UNITED STATES NUCLEAR REGULATORY COMMISSION
GENERIC FUNDAMENTALS EXAMINATION
SEPTEMBER 2020 BWR – FORM A

DO NOT BEGIN THIS EXAMINATION UNTIL DIRECTED TO DO SO.

Please Print:

Name: _____

Docket No.: 55-_____

Facility: _____

Start Time: _____ Stop Time: _____

Instructions to Examinee:

This examination applies to a typical U.S. boiling water reactor (BWR) nuclear power plant. There are 50 multiple-choice test items to answer, each having equal point value. There are multiple forms of this examination, each containing the same test items in a random order. Answer all test items using the provided answer sheet, ensuring a single answer is marked for each test item. A score of at least 80 percent is required to pass this portion of the NRC operator licensing written examination. When you have completed the examination, sign your name under the statement at the bottom of this page. All examination materials will be collected 3 hours after the examination begins.

KNOWLEDGE AREA	NUMBER OF TEST ITEMS	PERCENT OF TOTAL	SCORE
COMPONENTS	22	44	
REACTOR THEORY	14	28	
THERMODYNAMICS	14	28	
TOTALS	50	100	

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

_____

Examinee Signature

RULES AND INSTRUCTIONS FOR THE NRC GENERIC FUNDAMENTALS EXAMINATION

During the administration of this examination the following rules apply:

NOTE: The 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. Scrap paper will be provided for calculations.

7. 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.

8. Do not make assumptions regarding conditions that are not specified in the question unless they occur as a consequence of other conditions that are stated in the question. For example, you should not assume operator actions have been taken. Also, this examination tests knowledge of general fundamentals, therefore do not make assumptions based on specific plant procedures.

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

10. 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 the examination room.

11. 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.

12. 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.

13. 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 SHEET

EQUATIONS

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

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

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

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

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

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

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

$SUR = 26.06/\tau$

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

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

$\ell^* = 1.0 \times 10^{-4}$ sec

$\lambda_{eff} = 0.1\ \text{sec}^{-1}$ (for $\rho > 0$)

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

$P = P_o e^{t/\tau}$

$P = P_o 10^{SUR(t)}$

$A = A_o e^{-\lambda t}$

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

$CR_1(1 - K_{eff_1}) = CR_2(1 - K_{eff_2})$

$1/M = CR_1/CR_x$

$A = \pi r^2$

$F = PA$

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

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

$P = I^2R$

$P = IE$

$P_A = \sqrt{3}IE$

$P_T = \sqrt{3}IEpf$

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

Thermal Efficiency = Net Work Out/Energy In

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

$g = 32.2\ \text{ft/sec}^2$

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

CONVERSIONS

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1 MW = 3.41 x 10^6 Btu/hr

1 hp = 2.54 x 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 x 10^{10} dps

QUESTION: 1

When an AC motor-driven centrifugal pump was started, the motor ammeter reading immediately increased to, and stabilized at, many times the normal operating value. Which one of the following describes a possible cause for the ammeter response?

A. The pump was started with a fully closed discharge valve.

B. The pump was started with a fully open discharge valve.

C. The pump shaft seized upon start and did not rotate.

D. The pump shaft separated from the motor shaft upon start.

QUESTION: 2

The level in a condensate collection tank is being controlled by an automatic level controller using proportional-only control. Initially, the tank level is stable. Then the condensate flow rate into the tank increases and stabilizes at a higher flow rate.

As tank level increases, the controller positions a drain valve more open than necessary to stabilize the level. As tank level decreases, the controller positions the drain valve more closed than necessary to stabilize the level. This cycle is repeated continuously, never reaching a stable tank level or drain valve position.

The excessive valve positioning described above could be caused by the controller's gain being too _____; or by the controller's proportional band being too _____.

A. low; wide

B. low; narrow

C. high; wide

D. high; narrow

QUESTION: 3

Given the following information for a reactor:

Reactivity (ρ) = 0.0060
Average delayed neutron fraction ($\bar{\beta}$) = 0.0058
Effective delayed neutron fraction ($\bar{\beta}_{eff}$) = 0.0062

The reactor is _____, and the reactor fission rate is _____.

A. prompt critical; constant

B. prompt critical; increasing

C. not prompt critical; constant

D. not prompt critical; increasing

QUESTION: 4

A nuclear power plant is undergoing a startup with the reactor water initially saturated at 508°F. The main steam isolation valves are closed. Currently, the reactor has a stable positive 100-second reactor period and reactor power is well below the point of adding heat (POAH).

Which one of the following will occur first when reactor power reaches the POAH?

A. Reactor power will decrease.

B. Reactor period will lengthen.

C. Reactor pressure will increase.

D. Reactor water temperature will increase.

QUESTION: 5

Refer to the graph of neutron flux versus time (see figure below) for a nuclear power plant that experienced a reactor scram from steady-state 100 percent power at time = 0.

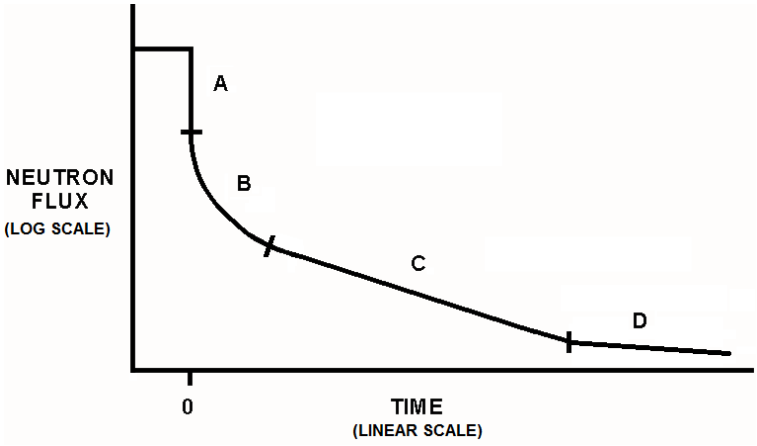
The shape of section B of the curve is determined primarily by the decreasing production rate of…

A. prompt fission neutrons.

B. delayed fission neutrons.

C. intrinsic source neutrons.

D. installed source neutrons.



QUESTION: 6

Which one of the following describes the primary purpose of minimum flow piping for a centrifugal pump?

A. Prevent pump runout during high flow conditions.

B. Prevent vortexing at the pump suction during high flow conditions.

C. Ensure adequate net positive suction head during low flow conditions.

D. Ensure adequate pump cooling during low flow conditions.

QUESTION: 7

Refer to the drawing of two water storage tanks with four differential pressure (D/P) level detectors (see figure below).

The tanks are identical and are being maintained at 2 psig overpressure, 60°F, and the same constant water level. The tanks are located within a sealed containment structure that is currently at standard atmospheric pressure. All level detectors have been calibrated and are producing the same level indication.

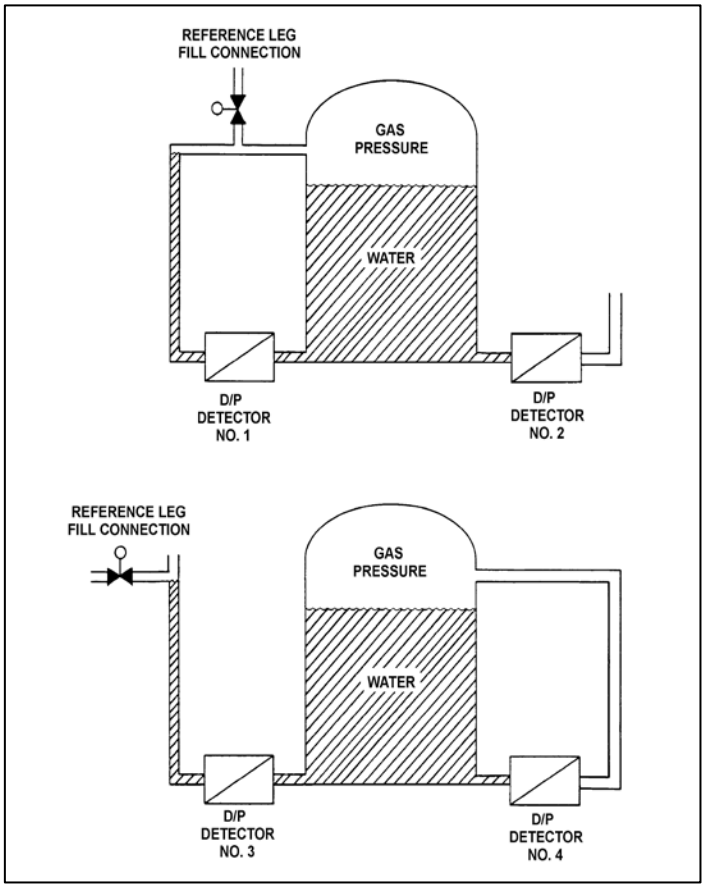
If a ventilation system malfunction causes the containment structure pressure to decrease to 13 psia, which level detectors will produce the lowest level indications?

A. 1 and 3

B. 1 and 4

C. 2 and 3

D. 2 and 4



QUESTION: 8

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.

QUESTION: 9

Condensate from a main condenser hotwell is flowing through a condensate demineralizer. A <u>decrease</u> in the condensate demineralizer's differential pressure could be caused by a/an _____ in the demineralizer condensate influent temperature; or by the _____ in the condensate demineralizer.

A. decrease; onset of channeling

B. increase; onset of channeling

C. decrease; accumulation of suspended solids

D. increase; accumulation of suspended solids

QUESTION: 10

Cooling water system pressure is being monitored by a simple diaphragm pressure detector with its low pressure side vented to the containment. If a main steamline rupture raises containment pressure by 20 psi, cooling water system pressure indication will: (Disregard any temperature effect on the detector.)

A. increase by 20 psi.

B. decrease by 20 psi.

C. increase by the square root of 20 psi.

D. decrease by the square root of 20 psi.

QUESTION: 11

An open vessel contains 5.0 lbm of saturated water at standard atmospheric pressure. 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

QUESTION: 12

A loss-of-coolant accident resulted in a reactor scram. The source range monitors (SRMs) were inserted and are currently positioned in a water-filled region of the core.

If the SRMs are subsequently repositioned to a voided region of the core, the indicated count rate will _____; primarily due to a _____ in the voided region of the core.

A. decrease, smaller fast neutron flux

B. decrease, smaller thermal neutron flux

C. increase, larger fast neutron flux

D. increase, larger thermal neutron flux

QUESTION: 13

Two identical reactors are currently shut down for refueling. Reactor A has been operating for 35 years with an average lifetime capacity factor of 90 percent. Reactor B has been operating for 45 years with an average lifetime capacity factor of 75 percent.

Compared to reactor B, reactor A has been exposed to _____ fast neutron irradiation, and has a _____ reactor vessel nil-ductility transition temperature.

A. less; lower

B. less; higher

C. more; lower

D. more; higher

QUESTION: 14

Refer to the drawing of a spring-loaded air-operated valve (see figure below).

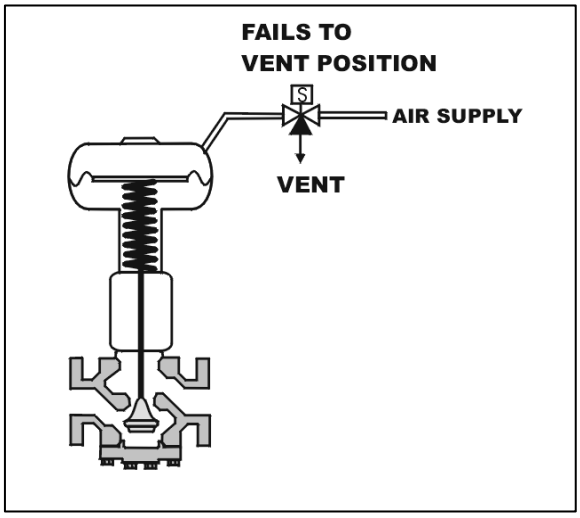
Upon a loss of air pressure, this valve will...

A. go to the fully open position.

B. remain at the current position.

C. go to the fully closed position.

D. go to the midposition.



QUESTION: 15

Which one of the following accounts for the majority of energy transfer from a fission neutron while slowing down in a moderator?

A. Collisions with the nuclei in the moderator.

B. Collisions with the electrons in the moderator.

C. Interactions with the electric fields of the nuclei in the moderator.

D. Interactions with the electric fields of the electrons in the moderator.

QUESTION: 16

Which one of the following is indicated when the maximum average power ratio (MAPRAT) is greater than 1.0? (LHGR is linear heat generation rate; APLHGR is average planar linear heat generation rate)

A. The LHGR limit has been exceeded.

B. The APLHGR limit has been exceeded.

C. The LHGR limit has <u>not</u> been exceeded.

D. The APLHGR limit has <u>not</u> been exceeded.

QUESTION: 17

A reactor has been operating at 80 percent power for two months. A manual reactor scram is required for a test. The scram will be followed by a reactor startup with criticality scheduled to occur 24 hours after the scram.

The greater assurance that xenon-135 reactivity will permit criticality during the reactor startup will exist if the reactor is operated at _____ power for 48 hours prior to the scram; and if criticality is rescheduled for _____ hours after the scram.

A. 60 percent; 18

B. 60 percent; 30

C. 100 percent; 18

D. 100 percent; 30

QUESTION: 18

Refer to the partial drawing of two identical single-speed radial-flow centrifugal pumps in a cooling water system (see figure below). Pumps 1 and 2 are driven by identical three-phase AC induction motors. Initially, pump 1 is operating normally and pump 2 is stopped.

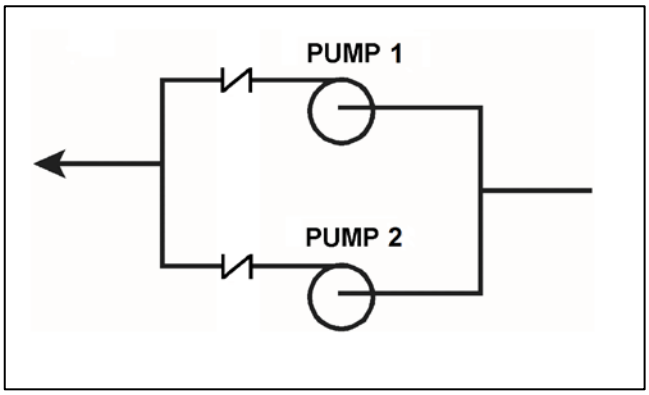
Then pump 2 is started, but its discharge check valve remains partially closed. When conditions stabilize, pump _____ will have the <u>smaller</u> motor current; and pump _____ will have the <u>greater</u> discharge head.

A. 1; 1

B. 1; 2

C. 2; 1

D. 2; 2



QUESTION: 19

A radial-flow centrifugal cooling water pump is driven by an AC induction motor. The pump can supply cooling water to several heat loads, all of which are in parallel alignment. The following pump conditions initially exist:

Pump motor current = 100 amps
Pump flow rate = 400 gpm
Pump suction temperature = 70°F

Four hours later, the motor is drawing 95 amps. Which one of the following could be responsible for the observed decrease in motor amps?

A. The temperature of the cooling water being pumped decreased to 60°F with no change in pump flow rate.

B. The temperature of the cooling water being pumped increased to 80°F with no change in pump flow rate.

C. Cooling water flow was established to an additional heat load with no change in the temperature of the cooling water being pumped.

D. Cooling water flow was isolated from an out-of-service heat load with no change in the temperature of the cooling water being pumped.

QUESTION: 20

Refer to the drawing of a curve showing the neutron absorption characteristics of a typical U-238 nucleus at a resonance neutron energy (see figure below). The associated reactor is currently operating at steady-state 80 percent power.

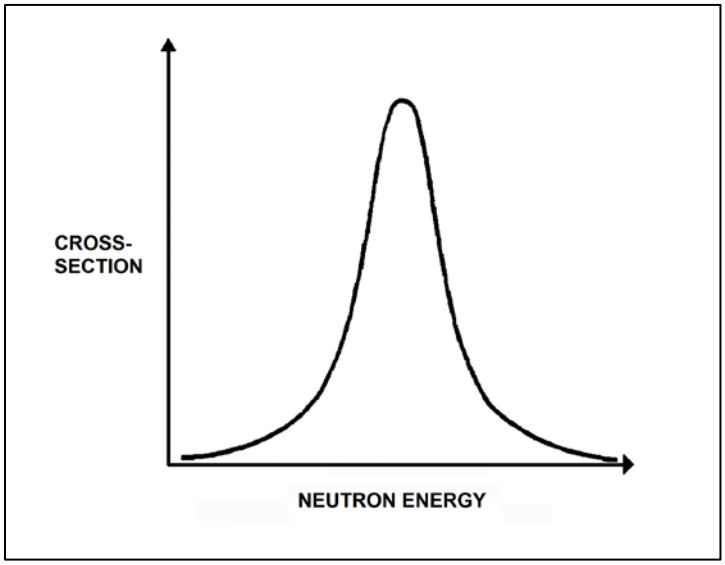
During a subsequent reactor power decrease to 70 percent, the curve will become _____; and the percentage of the core neutron population lost to resonance capture by U-238 will _____.

A. shorter and broader; increase

B. shorter and broader; decrease

C. taller and more narrow; increase

D. taller and more narrow; decrease



QUESTION: 21

Initially, a reactor was operating at steady-state 100 percent power when a loss of offsite power caused a reactor scram and a loss of forced reactor coolant flow. Several minutes later, the occurrence of natural circulation flow will be indicated by a differential _____ across the core plate, and coolant flow through the _____ pumps.

A. temperature; recirculation

B. temperature; jet

C. pressure; recirculation

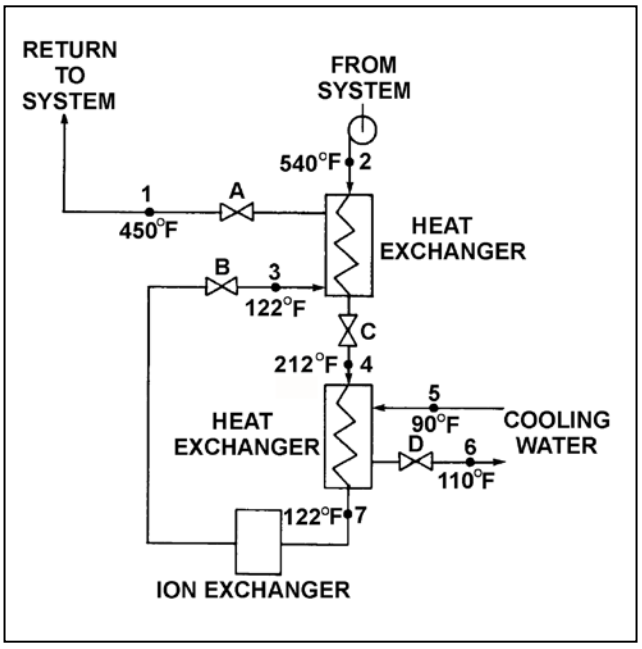
D. pressure; jet

QUESTION: 22

Refer to the drawing of an operating water cleanup system (see figure below) in which valves A, B, C, and D are fully open. Currently, the centrifugal pump is providing a cleanup water flow rate of 120 gpm.

If valve C is throttled to 50 percent, how will the temperatures at points 3 and 6 be affected?

	Point 3	Point 6
A.	Decrease	Decrease
B.	Decrease	Increase
C.	Increase	Decrease
D.	Increase	Increase



QUESTION: 23

One hour ago, a reactor scrammed from steady-state 100 percent power due to an instrument malfunction. All systems operated normally.

Given the following absolute values of reactivities added since the scram, assign a (+) or (–) as appropriate and choose the current value of core reactivity.

Xenon = ( ) 1.0 %ΔK/K
Fuel temperature = ( ) 2.0 %ΔK/K
Control rods = ( ) 14.0 %ΔK/K
Voids = ( ) 3.0 %ΔK/K

A. -8.0 %ΔK/K

B. -10.0 %ΔK/K

C. -14.0 %ΔK/K

D. -20.0 %ΔK/K

QUESTION: 24

Refer to the drawing of operating curves for a positive displacement water pump in a closed system (see figure below).

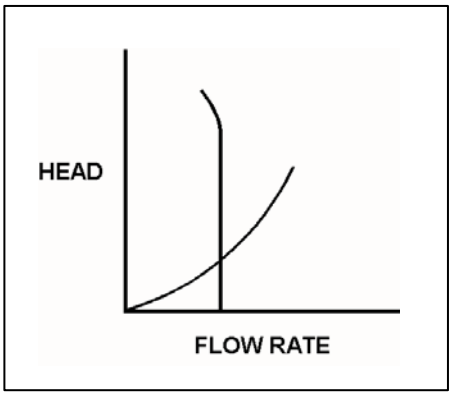
Which one of the following describes the value of the head where the two curves cross?

A. The maximum amount of head that the pump can provide.

B. The amount of pump head that is required to avoid cavitation.

C. The amount of pump head that is converted to kinetic energy in the pump.

D. The amount of pump head that is converted to heat as the water circulates through the system.



QUESTION: 25

Refer to the drawing of an operating cooling water system (see figure below) in which valve A is one-half open. Currently, the centrifugal pump is providing a system flow rate of 600 gpm.

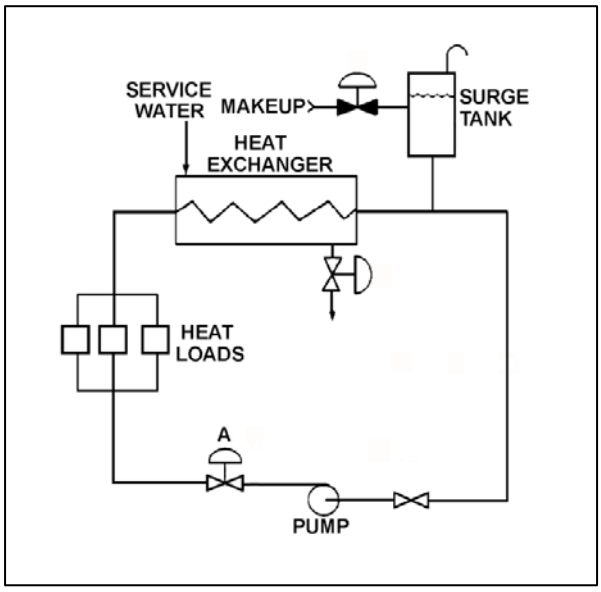
If valve A is opened further, until system flow rate is 800 gpm, the differential pressure across valve A will _____; and the differential pressure across the heat exchanger will _____.

A. decrease; decrease

B. decrease; increase

C. increase; decrease

D. increase; increase



QUESTION: 26

Which one of the following is responsible for the fuel cladding failure that results from operating the reactor above the limit for linear heat generation rate?

A. Fission product gas expansion causes fuel rod internal design pressure to be exceeded.

B. Corrosion buildup on the cladding surfaces reduces heat transfer and promotes transition boiling.

C. The zircaloy-steam reaction causes accelerated oxidation of the cladding at high temperatures.

D. The difference between thermal expansion rates of the fuel pellets and the cladding causes severe stress.

QUESTION: 27

Refer to the drawing of an operating heat exchanger (see figure below). Assume the overall heat exchanger heat transfer coefficient does not change.

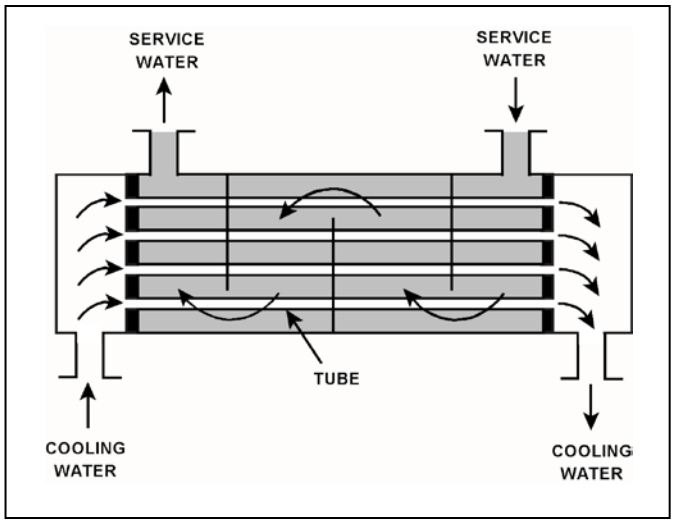
The rate of heat transfer between the two liquids will increase if the…

A. inlet temperatures of both liquids increase by 20°F.

B. inlet temperatures of both liquids decrease by 20°F.

C. mass flow rate of the hotter liquid increases by 10 percent.

D. mass flow rate of the colder liquid decreases by 10 percent.



QUESTION: 28

Refer to the drawing of a simple chromel-alumel thermocouple circuit (see figure below).

The thermocouple, thermocouple connection head, and reference junction panel are located inside a reactor building (RB) while the temperature instrument is located outside the RB. Thermocouple temperature indication is initially 440°F.

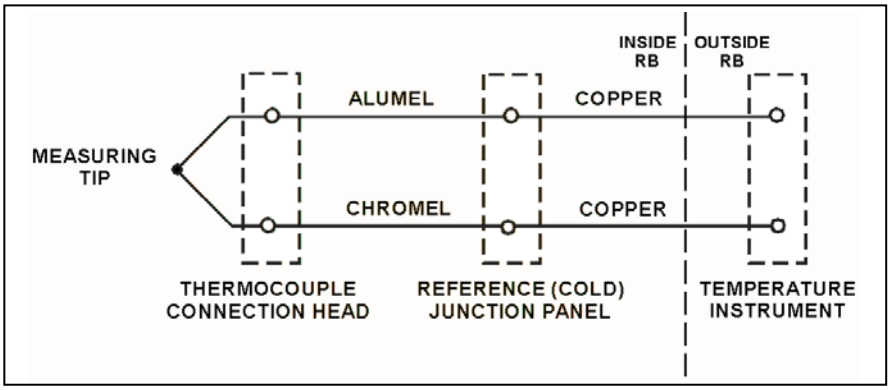
A steam leak inside the RB increases the temperatures of the thermocouple connection head and reference junction panel by 40°F, while the temperature at the measuring tip is unchanged. What is the resulting temperature indication?

A. 400°F

B. 440°F

C. 480°F

D. 520°F



QUESTION: 29

While remotely investigating the condition of a typical normally open 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 zero volts.
MCC ammeter indicates zero amperes.

Based on these indications, the operator can accurately report that the breaker is _____ and racked _____.

A. open; out

B. closed; out

C. open; to the TEST position

D. closed; to the TEST position

QUESTION: 30

Refer to the drawing of a valve motor control circuit (see figure below).

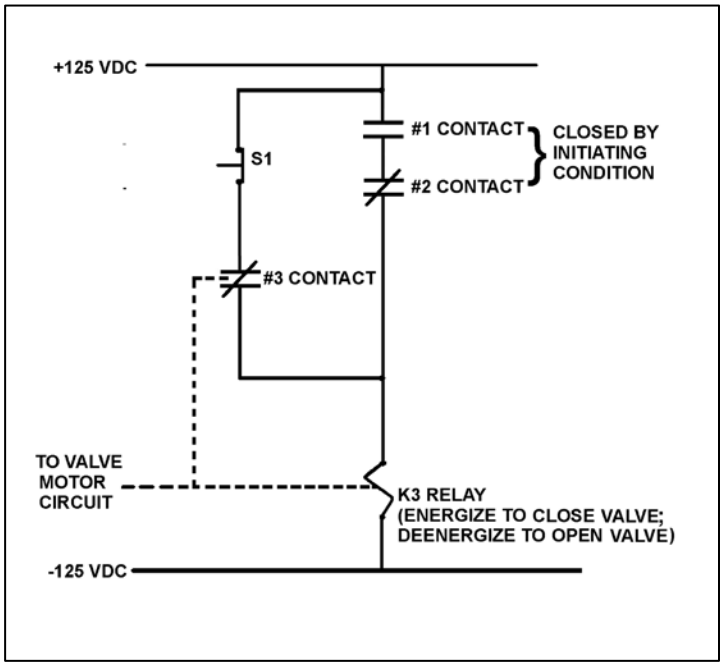
The valve is currently closed with the contact configuration as shown. If the S1 pushbutton is depressed, the valve will _____; and when the S1 pushbutton is subsequently released, the valve will _____.

A. open; close

B. open; remain open

C. remain closed; open

D. remain closed; remain closed



QUESTION: 31

Consider a stationary steam nozzle in the first stage of a main turbine. Assume the steam nozzle is frictionless, with no heat gain or loss.

Compared to the enthalpy of the steam entering the nozzle, the enthalpy of the steam exiting the nozzle is _____, because the nozzle converts _____.

A. lower; enthalpy into kinetic energy.

B. lower; enthalpy into flow energy.

C. the same; flow energy into kinetic energy.

D. the same; kinetic energy into flow energy.

QUESTION: 32

Which one of the following describes how and why the void coefficient of reactivity changes as void fraction increases during a control rod withdrawal at 80 percent power?

A. Becomes less negative, due to the increased absorption of neutrons by U-238.

B. Becomes less negative, due to a greater fraction of neutrons lost to leakage from the core.

C. Becomes more negative, due to the reduction in the fast fission contribution to the neutron population.

D. Becomes more negative, due to a greater fractional loss of moderator for a one percent void increase at higher void fractions.

QUESTION: 33

A reactor startup is in progress with K_{eff} at 0.999 and reactor period stable at infinity. If a control rod is withdrawn one notch, the reactor period will initially become _____, and then _____. (Assume K_{eff} remains less than 1.0.)

A. positive; approach infinity

B. positive; stabilize at a positive value

C. negative; approach infinity

D. negative; stabilize at a negative value

QUESTION: 34

The fuel thermal time constant specifies the amount of time required for...

A. a fuel pellet to achieve equilibrium temperature following a power change.

B. a fuel bundle to achieve equilibrium temperature following a power change.

C. the fuel cladding temperature to undergo most of its total change following a power change.

D. the fuel centerline temperature to undergo most of its total change following a power change.

QUESTION: 35

The vacuum in a main condenser is maintained by the condensation of turbine exhaust steam, because the _____ of the turbine exhaust steam _____ as it condenses.

A. enthalpy; increases

B. enthalpy; decreases

C. specific volume; increases

D. specific volume; decreases

QUESTION: 36

A centrifugal pump is used to provide makeup water to a storage tank that is 30 feet high. The pump is located at the base of the tank. The pump can be aligned to fill the tank via a top connection or a bottom connection using piping of equal lengths and diameters. The tank is currently half full.

With the pump in operation, the pump will have the highest discharge pressure if the pump is aligned to fill the tank via the _____ connection; and the tank will become full in the least amount of time if the pump is aligned to fill the tank via the _____ connection.

A. top; top

B. top; bottom

C. bottom; top

D. bottom; bottom

QUESTION: 37

A reactor is currently operating at 60 percent power immediately after a one-hour power increase from steady-state 40 percent power. To maintain reactor power at 60 percent over the next 2 hours, the operator must _____ control rods, or _____ reactor recirculation flow rate.

A. insert; increase

B. insert; decrease

C. withdraw; increase

D. withdraw; decrease

QUESTION: 38

Refer to the drawing of K_{eff} versus core age (see figure below).

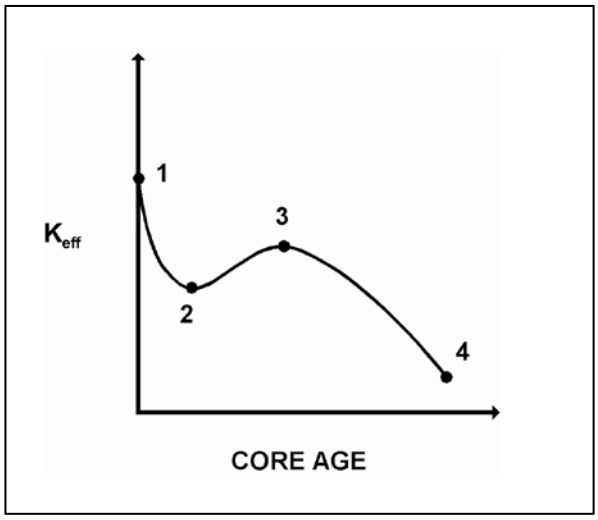
The major cause for the change in K_{eff} from point 3 to point 4 is the...

A. depletion of U-235.

B. depletion of U-238.

C. burnout of burnable poisons.

D. buildup of fission product poisons.



QUESTION: 39

A reactor is operating at 90 percent power near the end of a fuel cycle. When an operator withdraws a shallow control rod two notches, a power decrease occurs. This power decrease can be attributed to a relatively _____ differential rod worth, and a relatively _____ increase in bundle void content.

A. large; small

B. large; large

C. small; small

D. small; large

QUESTION: 40

Given the following pressure specifications for a safety relief valve (SRV):

Setpoint pressure (SRV will start to open) = 1,200 psia
Maximum pressure (SRV will be fully open) = 1,242 psia
Reseat pressure (SRV will be fully closed) = 1,152 psia

Which one of the following is the percent accumulation for the SRV?

A. 2.5 percent

B. 3.0 percent

C. 3.5 percent

D. 4.0 percent

QUESTION: 41

The power range nuclear instruments have been adjusted to 100 percent based on a calculated heat balance. Which one of the following will result in the indicated reactor power being lower than the actual reactor power?

A. The feedwater temperature used in the heat balance calculation was 10°F lower than actual feedwater temperature.

B. The reactor recirculation pump heat input term was omitted from the heat balance calculation.

C. The feedwater flow rate used in the heat balance calculation was 10 percent lower than actual feedwater flow rate.

D. The steam pressure used in the heat balance calculation was 50 psi lower than actual steam pressure.

QUESTION: 42

Which one of the following flow measuring elements produces the largest unrecoverable head loss when used in an operating fluid system?

A. Venturi

B. Flow nozzle

C. Pipe elbow

D. Orifice

QUESTION: 43

A nuclear power plant is operating at steady-state 100 percent power. Assume the main condenser cooling water inlet temperature and flow rate do not change.

If the main condenser vacuum slowly decreases, the temperature of the condensate falling into the hotwell will...

A. decrease, because the condensate saturation pressure has decreased.

B. decrease, because the amount of condensate subcooling has increased.

C. increase, because the condensate saturation pressure has increased.

D. increase, because the amount of condensate subcooling has decreased.

QUESTION: 44

A _____ pump in a liquid system should be started with its discharge valve _____ to avoid rupturing the pump casing and/or discharge piping.

A. centrifugal; fully closed

B. centrifugal; fully open

C. positive displacement; fully closed

D. positive displacement; fully open

QUESTION: 45

A reactor is initially critical below the point of adding heat (POAH) during a reactor startup. If control rods are manually withdrawn for 5 seconds, reactor power will initially increase, and then...

A. stabilize at a critical power level below the POAH.

B. decrease and stabilize at the original value.

C. stabilize at a critical power level at the POAH.

D. decrease and stabilize below the original value.

QUESTION: 46

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

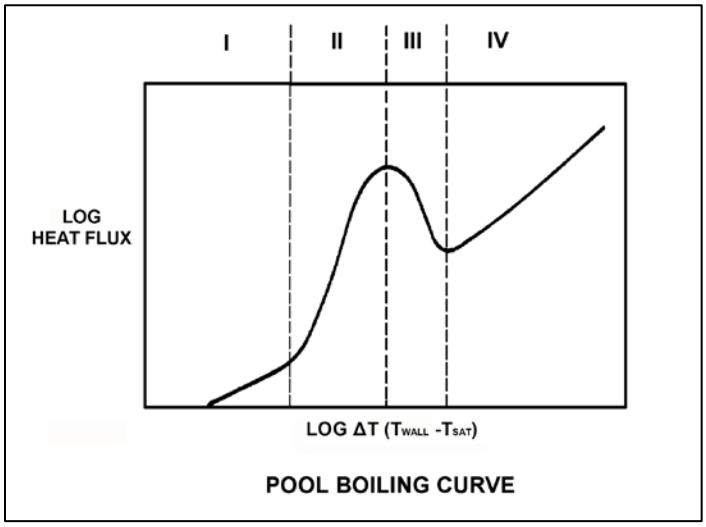
Which one of the following describes the conditions in a fuel assembly that is experiencing region IV heat transfer?

A. Saturated nucleate boiling.

B. Subcooled nucleate boiling.

C. Complete steam blanketing of the fuel rod surface.

D. Alternate wetting and drying of the fuel rod surface.



QUESTION: 47

The cation exchange resin in a mixed-bed demineralizer removes undesirable _____ ions from solution while releasing desirable _____ ions into solution.

A. negative; negative

B. negative; positive

C. positive; negative

D. positive; positive

QUESTION: 48

Refer to the drawing of a lube oil temperature control system (see figure below).

The temperature control system uses a reverse-acting proportional controller and a direct-acting transmitter. The controller's proportional band is 80°F to 130°F.

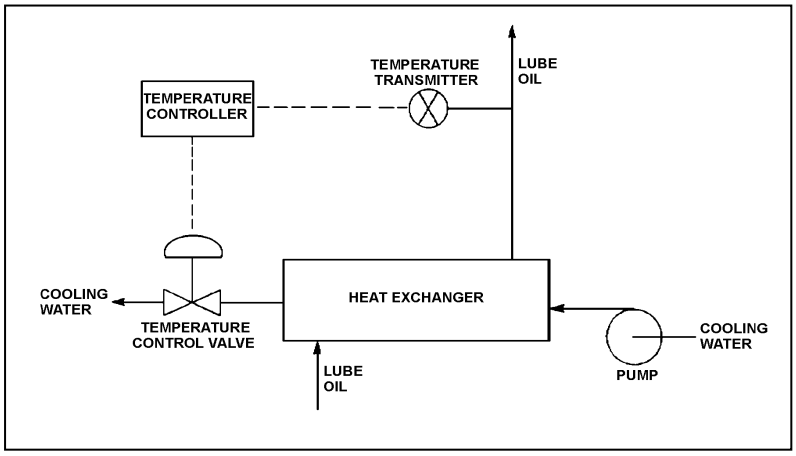
Which one of the following will be the controller's output percentage when the measured lube oil temperature is 98°F?

A. 18 percent

B. 32 percent

C. 36 percent

D. 64 percent



QUESTION: 49

A nuclear power plant was operating at full power when a 200 gpm reactor coolant leak caused a reactor scram and initiation of emergency coolant injection. Reactor vessel pressure stabilized at 900 psia.

Currently, all centrifugal injection pumps are operating with all pump recirculation flowpaths isolated. The shutoff heads for the pumps are as follows:

High pressure coolant injection (HPCI) pumps = 1,200 psia
Low pressure coolant injection (LPCI) pumps = 200 psia

If the injection pumps continue operating under these conditions, which pumps are more likely to fail, and why?

A. LPCI pumps, due to pump overheating.

B. LPCI pumps, due to motor overheating.

C. HPCI pumps, due to pump overheating.

D. HPCI pumps, due to motor overheating.

QUESTION: 50

Which one of the following control rods, when repositioned by two notches, will have the <u>greatest</u> effect on the axial neutron flux shape?

A. Deep rod near the center of the core.

B. Deep rod near the edge of the core.

C. Shallow rod near the center of the core.

D. Shallow rod near the edge of the core.

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

NRC GENERIC FUNDAMENTALS EXAMINATION
SEPTEMBER 2020 BWR

FORM A				FORM B			
NO.	ANS.	NO.	ANS.	NO.	ANS.	NO.	ANS.
1	C	26	D	1	C	26	D
2	D	27	C	2	D	27	C
3	D	28	A	3	D	28	D
4	B	29	D	4	D	29	A
5	B	30	B	5	A	30	D
6	D	31	A	6	D	31	C
7	B	32	D	7	C	32	D
8	D	33	A	8	B	33	B
9	B	34	C	9	C	34	B
10	B	35	D	10	D	35	B
11	C	36	B	11	B	36	D
12	B	37	B	12	B	37	B
13	A	38	A	13	B	38	A
14	C	39	D	14	C	39	A
15	A	40	C	15	A	40	D
16	B	41	C	16	A	41	D
17	B	42	D	17	D	42	D
18	D	43	C	18	C	43	B
19	D	44	D	19	C	44	B
20	D	45	C	20	C	45	A
21	D	46	C	21	B	46	C
22	A	47	D	22	D	47	B
23	B	48	D	23	D	48	D
24	D	49	A	24	B	49	C
25	B	50	C	25	D	50	A