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^{o}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。請判斷以下自急停起加入之各反應度值是(+)或(-)，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/題號：292002/1 (2016新增)
知能類：K1.08 [2.7/2.8]
序號：B6424 (P6424)

A 1.5 MeV neutron is about to interact with a U-238 nucleus in an operating reactor. Which one of the following describes the most likely interaction and its effect on K_{eff}?
A. The neutron will be scattered, thereby leaving K_{eff} unchanged.
B. The neutron will be absorbed and the nucleus will fission, thereby decreasing K_{eff}.
C. The neutron will be absorbed and the nucleus will fission, thereby increasing K_{eff}.
D. The neutron will be absorbed and the nucleus will decay to Pu-239, thereby increasing K_{eff}.
ANSWER: A.

一座運轉反應器中，一個 1.5MeV 的中子與鈾-238 原子核發生交互作用。下列何者最能描述其交互作用和對有效增殖因數的影響？
A.中子將會散射，因此有效增殖因數並不受影響
B.中子將會被吸收，原子核將會分裂，因此有效增殖因數將會減少
C.中子將會被吸收，原子核將會分裂，因此有效增殖因數將會增加
D.中子將會被吸收，而且原子核將會衰變為鈽-239，因此有效增殖因數將會增加

答案： A

科目/題號：292002/2 (2016 新增)
知能類：k1.12〔2.4/2.5〕
序號：B7647(P7647)

A reactor was initially shutdown at a stable power level of 2.0 x 10^{-5} percent. After a small positive reactivity addition, the current stable power level is 3.0 x 10^{-5} percent. If the initial K_{eff} was 0.982, what is the current K_{eff}?

A. 0.988

B. 0.992

C. 0.996

D. Cannot be determined without additional information.

ANSWER: A.

一座反應器最初停機穩定在 2.0×10^{-5}%功率。在加入某一小量的正反應度後，目前的穩定功率是 3.0×10^{-5}%。假如最初的有效增殖因數是 0.982，目前的有效增殖因數是多少？

A.0.988
B.0.992
C.0.996
D.在無更多資訊下無法決定

答案： A

科目/題號：292002/3 (2016 新增)
知能類：k1.14〔2.6/2.9〕
序號：B4924

Reactors A and B are identical except that reactor A is operating near the beginning of a fuel cycle (BOC) and reactor B is operating near the end of a fuel cycle (EOC). Both reactors are operating at 100 percent power.
Which reactor would have the smaller K_{eff} five minutes after a reactor scram?
A. Reactor A, because the control rods will add more negative reactivity near the BOC.
B. Reactor A, because the power coefficient is more negative near the BOC.
C. Reactor B, because the control rods will add more negative reactivity near the EOC.
D. Reactor B, because the power coefficient is more negative near the EOC.
ANSWER: C.

反應器 A 和 B 完全相同，除了反應器 A 係運轉在燃料週期初期(BOC)，而反應器 B 係運轉在燃料週期末期(EOC)。反應器均正運轉在 100%功率。何反應器在急停 5 分鐘後爐心的有效增殖因數較小？
A.反應器 A，因為控制棒在接近 BOC 時將加入更多負反應度
B.反應器 A，因為功率係數在接近 BOC 時其負值更大
C.反應器 B，因為控制棒在接近 EOC 時將加入更多負反應度
D.反應器 B，因為功率係數在接近 EOC 時其負值更大

答案： C

科目/題號：292002/4 (2016 新增)
知能類：k1.14〔2.6/2.9〕
序號：B5224

A reactor was initially operating at steady-state 100 percent power near the middle of a fuel cycle when it was shut down and then cooled down to 200°F over a three-day period.
Given the following absolute values of reactivities added during the shutdown and cooldown, assign a (+) or (–) as appropriate and choose the current value of core reactivity.

Control rods = ( ) 12.50 %ΔK/K
Voids = ( ) 3.50 %ΔK/K
Xenon = ( ) 2.50 %ΔK/K
Fuel temperature = ( ) 2.00 %ΔK/K
Moderator temperature = ( ) 0.50 %ΔK/K

A. -3.0 %ΔK/K
B. -4.0 %ΔK/K
C. -8.0 %ΔK/K
D. -9.0 %ΔK/K
ANSWER: B.

一反應器在燃料週期中期運轉，最初穩定在 100%功率。當其停機三天後降溫至 200℉。
假設在停機和降溫時，加入下列絕對值的反應度，請適當選擇目前爐心反應度並指定其(+)或(-)。

控制棒 = ( )12.5 %ΔK/K
空泡 = ( )3.50 %ΔK/K
氙毒 = ( )2.50 %ΔK/K
燃料溫度 = ( )2.00 %ΔK/K
緩和劑溫度 = ( )0.50%ΔK/K

A.-3.0%ΔK/K
B.-4.0%ΔK/K
C.-8.0%ΔK/K
D.-9.0%ΔK/K

答案： B

科目/題號：292002/5 (2016 新增)
知能類：k1.14〔2.6/2.9〕
序號：B6224

Reactors A and B are identical except that reactor A is operating near the beginning of a fuel cycle (BOC) and reactor B is operating near the end of a fuel cycle (EOC). Both reactors are operating at 100 percent power.
Which reactor will have the greater core K_{eff} five minutes after a reactor scram?
A. Reactor A, because complete control rod insertion will add less negative reactivity near the BOC.
B. Reactor A, because the power coefficient is less negative near the BOC.
C. Reactor B, because complete control rod insertion will add less negative reactivity near the EOC.
D. Reactor B, because the power coefficient is less negative near the EOC.
ANSWER: A.

反應器 A 和 B 完全相同，除了反應器 A 係運轉在燃料週期初期(BOC)，而反應器 B 係運轉在燃料週期末期(EOC)。兩座反應器均運轉在 100%功率。下列何者反應器在急停 5 分鐘後的爐心有效增殖因數較大？
A.反應器 A，因為在接近 BOC 時控制棒完全插入將加入較少負反應度
B.反應器 A，因為在接近 BOC 時功率係數負值較小
C.反應器 B，因為在接近 EOC 時控制棒完全插入將加入較少負反應度
D.反應器 B，因為在接近 EOC 時功率係數負值較小

答案： A

科目/題號：292002/6 (2016 新增)
知能類：k1.14〔2.6/2.9〕
序號：B7224

A nuclear power plant was initially operating at equilibrium 100 percent power just prior to a refueling outage. The plant was shut down, refueled, restarted, and is currently operating at equilibrium 100 percent power. Assume the 100 percent power fission rate did not change.
Which one of the following describes the current plant status as compared to the conditions just prior to the refueling?
A. The core thermal neutron flux is greater.
B. The available shutdown margin is smaller.
C. The control rods are withdrawn farther from the core.
D. The equilibrium core Xe-135 concentration is smaller.
ANSWER: B.

一核能電廠穩態運轉在更換燃料停機前的 100%功率。此核能電廠經歷停機、更換燃料、再啟動，目前穩態運轉在 100%功率。假設 100%功率分裂率不變。與更換燃料停機前的條件相比，下列何者敘述係目前核能電廠的狀態？
A.爐心熱中子通量較大
B.有效停機餘裕較小
C.控制棒群抽離爐心較多
D.爐心平衡氙-135 毒濃度較小

答案： B