TOPIC: 293005
KNOWLEDGE: K1.03 [2.6/2.7]
QID: B678

The location in a main turbine that experiences the greatest amount of blade erosion is the _____ stage of the _____ pressure turbine.

A. last; high

B. last; low

C. first; high

D. first; low

ANSWER: B.

TOPIC: 293005
KNOWLEDGE: K1.03 [2.6/2.7]
QID: B1978 (P2678)

If the moisture content of the steam supplied to a turbine decreases, the steam cycle thermal efficiency will increase because the...

A. enthalpy of the steam being supplied to the turbine has increased.

B. mass flow rate of the steam through the turbine has increased.

C. reheat capacity of the turbine extraction steam has increased.

D. the operating temperature of the turbine blades has increased.

ANSWER: A.

TOPIC: 293005
KNOWLEDGE: K1.03 [2.6/2.7]
QID: B2678

A main turbine consists of a high pressure (HP) unit and several low pressure (LP) units. The main turbine is most likely to experience stress-related failures of the rotor blades in the _____ stages of the _____ unit(s).

A. inlet; HP

B. inlet; LP

C. outlet; HP

D. outlet; LP

ANSWER: D.

TOPIC: 293005
KNOWLEDGE: K1.03 [2.6/2.7]
QID: B2978 (P2278)

If the moisture content of the steam supplied to a main turbine increases, turbine work will... (Assume the total mass flow rate does <u>not</u> change.)

A. decrease, because the enthalpy of the moist steam being supplied to the turbine has decreased.

B. decrease, because moist steam is more likely to leak between turbine stages.

C. increase, because the enthalpy of the moist steam being supplied to the turbine has increased.

D. increase, because moist steam is less likely to leak between turbine stages.

ANSWER: A.

TOPIC: 293005
KNOWLEDGE: K1.03 [2.6/2.7]
QID: B7240 (P7241)

A nuclear power plant has a thermal power rating of 3,200 MW. When the plant operates at 100 percent power, the main generator produces 1,200 MW at a 0.95 power factor. Plant modifications are planned that will upgrade the feedwater heaters and moisture separator/reheaters without changing the plant's thermal power rating. If the plant modifications improve plant thermal efficiency by 2 percent, what will be the resulting main generator electrical output at 100 percent reactor power with the same power factor?

A. 1,204 MW

B. 1,224 MW

C. 1,244 MW

D. 1,264 MW

ANSWER: D.

TOPIC: 293005
KNOWLEDGE: K1.03 [2.6/2.7]
QID: B7700 (P7700)

A nuclear reactor has a thermal power rating of 3,200 MW. When the reactor operates at 100 percent power, the main generator produces 1,200 MW at a 0.95 power factor. Modifications are planned that will upgrade major power plant equipment without changing the reactor's thermal power rating. If the modifications improve the power plant's thermal efficiency by 3 percent, what will be the resulting main generator electrical output with the same power factor at 100 percent reactor power?

A. 1,224 MW

B. 1,236 MW

C. 1,264 MW

D. 1,296 MW

ANSWER: D.

TOPIC: 293005
KNOWLEDGE: K1.03 [2.6/2.7]
QID: B7720 (P7720)

Initially, a main turbine is being supplied with inlet steam containing 0.25 percent moisture content. If the inlet steam moisture content increases to 0.5 percent at the same pressure and mass flow rate, the main turbine work output will…

A. increase, due to the increased enthalpy of the inlet steam.

B. increase, due to the increased momentum transfer from water droplets impacting the turbine blading.

C. decrease, due to the decreased temperature of the inlet steam.

D. decrease, due to the increased braking action from water droplets impacting the turbine blading.

ANSWER: D.

TOPIC: 293005
KNOWLEDGE: K1.03 [2.6/2.7]
QID: B7790 (P7790)

Initially, a main turbine is being supplied with inlet steam containing 0.5 percent moisture content. If the inlet steam moisture content decreases to 0.25 percent at the same pressure and mass flow rate, the main turbine work output will…

A. increase, due to the increased temperature of the inlet steam.

B. increase, due to the decreased braking action from water droplets impacting the turbine blading.

C. decrease, due to the decreased enthalpy of the inlet steam.

D. decrease, due to the decreased momentum transfer from water droplets impacting the turbine blading.

ANSWER: B.

TOPIC: 293005
KNOWLEDGE: K1.05 [2.7/2.8]
QID: B129

Which one of the following lists the initial effects of isolating extraction steam to a high pressure feedwater heater while at 90 percent power?

A. Core inlet subcooling remains the same and main generator MW output decreases.

B. Core inlet subcooling and reactor power both decrease.

C. Reactor power and main generator MW output remain the same.

D. Core inlet subcooling and main generator MW output both increase.

ANSWER: D.

TOPIC: 293005
KNOWLEDGE: K1.05 [2.7/2.8]
QID: B140

A direct advantage of using feedwater heaters in a typical steam cycle is that feedwater heaters increase the...

A. cycle efficiency.

B. turbine efficiency.

C. turbine MW output.

D. feedwater pump net positive suction head.

ANSWER: A.

TOPIC: 293005
KNOWLEDGE: K1.05 [2.7/2.8]
QID: B278

Which one of the following is the most probable location for superheated steam in a boiling water reactor steam cycle that uses moisture-separator reheaters?

A. The outlet of the high pressure turbine.

B. The inlet of the low pressure turbines.

C. The inlet of the high pressure turbine.

D. The outlet of the low pressure turbines.

ANSWER: B.

TOPIC: 293005
KNOWLEDGE: K1.05 [2.7/2.8]
QID: B978

A nuclear power plant is operating steady-state at 85 percent power when the extraction steam to a high pressure feedwater heater is isolated. Which one of the following describes the initial effect on main generator output (MW)? (Assume no operator action and no reactor protection actuation.)

A. Increases, because the steam cycle thermal efficiency initially increases.

B. Decreases, because the steam cycle thermal efficiency initially decreases.

C. Increases, because the steam flow rate through the main turbine initially increases.

D. Decreases, because the steam flow rate through the main turbine initially decreases.

ANSWER: C.

TOPIC: 293005
KNOWLEDGE: K1.05 [2.7/2.8]
QID: B1278 (P3378)

Initially, a nuclear power plant was operating at steady-state 90 percent reactor power when extraction steam to the feedwater heaters was isolated. With extraction steam still isolated, reactor power was returned to 90 percent and the plant was stabilized.

Compared to the initial main generator MW output, the current main generator MW output is...

A. lower, because the steam cycle is less efficient.

B. higher, because the steam cycle is less efficient.

C. lower, because less steam energy is available to the main turbine.

D. higher, because more steam energy is available to the main turbine.

ANSWER: A.

TOPIC: 293005
KNOWLEDGE: K1.05 [2.7/2.8]
QID: B1378

A nuclear power plant is operating at 80 percent power with 10°F of condensate subcooling. Which one of the following will initially increase the steam cycle thermal efficiency? (Assume main condenser vacuum does not change unless stated otherwise.)

A. Isolating extraction steam to a feedwater heater.

B. Decreasing main condenser cooling water flow rate.

C. Decreasing main condenser cooling water inlet temperature.

D. Decreasing main condenser vacuum (increasing pressure).

ANSWER: B.

TOPIC: 293005
KNOWLEDGE: K1.05 [2.7/2.8]
QID: B1679 (P1980)

Initially, a nuclear power plant was operating at steady-state 85 percent reactor power when the extraction steam to a high-pressure feedwater heater became isolated. Main generator load was returned to its initial value. When the plant stabilizes, reactor power will be _____ than 85 percent; and the steam cycle thermal efficiency will be _____.

A. greater; lower

B. greater; higher

C. less; lower

D. less; higher

ANSWER: A.

TOPIC: 293005
KNOWLEDGE: K1.05 [2.7/2.8]
QID: B1879 (P1878)

Initially, a nuclear power plant was operating at steady-state 85 percent reactor power when extraction steam to the feedwater heaters was isolated. With extraction steam still isolated, reactor power was returned to 85 percent and the plant was stabilized. Compared to the conditions just prior to the transient, the <u>current</u> main generator output (MW) is...

A. higher, because increased steam flow through the main turbine caused the main generator to pick up load.

B. lower, because decreased steam flow through the main turbine caused the main generator to reject load.

C. higher, because the steam cycle thermal efficiency has increased.

D. lower, because the steam cycle thermal efficiency has decreased.

ANSWER: D.

TOPIC: 293005
KNOWLEDGE: K1.05 [2.7/2.8]
QID: B2178 (P2178)

If superheating of the inlet steam to a low pressure (LP) turbine is reduced, LP turbine work output will _____; and LP turbine exhaust moisture content will _____. (Assume steam mass flow rate does not change.)

A. remain the same; increase

B. remain the same; decrease

C. decrease; increase

D. decrease; decrease

ANSWER: C.

TOPIC: 293005
KNOWLEDGE: K1.05 [2.7/2.8]
QID: B3378 (P3375)

Given the following:

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

TOPIC: 293005
KNOWLEDGE: K1.05 [2.7/2.8]
QID: B3578 (P378)

Steam turbines X and Y are identical 100 percent efficient turbines that exhaust to a condenser at 1.0 psia. Dry saturated steam at 250 psia enters turbine X. Superheated steam at 250 psia and 500°F enters turbine Y.

Which one of the following lists the percentage of moisture at the exhaust of turbines X and Y?

	Turbine X	Turbine Y
A.	24.5%	20.5%
B.	26.3%	13.0%
C.	24.5%	13.0%
D.	26.3%	20.5%

ANSWER: A.

TOPIC: 293005
KNOWLEDGE: K1.05 [2.7/2.8]
QID: B3778 (P3774)

Given the following:

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

TOPIC: 293005
KNOWLEDGE: K1.05 [2.7/2.8]
QID: B7440

Initially, a nuclear power plant was operating at steady-state 85 percent reactor power when the extraction steam to a high pressure feedwater heater became isolated. With the feedwater heater still isolated, the operators stabilized the plant at 85 percent reactor power. Compared to the initial main generator megawatt output, the current main generator megawatt output is…

A. lower, because the steam cycle thermal efficiency is lower.

B. lower, because the steam mass flow rate through the main turbine is lower.

C. higher, because the steam cycle thermal efficiency is higher.

D. higher, because the steam mass flow rate through the main turbine is higher.

ANSWER: A.

TOPIC: 293005
KNOWLEDGE: K1.05
QID: B7610

Given the following:

- A saturated steam-water mixture with an inlet quality of 70 percent is flowing through a moisture separator.
- The moisture separator is 100 percent efficient for removing moisture.

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

A. 15 lbm

B. 30 lbm

C. 35 lbm

D. 50 lbm

ANSWER: A.