科目： 193003
知能類：K1.02 [2.4/2.5]
序號： P1774 (N/A)

Two identical pressurizers are connected to the same location on two identical reactor coolant systems operating at 1,000 psia. Pressurizer A volume contains 50% saturated water and 50% saturated steam. Pressurizer B volume contains 50% subcooled water (300°F) and 50% nitrogen.

Which one of the following explains which pressurizer will maintain the highest pressure following a sudden 10% liquid outsurge from each pressurizer?

A. Pressurizer A due to vaporizing of saturated water as pressure begins to decrease

B. Pressurizer A due to the expansion characteristics of saturated steam being better than the expansion characteristics of nitrogen

C. Pressurizer B due to the subcooled water resulting in a smaller amount of energy being lost upon the outsurge

D. Pressurizer B due to the expansion characteristics of nitrogen being better than the expansion characteristics of saturated steam

ANSWER: A.

兩個相同調壓槽分別連至兩個相同的反應器冷卻水系統，該冷卻水系統在 1,000 psia 運轉，調壓槽連接該系統的位置相同。調壓槽 A 裝有 50%飽和水及 50%飽和蒸汽，調壓槽 B 裝有 50%次冷水(300°F)與 50%氮。

下列何者說明了各調壓槽突然湧出(outsurge)10%液體後，哪一調壓槽將維持最高壓力？

A. 調壓槽 A，因為飽和水隨著壓力開始降低而蒸發。

B. 調壓槽 A，因為飽和蒸汽的膨脹特性優於氮的膨脹特性。

C. 調壓槽 B，因為次冷水導致湧出時損失的能量較少。

D. 調壓槽 B，因為氮的膨脹特性優於飽和蒸汽的膨脹特性。

答案：A.

科目： 193003
知能類：K1.02 [2.4/2.5]
序號： P1973 (N/A)

Two identical pressurizers are connected to the same location on two identical reactor coolant systems operating at 1,000 psia. Pressurizer A volume contains 50% subcooled water (300°F) and 50% nitrogen. Pressurizer B volume contains 50% saturated water and 50% saturated steam.

Which one of the following explains which pressurizer will maintain the highest pressure during a sudden 10% liquid outsurge from each pressurizer?

A. Pressurizer A due to the subcooled water resulting in a smaller amount of energy being lost during the outsurge.

B. Pressurizer A due to the expansion characteristics of nitrogen being better than the expansion characteristics of saturated steam.

C. Pressurizer B due to vaporizing of saturated water as pressure begins to decrease.

D. Pressurizer B due to the expansion characteristics of saturated steam being better than the expansion characteristics of nitrogen.

ANSWER: C.

兩個相同調壓槽分別連至兩個相同的反應器冷卻水系統，該冷卻水系統在 1,000 psia 運轉，調壓槽連接該系統的位置相同。調壓槽 A 裝有 50%次冷水(300°F)及 50%氮，調壓槽 B 裝有 50%飽和水與 50%飽和蒸汽。

下列何者說明了各調壓槽突然湧出(outsurge)10%液體後，哪一調壓槽將維持最高壓力？

A. 調壓槽 A，因為次冷水導致湧出時損失的能量較少。

B. 調壓槽 A，因為氮的膨脹特性優於飽和蒸汽的膨脹特性。

C. 調壓槽 B，因為飽和水隨著壓力開始降低而蒸發。

D. 調壓槽 B，因為飽和蒸汽的膨脹特性優於氮的膨脹特性。

答案：C.

科目： 193003
知能類：K1.02 [2.4/2.5]
序號： P3874

A nuclear reactor is operating normally at 100% power. Reactor coolant enters the reactor vessel at a temperature of 556°F and a total flow rate of 320,000 gpm. The reactor coolant leaves the reactor vessel at 612°F.

What is the approximate flow rate of the reactor coolant leaving the reactor vessel?

A. 320,000 to 329,000 gpm

B. 330,000 to 339,000 gpm

C. 340,000 to 349,000 gpm

D. 350,000 to 359,000 gpm

ANSWER: D.

一部核子反應器以 100%功率正常運轉。進入反應爐槽的冷卻水溫為 556°F，總流量為 320,000 gpm。離開反應爐槽的冷卻水溫為 612°F。

請問離開反應爐的冷卻水流量約為多少？

A. 320,000 - 329,000 gpm

B. 330,000 - 339,000 gpm

C. 340,000 - 349,000 gpm

D. 350,000 - 359,000 gpm

答案：D.

科目： 193003
知能類：K1.08 [2.8/2.8]
科目： P674 (B1074)

A liquid is saturated with 0% quality. Assuming pressure remains constant, the addition of a small amount of heat will...

A. raise the liquid temperature above the boiling point.

B. result in a subcooled liquid.

C. result in vaporization of the liquid.

D. result in a superheated liquid.

ANSWER: C.

一飽和液體的蒸汽乾度為0%。假設壓力維持不變，加入少量的熱，將會……

A. 升高液體溫度以超過沸點。

B. 產生次冷液體。

C. 造成液體蒸發。

D. 造成過熱液體。

答案：C.

科目： 193003
知能類：K1.08 [2.8/2.8]
序號： P774 (N/A)

A pressurizer is operating in a saturated condition at 636°F. If a sudden pressurizer level decrease of 10% occurs, pressurizer pressure will _____ and pressurizer temperature will _____.

A. remain the same; decrease

B. remain the same; remain the same

C. decrease; decrease

D. decrease; remain the same

ANSWER: C.

一調壓槽於飽和狀態運轉，溫度為 636°F。調壓槽水位突然降低 10%時，其壓力將_____，溫度將_____。

A. 維持不變；降低

B. 維持不變；維持不變

C. 降低；降低

D. 降低；維持不變

答案 C.

科目： 193003
知能類：K1.08 [2.8/2.8]
序號： P874 (B875)

Consider a water/steam mixture with a current quality of 99%. If pressure remains constant and heat is removed from the mixture, the temperature of the mixture will _____ and the quality of the mixture will _____. (Assume the mixture remains saturated.)

A. decrease; remain the same

B. decrease; decrease

C. remain the same; remain the same

D. remain the same; decrease

ANSWER: D.

已知水/蒸汽混合物的現有蒸汽乾度為99%，如果壓力維持不變，移除混合物的熱量時，混合物溫度將_____，其乾度將_____(假設混合物維持飽和狀態)。

A. 降低；維持不變

B. 降低；降低

C. 維持不變；維持不變

D. 維持不變；降低

答案：D.

科目： 193003
知能類：K1.08 [2.8/2.8]
序號： P1075

A nuclear power plant is shut down with the pressurizer conditions as follows:

Pressurizer liquid temperature = 588°F
Pressurizer vapor temperature = 607°F
Pressurizer pressure = 1410 psia

If the pressurizer is vented until pressure equals 1200 psia, pressurizer liquid temperature will...

A. increase due to condensation of vapor.

B. increase due to evaporation of liquid.

C. decrease due to condensation of vapor.

D. decrease due to evaporation of liquid.

ANSWER: D.

核能電廠停機時，調壓槽狀況如下：

調壓槽液體溫度 = 588°F
調壓槽蒸汽溫度 = 607°F
調壓槽壓力 = 1410 psia

調壓槽若排氣至壓力等於 1200 psia 時，其液體溫度將……

A. 因為蒸汽凝結而升高。

B. 因為液體蒸發而升高。

C. 因為蒸汽冷凝而降低。

D. 因為液體蒸發而降低。

答案：D.

科目： 193003
知能類：K1.08 [2.8/2.8]
序號： P1174

Which one of the following describes the temperature of a saturated liquid?

A. Below the boiling point

B. At the boiling point

C. Above the boiling point

D. Unrelated to the boiling point

ANSWER: B.

下列何者描述了飽和液體溫度？

A. 低於沸點

B. 等於沸點

C. 高於沸點

D. 無關沸點

答案：B.

科目： 193003
知能類：K1.08 [2.8/2.8]
序號： P1374 (B1874)

Consider a water/steam mixture with a current quality of 95%. If pressure remains constant and heat is added to the mixture, the temperature of the mixture will _____ and the quality of the mixture will _____. (Assume the mixture remains saturated.)

A. increase; remain the same

B. increase; increase

C. remain the same; remain the same

D. remain the same; increase

ANSWER: D.

已知水/蒸汽混合物的現有蒸汽乾度為95%，如果壓力維持不變，加熱至混合物時，混合物溫度將_____，其蒸汽乾度將_____(假設混合物維持飽和狀態)。

A. 升高；維持不變

B. 升高；增加

C. 維持不變；維持不變

D. 維持不變；增加

答案：D.

科目： 193003
知能類：K1.08 [2.8/2.8]
序號： P1474 (B1974)

If 1 pound-mass of liquid water is in a saturated condition at a constant pressure, the addition of 1 Btu will...

A. raise the temperature of the water by 1°F.

B. vaporize a portion of the water.

C. increase the density of the water.

D. result in 1°F of superheat.

ANSWER: B.

在定壓飽和狀態下，將1 Btu加入一磅質量(lbm)的液態水，將會……

A. 升高水溫1˚F。

B. 蒸發部分的水。

C. 增加水密度。

D. 造成1˚F過熱

答案：B.

科目： 193003
知能類：K1.08 [2.8/2.8]
序號： P1574 (B1574)

Consider a steam-water mixture with a current quality of 79%. If pressure remains constant and heat is added to the mixture, the temperature of the mixture will _____ and the quality of the mixture will _____. (Assume the mixture remains saturated.)

A. increase; increase

B. increase; remain the same

C. remain the same; increase

D. remain the same; remain the same

ANSWER: C.

已知蒸汽-水混合物的現有蒸汽乾度為79%，如果壓力保持不變，加熱至混合物時，混合物溫度將_____，其乾度將_____(假設混合物維持飽和狀態)。

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：C.

科目： 193003
知能類：K1.08 [2.8/2.8]
序號： P1575

A nuclear power plant is shut down with the pressurizer in a saturated condition as follows:

Pressurizer liquid temperature = 588°F
Pressurizer vapor temperature = 588°F
Pressurizer pressure = 1,410 psia

Pressurizer spray is initiated to lower pressurizer pressure to 1350 psia. When pressurizer pressure stabilizes at 1350 psia, liquid temperature will be _____ and vapor temperature will be _____.

A. the same; the same

B. the same; lower

C. lower; the same

D. lower; lower

ANSWER: D.

核能電廠停機時，處於飽和狀態的調壓槽狀況如下：

調壓槽液體溫度 = 588°F
調壓槽蒸汽溫度 = 588°F
調壓槽壓力 = 1,410 psia

啟動調壓槽噴灑系統以降低槽壓至 1350 psia。槽壓穩定於 1350 psia 時，液體溫度將_____，蒸汽溫度將_____。

A. 維持相同；維持相同

B. 維持相同；較低

C. 較低；維持相同

D. 較低；較低

答案：D.

科目： 193003
知能類：K1.08 [2.8/2.8]
序號： P1974 (B3574)

A steam-water mixture is initially saturated with a quality of 50%, when a small amount of heat is added. Assuming pressure remains constant and the mixture remains saturated, mixture steam quality will _____ and mixture temperature will _____.

A. increase; increase

B. increase; remain the same

C. remain the same; increase

D. remain the same; remain the same

ANSWER: B.

蒸汽-水混合物的初始飽和蒸汽乾度為50%。假設壓力保持不變，混合物亦維持飽和，則微量加熱時，混合物的蒸汽乾度將_____，其溫度將_____。

A. 增加；升高

B. 增加；維持不變

C. 維持不變；升高

D. 維持不變；維持不變

答案：B.

科目： 193003
知能類：K1.08 [2.8/2.8]
序號： P1976 (B2874)

Which one of the following is the approximate steam quality of a steam-water mixture at 467°F with an enthalpy of 1,000 BTU/lbm?

A. 25%

B. 27%

C. 73%

D. 75%

ANSWER: C.

下列何者是467˚F、焓1,000 BTU/lbm的蒸汽-水混合物蒸汽乾度近似值？

A. 25%

B. 27%

C. 73%

D. 75%

答案：C.

科目： 193003
知能類：K1.08 [2.8/2.8]
序號： P2174

Consider a pressurizer containing a saturated water/steam mixture at 636°F with a quality of 50%. If an outsurge removes 10% of the liquid volume from the pressurizer, the temperature of the mixture will _____ and the quality of the mixture will _____. (Assume the mixture remains saturated.)

A. decrease; decrease

B. decrease; increase

C. remain the same; decrease

D. remain the same; increase

ANSWER: B.

已知調壓槽裝有636°F的飽和水/蒸汽混合物，蒸汽乾度為50%。如果調壓槽湧出(outsurge)而損失10%體積的液體，混合物溫度將_____，其乾度將_____(假設混合物維持飽和狀態)。

A. 降低；降低

B. 降低；增加

C. 維持不變；降低

D. 維持不變；增加

答案：B.

科目： 193003
知能類：K1.08 [2.8/2.8]
序號： P2374 (B2375)

Which one of the following describes the effect of removing heat from a steam-water mixture that is in a saturated condition? (Assume the mixture remains saturated.)

A. Temperature will increase.

B. Temperature will decrease.

C. Quality will increase.

D. Quality will decrease.

ANSWER: D.

從飽和狀態的蒸汽-水混合物移除熱量時，將發生哪種影響(假設混合物維持飽和狀態)？

A. 溫度將升高

B. 溫度將降低

C. 蒸汽乾度將增加

D. 蒸汽乾度將減少

答案：D.

科目： 193003
知能類：K1.08 [2.8/2.8]
序號： P2474

A nuclear power plant is shut down with the pressurizer in a saturated condition as follows:

Pressurizer liquid temperature = 588°F
Pressurizer vapor temperature = 588°F
Pressurizer pressure = 1,410 psia

Pressurizer heaters are energized to raise pressurizer pressure to 1,450 psia. When pressurizer pressure stabilizes at 1,450 psia, liquid temperature will be _____ and vapor temperature will be _____.

A. the same; the same

B. the same; higher

C. higher; the same

D. higher; higher

ANSWER: D.

核能電廠停機時，處於飽和狀態的調壓槽資料如下：

調壓槽液體溫度 = 588°F
調壓槽蒸汽溫度 = 588°F
調壓槽壓力 = 1,410 psia

啟動調壓槽加熱器以升高槽壓至 1,450 psia。當槽壓穩定於 1,450 psia 時，液體溫度將_____，蒸汽溫度將_____。

A. 維持相同；維持相同

B. 維持相同；較高

C. 較高；維持相同

D. 較高；較高

答案：D.

科目： 193003
知能類：K1.08 [2.8/2.8]
序號： P2874 (B3374)

An open container holds one pound-mass of liquid water at saturated conditions and atmospheric pressure. The addition of 4 Btus will...

A. raise the temperature of the water by 4°F.

B. vaporize a portion of the water.

C. increase the density of the water.

D. result in 4°F of superheat.

ANSWER: B.

一開放容器在飽和狀態和大氣壓力下，裝有一磅質量的液態水。加入4 Btu將……

A. 升高水溫4˚F

B. 蒸發部分的水

C. 增加水密度

D. 造成4˚F過熱

答案：B.

科目： 193003
知能類：K1.08 [2.8/2.8]
序號： P2974 (B2975)

Consider a pressurizer containing a saturated water/vapor mixture at 500°F. The mixture is currently stable with no net heat gain or loss occurring. Water and steam each occupy 50% of the pressurizer volume.

If a leak near the bottom of the pressurizer results in a loss of 10% of the liquid volume from the pressurizer, the temperature of the mixture will _____, and the overall quality of the mixture will _____. (Assume the mixture remains saturated.)

A. decrease; increase

B. decrease; decrease

C. remain the same; increase

D. remain the same; decrease

ANSWER: A.

已知調壓槽含有500˚F的飽和水/蒸汽混合物，混合物現況穩定，沒有發生熱量淨損益。調壓槽所裝的水與蒸汽各佔50%。

如果在調壓槽底部附近有裂縫，導致調壓槽流失10%體積的液體，混合物溫度將_____，其整體蒸汽乾度將_____(假設混合物維持飽和狀態)。

A. 降低；增加

B. 降低；降低

C. 維持不變；增加

D. 維持不變；降低

答案：A.

科目： 193003
知能類：K1.12 [2.8/2.3]
序號： P3375 (B3378)

Given the following:

- A saturated steam-water mixture with an inlet quality of 60% is flowing through a moisture separator.
- The moisture separator is 100% efficient for removing moisture.

How much moisture will be removed by the moisture separator from 50 lbm of the steam-water mixture?

A. 10 lbm

B. 20 lbm

C. 30 lbm

D. 40 lbm

ANSWER: B.

已知下列條件：

- 流經汽水分離器進口的飽和蒸汽-水混合物，其蒸汽乾度為 60%。
- 汽水分離器的除水效率為 100%。

汽水分離器將從 50 lbm 的蒸汽-水混合物移除多少水份？

A. 10 lbm

B. 20 lbm

C. 30 lbm

D. 40 lbm

答案：B.

科目： 193003
知能類：K1.12 [2.8/2.3]
序號： P3774 (B3778)

Given the following:

- A saturated steam-water mixture with an inlet quality of 40% is flowing through a moisture separator.
- The moisture separator is 100% efficient for removing water.

How much water will be removed by the moisture separator from 50 lbm of the steam-water mixture?

A. 10 lbm

B. 20 lbm

C. 30 lbm

D. 40 lbm

ANSWER: C.

已知下列條件：

- 流經汽水分離器進口的飽和蒸汽-水混合物，其蒸汽乾度為 40%。
- 汽水分離器的除水效率為 100%。

汽水分離器將從 50 lbm 的蒸汽-水混合物移除多少水？

A. 10 lbm

B. 20 lbm

C. 30 lbm

D. 40 lbm

答案：C.

科目： 193003
知能類：K1.14 [2.4/2.5]
序號： P574

Any vapor having a temperature above saturation temperature is a...

A. saturated vapor.

B. superheated vapor.

C. dry saturated vapor.

D. wet saturated vapor.

ANSWER: B.

溫度高於飽和溫度的蒸汽，稱為……

A. 飽和蒸汽

B. 過熱蒸汽

C. 乾飽和蒸汽

D. 濕飽和蒸汽

答案：B.

科目： 193003
知能類：K1.14 [2.4/2.5]
序號： P974

A nuclear power plant is shut down with the pressurizer in a saturated condition with liquid and vapor temperatures at 650°F. After a reactor coolant system cooldown, pressurizer conditions are as follows:

Pressurizer liquid temperature = 588°F
Pressurizer vapor temperature = 607°F
Pressurizer pressure = 1410 psia

Given these conditions, the pressurizer liquid is _____ and the pressurizer vapor is _____.

A. subcooled; saturated

B. subcooled; superheated

C. saturated; saturated

D. saturated; superheated

ANSWER: D.

核能電廠停機時，調壓槽為飽和狀態，液體與蒸汽溫度為 650°F。反應器冷卻水系統降溫後，調壓槽的狀況如下：

調壓槽液體溫度 = 588°F
調壓槽蒸汽溫度 = 607°F
調壓槽壓力 = 1410 psia

已知這些條件下，調壓槽液體為_____，其蒸汽為_____。

A. 次冷液體；飽和蒸汽

B. 次冷液體；過熱蒸汽

C. 飽和液體；飽和蒸汽

D. 飽和液體；過熱蒸汽

答案：D.

科目： 193003
知能類：K1.14 [2.4/2.5]
序號： P1674

A reactor trip occurred 10 minutes ago due to a loss of coolant accident. Emergency coolant injection is in progress and pressurizer level is increasing. Current pressurizer conditions are as follows:

Pressurizer liquid temperature = 540°F
Pressurizer vapor temperature = 607°F
Pressurizer pressure = 1,410 psia
Pressurizer level = 60%

Given these conditions, the pressurizer liquid is _____ and the pressurizer vapor is _____.

A. saturated; saturated

B. saturated; superheated

C. subcooled; saturated

D. subcooled; superheated

ANSWER: D.

冷卻水意外流失而導致反應器於 10 分鐘前急停。開始緊急注入冷卻水以後，調壓槽水位逐漸升高。該調壓槽現況如下：

調壓槽液體溫度 = 540°F
調壓槽蒸汽溫度 = 607°F
調壓槽壓力 = 1,410 psia
調壓槽水位 = 60%

已知這些條件下，調壓槽液體為_____，其蒸汽為_____。

A. 飽和液體；飽和蒸汽

B. 飽和液體；過熱蒸汽

C. 次冷液體；飽和蒸汽

D. 次冷液體；過熱蒸汽

答案：D.

科目： 193003
知能類：K1.14 [2.4/2.5]
序號： P2074 (B2074)

Consider a saturated water/steam mixture at 500°F with a quality of 90%. If the pressure of the mixture is decreased with no heat gain or loss, the temperature of the mixture will _____ and the quality of the mixture will _____. (Assume the mixture remains saturated.)

A. decrease; decrease

B. decrease; increase

C. remain the same; decrease

D. remain the same; increase

ANSWER: B.

已知飽和水/蒸汽混合物的蒸汽乾度為90%，溫度為500˚F。如果混合物壓力降低，沒有熱損益，混合物溫度將_____，其乾度將_____(假設混合物維持飽和狀態)。

A. 降低；降低

B. 降低；增加

C. 維持不變；降低

D. 維持不變；增加

答案：B.

科目： 193003
知能類：K1.16 [2.6/2.7]
序號： P2975 (B2973)

An open vessel contains one pound-mass of water at 206°F and atmospheric pressure. Which one of the following will be caused by the addition of 3.0 Btu to the water?

A. The water temperature will rise by approximately 3°F.

B. Approximately 3% of the water mass will vaporize.

C. The water density will decrease by approximately 3%.

D. The water will become superheated by approximately 3°F.

ANSWER: A.

一開放容器在206˚F和大氣壓力下，裝有一磅質量的水。若在水中加入3 Btu，將導致下列何者發生？

A. 水溫約升高3˚F

B. 水約蒸發3%

C. 水密度約減少3%

D. 水約過熱3˚F

答案：A.

科目： 193003
知能類：K1.17 [3.0/3.2]
序號： P575

A nuclear reactor is shut down with reactor coolant system (RCS) pressure at 1,500 psia and core decay heat is being removed by the steam generators (S/Gs). What pressure must be maintained in the S/Gs to obtain a 110°F subcooling margin in the RCS loop cold legs? (Assume a negligible temperature difference between the RCS and the S/Gs.)

A. 580 psia

B. 600 psia

C. 620 psia

D. 640 psia

ANSWER: B.

核子反應器停機時，反應器冷卻水系統(RCS)的壓力為 1,500 psia，蒸汽產生器(S/G)開始移除爐心衰變熱。蒸汽產生器必須維持多少壓力，才能在 RCS 迴路冷端(loop cold leg)，獲得 110°F 的次冷餘裕？(假設可忽略 RCS 與 S/G 之間的溫差)

A. 580 psia

B. 600 psia

C. 620 psia

D. 640 psia

答案：B.

科目： 193003
知能類：K1.17 [3.0/3.2]
序號： P675

Which one of the following steam generator (S/G) pressures will come closest to producing a 50°F reactor coolant system (RCS) subcooling margin with RCS pressure at 1000 psia? (Assume a negligible delta-T across the S/G tubes.)

A. 550 psia

B. 600 psia

C. 650 psia

D. 700 psia

ANSWER: C.

欲於反應器冷卻水系統(RCS)壓力為 1,000 psia 時，產生 50°F 的 RCS 次冷餘裕，下列何者是最接近的蒸汽產生器(S/G)壓力？(假設可忽略蒸汽產生器管子兩端的 ΔT)

A. 550 psia

B. 600 psia

C. 650 psia

D. 700 psia

答案：C.

科目： 193003
知能類：K1.17 [3.0/3.2]
序號： P775

Which one of the following changes will result in increased subcooling of the condensate water in the condenser hotwell?

A. Isolate one bay of the condenser circulating water system

B. Increase circulating water temperature

C. Decrease circulating water flow

D. Decrease the main turbine steam flow rate

ANSWER: D.

下列哪項變化將提高冷凝器熱井的冷凝水次冷度？

A. 隔離一個冷凝器之循環水系統的水箱。

B. 增加循環水溫度。

C. 減少循環水流。

D. 減少主汽機蒸汽流量。

答案：D.

科目： 193003
知能類：K1.24 [2.8/3.1]
序號： P1475

A nuclear power plant has been operating at 100% power (3400 MWt) for six months when a main steamline break results in a reactor trip. The break is isolated and all steam generators (S/Gs) stop depressurizing at 700 psia. The reactor coolant system (RCS) cooldown stops at 503°F and a heatup begins. Current plant conditions are as follows:

Total mass of water in the RCS and S/Gs:	800,000 lbm
Specific heat of RCS and S/G feedwater:	1.2 Btu/lbm-°F
Reactor coolant pump heat input to RCS:	15 MWt
Decay heat generation rate:	3%
RCS pressure:	1,600 psia
Feedwater flow to S/Gs:	Isolated

The above parameters do not change once the break is isolated. The RCS and S/Gs remain in thermal equilibrium during the heatup. The S/Gs remain saturated and the only S/G heat removal path is via the safety valve.

Approximately how long from break isolation will it take for S/G pressure to reach the safety valve setpoint of 1,100 psia?

A. 2 minutes

B. 8 minutes

C. 16 minutes

D. 30 minutes

ANSWER: B.

核能電廠以 100%功率(3400 MWt)運轉六個月，主蒸汽管於此時破裂，造成反應器急停。隔離破裂之後，所有蒸汽產生器(S/G)於 700 psia 處停止減壓。反應器冷卻水系統(RCS)降溫至 503°F 處停住並開始升溫。電廠現況如下：

RCS 與 S/G 總水量：	800,000 lbm
RCS 與 S/G 飼水比熱：	1.2 Btu/lbm-°F
反應器冷卻水泵輸入 RCS 的熱量：	15 MWt
衰變熱產生率：	3%
RCS 壓力：	1,600 psia
流入 S/G 的飼水水流：	隔離

當管路破裂處隔離後，上述參數即未改變。RCS 與 S/G 於升溫期間維持熱平衡。S/G 維持飽和狀態，而且僅能經由安全閥排熱。

從隔離破裂那時起，約耗費多久的時間，才能讓 S/G 的壓力達到安全閥設定點 1,100 psia？

A. 2 分鐘

B. 8 分鐘

C. 16 分鐘

D. 30 分鐘

答案：B.

科目： 193003
知能類：K1.24 [2.8/3.1]
序號： P1675 (B1175)

Which one of the following is the approximate temperature of a water-steam mixture that has an enthalpy of 1,150 Btu/lbm and a quality of 95%?

A. 220°F

B. 270°F

C. 360°F

D. 440°F

ANSWER: C.

焓1,150 Btu/lbm、蒸汽乾度95%的水-蒸汽混合物，其溫度約為多少？

A. 220˚F

B. 270˚F

C. 360˚F

D. 440˚F

答案：C.

科目： 193003
知能類：K1.25 [3.3/3.4]
序號： P75

Which one of the following is the approximate reactor coolant system subcooling margin when reactor coolant temperature is 280°F and pressurizer pressure is 400 psig?

A. 165°F

B. 168°F

C. 265°F

D. 268°F

ANSWER: B.

反應器冷卻水溫為 280°F、調壓槽壓力為 400 psig 時，反應器冷卻水系統的次冷餘裕約為多少？

A. 165°F

B. 168°F

C. 265°F

D. 268°F

答案：B.

科目： 193003
知能類：K1.25 [3.3/3.4]
序號： P141

Given the following reactor coolant system (RCS) parameters, determine the approximate RCS subcooling margin.

RCS pressure = 2,235 psig
RCS hot leg temperature = 610°F

A. 25°F

B. 31°F

C. 38°F

D. 43°F

ANSWER: D.

反應器冷卻水系統(RCS)的已知參數如下，請算出 RCS 次冷餘裕約略值。

RCS 壓力 = 2,235 psig
RCS 熱端(hot leg)溫度 = 610°F

A. 25°F

B. 31°F

C. 38°F

D. 43°F

答案：D.

科目： 193003
知能類：K1.25 [3.3/3.4]
序號： P275 (B275)

The saturation pressure for water at 328°F is approximately...

A. 85 psig.

B. 100 psig.

C. 115 psig.

D. 130 psig.

ANSWER: A.

328˚F的水，其飽和壓力約為……

A. 85 psig

B. 100 psig

C. 115 psig

D. 130 psig

答案：A.

科目： 193003
知能類：K1.25 [3.3/3.4]
序號： P376

If a wet vapor is at 130°F and has a quality of 90%, its specific enthalpy is approximately...

A. 1,015 Btu/lbm.

B. 1,093 Btu/lbm.

C. 1,118 Btu/lbm.

D. 1,216 Btu/lbm.

ANSWER: A.

如果濕蒸汽溫度為 130°F，其乾度為 90%，比焓約為……

A. 1,015 Btu/lbm

B. 1,093 Btu/lbm

C. 1,118 Btu/lbm

D. 1,216 Btu/lbm

答案：A.

科目： 193003
知能類：K1.25 [3.3/3.4]
序號： P385

Given the following nuclear power plant conditions:

Core Thermal Power = 3,400 MWt
RCS T_{ave} = 573.5°F
S/G T_{stm} = 513.5°F

The plant is shut down for maintenance, during which 5.0% of the total steam generator (S/G) tubes are plugged. Upon completion of the maintenance, the plant is returned to 3,400 MWt with RCS mass flow rate and RCS temperatures unchanged.

Which one of the following is the approximate new S/G steam pressure with the plant at 3,400 MWt?

A. 711 psia

B. 734 psia

C. 747 psia

D. 762 psia

ANSWER: C.

已知核能電廠的狀況如下：

爐心熱功率 = 3,400 MWt
RCS T_{ave} = 573.5°F
S/G T_{stm} = 513.5°F

電廠停機進行維修，在維修期間，蒸汽產生器(S/G)有 5.0%的 U 型管被塞管。維修結束後，電廠恢復至 3,400 MWt，RCS 質量流量與 RCS 溫度維持不變。

請問電廠處於 3,400 MWt 時，S/G 的新蒸汽壓力約為多少？

A. 711 psia

B. 734 psia

C. 747 psia

D. 762 psia

答案：C.

科目： 193003
知能類：K1.25 [3.3/3.4]
序號： P474

Main condenser hotwell condensate is 4°F subcooled at a temperature of 112°F. What is the condenser pressure?

A. 1.78 psia

B. 1.51 psia

C. 1.35 psia

D. 1.20 psia

ANSWER: B.

主冷凝器熱井冷凝水溫為 112°F，其次冷度為 4°F。請問冷凝器壓力為多少？

A. 1.78 psia

B. 1.51 psia

C. 1.35 psia

D. 1.20 psia

答案：B.

科目： 193003
知能類：K1.25 [3.3/3.4]
序號： P1275

If steam pressure is 230 psia at a temperature of 900°F, what is the approximate amount of superheat?

A. 368°F

B. 393°F

C. 506°F

D. 535°F

ANSWER: C.

如果蒸汽壓力為 230 psia，溫度為 900°F，過熱值約為多少？

A. 368°F

B. 393°F

C. 506°F

D. 535°F

答案：C.

科目： 193003
知能類：K1.25 [3.3/3.4]
序號： P1775 (B1776)

Which one of the following is the approximate amount of heat required to convert 3 lbm of water at 100°F and 100 psia to a saturated vapor at 100 psia?

A. 889 Btu

B. 1,119 Btu

C. 2,666 Btu

D. 3,358 Btu

ANSWER: D.

要將3 lbm的水由100˚F、100 psia轉換成100 psia的飽和蒸汽，大約需要多少熱量？

A. 889 Btu

B. 1,119 Btu

C. 2,666 Btu

D. 3,358 Btu

答案：D.

科目： 193003
知能類：K1.25 [3.3/3.4]
序號： P1875

Saturated steam undergoes an ideal expansion process in an ideal turbine from 1,000 psia to 28 inches Hg vacuum. Approximately how much specific work is being performed by the turbine?

A. 1,193 Btu/lbm

B. 805 Btu/lbm

C. 418 Btu/lbm

D. 388 Btu/lbm

ANSWER: C.

飽和蒸汽於理想汽機內進行理想膨脹過程，從 1,000 psia 膨脹成 28 吋汞柱(inch-Hg)真空。汽機做的比功(specific work)約為多少？

A. 1,193 Btu/lbm

B. 805 Btu/lbm

C. 418 Btu/lbm

D. 388 Btu/lbm

答案：C.

科目： 193003
知能類：K1.25 [3.3/3.4]
序號： P2275 (B2275)

1.0×10^6 lbm/hr saturated steam at 30% steam quality is leaving a main turbine and entering a condenser at 2.0 psia. Condensate is entering the hotwell at 118°F.

Which one of the following is the approximate condenser heat transfer rate?

A. 3.1×10^8 Btu/hr

B. 5.8×10^8 Btu/hr

C. 7.2×10^8 Btu/hr

D. 9.9×10^8 Btu/hr

ANSWER: A.

蒸汽乾度30%、1.0×10^6 lbm/hr的飽和蒸汽離開主汽機，進入壓力2.0 psia的冷凝器。冷凝水以118˚F的溫度進入熱井。

下列何者為冷凝器的近似熱傳率？

A. 3.1×10^8 Btu/hr

B. 5.8×10^8 Btu/hr

C. 7.2×10^8 Btu/hr

D. 9.9×10^8 Btu/hr

答案：A.

科目： 193003
知能類：K1.25 [3.3/3.4]
序號： P2375 (B2374)

Which one of the following is the approximate amount of heat required to convert 2.0 lbm of water at 100°F and 100 psia to a saturated vapor at 100 psia?

A. 1,119 Btu

B. 1,187 Btu

C. 2,238 Btu

D. 2,374 Btu

ANSWER: C.

要將2.0 lbm、100˚F、100 psia的水，轉換成100 psia的飽和蒸汽，大約需要多少熱量？

A. 1,119 Btu

B. 1,187 Btu

C. 2,238 Btu

D. 2,374 Btu

答案：C.

科目： 193003
知能類：K1.25 [3.3/3.4]
序號： P2475 (B2475)

A steam line is carrying steam at 500 psia and 507°F. Approximately how much ambient heat loss is required before moisture formation occurs in the steam line?

A. 31 Btu/lbm

B. 45 Btu/lbm

C. 58 Btu/lbm

D. 71 Btu/lbm

ANSWER: A.

500 psia、507˚F的蒸汽流經蒸汽管。大約需要先流失多少熱量至環境，才會在蒸汽管產生凝結？

A. 31 Btu/lbm

B. 45 Btu/lbm

C. 58 Btu/lbm

D. 71 Btu/lbm

答案：A.

科目： 193003
知能類：K1.25 [3.3/3.4]
序號： P2575 (B2575)

Which one of the following is the approximate amount of heat required to convert 2.0 lbm of water at 100°F and 100 psia to a superheated vapor at 400°F and 100 psia?

A. 1,119 Btu

B. 1,159 Btu

C. 2,238 Btu

D. 2,318 Btu

ANSWER: D.

大約需要多少熱量，才能將2.0 lbm、100˚F、100 psia的水，轉換成400˚F、100 psia的過熱蒸汽？

A. 1,119 Btu

B. 1,159 Btu

C. 2,238 Btu

D. 2,318 Btu

答案：D.

科目： 193003
知能類：K1.25 [3.3/3.4]
序號： P2675 (B2675)

What is the specific heat (Btu/lbm-°F) of water at 300°F and 100 psia?

A. 1.03 Btu/lbm-°F

B. 1.11 Btu/lbm-°F

C. 1.17 Btu/lbm-°F

D. 1.25 Btu/lbm-°F

ANSWER: A.

300˚F、100 psia的水比熱(Btu/lbm-˚F)為多少？

A. 1.03 Btu/lbm-˚F

B. 1.11 Btu/lbm-˚F

C. 1.17 Btu/lbm-˚F

D. 1.25 Btu/lbm-˚F

答案：A.

科目： 193003
知能類：K1.25 [3.3/3.4]
序號： P2775 (B2776)

With a nuclear power plant operating near rated power, air inleakage into the main condenser causes main condenser pressure to increase from 1.0 psia to 2.0 psia.

Given the following:

- Initial main condenser condensate depression was 4°F.
- After the plant stabilizes, with main condenser pressure at 2.0 psia, main condenser condensate depression is 2°F.

Which one of the following is the approximate increase in main condenser specific heat rejection needed to restore condensate depression to 4°F?

A. 2 Btu/lbm

B. 4 Btu/lbm

C. 8 Btu/lbm

D. 16 Btu/lbm

ANSWER: A.

核能電廠以接近額定功率運轉，由於主冷凝器有空氣滲入，導致主冷凝器壓力由1.0 psia增至2.0 psia。

已知下列條件：

- 主冷凝器的冷凝水次冷度為4°F。
- 電廠穩定後，主冷凝器壓力為2.0 psia，其冷凝水次冷度為2°F。

欲使冷凝水次冷度回到4°F，主冷凝器排氣比熱大約要增加多少？

A. 2 Btu/lbm

B. 4 Btu/lbm

C. 8 Btu/lbm

D. 16 Btu/lbm

答案：A.

科目： 193003
知能類：K1.25 [3.3/3.4]
序號： P2875

Given the following:

- A nuclear power plant is operating near rated power.
- The main turbine is comprised of a single unit with no reheat.
- Main turbine inlet steam conditions are 900 psia and 100% quality.
- Ideal steam expansion is occurring in the main turbine.
- Main condenser pressure is 1.0 psia.

Which one of the following is the approximate main condenser specific heat rejection needed to establish condensate depression at 4°F?

A. 716 Btu/lbm

B. 782 Btu/lbm

C. 856 Btu/lbm

D. 1,132 Btu/lbm

ANSWER: A.

已知下列條件：

- 核能電廠以接近額定功率運轉。
- 主汽機由沒有再熱的單一機組構成。
- 主汽機進口蒸汽的狀態為 900 psia 和 100%蒸汽乾度。
- 主汽機為理想蒸汽膨脹過程。
- 主冷凝器壓力為 1.0 psia。

欲建立 4°F 次冷度時，需由主冷凝器排氣移除的比熱(specific heat)約為多少？

A. 716 Btu/lbm

B. 782 Btu/lbm

C. 856 Btu/lbm

D. 1,132 Btu/lbm

答案：A.

科目： 193003
知能類：K1.25 [3.3/3.4]
序號： P3074 (B3075)

The temperature of a saturated steam-water mixture is 467°F.

Which one of the following additional parameter values, when paired with the temperature, provides insufficient data to determine the approximate steam quality of the mixture?

A. Pressure at 499.96 psia

B. Enthalpy at 977.33 Btu/lbm

C. Entropy at 1.17 Btu/lbm -°R

D. Specific volume at 0.817 ft^3/lbm

ANSWER: A.

飽和蒸汽-水混合物的溫度為 467°F。

下列哪項額外參數值若搭配溫度，將導致判斷混合物蒸汽乾度近似值所需的資料不足？

A. 壓力為 499.96 psia

B. 熱焓為 977.33 Btu/lbm

C. 熵為 1.17 Btu/lbm -°R

D. 比容為 0.817 ft^3/lbm

答案：A.

科目： 193003
知能類：K1.25 [3.3/3.4]
序號： P3175 (B3175)

A steam line is carrying saturated steam vapor at 500 psia and 467°F. Approximately how much specific heat addition to the steam vapor is necessary to achieve 60°F of superheat?

A. 31 Btu/lbm

B. 45 Btu/lbm

C. 58 Btu/lbm

D. 71 Btu/lbm

ANSWER: B.

500 psia、467˚F飽和蒸汽流經蒸汽管。若要達到60˚F過熱，大約要在蒸汽中加入多少比熱(specific heat)？

A. 31 Btu/lbm

B. 45 Btu/lbm

C. 58 Btu/lbm

D. 71 Btu/lbm

答案：B.

科目： 193003
知能類：K1.25 [3.3/3.4]
序號： P3275 (B3274)

An ideal main turbine generator (MTG) is producing 1000 MW of electrical power while being supplied with 100% quality steam at 920 psig. Steam supply pressure is then gradually increased to 980 psig at the same quality. Assume turbine control valve position and condenser vacuum remain the same.

Which one of the following describes why the MTG output increases as steam pressure increases?

A. Each lbm of steam entering the turbine has a higher specific heat.

B. Each lbm of steam entering the turbine has a higher specific enthalpy.

C. Each lbm of steam passing through the turbine expands to fill a greater volume.

D. Each lbm of steam passing through the turbine performs increased work in the turbine.

ANSWER: D.

理想的主汽輪發電機(MTG)在輸入920 psig、100%蒸汽乾度的蒸汽時，會產生1000 MW的電力。輸入蒸汽的壓力逐漸增至980 psig，蒸汽乾度不變。假設汽機的控制閥位置和冷凝器真空度保持不變。

下列何者解釋了主汽輪發電機的輸出，為何隨著蒸汽壓力升高而增加？

A. 進入汽機的每lbm蒸汽都有較高比熱。

B. 進入汽機的每lbm蒸汽都有較高比焓。

C. 經過汽機的每lbm蒸汽膨脹以填滿較大容積。

D. 經過汽機的每lbm蒸汽，在汽機做的功增加。

答案：D.

科目： 193003
知能類：K1.25 [3.3/3.4]
序號： P3475 (B3475)

Which one of the following is the approximate amount of heat required to convert 2 lbm of water at 100°F and 100 psia to a saturated vapor at 100 psia?

A. 560 Btu

B. 1,120 Btu

C. 2,238 Btu

D. 3,356 Btu

ANSWER: C.

要將100˚F、100 psia、2 lbm的水，轉換成100 psia的飽和蒸汽，約需要多少熱量？

A. 560 Btu

B. 1,120 Btu

C. 2,238 Btu

D. 3,356 Btu

答案：C.

科目： 193003
知能類：K1.25 [3.3/3.4]
序號： P3575

The following stable nuclear power plant conditions existed just prior to a plant shutdown for maintenance:

Power = 100%
RCS T_{ave} = 572°F
SG T_{stm} = 534°F

During the shutdown, 5% of the total steam generator (SG) tubes were plugged. Which one of the following will be the approximate SG steam pressure when the plant is returned to 100% power? (Assume RCS mass flow rate and RCS T_{ave} are the same as their pre-shutdown 100% power values.)

A. 813 psia

B. 841 psia

C. 870 psia

D. 900 psia

ANSWER: D.

下面是核能電廠停機維修前的穩定狀態：

功率 = 100%
RCS T_{ave} = 572°F
SG T_{stm} = 534°F

停機期間，蒸汽產生器(SG)的 U 型管有 5%被塞管。電廠恢復至 100%功率時，SG 的蒸汽壓力約為多少？(假設 RCS 質量流量與 RCS T_{ave}，同於停機前以 100%功率運轉時的數值)

A. 813 psia

B. 841 psia

C. 870 psia

D. 900 psia

答案：D.

科目： 193003
知能類：K1.25 [3.3/3.4]
序號： P3775 (B3774)

A 100 ft^3 vessel contains a saturated water-steam mixture at 1,000 psia. The water portion occupies 30 ft^3 and the steam portion occupies the remaining 70 ft^3. What is the approximate total mass of the mixture in the vessel?

A. 1,547 lbm

B. 2,612 lbm

C. 3,310 lbm

D. 4,245 lbm

ANSWER: A.

一個100 ft^3的容器，裝有1,000 psia的飽和水-蒸汽混合物。水佔了30 ft^3，蒸汽佔了70 ft^3。請問容器內混合物的總質量約為多少？

A. 1,547 lbm

B. 2,612 lbm

C. 3,310 lbm

D. 4,245 lbm

答案：A.

科目： 193003
知能類：K1.25 [3.3/3.4]
序號： P3875

A nuclear power plant has been operating at full power for six months when a sustained station blackout occurs, resulting in a reactor trip and a complete loss of forced reactor coolant circulation. All means of reactor coolant injection are unavailable. Reactor coolant system (RCS) pressure is being maintained at approximately 2,100 psia by operation of the pressurizer relief valves.

The following conditions exist five minutes after the reactor trip:

RCS pressure: 2,100 psia
Core exit thermocouple (CET) temperature: 550°F

Assuming that core uncovery occurs within the next few hours, which one of the following describes the future response of the CET temperature indication?

A. CET indication will remain stable at approximately 550°F until the core becomes uncovered; then, CET indication will become erratic.

B. CET indication will remain stable at approximately 550°F until the core becomes uncovered; then, CET indication will increase to approximately 643°F where it will become erratic.

C. CET indication will steadily increase to approximately 643°F and stabilize; then, as the core begins to uncover, CET indication will increase further until it becomes erratic.

D. CET indication will steadily increase until it becomes erratic.

ANSWER: C.

核能電廠已經以全功率運轉六個月，運轉中的電廠於此時發生持續之全黑(sustained station blackout)，導致反應器急停，反應器冷卻水強制循環完全喪失。沒有方法能注入反應器冷卻水。反應器冷卻水系統(RCS)藉由調壓槽釋壓閥的運作，得以維持約2,100 psia的壓力。

反應器急停後五分鐘的狀況如下：

RCS 壓力： 2,100 psia
爐心出口熱電偶(Core exit thermocouple/CET)溫度：550°F

假設幾小時後發生爐心裸露，下列何者說明了往後的 CET 溫度指示值反應？

A. CET 指示值將穩定在 550°F 左右，直到爐心開始裸露為止；接著，CET 指示值將變得不穩定。

B. CET 指示值將穩定在 550°F 左右，直到爐心開始裸露為止；接著，CET 指示值將增加至 643°F 左右，在此處變得不穩定。

C. CET 指示值將穩定增加至 643°F 左右，然後穩定；接著，CET 指示值將隨著爐心開始裸露而繼續增加，直到變得不穩定為止。

D. CET 指示值將持續增加，直到變得不穩定為止。

答案：C.

科目： 193003
知能類：K1.25 [3.3/3.4]
序號： P3939 (B3938)

Main steam is being used to reheat high-pressure (HP) turbine exhaust in a moisture separator reheater (MSR).

Given:

- The HP turbine exhaust enters the MSR reheater section as saturated steam (100% quality).
- The exhaust enters and exits the reheater section at 280 psia and a flow rate of 1.0E6 lbm/hr.
- The main steam heat transfer rate in the reheater section is 42.1E6 Btu/hr.

Which one of the following is the approximate temperature of the HP turbine exhaust leaving the reheater section of the MSR?

A. 450°F

B. 475°F

C. 500°F

D. 525°F

ANSWER: B.

在汽水分離再熱器(MSR)中，主蒸汽被用來再加熱高壓(HP)汽機的排汽。

已知下列條件：

- 進入汽水分離再熱器再熱區的高壓汽機排汽為飽和蒸汽(蒸汽乾度100%)。
- 進出再熱區的排汽壓力為280 psia，流量為1.0E6 lbm/hr。
- 再熱區的主蒸汽熱傳率為42.1E6 Btu/hr。

下列何者為高壓汽機排汽離開汽水分離再熱器再熱區的約略溫度？

A. 450˚F

B. 475˚F

C. 500˚F

D. 525˚F

答案：B.

科目： 193003
知能類：K1.25 [3.3/3.4]
序號： P4139 (B4138)

Saturated steam at 50% steam quality is leaving a main turbine at a flow rate of 1.0 x 10^6 lbm/hr and entering a condenser at 1.6 psia. Condensate is entering the hotwell at 112°F.

Which one of the following is the approximate condenser heat transfer rate?

A. 3.1 x 10^8 Btu/hr

B. 3.8 x 10^8 Btu/hr

C. 4.5 x 10^8 Btu/hr

D. 5.2 x 10^8 Btu/hr

ANSWER: D.

蒸汽乾度50%、流量為1.0 x 10^6 lbm/hr的飽和蒸汽離開主汽機，進入壓力為1.6 psia的冷凝器。冷凝水以112˚F的溫度進入熱井。

下列何者為冷凝器的近似熱傳率？

3.1 x 10^8 Btu/hr

3.8 x 10^8 Btu/hr

4.5 x 10^8 Btu/hr

5.2 x 10^8 Btu/hr

答案：D.

科目： 193003
知能類：K1.25 [3.3/3.4]
序號： P4339 (B4338)

A nuclear power plant is operating at full rated power. The main turbine has one high pressure (HP) unit and one low pressure (LP) unit.

Main steam enters the HP unit of the main turbine with the following parameters:

Pressure: 1,000 psia
Quality: 100%

The exhaust steam exits the HP unit at 200 psia, then goes through a moisture separator/reheater, and enters the LP units with the following parameters:

Pressure: 200 psia
Temperature: 500°F

The main condenser pressure is 1.0 psia. Assume that each unit of the main turbine is 100% efficient.

The higher enthalpy steam is being supplied to the _____ unit of the main turbine; and the greater moisture content is found in the exhaust of the _____ unit.

A. LP; LP

B. LP; HP

C. HP; LP

D. HP; HP

ANSWER: A.

核能電廠以全額定功率運轉。主汽機由一高壓(HP)汽機及一低壓(LP)汽機構成。

進入主汽機高壓汽機的蒸汽參數如下：

壓力： 1,000 psia
蒸汽乾度： 100%

離開高壓汽機的排放蒸汽壓力為 200 psia，然後送至汽水分離器/再熱器，並進入低壓汽機，此時的參數如下：

壓力：200 psia
溫度：500°F

主冷凝器的壓力為 1.0 psia。假設主汽機的各組件效率為 100%。

熱焓較高的蒸汽供應至主汽機的_____汽機；_____汽機的排汽經發現含水量較高。

A. 低壓；低壓

B. 低壓；高壓

C. 高壓；低壓

D. 高壓；高壓

答案：A.

科目/題號：193003/1 (2016新增)
知能類：K1.08 [2.8/2.8]
序號：P674 (B1074)

A liquid is saturated with 0 percent quality. Assuming pressure remains constant, the addition of a small amount of heat will...
A. raise the steady-state liquid temperature above the boiling point.
B. result in a subcooled liquid.
C. result in some of the liquid vaporizing.
D. result in a superheated liquid.
ANSWER: C.

一飽和液體其蒸汽乾度為0%。假設壓力維持不變，加入少量的熱，將會____。
A.提高液體溫度，超過沸點
B.產生過冷的液體
C.使液體蒸發
D.產生過熱的蒸汽

答案：C

科目/題號：191003/2 (2016新增)
知能類：K1.24 [2.8/3.1]
序號：P6039 (B6038)

Given a set of steam tables that lists the following parameters for saturated steam and water:
- Pressure
- Enthalpy
- Specific volume
- Entropy
- Temperature

One can determine the _____ of a saturated steam-water mixture given only the _____.
A. temperature; enthalpy
B. temperature; pressure
C. pressure; entropy
D. pressure; specific volume
ANSWER: B.

已知一組蒸汽表，有如下飽和蒸汽和水的參數：
- 壓力
- 焓
- 比容
- 熵
- 溫度

只要已知_____就能確定飽和蒸汽-水混合物的_____。
A.溫度；焓
B.溫度；壓力
C.壓力；熵
D.壓力；比容

答案： B

科目/題號：193003/3 (2016新增)
知能類：K1.24 [2.8/3.1]
序號：P6939 (B6938)

A nuclear power plant experienced a loss of all AC electrical power due to a natural disaster. A few days later, there is turbulent boiling in the spent fuel pool. Average spent fuel temperature is elevated but stable. Assume that boiling is the only means of heat removal from the spent fuel pool.
Given the following stable current conditions:
Spent fuel decay heat rate = 4.8 MW
Spent fuel building pressure = 14.7 psia
Spent fuel pool temperature = 212°F
At what approximate rate is the mass of water in the spent fuel pool decreasing?
A. 4,170 lbm/hr
B. 4,950 lbm/hr
C. 14,230 lbm/hr
D. 16,870 lbm/hr
ANSWER: D.

由於自然災害，一座核電廠經歷了喪失全部交流電力。幾天後，在用過燃料池發生擾流沸騰。用過燃料平均溫度是升高後穩定。假定沸騰是唯一自用過燃料池移除熱量的方法。
下列為目前穩定的條件：
用過燃料熱衰變率= 4.8 MW
用過燃料廠房壓力= 14.7 psia
用過燃料池水溫= 212°F
用過燃料池的水會以大約多少質量流量率減少？
A. 4,170 lbm/hr
B. 4,950 lbm/hr
C. 14,230 lbm/hr
D. 16,870 lbm/hr

答案： D

科目/題號：193003/4 (2016新增)
知能類：K1.24 [2.8/3.1]
序號：P7039 (B7038)

Given the following initial conditions for a spent fuel pool:
Spent fuel decay heat rate = 5.0 MW
Spent fuel pool water temperature = 90°F
Spent fuel pool water mass = 2.5 x 10^6 lbm
Spent fuel pool water specific heat = 1.0 Btu/lbm-°F
If a complete loss of spent fuel pool cooling occurs, how long will it take for spent fuel pool water temperature to reach 212°F? (Assume that the spent fuel pool remains in thermal equilibrium, and that there is no heat removal from the spent fuel pool.)
A. 18 hours
B. 31 hours
C. 48 hours
D. 61 hours
ANSWER: A.

已知用過燃料池下列的初始條件：
用過燃料熱衰變率= 5.0 MW
用過燃料池水溫度= 90°F
用過燃料池水質量= 2.5 x 10^6 lbm
用過燃料池水比熱= 1.0 Btu/lbm-°F
如果用過燃料池完全喪失冷卻時，需要多長時間池水溫度會達到 212°F？(假設用過燃料池仍然處於熱平衡，且沒有熱移除)
A. 18 小時
B. 31 小時
C. 48 小時
D. 61 小時

答案： A

科目/題號：193003/5 (2016新增)
知能類：K1.25 [3.3/3.4]
序號：P4739 (B4738)

Consider a 100 lbm quantity of a saturated steam-water mixture at standard atmospheric pressure. The mixture has a quality of 70 percent. Assume that pressure remains constant and there is no heat loss from the mixture.
Which one of the following is the approximate heat addition needed to increase the quality of the mixture to 100 percent?
A. 5,400 Btu
B. 12,600 Btu
C. 29,100 Btu
D. 67,900 Btu
ANSWER: C.

在標準大氣壓下 100 lbm 的飽和蒸汽-水混合物，該混合物具有 70%的乾度。假定壓力保持恆定，並且混合物沒有熱損失。
下列何者是提升混合物乾度至 100%所需增加熱量的近似值？
A. 5,400 Btu
B. 12,600 Btu
C. 29,100 Btu
D. 67,900 Btu

答案： C

科目/題號：193003/6 (2016新增)
知能類：K1.25 [3.3/3.4]
序號：P4839 (B4838)

An open vessel contains 1.0 lbm-mass of water at 204°F and standard atmospheric pressure. If 16.0 Btu of heat is added to the water, the water temperature will rise by about _____; and approximately _____ of the water mass will become steam.
A. 8°F; 1 percent
B. 8°F; 10 percent
C. 16°F; 1 percent
D. 16°F; 10 percent
ANSWER: A.

一個開放的容器中含有溫度 204°F 和標準大氣壓力，質量 1.0 lbm 的水。如果將熱量 16.0 Btu 加入水中，水的溫度將上升約_____；大約_____的水量將成為蒸汽。
A. 8°F；1%
B. 8°F；10%
C. 16°F；1%
D. 16°F；10%

答案： A

科目/題號：193003/7 (2016新增)
知能類：K1.25 [3.3/3.4]
序號：P4939 (B4938)

Water enters an ideal convergent-divergent nozzle with the following parameters:
Pressure = 300 psia
Temperature = 102°F
Velocity = 50 ft/sec
The velocity of the water at the throat of the nozzle is 200 ft/sec.
Given that nozzles convert enthalpy to kinetic energy, and assuming no heat transfer to or from the nozzle, what is the approximate pressure of the water at the throat of the nozzle?
A. 296 psia
B. 150 psia
C. 75 psia
D. 50 psia
ANSWER: D.

水以下列參數流進一理想的漸縮-漸擴噴嘴：
壓力= 300 psia
溫度= 102°F
速度= 50 ft/sec
水流在噴嘴喉部的流速為 200 ft/sec。已知噴嘴轉換焓值為動能，並且假設噴嘴沒有熱傳進出，請問水在噴嘴的喉部的壓力大約為多少？
A. 296 psia
B. 150 psia
C. 75 psia
D. 50 psia

答案： D

科目/題號：193003/8 (2016新增)
知能類：K1.25 [3.3/3.4]
序號：P5039 (B5038)

An open vessel contains 1.0 lbm of water at 206°F and standard atmospheric pressure. Which one of the following will be caused by the addition of 12.0 Btu to the water?
A. The water temperature will rise by about 6°F and none of the water will vaporize.
B. The water temperature will rise by about 6°F and some of the water will vaporize.
C. The water temperature will rise by about 12°F and none of the water will vaporize.
D. The water temperature will rise by about 12°F and some of the water will vaporize.
ANSWER: B.

一個開放的容器中含有 206°F 和標準大氣壓力，質量 1.0 lbm 的水。
以下何者是因為加入熱量 12.0 Btu 至水所造成的？
A.水溫將上升約 6°F 和沒有水會蒸發
B.水溫將上升約 6°F 和部分水會蒸發
C.水溫將上升約 12°F 和沒有水會蒸發
D.水溫將上升約 12°F 和部分水會蒸發

答案： B

科目/題號：193003/9 (2016新增)
知能類：K1.25 [3.3/3.4]
序號：P5139 (B5138)

A feedwater pump discharges into a 16-inch diameter discharge line. Given the following:

Pump discharge pressure = 950 psia
Feedwater temperature = 300°F
Feedwater velocity = 15.2 ft/sec

What is the feedwater pump discharge mass flow rate?

A. 1.1 x 10^6 lbm/hr
B. 4.4 x 10^6 lbm/hr
C. 1.8 x 10^7 lbm/hr
D. 5.3 x 10^7 lbm/hr

ANSWER: B.

飼水泵出口管路直徑 16-inch。下列為已知：

泵出口壓力= 950 psia
飼水溫度= 300°F
飼水流速= 15.2 ft/sec

請問飼水泵出口的質量流量率為多少？

A. 1.1 x 10^6 lbm/hr
B. 4.4 x 10^6 lbm/hr
C. 1.8 x 10^7 lbm/hr
D. 5.3 x 10^7 lbm/hr

答案： B

科目/題號：193003/10 (2016新增)
知能類：K1.25 [3.3/3.4]
序號：P5239 (B5238)

Dry saturated steam enters a frictionless convergent-divergent nozzle with the following parameters:

Pressure = 850 psia
Velocity = 10 ft/sec

The steam at the throat of the nozzle has a subsonic velocity of 950 ft/sec.
Given that nozzles convert enthalpy to kinetic energy, and assuming no heat transfer to or from the nozzle, what is the enthalpy of the steam at the throat of the nozzle?
A. 1,162 Btu/lbm
B. 1,171 Btu/lbm
C. 1,180 Btu/lbm
D. 1,189 Btu/lbm
ANSWER: C.

乾飽和蒸汽以下列參數進入無摩擦漸縮-漸擴噴嘴：

壓力= 850 psia
流速= 10 ft/sec

蒸汽在噴嘴的喉部具有 950 ft/sec 的次音速
已知噴嘴轉換焓為動能，並且假設噴嘴沒有熱傳進出，請問蒸汽在噴嘴喉部的焓值為多少？
A. 1,162 Btu/lbm
B. 1,171 Btu/lbm
C. 1,180 Btu/lbm
D. 1,189 Btu/lbm

答案： C

科目/題號：193003/11 (2016新增)
知能類：K1.25 [3.3/3.4]
序號：P5439 (B5438)

An ideal auxiliary steam turbine exhausts to the atmosphere. The steam turbine is supplied with dry saturated steam at 900 psia. Which one of the following is the maximum specific work (Btu/lbm) that can be extracted from the steam by the steam turbine?
A. 283 Btu/lbm
B. 670 Btu/lbm
C. 913 Btu/lbm
D. 1,196 Btu/lbm
ANSWER: A.

一部理想的輔助汽機排汽到大氣中。汽機蒸汽是由 900 psia 乾飽和蒸汽供給。下列何者是汽機可從蒸汽抽取之最大比功(Btu/lbm)？
A. 283 Btu/lbm
B. 670 Btu/lbm
C. 913 Btu/lbm
D. 1,196 Btu/lbm

答案： A

科目/題號：193003/12 (2016新增)
知能類：K1.25 [3.3/3.4]
序號：P5639

An ideal steam turbine exhausts to a steam condenser at 1.0 psia. The turbine is driven by dry saturated steam at 600 psia. What is the work (Btu/hr) of the steam turbine if the turbine steam flow rate is 200,000 lbm/hr?
A. 7.9×10^6 Btu/hr
B. 1.6×10^7 Btu/hr
C. 7.9×10^7 Btu/hr
D. 1.6×10^8 Btu/hr
ANSWER: C.

一理想汽機以壓力1.0 psia排入冷凝器，汽機以600 psia的乾飽和蒸汽驅動；如果汽機蒸汽流量率為200,000 lbm/hr，此汽機做功(Btu/hr)為多少？
A. 7.9×10^6 Btu/hr
B. 1.6×10^7 Btu/hr
C. 7.9×10^7 Btu/hr
D. 1.6×10^8 Btu/hr

答案： C

科目/題號：193003/13 (2016新增)
知能類： K1.25 [3.3/3.4]
序號： P5739 (B5738)

A steam turbine exhausts to a steam condenser at 1.0 psia. The steam turbine is supplied with dry saturated steam at 900 psia at a flow rate of 200,000 lbm/hr. What is the approximate rate of condensate addition to the condenser hotwell in gallons per minute?
A. 400 gpm
B. 2,400 gpm
C. 4,000 gpm
D. 24,000 gpm
ANSWER: A

一汽機排汽至壓力 1.0 psia 的冷凝器。汽機之蒸汽是由流量 200,000 lbm/hr，壓力 900 psia 之乾飽和蒸汽供給。加在冷凝器熱井的冷凝率大約是多少 gpm？
A. 400 gpm
B. 2,400 gpm
C. 4,000 gpm
D. 24,000 gpm

答案： A

科目/題號：193003/14 (2016新增)
知能類：K1.25 [3.3/3.4]
序號：P5939

What happens to the enthalpy of the saturated steam in a steam generator (SG) as heat addition increases SG pressure from 100 psia to 1,000 psia?
A. The enthalpy increases during the entire pressure increase.
B. The enthalpy initially increases and then decreases.
C. The enthalpy decreases during the entire pressure increase.
D. The enthalpy initially decreases and then increases.
ANSWER: B.

當蒸汽產生器因加熱，壓力從 100 psia 提升至 1,000 psia，蒸汽產生器(SG)中飽和蒸汽的熱焓會發生什麼變化？
A.熱焓於整個壓力增加時隨之升高
B.熱焓於初始升高然後降低
C.熱焓在整個壓力增加時隨之降低
D.熱焓於初始降低然後升高

答案：B

科目/題號：193003/15 (2016新增)
知能類：K1.25 [3.3/3.4]
序號：P6139 (B6113)

Water enters a positive displacement pump at 50 psig and 90°F. What is the available net positive suction head for the pump?
A. 80 feet
B. 114 feet
C. 133 feet
D. 148 feet
ANSWER: D.

進入一只正排量泵的水體，其壓力為50 psig，溫度為90°F。下列何者為該泵之可用淨正吸水頭？
A. 80 feet
B. 114 feet
C. 133 feet
D. 148 feet

答案：D

科目/題號：193003/16 (2016新增)
知能類：K1.25 [3.3/3.4]
序號：P6339 (B6338)

Dry saturated steam is flowing to a reheater. The reheater inlet and outlet pressures are both 260 psia. If the reheater adds 60.5 Btu/lbm to the steam, what is the temperature of the steam exiting the reheater?
A. 405°F
B. 450°F
C. 465°F
D. 500°F
ANSWER: D.

乾飽和蒸汽流進一個再熱器。再熱器進口和出口壓力都是 260 psia。如果再熱器增加了 60.5 Btu/lbm 至蒸汽，則離開再熱器的蒸汽溫度是多少？
A. 405°F
B. 450°F
C. 465°F
D. 500°F

答案： D

科目/題號：193003/17 (2016新增)
知能類：K1.25 [3.3/3.4]
序號：P6439 (B6438)

An open vessel contains 5.0 lbm of water at constant standard atmospheric pressure. The water has been heated to the saturation temperature. If an additional 1,600 Btu is added to the water, the water temperature will _____, and _____ than 50 percent of the water will vaporize.
A. increase significantly; less
B. increase significantly; more
C. remain about the same; less
D. remain about the same; more
ANSWER: C.

一個開放的容器中含有標準大氣壓下 5.0 lbm 的水。水已被加熱到飽和溫度。若再加入 1,600 Btu 熱量到水中，水溫將_____和_____於 50%的水會蒸發。
A.顯著增加；少
B.顯著增加；多
C.幾乎保持不變；少
D.幾乎保持不變；多

答案： C

科目/題號：193003/18 (2016新增)
知能類：K1.25 [3.3/3.4]
序號：P6639 (B6638)

Dry saturated steam at 240 psia enters an ideal low pressure (LP) turbine and exhausts to a steam condenser at 1.0 psia. Compared to the LP turbine entry conditions, the volumetric flow rate of the steam leaving the LP turbine will be about _____ times larger.
A. 103
B. 132
C. 174
D. 240
ANSWER: B.

壓力 240 psia 乾飽和蒸汽進入理想的低壓（LP）汽機，並排放 1.0 psia 蒸汽至冷凝器。與低壓汽機進口的條件相較，離開低壓汽機的蒸汽體積流量率約為_____倍大。
A. 103
B. 132
C. 174
D. 240

答案： B

科目/題號：193003/19 (2016新增)
知能類：K1.25 [3.3/3.4]
序號：P7239 (B7238)

An open vessel contains 1.0 lbm of water at 120°F and standard atmospheric pressure. Which one of the following will be caused by the addition of 540 Btu to the water?
A. The water temperature will increase to approximately 212°F; and less than 50 percent of the water will vaporize.
B. The water temperature will increase to approximately 212°F; and more than 50 percent of the water will vaporize.
C. The water temperature will increase to significantly higher than 212°F; and less than 50 percent of the water will vaporize.
D. The water temperature will increase to significantly higher than 212°F; and more than 50 percent of the water will vaporize.
ANSWER: A.

一個開放的容器中含有標準大氣壓下 120°F 的水 1.0 lbm。下列何者會是添加 540 Btu 熱至水所造成的？
A.水溫將上升至約 212°F；少於 50%的水會蒸發
B.水溫將上升至約 212°F；多於 50%的水會蒸發
C.水溫將上升至顯著高於 212°F；少於 50%的水會蒸發
D.水溫將上升至顯著高於 212°F；高於 50%的水會蒸發

答案： A

科目/題號：193003/20 (2016新增)
知能類：K1.25 [3.3/3.4]
序號：P7339 (B7338)

Dry saturated steam at 1,000 psia enters an ideal high pressure (HP) turbine and exhausts at 100 psia. The HP turbine exhaust then enters an ideal low pressure (LP) turbine and exhausts to a steam condenser at 1.5 psia. Which one of the following will cause the HP and LP turbines to produce more equal power? (Assume all pressures remain the same unless stated otherwise.)
A. Reheat the HP turbine exhaust.
B. Lower the steam condenser pressure.
C. Remove the moisture from the HP turbine exhaust.
D. Decrease the pressure of the dry saturated steam entering the HP turbine.
ANSWER: C.

壓力 1,000 psia 乾飽和蒸汽進入理想的高壓(HP)汽機，並以壓力 100 psia 排汽。高壓(HP)汽機排汽然後進入理想的低壓(LP)汽機，排放壓力 1.5 psia 的蒸汽至冷凝器內。下列何者會導致 HP 和 LP 汽機產生相近的功率？(除非有其他敘述，否則假設設所有壓力仍相同)
A.HP 汽機排汽再熱
B.降低冷凝器壓力
C.移除 HP 汽機排汽中的水分
D.減低進入 HP 汽機的乾飽和蒸汽壓力

答案： C

科目/題號：193003/21 (2016新增)
知能類：K1.25 [3.3/3.4]
序號：P7439

A nuclear power plant experienced a reactor trip. One hour after the trip, core cooling is being accomplished by relieving dry saturated steam from a steam generator (SG). Water level in the SG is being maintained by an operating feedwater pump. Average fuel temperature is stable.
Given the following current conditions:
Core decay heat rate = 33 MW
SG pressure = 1,000 psia
Feedwater temperature = 90°F
For the above conditions, approximately what feedwater flow rate is needed to maintain a constant mass of water in the SG?
A. 100,000 lbm/hr
B. 125,000 lbm/hr
C. 170,000 lbm/hr
D. 215,000 lbm/hr
ANSWER: A.

一核能電廠曾發生反應器跳脫。跳脫後一小時，爐心冷卻係從蒸汽產生器(SG)排放乾飽和蒸汽來完成的。SG水位係由一台運轉的飼水泵維持，燃料平均溫度維持穩定，已知目前狀況如下：
爐心熱衰變率=33MW
SG壓力=1,000 psia
飼水溫度=90°F
依上述條件，約需多大的飼水質量流量率，以使SG內的水維持恆定質量？
A. 100,000 lbm/hr
B. 125,000 lbm/hr
C. 170,000 lbm/hr
D. 215,000 lbm/hr

答案：A.

科目/題號：193003/22 (2016新增)
知能類：K1.25 [3.3/3.4]
序號：P7539 (B7538)

Subcooled water is flowing through a heat exchanger with the following parameters:
Inlet temperature = 75°F
Outlet temperature = 120°F
Mass flow rate = 6.0 x 10^4 lbm/hr
What is the approximate heat transfer rate in the heat exchanger?
A. 1.1 x 10^6 Btu/hr
B. 2.1 x 10^6 Btu/hr
C. 2.7 x 10^6 Btu/hr
D. 3.3 x 10^6 Btu/hr
ANSWER: C.

次冷水以下列參數流經熱交換器：
進口溫度= 75°F
出口溫度= 120°F
質量流量率= 6.0 x 10^4 lbm/hr
熱交換器的熱傳率大約為多少？
A. 1.1 x 10^6 Btu/hr
B. 2.1 x 10^6 Btu/hr
C. 2.7 x 10^6 Btu/hr
D. 3.3 x 10^6 Btu/hr

答案： C

科目/題號：193003/23 (2016新增)
知能類：K1.25 [3.3/3.4]
序號：P7609 (B7609)

A main condenser is operating at 1.0 psia. If 20,000 ft3 of dry saturated steam is condensed to saturated water in the condenser, what will be the approximate volume of the saturated water?
A. 1 ft^3
B. 10 ft^3
C. 100 ft^3
D. 1,000 ft^3
ANSWER: A.

一座主冷凝器以1.0 psia運轉。如果在冷凝器中將20,000ft^3飽和乾蒸汽冷凝成飽和水，則飽和水的體積大約為多少？
A. 1 ft^3
B. 10 ft^3
C. 100 ft^3
D. 1,000 ft^3

答案： A

科目/題號：193003/24 (2016新增)
知能類：K1.25 [3.3/3.4]
序號：P7629 (B7629)

An open vessel contains 2.0 lbm of water at 200°F and standard atmospheric pressure. Which one of the following will be caused by the addition of 16.0 Btu to the water?
A. The water temperature will increase, and all of the water will boil off.
B. The water temperature will increase, and none of the water will boil off.
C. The water temperature will rise to 212°F, and some of the water will boil off.
D. The water temperature will rise to 216°F, and some of the water will boil off.
ANSWER: B.

一個開放的容器中含有標準大氣壓下 200°F 的水 2.0 lbm。下列何者會是添加 16.0 Btu 熱至水所造成的？
A.水溫會增加，全部水會蒸發掉
B.水溫會增加，沒有水會蒸發掉
C.水溫將上升到 212°F，且部分水將蒸發掉
D.水溫將上升到 216°F，且部分水將蒸發掉

答案： B