UNITED STATES NUCLEAR REGULATORY COMMISSION
PRESSURIZED WATER REACTOR GENERIC FUNDAMENTALS EXAMINATION
JUNE 2011--FORM A

Please Print

Name: _____

Docket No.: _____

Facility: _____

Start Time: _____ Stop Time: _____

INSTRUCTIONS TO APPLICANT

Answer all the test items using the answer sheet provided, ensuring a single answer is marked for each test item. Each test item has equal point value. A score of at least 80 percent is required to pass this portion of the NRC operator licensing written examination. All examination materials will be collected 3 hours after the examination begins. This examination applies to a typical U.S. pressurized water reactor (PWR) nuclear power plant.

SECTION	QUESTIONS	% OF TOTAL	SCORE
COMPONENTS	1 - 22		
REACTOR THEORY	23 - 36		
THERMODYNAMICS	37 - 50		
TOTALS	50		

All work performed on this examination is my own. I have neither given nor received aid.

_____
Applicant's Signature

RULES AND INSTRUCTIONS FOR THE NRC
GENERIC FUNDAMENTALS EXAMINATION

During the administration of this examination the following rules apply:

NOTE: The generic term "control rod" refers to the length of neutron absorber material that can be positioned by the operator to change core reactivity.

NOTE: Numerical answers are rounded to the nearest whole number unless otherwise indicated.

1. Print your name in the blank provided on the cover sheet of the examination.

2. Fill in your individual docket number.

3. Fill in the name of your facility.

4. Fill in your start and stop times at the appropriate times.

5. Two aids are provided for your use during the examination:

   (1) An equations and conversions sheet contained within the examination copy, and

   (2) Steam tables and Mollier Diagram provided by your proctor.

6. Place your answers on the answer sheet provided. Credit will only be given for answers properly marked on this sheet. Follow the instructions for filling out the answer sheet.

7. Scrap paper will be provided for calculations.

8. Cheating on the examination will result in the automatic forfeiture of this examination. Cheating could also result in severe penalties.

9. Restroom trips are limited. Only **one** examinee may leave the room at a time. In order to avoid the appearance or possibility of cheating, avoid all contact with anyone outside of the examination room.

10. After you have completed the examination, sign the statement on the cover sheet indicating that the work is your own and you have neither given nor received any assistance in completing the examination. Either pencil or pen may be used.

11. Turn in your examination materials, answer sheet on top, followed by the examination copy and the examination aids, e.g., steam tables, handouts, and scrap paper.

12. After turning in your examination materials, leave the examination area, as defined by the proctor. If after leaving you are found in the examination area while the examination is in progress, your examination may be forfeited.

GENERIC FUNDAMENTALS EXAMINATION
EQUATIONS AND CONVERSIONS HANDOUT SHEET

EQUATIONS

$\dot{Q} = \dot{m}c_p\Delta T$

$\dot{Q} = \dot{m}\Delta h$

$\dot{Q} = UA\Delta T$

$\dot{Q} \propto \dot{m}^3_{Nat\ Circ}$

$\Delta T \propto \dot{m}^2_{Nat\ Circ}$

$K_{eff} = 1/(1 - \rho)$

$\rho = (K_{eff} - 1)/K_{eff}$

$SUR = 26.06/\tau$

$$\tau = \frac{\bar{\beta}_{eff} - \rho}{\lambda_{eff}\,\rho}$$

$$\rho = \frac{\ell^*}{\tau} + \frac{\bar{\beta}_{eff}}{1 + \lambda_{eff}\,\tau}$$

$\ell^* = 1 \times 10^{-4}$ sec

$\lambda_{eff} = 0.1\ sec^{-1}$ (for small positive ρ)

$DRW \propto \varphi^2_{tip}/\varphi^2_{avg}$

$A = A_0e^{-\lambda t}$

$P = P_o10^{SUR(t)}$

$P = P_oe^{(t/\tau)}$

$CR_{S/D} = S/(1 - K_{eff})$

$CR_1(1 - K_{eff1}) = CR_2(1 - K_{eff2})$

$1/M = CR_1/CR_X$

$A = \pi r^2$

$F = PA$

$\dot{m} = \rho A\vec{v}$

$\dot{W}_{Pump} = \dot{m}\Delta P\upsilon$

$P = IE$

$P_A = \sqrt{3}IE$

$P_T = \sqrt{3}IEpf$

$P_R = \sqrt{3}IE\sin\theta$

Thermal Efficiency = Net Work Out/Energy In

$$\frac{g(z_2 - z_1)}{g_c} + \frac{(\vec{v}_2^{\,2} - \vec{v}_1^{\,2})}{2g_c} + \upsilon(P_2 - P_1) + (u_2 - u_1) + (q - w) = 0$$

$g_c = 32.2$ lbm-ft/lbf-sec^2

CONVERSIONS

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1 Mw = 3.41×10^6 Btu/hr

1 hp = 2.54×10^3 Btu/hr

1 Btu = 778 ft-lbf

°C = (5/9)(°F - 32)

°F = (9/5)(°C) + 32

1 kg = 2.21 lbm

1 ft^3_{water} = 7.48 gal

1 gal_{water} = 8.35 lbm

1 Curie = 3.7×10^{10} dps

QUESTION: 1

Water storage tanks A and B are identical except that tank A receives overpressure protection from an installed relief valve, whereas tank B has an installed safety valve. The relief valve and safety valve have the same pressure setpoint and design flow rate.

Water is continuously added to each tank at the same rate (50 percent of the design flow rate of the relief/safety valve). After the tanks are completely full, tank A pressure will _____; and tank B pressure will _____.

A. fluctuate within a few percent of the pressure setpoint; stabilize slightly above the pressure setpoint

B. fluctuate within a few percent of the pressure setpoint; fluctuate within a few percent of the pressure setpoint

C. stabilize slightly above the pressure setpoint; stabilize slightly above the pressure setpoint

D. stabilize slightly above the pressure setpoint; fluctuate within a few percent of the pressure setpoint

QUESTION: 2

Consider a 6-inch globe valve and a 6-inch gate valve in the same water system application. Typically, the valve that requires the most linear disk travel from fully closed to fully open is the _____ valve; and the valve that produces the smallest pressure drop when fully open is the _____ valve.

A. gate; gate

B. gate; globe

C. globe; gate

D. globe; globe

QUESTION: 3

Refer to the drawing of a frictionless venturi flow element (see figure below). Subcooled water is flowing through the venturi with the following initial conditions:

Flow rate: 500 gpm
Tap A pressure: 40 psia
Tap B pressure: 36 psia

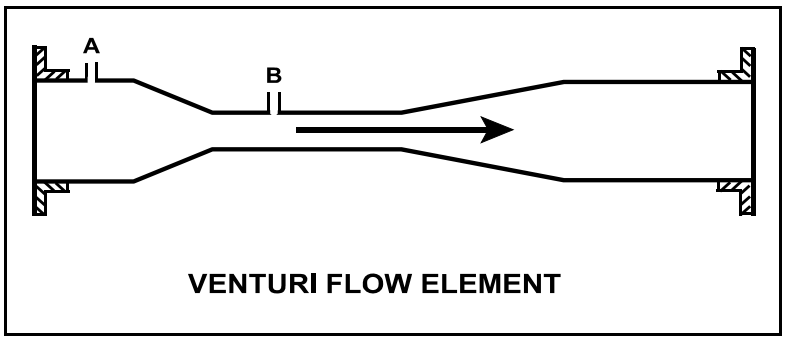
Flow rate increases to 1,000 gpm, which results in a tap A pressure of 68 psia. What is the new pressure at tap B?

A. 60 psia

B. 52 psia

C. 44 psia

D. 32 psia



VENTURI FLOW ELEMENT

QUESTION: 4

Refer to the drawing of a pressurizer differential pressure (D/P) level detection system (see figure below). The pressurizer level instrument was calibrated while the plant was in a cold shutdown condition.

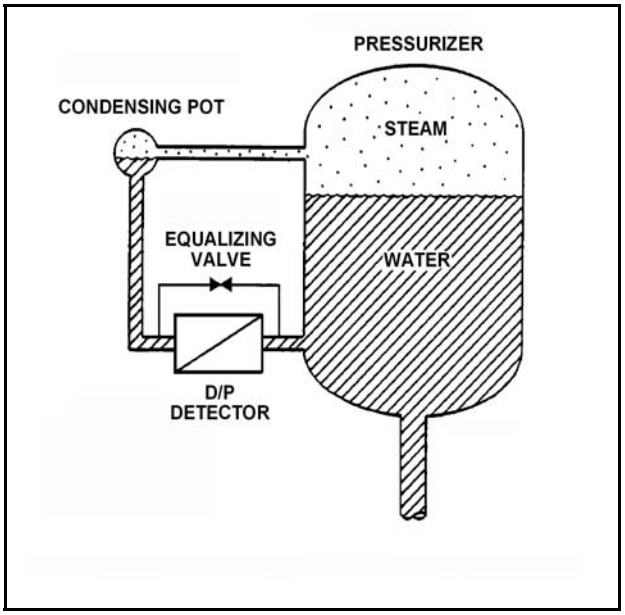
When the plant is returned to normal operating conditions, pressurizer level will indicate _____ than actual level because a given pressurizer level at normal operating conditions produces a _____ D/P compared to cold shutdown conditions.

A. lower; larger

B. lower; smaller

C. higher; larger

D. higher; smaller



QUESTION: 5

During a refueling outage, the fuel assemblies were reconfigured to reduce the radial power peak at the center of the core while maintaining the same rated thermal power. Excore power range detectors were calibrated at 50 percent power just prior to the outage.

How will actual reactor power compare to indicated reactor power when the nuclear power plant is stabilized at 50 percent power following the outage?

A. Actual reactor power will be higher than indicated reactor power due to increased core neutron leakage.

B. Actual reactor power will be higher than indicated reactor power due to decreased core neutron leakage.

C. Actual reactor power will be lower than indicated reactor power due to increased core neutron leakage.

D. Actual reactor power will be lower than indicated reactor power due to decreased core neutron leakage.

QUESTION: 6

A nuclear plant worker normally wears a thermoluminescent dosimeter (TLD) or similar device for measuring radiation exposure. When a self reading pocket dosimeter (SRPD) is also required, where will the SRPD be worn and why?

A. Below the waist near the TLD to measure radiation from the same source(s).

B. Below the waist away from the TLD to measure radiation from different source(s).

C. Above the waist near the TLD to measure radiation from the same source(s).

D. Above the waist away from the TLD to measure radiation from different source(s).

QUESTION: 7

Consider a direct-acting proportional flow controller that is maintaining flow rate at a value that is offset from the controller setpoint. If the controller's gain is decreased, the controller's offset will _____ and the controller's proportional band will _____.

A. decrease; decrease

B. decrease; increase

C. increase; decrease

D. increase; increase

QUESTION: 8

An emergency diesel generator (DG) is the only power source connected to an emergency bus. The governor of the DG directly senses DG _____ and adjusts DG fuel flow to maintain a relatively constant DG _____.

A. speed; voltage

B. speed; frequency

C. voltage; voltage

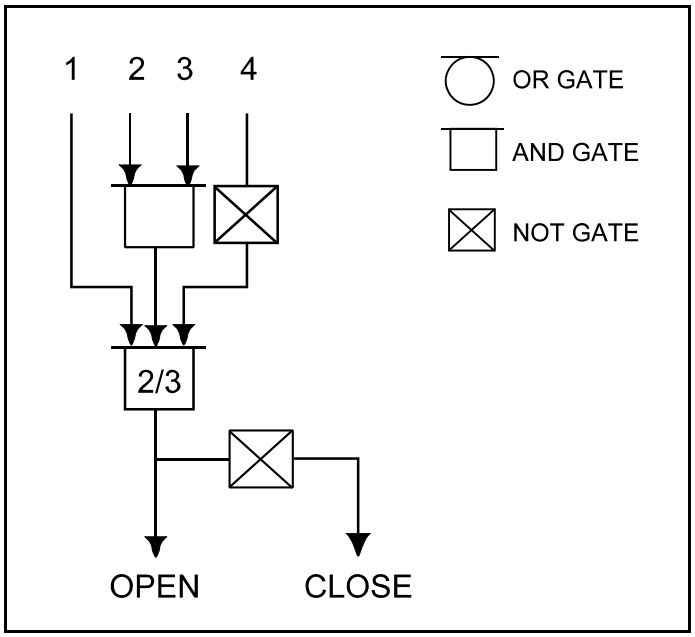
D. voltage; frequency

QUESTION: 9

Refer to the logic diagram for a valve controller (see figure below).

Which one of the following combinations of inputs will result in the valve receiving a CLOSE signal?

	INPUTS			
	1	2	3	4
A.	On	On	On	On
B.	Off	On	On	On
C.	On	Off	Off	Off
D.	Off	On	On	Off



QUESTION: 10

The current conditions for a centrifugal water pump are as follows:

Pump suction pressure: 140 psia
Pump suction temperature: 300°F

The pump requires a net positive suction head (NPSH) of 150 ft-lbf/lbm for pumping water at 300°F. Which one of the following is the lowest pump suction pressure that will provide the required NPSH for the current conditions?

A. 132 psia

B. 127 psia

C. 73 psia

D. 67 psia

QUESTION: 11

An ac motor-driven centrifugal water pump was just started. During the start, motor current remained peaked for 2 seconds, and then decreased and stabilized at about one-fifth the standard running current. Normally, the starting current peak lasts about 4 seconds.

Which one of the following could have caused the abnormal start indications above?

A. The pump shaft was initially seized and the motor breaker opened.

B. The pump was initially rotating slowly in the reverse direction.

C. The pump was initially air bound, and then primed itself after 2 seconds of operation.

D. The coupling between the motor and pump shafts was left unfastened after maintenance.

QUESTION: 12

Which one of the following contains two reasons for starting a typical radial-flow centrifugal pump with the discharge piping full of water and the discharge valve shut?

A. Prevent pump runout and prevent motor overspeed.

B. Prevent pump runout and ensure lubrication of pump seals.

C. Prevent water hammer and ensure adequate pump recirculation flow.

D. Prevent water hammer and prevent excessive duration of starting current.

QUESTION: 13

The minimum required net positive suction head for a typical positive displacement pump will increase the most if the pump...

A. motor speed increases from 1,200 rpm to 1,600 rpm.

B. discharge pressure decreases from 100 psig to 50 psig.

C. suction temperature increases from 75°F to 85°F.

D. discharge valve is positioned from 90 percent open to fully open.

QUESTION: 14

A centrifugal pump is driven by a single-speed ac induction motor. Pump flow rate is controlled by a throttled discharge flow control valve.

The following initial pump conditions exist:

Pump motor current: 50 amps
Pump flow rate: 400 gpm

What will the resulting pump motor current be if the flow control valve is repositioned such that pump flow rate increases to 800 gpm?

A. 100 amps

B. 200 amps

C. 400 amps

D. Cannot be determined without additional information.

QUESTION: 15

The frequency of large ac motor starts should be limited to prevent excessive...

A. wear of pump thrust bearings.

B. heat buildup within the motor.

C. torsional stresses on the motor shaft.

D. arcing and degradation of motor breaker contacts.

QUESTION: 16

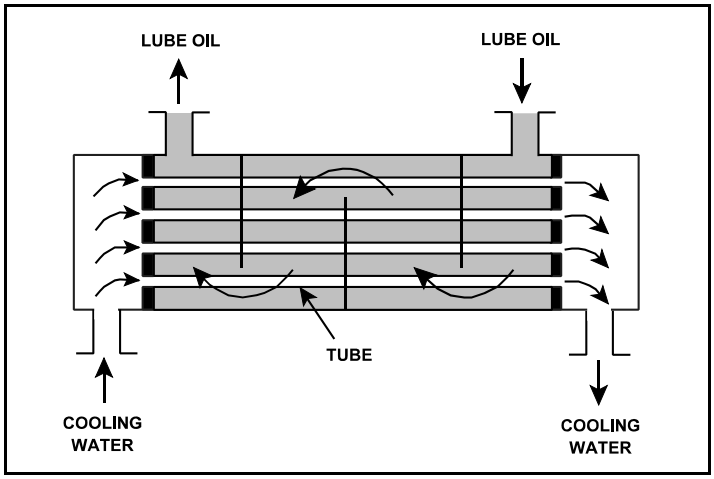
Refer to the drawing of a lube oil heat exchanger (see figure below).

The lube oil heat exchanger is in service with the following inlet temperatures:

Lube oil inlet temperature: 130°F
Cooling water inlet temperature: 70°F

Assume that cooling water mass flow rate is less than lube oil mass flow rate, and that both fluids have the same specific heat. Which one of the following pairs of heat exchanger outlet temperatures is not possible?

	Lube Oil Outlet Temp	Cooling Water Outlet Temp
A.	100°F	105°F
B.	105°F	105°F
C.	110°F	90°F
D.	115°F	90°F



QUESTION: 17

Refer to the drawing of an operating cooling water system (see figure below).

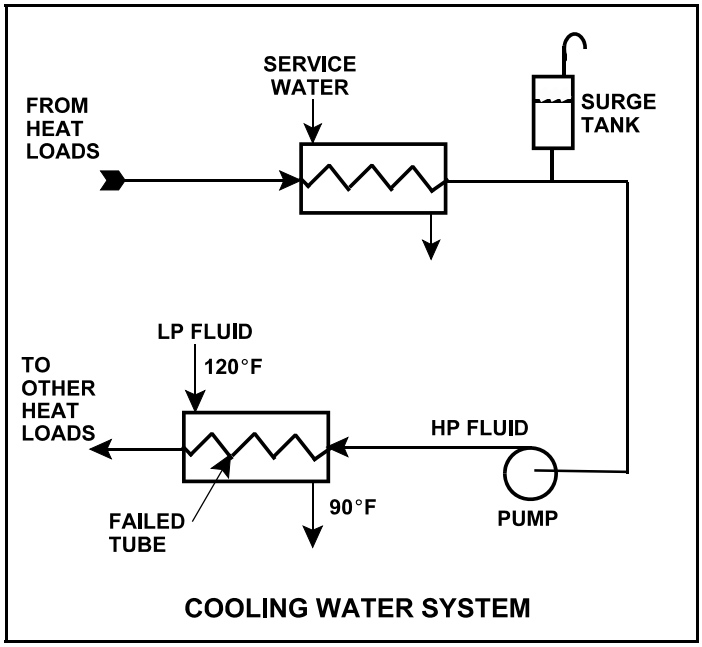
Which one of the following will occur as a result of the indicated tube failure in the heat exchanger?

A. High pressure (HP) fluid inventory increases.

B. Pressure in the low pressure (LP) system decreases.

C. Temperature in the low pressure (LP) system increases.

D. Level in the surge tank decreases.



QUESTION: 18

During a nuclear power plant cooldown, the reactor experiences a large crud burst. After 10 minutes, with stable reactor coolant chemistry parameters, the operators begin to record parameters for the in-service reactor coolant purification ion exchanger. The ion exchanger was recently filled with fresh resin.

Assuming no additional operator actions, what trend will the recorded parameters show during the next few hours?

A. Increasing ion exchanger inlet water conductivity.

B. Increasing ion exchanger outlet water conductivity.

C. Increasing flow rate through the ion exchanger.

D. Increasing radiation levels around the ion exchanger.

QUESTION: 19

Which one of the following indicates that a demineralizer receiving 75 gpm of reactor coolant is boron-saturated?

A. The decontamination factor of the demineralizer is less than 1.0.

B. The decontamination factor of the demineralizer is greater than 1.0.

C. Following a reactor coolant temperature increase, demineralizer effluent boron concentration exceeds influent boron concentration.

D. Following a reactor coolant temperature increase, demineralizer influent boron concentration exceeds effluent boron concentration.

QUESTION: 20

Refer to the drawing of a valve motor control circuit (see figure below) for a valve that is currently fully closed and has a 10-second stroke time.

Note: Limit switch (LS) contacts are shown open regardless of valve position, but relay contacts are shown open/closed according to the standard convention for control circuit drawings.

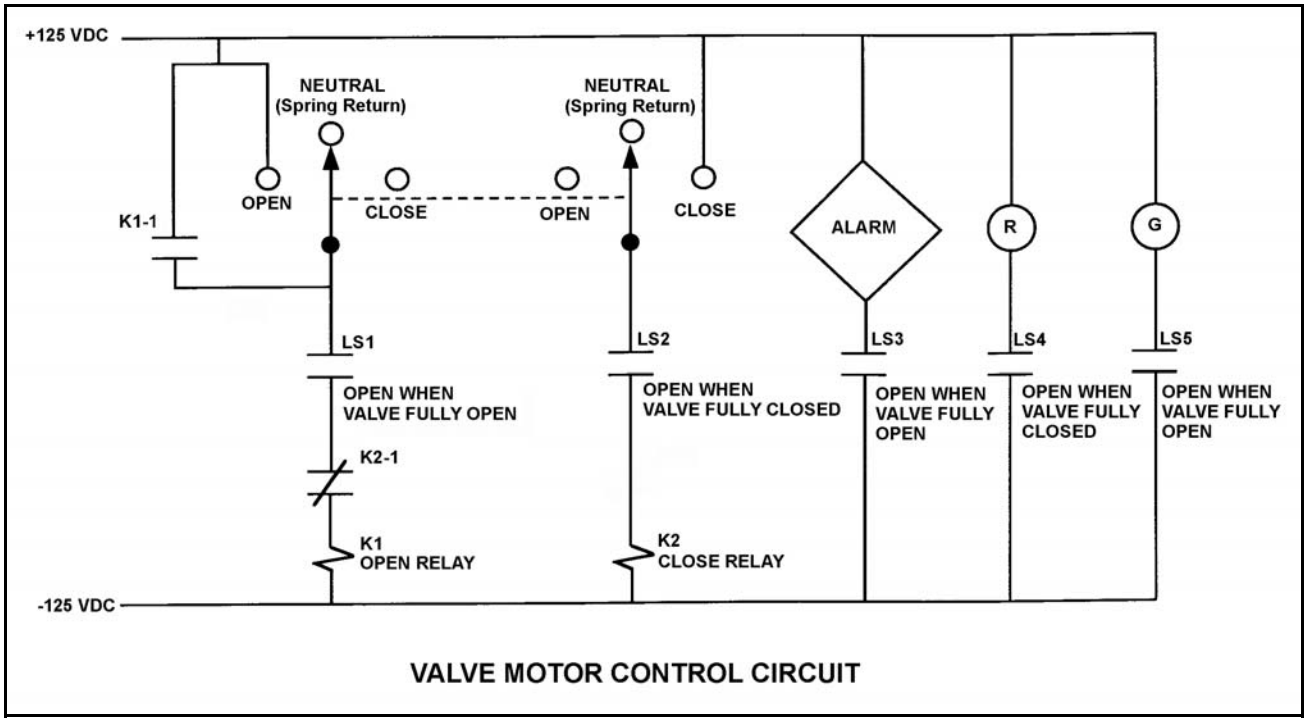
An operator takes the control switch to OPEN momentarily and the valve begins to open. Five seconds later, the operator takes the control switch to CLOSE momentarily and releases the switch. Which one of the following describes the valve response when the control switch is taken to CLOSE momentarily and released?

A. The valve will stop opening and remain partially open.

B. The valve will stop opening and then go fully closed.

C. The valve will open fully and remain fully open.

D. The valve will open fully and then go fully closed.



VALVE MOTOR CONTROL CIRCUIT

QUESTION: 21

Refer to the simplified drawing of an electrical distribution system (see figure below).

The high voltage side of each step-down transformer has a remote-operated disconnect to allow transformer maintenance while keeping the other transformers in service. The control circuit for each disconnect is position-interlocked with the associated MCC feeder breaker.

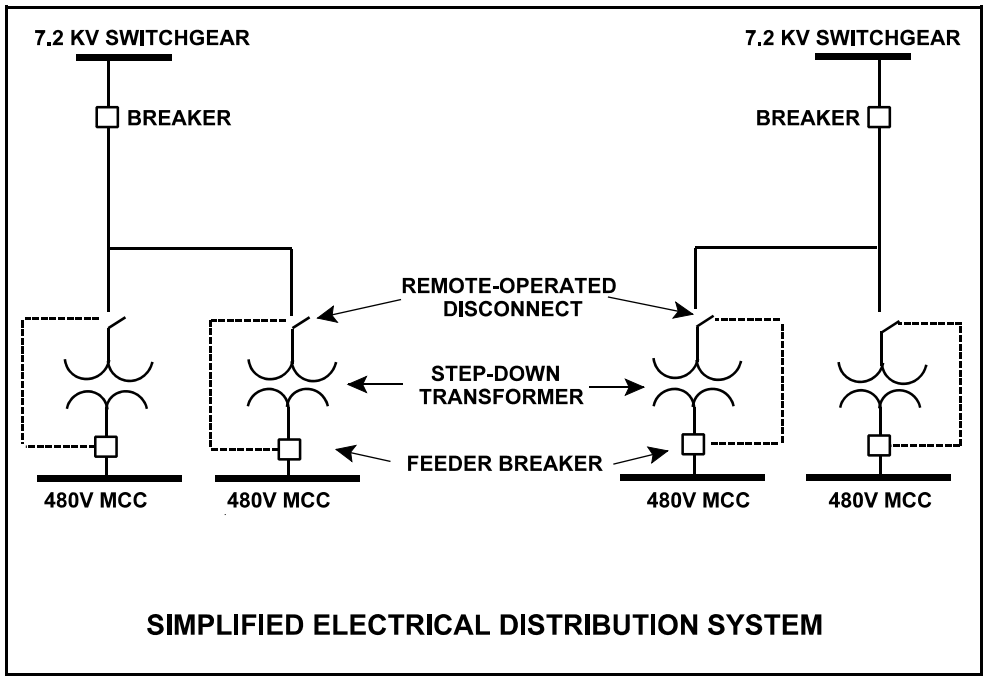
Which one of the following describes the purpose served by the interlock?

A. Prevent damage to the disconnect.

B. Prevent damage to the transformer.

C. Prevent damage to the feeder breaker.

D. Prevent damage to the 480V MCC.



SIMPLIFIED ELECTRICAL DISTRIBUTION SYSTEM

QUESTION: 22

While remotely investigating the condition of a normally-open 480 VAC motor control center (MCC) feeder breaker, an operator observes the following indications:

Green breaker position indicating light is out.
Red breaker position indicating light is lit.
MCC voltmeter indicates 480 VAC.
MCC ammeter indicates zero amperes.

Based on these indications, the operator should report that the feeder breaker is _____ and racked _____.

A. open; in

B. closed; in

C. open; to the test position

D. closed; to the test position

QUESTION: 23

In a comparison between a delayed neutron and a prompt neutron produced from the same fission event, the prompt neutron is more likely to...

A. leak out of the core while slowing down.

B. be captured by a U-238 nucleus at a resonance energy.

C. be captured by a Xe-135 nucleus.

D. cause thermal fission of a U-235 nucleus.

QUESTION: 24

With a nuclear power plant operating at 75 percent power and rod control in Manual, the operator dilutes reactor coolant system (RCS) boron concentration by 5 ppm. Assuming that reactor power does not change, shutdown margin will...

A. increase and stabilize at a higher value.

B. increase, then decrease to the original value as coolant temperature changes.

C. decrease and stabilize at a lower value.

D. decrease, then increase to the original value as coolant temperature changes.

QUESTION: 25

Given the following stable initial conditions for a nuclear reactor:

Power level: 1.0×10^{-8} percent
K_{eff}: 0.999
Core $\overline{\beta}_{eff}$: 0.006

What will the stable reactor period be following an addition of positive 0.15 %ΔK/K reactivity to the reactor? (Assume the stable reactor period occurs before the reactor reaches the point of adding heat.)

A. 30 seconds

B. 50 seconds

C. 80 seconds

D. 110 seconds

QUESTION: 26

Factors that affect the probability of resonance absorption of a neutron by 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.

QUESTION: 27

Ignoring the effects of changes in fission product poisons, 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

QUESTION: 28

A nuclear 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.

QUESTION: 29

Why do the control rod insertion limits generally rise as reactor power increases?

A. Power defect increases as power increases.

B. Control rod worth decreases as power increases.

C. Doppler (fuel temperature) coefficient decreases as power increases.

D. Equilibrium core xenon-135 negative reactivity increases as power increases.

QUESTION: 30

A reactor trip occurred one hour ago following several months of operation at 100 percent power. Reactor coolant temperature is being maintained at 550°F and the source range count rate is currently 400 cps. Assume a constant shutdown neutron flux. If no operator action is taken, how will the source range count rate respond during the next 24 hours?

A. The count rate will remain about the same.

B. The count rate will decrease for the entire period.

C. The count rate will initially decrease and then increase.

D. The count rate will initially increase and then decrease.

QUESTION: 31

A nuclear reactor has been shut down for seven days following two months of steady state 100 percent power operation. A reactor startup is then performed and the reactor is taken to 100 percent power over a 12-hour period. After 100 percent power is reached, what incremental control rod positioning will be needed to compensate for xenon-135 changes in the core over the next 24 hours?

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.

QUESTION: 32

Refer to the graph of critical boron concentration versus core burnup for a nuclear reactor core during its first fuel cycle (see figure below).

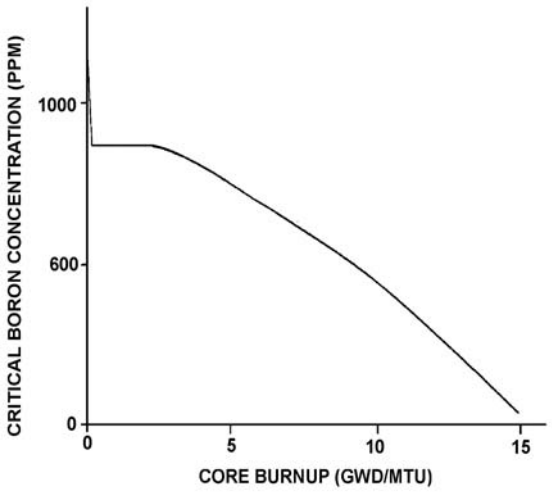
Which one of the following explains why reactor coolant critical boron concentration becomes relatively constant for a period early in the fuel cycle?

A. Buildup of fission product poisons is being offset by burnable poison burnout and fuel depletion.

B. Burnable poison burnout and fuel depletion are being offset by buildup of fission product poisons.

C. Fuel depletion is being offset by the buildup of fissionable plutonium and fission product poison buildup.

D. Fission product poison buildup and fuel depletion are being offset by burnable poison burnout.



QUESTION: 33

A reactor startup is in progress and the reactor is slightly subcritical in the source range. Assuming the reactor remains subcritical, a short control rod withdrawal will cause the reactor startup rate indication to increase sharply in the positive direction, and then...

A. rapidly decrease and stabilize at a negative 1/3 dpm.

B. gradually decrease and stabilize at zero.

C. stabilize until the point of adding heat (POAH) is reached; then decrease to zero.

D. continue increasing until the POAH is reached; then decrease to zero.

QUESTION: 34

After taking critical data during a nuclear reactor startup, the operator establishes a stable 0.75 dpm startup rate to increase power to the point of adding heat (POAH). Which one of the following is the approximate amount of reactivity needed to stabilize reactor power at the POAH? (Assume $\overline{\beta}_{eff}$ = 0.0066.)

A. -0.10 %ΔK/K

B. -0.12 %ΔK/K

C. -0.15 %ΔK/K

D. -0.28 %ΔK/K

QUESTION: 35

A nuclear reactor is critical at the point of adding heat (POAH) 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. increase and stabilize at the POAH.

B. quickly stabilize at a power level below the POAH.

C. continue to decrease on a negative 80 second period until the shutdown equilibrium neutron level is reached.

D. continue to decrease with an unknown period until the shutdown equilibrium neutron level is reached.

QUESTION: 36

A nuclear reactor was shut down one week ago following several months of operation at 100 percent power. Reactor coolant is being maintained at 500°F and all reactor coolant pumps are operating.

The principle source of heat input to the reactor coolant is from...

A. reactor coolant pumps.

B. subcritical thermal fission of U-235 and Pu-239.

C. subcritical fast fission of U-238.

D. fission product decay.

QUESTION: 37

Which one of the following is the approximate condenser vacuum when condenser pressure is 16 inches Hg absolute?

A. 4 inches Hg vacuum

B. 8 inches Hg vacuum

C. 12 inches Hg vacuum

D. 14 inches Hg vacuum

QUESTION: 38

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

A. decrease; decrease

B. decrease; increase

C. remain the same; decrease

D. remain the same; increase

QUESTION: 39

Given a set of steam tables with the following parameters for saturated steam-water mixtures:

- 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

QUESTION: 40

A main condenser is operating at 28 inches of Hg vacuum with a condensate outlet temperature of 92°F. Which one of the following is the approximate amount of condensate depression?

A. 6°F

B. 10°F

C. 13°F

D. 17°F

QUESTION: 41

Which one of the following actions will result in a decrease in overall nuclear power plant thermal efficiency?

A. Increasing steam quality by adding additional heat to the steam prior to entering the turbine.

B. Increasing the temperature of the feed water entering the steam generator.

C. Decreasing the amount of condensate depression in the main condenser.

D. Decreasing the amount of turbine steam extracted for feed water heating.

QUESTION: 42

Reactor coolant system (RCS) hot leg temperature is 552°F and RCS pressure is decreasing due to a small leak. Which one of the following pressure ranges includes the pressure at which two-phase flow will first occur in the hot leg?

A. 1,100 to 1,051 psig

B. 1,050 to 1,001 psig

C. 1,000 to 951 psig

D. 950 to 901 psig

QUESTION: 43

Refer to the drawing of a venturi in a steam line (see figure below). The venturi inlet and outlet pipe diameters at P1 and P2 are equal.

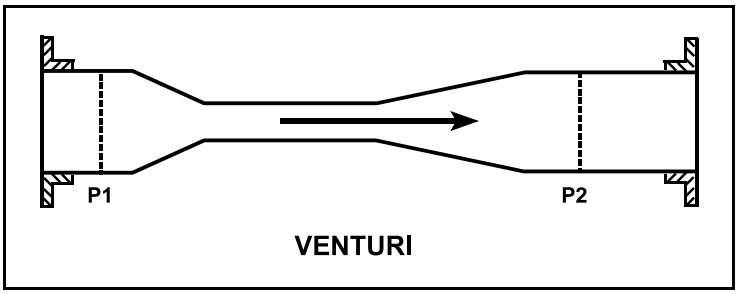
Currently, steam is flowing through the venturi, reaching sonic velocity in the throat of the venturi. If the steam inlet pressure (P1) remains constant while the downstream pressure (P2) decreases, the mass flow rate of the steam will _____; and the velocity of the steam at the venturi outlet will _____.

A. increase; increase

B. increase; remain the same

C. remain the same; increase

D. remain the same; remain the same



QUESTION: 44

When performing a heat balance calculation to determine core thermal power, the measured thermal power is _____ by a value associated with the reactor coolant pumps (RCPs); the adjustment is needed because _____ of the flow energy added to the reactor coolant by the RCPs is converted to thermal energy of the reactor coolant.

A. increased; a small fraction

B. increased; nearly all

C. decreased; a small fraction

D. decreased; nearly all

QUESTION: 45

A nuclear reactor is shut down at normal operating temperature and pressure with all control rods inserted. Which one of the following will decrease the departure from nucleate boiling ratio for this reactor? (Assume the reactor remains shutdown.)

A. Fully withdrawing a bank of shutdown rods.

B. Diluting RCS boron concentration by 50 ppm.

C. Reducing RCS temperature by 5°F.

D. Decreasing RCS pressure by 10 psig.

QUESTION: 46

During the reflux boiling method of core cooling, the steam that is generated in the core is condensed in the _____ side of a steam generator and flows back into the core via the _____. (Assume the steam generators contain U-tubes.)

A. hot leg; hot leg

B. cold leg; hot leg

C. hot leg; cold leg

D. cold leg; cold leg

QUESTION: 47

Refer to the drawing of a pool boiling curve (see figure below).

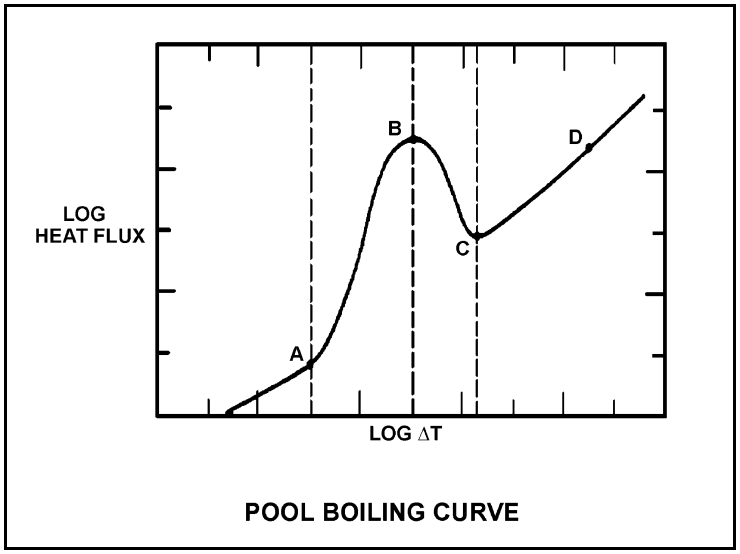
Which one of the points shown marks the smallest ΔT at which stable film boiling can exist?

A. A

B. B

C. C

D. D



QUESTION: 48

A nuclear reactor is operating at 100 percent power when a loss of offsite power occurs, resulting in a reactor trip and a loss of forced reactor coolant circulation. Reactor coolant system (RCS) hot leg temperature is greater than cold leg temperature and all other parameters (e.g. steam generator (SG) levels) are stable.

Which one of the following combinations of parameter trends, occurring 2 hours after the trip, indicates that natural circulation is <u>not</u> occurring? (CET = core exit thermocouples)

	RCS Hot Leg Temperature	RCS Cold Leg Temperature	SG Pressures	RCS CET Subcooling
A.	Stable	Decreasing	Decreasing	Stable
B.	Stable	Stable	Decreasing	Decreasing
C.	Decreasing	Decreasing	Decreasing	Increasing
D.	Decreasing	Stable	Stable	Increasing

QUESTION: 49

A nuclear reactor is operating at 80 percent power with all control rods fully withdrawn. Compared to a 50 percent insertion of a group (or bank) of control rods, a 50 percent insertion of a single control rod will cause a _____ increase in the axial peaking hot channel factor and a _____ increase in the radial peaking hot channel factor. (Assume reactor power remains constant.)

A. larger; larger

B. larger; smaller

C. smaller; larger

D. smaller; smaller

QUESTION: 50

The thermal stress experienced by the reactor vessel during a reactor coolant system heatup is...

A. compressive across the entire vessel wall.

B. tensile across the entire vessel wall.

C. compressive at the inner wall and tensile at the outer wall of the vessel.

D. tensile at the inner wall and compressive at the outer wall of the vessel.

***** FINAL ANSWER KEY *****

JUNE 2011 NRC GENERIC FUNDAMENTALS EXAMINATION
PRESSURIZED WATER REACTOR - ANSWER KEY

FORM A	FORM B	ANS.	FORM A	FORM B	ANS.
1	15	D	26	40	A
2	16	A	27	41	A
3	17	B	28	42	C
4	18	A	29	43	A
5	19	C	30	44	C
6	20	C	31	45	A
7	21	D	32	46	D
8	22	B	33	47	B
9	23	B	34	48	C
10	24	B	35	49	B
11	25	D	36	50	A or D
12	26	D	37	1	D
13	27	A	38	2	B
14	28	D	39	3	B
15	29	B	40	4	B
16	30	C	41	5	D
17	31	D	42	6	B
18	32	D	43	7	C
19	33	C	44	8	D
20	34	A	45	9	D
21	35	A	46	10	A
22	36	B	47	11	C
23	37	A	48	12	B
24	38	C	49	13	C
25	39	D	50	14	C