A. 0.01% ΔK/K
B. 0.12% ΔK/K
C. 0.16% ΔK/K
D. 0.21% ΔK/K
ANSWER： B.

在擷取了反應爐啟動的臨界資料後，運轉員建立起38秒的穩定週期，以增加功率達到加熱起始點。在加熱起始點要停止功率增加，則需加入多少的負反應度？（假設$\bar{\beta}_{eff}$= 0.00579）

A. 0.01% ΔK/K
B. 0.12% ΔK/K
C. 0.16% ΔK/K
D. 0.21% ΔK/K
答案： B.

科目： 292008
知能類： K1.13 [3.8/3.9]
序號： B1769

After taking critical data during a reactor startup, the operator establishes a positive 31-second reactor period to increase power to the point of adding heat (POAH). Which one of the following is the appropriate amount of reactivity needed to stabilize power at the POAH?
(Assume $\bar{\beta}_{eff}$ = 0.00579.)
A. -0.14% ΔK/K
B. -0.16% ΔK/K
C. -1.4% ΔK/K
D. -1.6% ΔK/K
ANSWER： A.

在擷取了反應爐啟動的臨界資料後，運轉員建立起正31秒的週期，以增加功率達到加熱起始點。為使功率穩定於加熱起始點，則需加入多少的負反應度？（假設$\bar{\beta}_{eff}$ = 0.00579）

A. -0.14% ΔK/K
B. -0.16% ΔK/K
C. -1.4% ΔK/K
D. -1.6% ΔK/K
答案： A.

科目： 292008
知能類： K1.13 [3.8/3.9]
序號： B2369 (P2370)

After taking critical data during a reactor startup, the operator establishes a positive 48-second reactor period to increase power to the point of adding heat (POAH). Which one of the following is the approximate amount of reactivity needed to stabilize power at the POAH?
(Assume $\bar{\beta}_{eff}$ = 0.00579.)
A. -0.10% ΔK/K
B. -0.12% ΔK/K
C. -0.01% ΔK/K
D. -0.012% ΔK/K
ANSWER： A.

在擷取了反應爐啟動的臨界資料後，運轉員建立起正48秒的週期，以增加功率達到加熱起始點。為使功率穩定於加熱起始點，則需加入多少的負反應度？（假設$\bar{\beta}_{eff}$ = 0.00579）

A. -0.10% ΔK/K
B. -0.12% ΔK/K
C. -0.01% ΔK/K
D. -0.012% ΔK/K
答案： A.

科目： 292008
知能類： K1.13 [3.8/3.9]
序號： B3068 (P3068)

After taking critical data during a reactor startup, the operator establishes a stable 34-second reactor period to increase power to the point of adding heat (POAH). Which one of the following is the approximate amount of reactivity that must be added to stabilize reactor power at the POAH? (Assume $\bar{\beta}_{eff}$ = 0.0066.)
A. -0.10 %ΔK/K
B. -0.12 %ΔK/K
C. -0.15 %ΔK/K
D. -0.28 %ΔK/K
ANSWER： C.

在擷取了反應爐啟動的臨界資料後，運轉員建立起34秒的穩定週期，以增加功率達到加熱起始點。為使功率穩定於加熱起始點，則需加入多少的負反應度？（假設$\bar{\beta}_{eff}$ = 0.0066）

A. -0.10 %ΔK/K
B. -0.12 %ΔK/K
C. -0.15 %ΔK/K
D. -0.28 %ΔK/K
答案： C.

科目： 292008
知能類： K1.13 [3.4/3.6]
序號： B3934 (P3935)

After taking critical data during a reactor startup, the operator establishes a stable 0.52 dpm startup rate to increase power to the point of adding heat (POAH). Which one of the following is the approximate amount of reactivity that must be added to stabilize reactor power at the POAH? (Assume $\bar{\beta}_{eff}$ = 0.006.)
A. -0.01 %ΔK/K
B. -0.06 %ΔK/K
C. -0.10 %ΔK/K
D. -0.60 %ΔK/K
ANSWER： C.

在擷取了反應爐啟動的臨界資料後，運轉員建立起穩定的0.52dpm啟動速率，以增加功率達到加熱起始點。為使功率穩定於加熱起始點，則需加入多少的反應度？（假設$\bar{\beta}_{eff}$ = 0.006）

A. -0.01 %ΔK/K
B. -0.06 %ΔK/K
C. -0.10 %ΔK/K
D. -0.60 %ΔK/K
答案： C.

科目： 292008
知能類： K1.14 [3.5/3.5]
序號： B769

During a reactor heat-up, a center control rod is notched outward with no subsequent operator action. The heat-up rate will...
A. increase initially, then gradually decrease.
B. decrease initially, then gradually increase.
C. increase and stabilize at a new higher value.
D. decrease and stabilize at a new lower value.
ANSWER： A.

在反應爐加熱中，一中央控制棒在沒有後續運轉員操作下被抽出一節。則加熱率將會
A. 初始增加，其後漸漸減小
B. 初始減小，其後漸漸增加
C. 增加並在一新的較高值達到穩定
D. 減小並在一新的較低值達到穩定
答案： A.

科目： 292008
知能類： K1.14 [3.5/3.5]
序號： B1071

A reactor heat-up from 180°F to 500°F is in progress. To maintain a constant heat-up rate, as reactor temperature increases reactor power will have to...
A. increase due to increasing density of water.
B. decrease due to decreasing specific heat of water.
C. increase due to increasing heat losses to ambient.
D. decrease due to decreasing heat of vaporization of water.
ANSWER： C.

一反應爐從180°F加熱至500°F的過程中，為了維持穩定的加熱率，當反應爐溫度增加時，其功率必須
A. 增加，因為水的密度增加
B. 減小，因為水的比熱減小
C. 增加，因為對環境的熱損增加
D. 減小，因為水的蒸發熱量減小
答案： C.

科目： 292008
知能類： K1.14 [3.5/3.5]
序號： B1468

A nuclear reactor is undergoing a startup with reactor pressure and temperature initially stable at 731.4 psia and 508°F. Main steam isolation valves are closed and reactor criticality has been achieved. The reactor currently has a stable positive 100-second reactor period with reactor power well below the point of adding heat (POAH).
Which one of the following will occur first when reactor power reaches the POAH?
A. Reactor period will shorten.
B. Reactor pressure will increase.
C. Reactor coolant temperature will decrease.
D. Intermediate range power level will decrease.
ANSWER： B.

一反應爐在初始穩定壓力731.4psia與溫度508°F下正進行啟動，主蒸汽隔離閥關閉，反應爐已達臨界，反應爐目前具有一正100秒週期，其功率遠低於加熱起始點。當功率達到加熱起始點時，下列何者最先發生？
A. 反應爐週期將縮短
B. 反應爐壓力將增加
C. 反應爐冷卻水溫度將降低
D. 中程階功率將減小
答案： B.

科目： 292008
知能類： K1.15 [3.7/3.7]
序號： B469

A reactor is stable at the point of adding heat (POAH) with the reactor coolant at 160^{o}F during the reactor heat-up and pressurization phase of a reactor startup. Control rods are withdrawn a few notches to raise reactor power and establish a heat-up rate. Assume no core voiding occurs.
If no further control rod withdrawal occurs, reactor power will...
A. remain stable until voiding begins to occur.
B. increase until the control rods are reinserted.
C. decrease and stabilize at a subcritical power level.
D. decrease and stabilize at the POAH.
ANSWER： D.

一反應爐於啟動加壓加熱過程中在加熱起始點達到穩定，反應爐冷却水溫度為160^{o}F。控制棒被抽出幾節，以提高反應爐功率並建立一加熱率。假設沒有爐心空泡發生。若無進一步抽出控制棒，則反應爐功率將會
A. 維持穩定，直到空泡開始發生
B. 增加，直到控制棒被重新插入
C. 減小，並且在次臨界功率達到穩定
D. 減小，並且在加熱起始點達到穩定
答案： D.

科目： 292008
知能類： K1.15 [3.7/3.7]
序號： B1966 (P1367)

A reactor is critical at 5 x 10^{-2}% power during a cold reactor startup at the beginning of core life. Reactor period is stable at positive 87 seconds. Assuming no operator action, no reactor scram, and no steam release, what will be reactor power 10 minutes later?
A. Below the point of adding heat (POAH)
B. At the POAH
C. Above the POAH but less than 49%
D. Approximately 50%
ANSWER： B.

一反應爐於爐心壽命初期，在冷爐啟動中於5 x 10^{-2}%功率達到臨界。反應爐週期於正87秒達到穩定。假設沒有運轉員操作，沒有反應爐急停，沒有蒸汽排放，則十分鐘後反應爐的功率將為何？
A. 低於加熱起始點
B. 位於加熱起始點
C. 高於加熱起始點但小於49％
D. 約在50％
答案： B.

科目： 292008
知能類： K1.15 [3.7/3.7]
序號： B2569

A reactor is critical at 10^{-3}% power during a cold reactor startup at the beginning of core life. Reactor period is stable at positive 60 seconds. Assuming no operator action, no reactor scram, and no steam release, what will be reactor power 10 minutes later?
A. Below the point of adding heat (POAH)
B. At the POAH
C. Approximately 22%
D. Greater than 100%
ANSWER： B.

一反應爐於爐心壽命初，在冷爐啟動中於10^{-3}%功率達到臨界。反應爐週期於正60秒達到穩定。假設沒有運轉員操作，沒有反應爐急停，沒有蒸汽排放，則十分鐘後反應爐的功率將為何？
A. 低於加熱起始點
B. 位於加熱起始點
C. 約在22%
D. 大於100%
答案： B.

科目： 292008
知能類： K1.16 [3.6/3.7]
序號： B870

During a reactor plant startup, reactor pressure is increased from 5 psig to 50 psig in a 2-hour period. What was the average heat-up rate?
A. 35°F/hr
B. 60 °F /hr
C. 70 °F /hr
D. 120 °F /hr
ANSWER： A.

在一反應爐啟動中，其壓力在兩小時期間從5psig增加到50psig。則平均加熱率為多少？
A. 35 °F /hr
B. 60 °F /hr
C. 70 °F /hr
D. 120 °F /hr
答案： A.

科目： 292008
知能類： K1.16 [3.6/3.7]
序號： B1972

A reactor is critical and a reactor coolant heat-up is in progress with coolant temperature currently at 140 ^{o}F. If the point of adding heat is 1% reactor power, and reactor power is held constant at 3% during the heat-up, which one of the following describes the coolant heat-up rate (HUR) from 140 ^{o}F to 200^{o}F?
A. HUR will initially decrease and then increase.
B. HUR will slowly decrease during the entire period.
C. HUR will slowly increase during the entire period.
D. HUR will remain the same during the entire period.
ANSWER： B.

一反應爐處於臨界，而反應爐冷卻水加熱正在進行，冷卻水溫度目前為140 ^{o}F。若加熱起始點為1%功率，同時反應爐功率在加熱過程中維持穩定於3%,則下列何者描述了從140 ^{o}F到200 ^{o}F之冷卻水加熱率(HUR)？
A. HUR起初會減小，然後增加
B. HUR在整個過程中會緩慢減小
C. HUR在整個過程中會緩慢增加
D. HUR在整個過程中會維持不變
答案： B.

科目： 292008
知能類： K1.18 [3.8/3.8]
序號： B1270

Which one of the following will add the most positive reactivity during a power decrease from 100% to 65% over a 1 hour period? (Assume the power change is performed only by changing core recirculation flow rate.)
A. Fuel temperature change
B. Moderator temperature change
C. Fission product poison change
D. Core void fraction change
ANSWER： A.

在一小時內，功率從100%降低至65%過程中，下列何者將加入最多的正反應度？（假設功率改變只靠爐心再循環流量改變。）
A. 燃料溫度改變
B. 緩和劑溫度改變
C. 分裂產物之毒素改變
D. 爐心空泡比改變
答案： A.

科目： 292008
知能類： K1.18 [3.8/3.8]
序號： B1371 (P1470)

With a reactor on a constant period, which one of the following power changes requires the longest time to occur?
A. 1% power to 4% power
B. 5% power to 15% power
C. 20% power to 35% power
D. 40% power to 60% power
ANSWER： A.

對於一具有固定週期之反應爐，下列何種功率變化達成所需的時間最長？
A. 1%功率至4%功率
B. 5%功率至15%功率
C. 20%功率至35%功率
D. 40%功率至60%功率
答案： A.

科目： 292008
知能類： K1.18 [3.8/3.8]
序號： B1570 (P1567)

With a reactor on a constant period of 30 seconds, which one of the following power changes requires the least time to occur?
A. 1% power to 6% power
B. 10% power to 20% power
C. 20% power to 35% power
D. 40% power to 60% power

對於一具有固定週期30秒之反應爐，下列何種功率變化所需的時間最短？
A. 1%功率至6%功率
B. 10%功率至20%功率
C. 20%功率至35%功率
D. 40%功率至60%功率
答案： D.

科目： 292008
知能類： K1.18 [3.8/3.8]
序號： B1765

Which one of the following lists the method(s) used to add positive reactivity during a normal power increase from 10% to 100%?
A. Control rod withdrawal only
B. Recirculation pump flow increase only
C. Control rod withdrawal and recirculation pump flow increase
D. Recirculation pump flow increase and steaming rate increase

在正常功率從10％增加到100％過程中，下列何方法用以添加正反應度？
A. 只有控制棒抽出
B. 只有再循環泵流量增加
C. 控制棒抽出與再循環泵流量增加
D. 再循環泵流量增加與蒸汽流量增加
答案： C.

科目： 292008
知能類： K1.18 [3.8/3.8]
序號： B2070 (P2071)

Neglecting the effects of changes in core Xe-135, which one of the following power changes requires the greatest amount of positive reactivity addition?
A. 3% power to 5% power
B. 5% power to 15% power
C. 15% power to 30% power
D. 30% power to 60% power
ANSWER： D.

忽略爐心氙-135變化之影響，下列何種功率變化需要的正反應度添加最多？
A. 3%功率至5%功率
B. 5%功率至15%功率
C. 15%功率至30%功率
D. 30%功率至60%功率
答案： D.

科目： 292008
知能類： K1.18 [3.8/3.8]
序號： B2072 (P2069)

With a reactor on a constant period of 180 seconds, which one of the following power changes requires the longest amount of time to occur?
A. 3% power to 5% power
B. 5% power to 15% power
C. 15% power to 30% power
D. 30% power to 60% power
ANSWER： B.

對於一具有固定週期180秒之反應爐，下列何種功率變化所需的時間最長？
A. 3%功率至5%功率
B. 5%功率至15%功率
C. 15%功率至30%功率
D. 30%功率至60%功率
答案： B.

科目： 292008
知能類： K1.18 [3.8/3.8]
序號： B2166

A nuclear power plant is operating at 80% of rated power near the end of a fuel cycle. Which one of the following lists the typical method(s) used to add positive reactivity during a normal power increase to 100%?
A. Withdrawal of deep control rods and increasing recirculation flow rate
B. Withdrawal of deep control rods only
C. Withdrawal of shallow control rods and increasing recirculation flow rate
D. Withdrawal of shallow control rods only
ANSWER： A.

一核能電廠於接近燃料週期末期以80％額定功率運轉，若要使功率正常增加至100％，下列何者列出了用以添加正反應度的方法？
A. 深控制棒抽出與增加再循環流量
B. 只有深控制棒抽出
C. 淺控制棒抽出與增加再循環流量
D. 只有淺控制棒抽出
答案： A.

科目： 292008
知能類： K1.18 [3.8/3.8]
序號： B2270

With a reactor on a constant period, which one of the following power changes requires the shortest time to occur?
A. 1% power to 4% power
B. 5% power to 15% power
C. 20% power to 35% power
D. 40% power to 60% power
ANSWER： D.

對於一具有固定週期之反應爐，下列何種功率變化所需的時間最短？
A. 1%功率至4%功率
B. 5%功率至15%功率
C. 20%功率至35%功率
D. 40%功率至60%功率
答案： D.

科目： 292008
知能類： K1.18 [3.8/3.8]
序號： B2470
Neglecting the effects of core Xe-135, which one of the following power changes requires the greatest amount of positive reactivity addition?
A. 3% power to 10% power
B. 10% power to 25% power
C. 25% power to 60% power
D. 60% power to 100% power
ANSWER： D.

忽略爐心內氙-135變化之影響，下列何種功率變化需要添加的正反應度最多？
A. 3%功率至10%功率
B. 10%功率至25%功率
C. 25%功率至60%功率
D. 60%功率至100%功率
答案： D.

科目： 292008
知能類： K1.18 [3.8/3.8]
序號： B2669 (P2169)

Neglecting the effects of core Xe-135, which one of the following power changes requires the smallest amount of positive reactivity addition?
A. 2% power to 5% power
B. 5% power to 15% power
C. 15% power to 30% power
D. 30% power to 50% power
ANSWER： A.

忽略爐心內氙-135變化之影響，下列何種功率變化需要添加的正反應度最少？
A. 2%功率至5%功率
B. 5%功率至15%功率
C. 15%功率至30%功率
D. 30%功率至50%功率
答案： A.

科目： 292008
知能類： K1.18 [3.8/3.8]
序號： B2770 (P2770)

With a reactor on a constant period of 180 seconds, which one of the following power changes requires the shortest amount of time to occur?
A. 3% power to 5% power
B. 5% power to 15% power
C. 15% power to 30% power
D. 30% power to 60% power
ANSWER： A.

對於一具有固定週期180秒之反應爐，下列何種功率變化所需的時間最短？
A. 3%功率至5%功率
B. 5%功率至15%功率
C. 15%功率至30%功率
D. 30%功率至60%功率
答案： A.

科目： 292008
知能類： K1.18 [3.8/3.8]
序號： B3769 (P3753)

Neglecting the effects of changes in core Xe-135, which one of the following power changes requires the smallest amount of positive reactivity addition?
A. 3% power to 10% power
B. 10% power to 15% power
C. 15% power to 30% power
D. 30% power to 40% power
ANSWER： B.

忽略爐心內氙-135變化之影響，下列何種功率變化需要添加的正反應度最少？
A. 3%功率至10%功率
B. 10%功率至15%功率
C. 15%功率至30%功率
D. 30%功率至40%功率
答案： B.

科目： 292008
知能類： K1.19 [3.1/3.2]
序號： B69

For which one of the following events will the Doppler coefficient act first to change the reactivity addition to the core?
A. A control rod drop during reactor power operation
B. The loss of one feedwater heater (extraction steam isolated) during reactor power operation
C. Tripping of the main turbine at 45% reactor power
D. A safety relief valve opening during reactor power operation
ANSWER： A.

對於下列那一事件，都卜勒係數會最先反應而改變添加於爐心之反應度？
A. 在反應爐功率運轉中發生控制棒掉落事件
B. 在反應爐功率運轉中發生喪失一飼水加熱器
C. 主汽機在45%反應爐功率時跳脫
D. 在反應爐功率運轉中發生一安全釋壓閥開啟
答案： A.

科目： 292008
知能類： K1.19 [3.1/3.2]
序號： B367

Reactor power was increased from 20% to 30% in 1 hour using only control rod withdrawal. Which one of the following describes the response of void fraction during the power increase?
A. Void fraction initially decreases, then increases back to the original value.
B. Void fraction initially increases, then decreases back to the original value.
C. Void fraction decreases and stabilizes below the original value.
D. Void fraction increases and stabilizes above the original value.
ANSWER： D.

若反應爐功率的提升只使用控制棒抽出方式，在一小時內從20%增加至30%。下列何者描述了在功率增加過程中空泡比的反應？
A. 空泡比起初減小，然後增加回到原始值
B. 空泡比起初增加，然後減小回到原始值
C. 空泡比減小，並在低於原始值處達到穩定
D. 空泡比增加，並在高於原始值處達到穩定
答案： D.

科目： 292008
知能類： K1.19 [3.1/3.2]
序號： B1169

Which one of the following describes the core void fraction response that accompanies a reactor power increase from 20% to 30% using only control rod withdrawal?
A. Decreases and stabilizes at a lower void fraction
B. Increases and stabilizes at a higher void fraction
C. Initially decreases, then increases and stabilizes at the initial void fraction
D. Initially increases, then decreases and stabilizes at the initial void fraction
ANSWER： B.

反應爐功率只使用控制棒抽出方式，在一小時內從20%增加至30%。下列何者描述了在功率增加過程中空泡比的反應？
A. 減小，並於一較低之空泡比達到穩定
B. 增加，並於一較高之空泡比達到穩定
C. 起初減小，然後增加並於初始空泡比達到穩定
D. 起初增加，然後減小並於初始空泡比達到穩定
答案： B.

科目： 292008
知能類： K1.19 [3.1/3.2]
序號： B1368

A nuclear power plant is operating at 90% of rated power late in core life. When an operator withdraws a shallow rod two notches a power decrease occurs. This power decrease can be attributed to rod worth being _____ and _____ bundle void content.
A. high; decreased
B. high; increased
C. low; increased
D. low; decreased
ANSWER： C.

一核能電廠於爐心壽命末期在90%額定功率下運轉。當運轉員抽出一淺棒兩節，功率開始下降。此功率降低可歸因於____控制棒本領，以及_____的燃料束空泡含量。
A. 高；減少
B. 高；增加
C. 低；增加
D. 低；減少
答案： C.

科目： 292008
知能類： K1.19 [3.1/3.2]
序號： B2670

A reactor is operating with the following initial conditions:
Power level = 100%
Control rod density = 60%
After a load decrease reactor conditions are as follows:
Power level = 80%
Control rod density = 62%
All parameters attained normal steady-state values before and after the power change.
Given the following:
Total control rod
reactivity change = -2.2 x 10^{-1}% ΔK/K
Power coefficient = -1.5 x 10^{-2}% ΔK/K/% power
How much reactivity was added by changes in core recirculation flow rate during the load decrease? (Assume fission product poison reactivity does <u>not</u> change.)
A. 0.0% ΔK/K
B. -5.2 x 10^{-1}% ΔK/K
C. -2.0 x 10^{-1}% ΔK/K
D. -8.0 x 10^{-2}% ΔK/K

一反應爐以如下初始條件運轉：
功率= 100%
控制棒密度= 60%
在負載減少後反應爐狀況如下：
功率= 80%
控制棒密度= 62%
所有參數在功率變化之前與之後取得正常穩態值。
根據以下條件：
全部控制棒
反應度變化= -2.2 x 10^{-1}% ΔK/K
功率係數= -1.5 x 10^{-2}% ΔK/K/% power
在負載減少情況下，藉由爐心再循環流量的改變而添加的反應度有多少？（假設分裂產物毒素之反應度<u>沒有</u>變化。）
A. 0.0% ΔK/K
B. -5.2 x 10^{-1}% ΔK/K
C. -2.0 x 10^{-1}% ΔK/K
D. -8.0 x 10^{-2}% ΔK/K

答案： D.

科目： 292008
知能類： K1.19 [3.1/3.2]
序號： B2970 (N/A)
If a reactor power increase is accomplished using only the control rods, which one of the following would result in the greatest amount of negative reactivity feedback from the void coefficient?
A. A void fraction increase from 5% to 10% at beginning of core life
B. A void fraction increase from 5% to 10% at end of core life
C. A void fraction increase from 40% to 45% at beginning of core life
D. A void fraction increase from 40% to 45% at end of core life
ANSWER： C.

若一反應爐只利用控制棒提升功率，則下列何者將導致由空泡係數所生之最大負反應度回饋？
A. 在爐心壽命初期，空泡比從5%增加至10%
B. 在爐心壽命末期，空泡比從5%增加至10%
C. 在爐心壽命初期，空泡比從40%增加至45%
D. 在爐心壽命末期，空泡比從40%增加至45%
答案： C.

科目： 292008
知能類： K1.20 [3.3/3.4]
序號： B70
A nuclear power plant is operating at 100% power and core flow rate. Reactor power is reduced to 90% by inserting control rods. (Recirculating pump speed remains constant.)
What is the effect on core flow rate?
A. Core flow rate will decrease due to an increase in core voiding.
B. Core flow rate will increase due to the decrease in recirculation ratio.
C. Core flow rate will increase due to the decrease in two-phase flow resistance.
D. Core flow rate will decrease due to an increase in two-phase flow resistance.
ANSWER： C.

一核能電廠在100%功率與爐心流量下運轉，反應爐功率藉由控制棒插入而降低至90%（再循環泵速度維持不變），對爐心流量的影響為何？
A. 爐心流量將會減少，因為爐心空泡增加
B. 爐心流量將會增加，因為再循環率減小
C. 爐心流量將會增加，因為雙相流阻力減小
D. 爐心流量將會減小，因為雙相流阻力增加
答案： C.

科目： 292008
知能類： K1.20 [3.3/3.4]
序號： B183

A power increase is initiated by an increase in recirculation flow, causing voids to be swept away and adding positive reactivity. Which one of the following statements best describes the response of the reactivity coefficients?

A. Increasing fuel temperature implies more heat transfer to the coolant; increased moderator temperature causes more void formation, and power stabilizes at a new higher level.
B. Increasing fuel temperature implies more heat transfer to the coolant, thus increasing steam generation; the increased void fraction and fuel temperature add negative reactivity, and power stabilizes at a new higher level.
C. Increasing fuel temperature implies more heat transfer to the coolant, thus increasing steam generation; the increased steam generation raises reactor pressure and moderator temperature, offsetting the decreasing voids, and power stabilizes at a new higher level.
D. Increased moderator and fuel temperature stabilize power at a new higher level.

ANSWER： B.

再循環流量增加而導致功率增加，引發空泡被掃除，並加入正反應度。下列何者最能描述反應度係數的反應？

A. 增加燃料溫度代表傳導至冷卻水的熱更多；緩和劑溫度增加，導致空泡形成，最後功率在一新的較高值達到穩定。
B. 增加燃料溫度代表傳導至冷卻水的熱更多，因此增加蒸汽生成；空泡比以及燃料溫度的增加添加了負反應度，最後功率在一新的較高值達到穩定。
C. 增加燃料溫度代表傳導至冷卻水的熱更多，因此增加蒸汽生成；增加蒸汽生成提高反應爐壓力與緩和劑溫度，彌補了空泡的減少，最後功率在一新的較高值達到穩定。
D. 增加的緩和劑與燃料溫度使功率在一新的較高值達到穩定。

答案： B.

科目： 292008
知能類： K1.20 [3.3/3.4]
序號： B1469

Reactor power is increased from 70% to 90% by changing recirculation flow. Which one of the following describes the effect on the plant?
A. Core void fraction increases.
B. Feedwater temperature decreases.
C. Reactor vessel outlet steam pressure increases.
D. Condensate depression in the main condenser hotwell increases.
ANSWER： C.

反應爐藉由改變再循環流量而使功率從70%增加至90%。下列何者描述了對於電廠的效應？
A. 爐心空泡比增加
B. 飼水溫度降低
C. 反應爐出口蒸汽壓力增加
D. 主冷凝器熱井中冷凝水次冷度增加
答案： C.

科目： 292008
知能類： K1.21 [2.9/3.0]
序號： B270

A nuclear power plant has been operating at full power for several months. Following a normal reactor shutdown, steam production will continue for a period of time, with the rate (Btu/hr) of steam production dependent upon the...
A. rate of reactor power decrease from full power to the point of adding heat.
B. pressure being maintained in the reactor pressure vessel (RPV).
C. previous power history of the plant and the time elapsed since shutdown.
D. recirculation flow rate and the water level being maintained in the RPV.
ANSWER： C.

一核能電廠在全功率下運轉數月。在正常停機後，蒸汽產生將會繼續一段時間，而其蒸汽產生率（Btu/hr）將視何者而定？
A. 從全功率至加熱起始點之反應爐功率降低速率
B. 反應爐壓力槽中所維持之壓力
C. 電廠原本之功率歷史以及自停機後所經過之時間
D. 再循環流量以及反應爐壓力槽中所維持之水位
答案： C.

科目： 292008
知能類： K1.21 [2.9/3.0]
序號： B1372 (P1272)

Following a reactor shutdown from three-months operation at full power, core heat production will continue for a period of time. The rate of core heat production will be dependent upon the...
A. amount of fuel that has been depleted.
B. amount of time that has elapsed since K_{eff} decreased below 1.0.
C. amount of time required for the reactor pressure vessel to cool down.
D. rate at which the photoneutron source strength decays following shutdown.
ANSWER： B.

在反應爐經過三個月全功率運轉後進行停機，其後爐心熱量的產生將會繼續一段時間。其產生率將會依何者而變？
A. 被燃耗之燃料量
B. 自K_{eff}降低到1.0以下後所經歷的時間
C. 反應爐壓力槽冷卻所需要的時間
D. 在停機之後光中子源強度衰減之速率
答案： B.

科目： 292008
知能類： K1.21 [2.9/3.0]
序號： B3169 (P3171)

A nuclear power plant is operating at 60% of rated power in the middle of a fuel cycle when a turbine control system malfunction closes the turbine steam inlet valves an additional 5 percent. Which one of the following describes the initial reactor power change and the cause for the power change?
A. Decrease, because the rate of neutron absorption in the moderator initially increases.
B. Decrease, because the rate of neutron absorption at U-238 resonance energies initially increases.
C. Increase, because the rate of neutron absorption in the moderator initially decreases.
D. Increase, because the rate of neutron absorption at U-238 resonance energies initially decreases.
ANSWER： D.

一核能電廠於燃料循環中期以60%的額定功率運轉，此時一汽機控制系統故障，而多關閉汽機進口閥5%。下列何者描述了初始功率變化，以及此功率變化的原因？
A. 下降，因為緩和劑中之中子吸收速率增加
B. 下降，因為U-238共振能量(resonance energies)之中子吸收速率增加
C. 增加，因為緩和劑中之中子吸收速率減小
D. 增加，因為U-238共振能量之中子吸收速率減小
答案： D.

科目： 292008
知能類： K1.21 [2.9/3.0]
序號： B4036

A nuclear power plant is operating at 60% of rated power in the middle of a fuel cycle when a turbine control system malfunction opens the turbine steam inlet valves an additional 5 percent. Which one of the following describes the initial reactor power change and the cause for the power change?
A. Decrease, because the rate of neutron absorption in the moderator initially increases.
B. Decrease, because the rate of neutron absorption at U-238 resonance energies initially increases.
C. Increase, because the rate of neutron absorption in the moderator initially decreases.
D. Increase, because the rate of neutron absorption at U-238 resonance energies initially decreases.
ANSWER： B.

一核能電廠於燃料循環中期以60%的額定功率運轉，此時一汽機控制系統故障，而多開啟汽機進口閥5%。下列何者描述了初始功率變化，以及此功率變化的原因？
A. 下降，因為緩和劑中之中子吸收速率增加
B. 下降，因為U-238共振能量(resonance energies)之中子吸收速率增加
C. 增加，因為緩和劑中之中子吸收速率減小
D. 增加，因為U-238共振能量之中子吸收速率減小
答案： B.

科目： 292008
知能類： K1.22 [3.5/3.6]
序號： B570

A nuclear power plant is operating normally at 50% of rated power when a steam line break occurs that releases 5% of rated steam flow. Assume no operator or protective actions occur, automatic pressure control returns reactor pressure to its value prior to the break, and feedwater injection temperature remains the same.
How will reactor power respond to the steam line break?
A. Decrease and stabilize at a lower power level
B. Increase and stabilize at a higher power level
C. Decrease initially, then increase and stabilize at the previous power level
D. Increase initially, then decrease and stabilize at the previous power level
ANSWER： C.

一核能電廠在50%額定功率下運轉，此時一蒸汽管線破裂，而釋放出5%的額定蒸汽流量。假設無運轉員或保護動作發生，自動壓力控制將反應爐壓力回復至破裂之前之數值，飼水注入溫度維持不變。反應爐功率對於蒸汽管線破裂的反應為何？
A. 降低，並且在一較低功率達到穩定
B. 增加，並且在一較高功率達到穩定
C. 開始時降低，然後增加並穩定在原本之功率
D. 開始時增加，然後降低並穩定在原本之功率
答案： C.

科目： 292008
知能類： K1.22 [3.5/3.6]
序號： B971

A nuclear power plant is operating at 85% of rated power when a failure of the steam pressure control system opens the turbine control valves to admit 10% more steam flow to the main turbine. No operator actions occur and no protective system actuations occur. How will reactor power respond? (Assume the control valves remain in the failed position.)
A. Increase until power level matches the new steam demand.
B. Increase continuously and exceed reactor protection set points.
C. Decrease and stabilize at a lower power level above the point of adding heat.
D. Decrease and stabilize at a critical power level below the point of adding heat.
ANSWER： C.

一核能電廠在85%額定功率下運轉，此時一蒸汽壓力控制系統失效而開啟了汽機控制閥，使得額外10%的蒸汽流入主汽機，無運轉員或保護動作發生。反應爐功率的反應為何？（假設控制閥維持在失效位置。）
A. 增加直到功率與新的蒸汽需求相匹配
B. 連續增加，並超過反應爐保護設定點
C. 減少，並在一高於加熱起始點之較低功率達到穩定
D. 減少，並在一低於加熱起始點之臨界功率達到穩定
答案： C.

科目： 292008
知能類： K1.22 [3.5/3.6]
序號： B1670

A nuclear power plant is operating normally at 50% of rated power when a steam break occurs that releases 5% of rated steam flow. Assume no operator or protective actions occur, automatic pressure control returns reactor pressure to its initial value, and feed water injection temperature remains the same.
How will turbine power respond?
A. Decrease and stabilize at a lower power level.
B. Increase and stabilize at a higher power level.
C. Decrease, then increase and stabilize at the previous power level.
D. Increase, then decrease and stabilize at the previous power level.
ANSWER： A.

一核能電廠在50%額定功率下運轉，此時一蒸汽管線破裂，而釋放出5%的額定蒸汽流量。假設無運轉員或保護動作發生，自動壓力控制將反應爐壓力回復至初始值，飼水注入溫度維持不變。汽機功率的反應為何？
A. 降低，並且在一較低功率達到穩定
B. 增加，並且在一較高功率達到穩定
C. 開始時降低，然後增加並在原本之功率達到穩定
D. 開始時增加，然後降低並在原本之功率達到穩定
答案： A.

科目： 292008
知能類： K1.22 [3.5/3.6]
序號： B2371
A nuclear power plant is operating at 90% of rated power at the end of core life when the turbine control system opens the turbine control valves an additional 5 percent. Reactor power will initially...
A. increase due to positive reactivity addition from the void coefficient only.
B. increase due to positive reactivity addition from the void and moderator temperature coefficients.
C. decrease due to negative reactivity addition from the void coefficient only.
D. decrease due to negative reactivity addition from the void and moderator temperature coefficients.
ANSWER： C.

一核能電廠於燃料循環末期以90%的額定功率運轉，此時汽機控制系統故障，而多開啟汽機控制閥5%。反應爐功率起初將會
A. 增加，因為僅來自於空泡係數的正反應度添加
B. 增加，因為來自於空泡係數與緩和劑溫度係數的正反應度添加
C. 減小，因為僅來自於空泡係數的負反應度添加
D. 減小，因為來自於空泡係數與緩和劑溫度係數的負反應度添加
答案： C.

科目： 292008
知能類： K1.22 [3.5/3.6]
序號： B2571

A nuclear power plant is operating normally at 50% of rated power when a steam break occurs that releases 5% of rated steam flow. Reactor power will initially...
A. increase due to positive reactivity addition from the void coefficient only.
B. increase due to positive reactivity addition from the void and moderator temperature coefficients.
C. decrease due to negative reactivity addition from the void coefficient only.
D. decrease due to negative reactivity addition from the void and moderator temperature coefficients.
ANSWER： C.

一核能電廠在50%額定功率下運轉，此時一蒸汽管線破裂發生，而釋放出5%的額定蒸汽流量。反應爐的功率初始將會
A. 增加，因為僅增加來自於空泡係數的正反應度
B. 增加，因為增加來自於空泡係數與緩和劑溫度係數的正反應度
C. 減小，因為僅增加來自於空泡係數的負反應度
D. 減小，因為增加來自於空泡係數與緩和劑溫度係數的負反應度
答案： C.

科目： 292008
知能類： K1.23 [2.6/3.1]
序號： B368

Which one of the following is the purpose of a rod sequence exchange?
A. Ensures proper rod coupling
B. Prevents rod shadowing
C. Promotes even fuel burnout
D. Minimizes water hole peaking
ANSWER： C.

下列何者是控制棒棒序交換的原因？
A. 確保適當之控制棒耦合
B. 預防控制棒陰影效應
C. 促進燃料均勻燃耗
D. 使水洞尖峰值降至最低
答案： C.

科目： 292008
知能類： K1.23 [2.6/3.1]
序號： B2572

During continuous reactor power operation, rod pattern exchanges are performed periodically to...
A. ensure some control rods remain inserted as deep control rods until late in the fuel cycle.
B. allow the local power range monitoring nuclear instruments to be asymmetrically installed in the core.
C. increase the rod worth of control rods that are nearly fully withdrawn.
D. prevent the development of individual control rods with very high reactivity worths.
ANSWER： D.

在連續反應爐功率運轉中，控制棒佈局需定期進行交換，其目的為
A. 確保某些控制棒維持插入而為深控制棒，直到燃料週期末期
B. 讓局部功率中子偵測儀器能在爐心中以不對稱方式裝設
C. 增加近乎全出控制棒之控制棒本領
D. 預防個別控制棒產生非常高的反應度本領
答案： D.

科目： 292008
知能類： K1.25 [2.8/2.9]
序號： B72 (P71)

Shortly after a reactor trip, reactor power indicates 5 x 10^{-2}% when a stable negative reactor period is attained. Approximately how much additional time is required for reactor power to decrease to 5 x 10^{-3}%?
A. 90 seconds
B. 180 seconds
C. 270 seconds
D. 360 seconds
ANSWER： B.

在反應爐跳脫之後不久，當達到穩定之負反應度週期時，反應爐功率指示5 x 10^{-2}%，其功率要降低至5 x 10^{-3}%所需要的時間約為何？
A. 90秒
B. 180秒
C. 270秒
D. 360秒
答案： B.

科目： 292008
知能類： K1.25 [2.8/2.9]
序號： B771 (P770)

Which one of the following is responsible for the negative 80-second stable reactor period experienced shortly after a reactor scram?
A. The shortest-lived delayed neutron precursors
B. The longest-lived delayed neutron precursors
C. The shutdown margin just prior to the scram
D. The worth of the inserted control rods
ANSWER： B.

在反應爐急停後，下列何者導致其負80秒之穩定週期？
A. 壽命最短之延遲中子之母核
B. 壽命最長之延遲中子之母核
C. 急停前之停機餘裕
D. 已插入控制棒之控制棒本領
答案： B.

科目： 292008
知能類： K1.25 [2.8/2.9]
序號： B1369 (P1965)

Shortly after a reactor scram, reactor power indicates 10^{-3}% where a stable negative period is attained. Reactor power will decrease to 10^{-4}% in approximately _____ seconds.
A. 380
B. 280
C. 180
D. 80
ANSWER： C.

反應爐急停之後不久，當達到穩定之負反應度週期時，其功率指示10^{-3}%，若功率要降低至10^{-4}%所需要的時間約為____秒。
A. 380
B. 280
C. 180
D. 80
答案： C.

科目： 292008
知能類： K1.25 [2.8/2.9]
序號： B1770 (P2171)

Following a reactor trip, reactor power indicates 0.1% when the typical stable post-trip reactor period is observed. Which one of the following is the approximate time required for reactor power to decrease to 0.05%?
A. 24 seconds
B. 55 seconds
C. 173 seconds
D. 240 seconds
ANSWER： B.

在反應爐急停之後不久，當觀察到一般穩定之週期時，其功率指示為0.1%，若功率降至0.05%所需要的時間約為何？
A. 24秒
B. 55秒
C. 173秒
D. 240秒
答案： B.

科目： 292008
知能類： K1.25 [2.8/2.9]
序號： B2071

A nuclear power plant is operating at 100% power at the end of core life when a single main steam isolation valve suddenly closes. Prior to a reactor scram, reactor power will initially...
A. increase due to positive reactivity addition from the void coefficient only.
B. increase due to positive reactivity addition from the void and moderator coefficients.
C. decrease due to negative reactivity addition from the Doppler coefficient only.
D. decrease due to negative reactivity addition from the Doppler and moderator temperature coefficients.
ANSWER： A.

一核能電廠於爐心壽命末期時以100%功率運轉，此時一主蒸汽隔離閥突然關閉。在反應爐急停之前，其功率首先
A. 增加，因為僅增加來自於空泡係數的正反應度
B. 增加，因為增加來自於空泡係數與緩和劑溫度係數的正反應度
C. 減小，因為僅增加來自於都卜勒係數的負反應度
D. 減小，因為增加來自於都卜勒係數與緩和劑溫度係數的負反應度
答案： A.

科目： 292008
知能類： K1.25 [2.8/2.9]
序號： B2769 (P2768)

Reactors A and B are identical and have been operated at 100% power for six months when a reactor scram occurs simultaneously on both reactors. All reactor A control rods fully insert. One reactor B control rod sticks fully withdrawn.
Which reactor, if any, will have the longest reactor period five minutes after the scram?
A. Reactor A due to the greater shutdown reactivity.
B. Reactor B due to the smaller shutdown reactivity.
C. Both reactors will have the same reactor period because, after five minutes, both reactors will be stable at a power level low in the source range.
D. Both reactors will have the same reactor period because, after five minutes, only the longestlived delayed neutron precursors will be releasing fission neutrons.
ANSWER： D.

反應爐A與B相同，同時在100%功率運轉六個月，此時兩反應爐同時發生急停。反應爐A的所有控制棒完全插入，而B的一支控制棒卡在全出位置。在急停後五分鐘，何者所具有的反應爐週期最長？
A. 反應爐A，因為較大之停機反應度
B. 反應爐B，因為較小之停機反應度
C. 兩反應爐將具有相同之反應爐週期，因為在五分鐘後，兩反應爐會在較低的某一源階功率達到穩定
D. 兩反應爐將具有相同之反應爐週期，因為在五分鐘後，只有壽命最長的延遲中子母核將會釋放出分裂中子
答案： D.

科目： 292008
知能類： K1.25 [2.8/2.9]
序號： B3271 (P3271)

Nuclear reactors A and B are identical and have been operated at 100% power for six months when a reactor scram occurs simultaneously on both reactors. All reactor A control rods fully insert. One reactor B control rod sticks fully withdrawn.
After five minutes, when compared to reactor B, the core fission rate in reactor A will be _____, and the reactor period in reactor A will be _____.
A. the same; shorter
B. the same; the same
C. lower; shorter
D. lower; the same
ANSWER： D.

反應爐A與B相同，同時在100%功率運轉六個月，此時兩反應爐同時發生急停。反應爐A的所有控制棒完全插入，而B的一支控制棒卡在全出位置。在急停後五分鐘，與反應爐B相比，反應爐A的爐心分裂率將會_____，而反應爐A之反應爐週期將會_____。
A. 相等；較短
B. 相等；相等
C. 較低；較短
D. 較低；相等
答案： D.

科目： 292008
知能類： K1.25 [2.8/2.9]
序號： B3472 (P3468)

A reactor is critical just below the point of adding heat when an inadvertent reactor scram occurs. All control rods fully insert except for one rod, which remains fully withdrawn. Five minutes after the reactor scram, with reactor period stable at approximately negative (-) 80 seconds, the remaining withdrawn control rod suddenly and rapidly fully inserts. Which one of the following describes the reactor response to the insertion of the last control rod?

A. The negative period will remain stable at approximately -80 seconds.
B. The negative period will immediately become shorter, and then lengthen and stabilize at approximately -80 seconds.
C. The negative period will immediately become shorter, and then lengthen and stabilize at a value more negative than -80 seconds.
D. The negative period will immediately become shorter, and then lengthen and stabilize at a value less negative than -80 seconds.

ANSWER： B.

一反應爐在加熱起始點之下達到臨界，此時一意外之反應爐急停發生。除了一支控制棒維持完全抽出外，其他所有控制棒均完全插入。在急停五分鐘後週期在負80秒達到穩定，維持抽出之控制棒突然快速完全插入。下列何者描述最後一根控制棒插入的反應爐反應？

A. 負週期將會在約負80秒維持穩定
B. 負週期將會立刻縮短，然後增長，且在約負80秒處維持穩定
C. 負週期將會立刻縮短，然後增長，且在一較負80秒負更多處維持穩定
D. 負週期將會立刻縮短，然後增長，且在一較負80秒負更少處維持穩定

答案： B.

科目： 292008
知能類： K1.25 [2.8/2.9]
序號： B3771 (P3772)

A nuclear plower plant that has been operating at rated power for two months experiences a reactor scram. Five minutes after the scram, with all control rods still fully inserted, a count rate of 5,000 cps is indicated on the source range nuclear instruments with a reactor period of negative 80 seconds.
The majority of the source range detector output is currently being caused by the interaction of _____ with the detector.
A. intrinsic source neutrons
B. fission gammas from previous power operation
C. fission neutrons from subcritical multiplication
D. delayed fission neutrons from previous power operation
ANSWER： D.

一核能電廠在額定功率運轉兩個月，此時發生反應爐急停。急停後五分鐘，在所有控制棒完全插入情況下，源階中子偵測儀器指示計數率為5,000cps，其週期為負80秒。此時，源階中子偵測器大部分輸出是因_____與偵測器的交互作用所致。
A. 自發中子源
B. 來自之前功率運轉之分裂伽瑪
C. 來自次臨界增殖之分裂中子
D. 來自之前功率運轉之延遲分裂中子
答案： D.

科目： 292008
知能類： K1.26 [3.4/3.7]
序號： B471

A nuclear power plant is operating at 100% power when one recirculation pump trips. Reactor power decreases and stabilizes at a lower power level. Which one of the following reactivity coefficients caused the initial decrease in reactor power?
A. Void
B. Pressure
C. Moderator temperature
D. Fuel temperature (Doppler)
ANSWER： A.

一核能電廠在100%功率運轉，此時一再循環泵跳脫。反應爐功率降低並在一較低功率達到穩定。下列那一反應度係數導致了反應爐功率降低？
A. 空泡
B. 壓力
C. 緩和劑溫度
D. 燃料溫度（都卜勒）
答案： A.

科目： 292008
知能類： K1.26 [3.4/3.7]
序號： B672

A nuclear power plant is operating at 70% of rated power when one recirculation pump trips. Reactor power will initially _____ because of the effects of the _____ coefficient.
A. decrease; void
B. increase; moderator temperature
C. decrease; moderator temperature
D. increase; void
ANSWER： A.

一核能電廠在70%功率運轉，此時一再循環泵跳脫。反應爐功率將會開始_____，因為_____係數的影響所致。
A. 降低；空泡
B. 增加；緩和劑溫度
C. 降低；緩和劑溫度
D. 增加；空泡
答案： A.

科目： 292008
知能類： K1.27 [3.4/3.5]
序號： B126

A reactor is exactly critical in the source range when a fully withdrawn control rod fully inserts into the core. If no operator or automatic actions occur, how will the source range count rate respond?
A. Decrease to zero.
B. Decrease to the value of the source neutron strength.
C. Decrease to a value above the source neutron strength.
D. Decrease initially and then slowly increase and stabilize at the initial value.
ANSWER： C.

一反應爐在源階中恰好臨界，此時一全出之控制棒完全插入爐心。若無運轉員或自動動作發生，源階計數率將如何反應？
A. 降低至零
B. 降低至中子源強度值
C. 降低至大於中子源強度之值
D. 初始降低，然後緩慢增加，並在初始值達到穩定
答案： C.

科目： 292008
知能類： K1.27 [3.4/3.5]
序號： B1472 (N/A)

A nuclear power plant is initially operating at 100% power when a control rod fully inserts into the core. Assuming no operator action, reactor power will initially decrease and then...
A. return to the original power level with the void boundary lower in the core.
B. stabilize at a lower power level with the void boundary lower in the core.
C. return to the original power level with the void boundary higher in the core.
D. stabilize at a lower power level with the void boundary higher in the core.
ANSWER： D.

一反應爐初始在100%功率運轉，此時一控制棒完全插入爐心。若無運轉員操作，反應爐功率將初始減小，然後
A. 回復至原功率且其爐心空泡邊界位置較低
B. 在一較低之功率達到穩定且其爐心空泡邊界位置較低
C. 回復至原功率且其爐心空泡邊界位置較高
D. 在一較低之功率達到穩定且其爐心空泡邊界位置較高
答案： D.

科目： 292008
知能類： K1.27 [3.4/3.5]
序號： B1969 (P672)

A reactor is exactly critical below the point of adding heat when a single control rod is fully inserted into the core. Assuming no operator or automatic action, reactor power will slowly decrease to...
A. zero.
B. an equilibrium value less than the source neutron strength.
C. an equilibrium value greater than the source neutron strength.
D. a slightly lower value, then slowly return to the initial value.
ANSWER： C.

一反應爐在加熱起始點之下恰好達到臨界，此時一控制棒完全插入爐心。假設無運轉員操作，反應爐功率將會緩慢降低至
A. 零
B. 一較源中子(source neutron)強度為小的平衡值
C. 一較源中子強度為大的平衡值
D. 一稍微較低之值，然後緩慢回復至初始值
答案： C.

科目： 292008
知能類： K1.30 [3.2/3.5]
序號： B131 (P2672)

Which one of the following percentages most closely approximates the decay heat produced in the reactor at 1 second and at 1 hour, respectively, following a scram from extended operation at 100% power?

	ONE SECOND	ONE HOUR
A.	15.0%	1.0%
B.	7.0%	1.0%
C.	1.0%	0.1%
D.	0.5%	0.1%

ANSWER： B.

一反應爐長期於100%功率運轉，發生急停後，於時間一秒與一小時處，下列何者最接近其各別的衰變熱百分率值？

	一秒	一小時
A.	15.0%	1.0%
B.	7.0%	1.0%
C.	1.0%	0.1%
D.	0.5%	0.1%

答案： B.

科目： 292008
知能類： K1.30 [3.2/3.5]
序號： B372 (P370)

After one month of operation at 100% reactor power, the fraction of thermal power being produced from the decay of fission products in the operating reactor is:
A. greater than 10%.
B. greater than 5% but less than 10%.
C. greater than 1% but less than 5%.
D. less than 1%.
ANSWER： B.

一反應爐在100%功率運轉一個月後，此反應爐中由分裂產物衰變而產生之熱功率比率
A. 大於10%
B. 大於5%但小於10%
C. 大於1%但小於5%
D. 小於1%
答案： B.

科目： 292008
知能類： K1.30 [3.2/3.5]
序號： B2272 (P572)

A nuclear power plant has been operating at 100% power for several weeks when a reactor scram occurs. How much time will be required for core heat production to decrease to 1% following the scram?
A. 1 to 8 days
B. 1 to 8 hours
C. 1 to 8 minutes
D. 1 to 8 seconds
ANSWER： B.

一核能電廠在100%功率運轉數週，此時發生急停。急停後爐心熱量產生降低至1%所需時間為何？
A. 1至8天
B. 1至8小時
C. 1至8分
D. 1至8秒
答案： B.

科目： 292008
知能類： K1.30 [3.2/3.5]
序號： B2872 (P2872)

A reactor has been shutdown for several weeks when a loss of all ac power results in a loss of forced decay heat removal flow.
Given the following information, what will be the average reactor coolant heatup rate during the 20 minutes immediately after decay heat removal flow is lost? Assume that only ambient losses are removing heat from the reactor coolant system (RCS).
Reactor rated thermal power: 2,800 MWt
Decay heat rate: 0.2% rated thermal power
RCS ambient heat loss rate: 2.4 MWt
RCS c_p: 1.1 Btu/lbm-EF
Reactor vessel coolant inventory: 325,000 lbm
A. Less than 25^{o}F/hour
B. 26 to 50^{o}F/hour
C. 51 to 75F/hour
D. More than 76^{o}F/hour
ANSWER： B.

一反應爐停機數週後，因所有直流電源喪失導致強制衰變熱移除流量喪失。根據以下數據，緊接在強制衰變熱移除流量喪失後20分鐘，下列何者是反應爐冷卻水加熱率？假設只有散失至環境的熱量會從反應爐冷卻水系統（RCS）移除熱量。
反應爐額定熱功率：2,800 MWt
衰變熱功率：0.2%額定熱功率
RCS散失至環境的熱損失率：2.4 MWt
RCS c_p: 1.1 Btu/lbm-EF
反應槽冷卻水總量：325,000 lbm
A. 小於25^{o}F/hour
B. 26至50 ^{o}F/hour
C. 51至75^{o}F/hour
D. 大於76^{o}F/hour
答案： B.

科目： 292008
知能類： K1.30 [3.2/3.5]
序號： B2972 (P2972)

A nuclear power plant has been operating for one hour at 50% of rated power following six months of operation at steady-state 100% power. Which one of the following is the percentage of rated thermal power currently being generated by decay heat?
A. 1% to 2%
B. 3% to 5%
C. 6% to 8%
D. 9% to 11%
ANSWER： B.

一核能電廠在100%功率穩定運轉六個月後，並於50%額定功率運轉一小時。衰變熱(decay heat)產生了多少百分比之額定熱功率？
A. 1%至2%
B. 3%至5%
C. 6%至8%
D. 9%至11%
答案： B.