UNITED STATES NUCLEAR REGULATORY COMMISSION
BOILING WATER REACTOR GENERIC FUNDAMENTALS EXAMINATION
SEPTEMBER 2015 – 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. boiling water reactor (BWR) 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 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 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 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 small positive ρ)

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

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

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

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

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

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

$1/M = CR_1/CR_x$

$A = \pi r^2$

$F = PA$

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

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

$P = IE$

$P_A = \sqrt{3}IE$

$P_T = \sqrt{3}IEpf$

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

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 $= 3.41 \times 10^6$ Btu/hr

1 hp $= 2.54 \times 10^3$ Btu/hr

1 Btu $= 778$ ft-lbf

$℃ = (5/9)(°F - 32)$

$°F = (9/5)(℃) + 32$

1 kg $= 2.21$ lbm

1 $ft^3_{water} = 7.48$ gal

1 $gal_{water} = 8.35$ lbm

1 Curie $= 3.7 \times 10^{10}$ dps

QUESTION: 1

A completely full water storage tank is being hydrostatically tested to 200 psig using a positive displacement pump (PDP) with a smooth and constant discharge flow rate of 4 gpm. The tank is protected by a relief valve that discharges to the atmosphere. The relief valve has the following characteristics:

- The opening setpoint is 200 psig with an accumulation of 5 percent.
- The valve has linear flow characteristics and a maximum rated flow rate of 8 gpm.

The PDP is inadvertently left running when tank pressure reaches 200 psig.

With the PDP still running, at what pressure will the tank stabilize?

A. 190 psig

B. 195 psig

C. 205 psig

D. 210 psig

QUESTION: 2

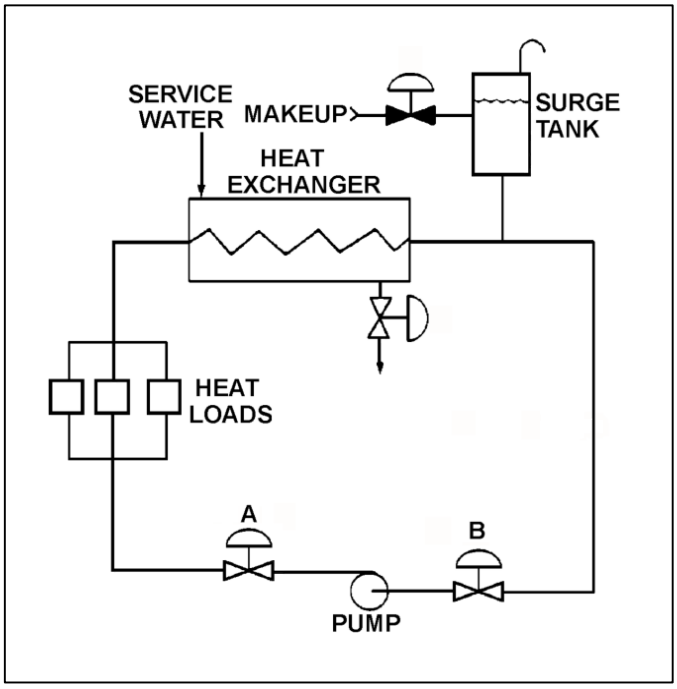
Refer to the drawing of an operating cooling water system (see figure below) in which valves A and B are identical. Valve A is one-half open and valve B is fully open. If valve A is opened fully, the differential pressure (D/P) across valve B will…

A. increase by the same amount as the absolute change in D/P across valve A.

B. increase by an amount less than the absolute change in D/P across valve A.

C. decrease by the same amount as the absolute change in D/P across valve A.

D. decrease by an amount less than the absolute change in D/P across valve A.



QUESTION: 3

In a comparison between globe valves and gate valves in the same water system application, globe valves...

A. are less effective at throttling flow.

B. are less effective as pressure regulating valves.

C. produce a smaller pressure decrease when fully open.

D. require less force to open against large differential pressures.

QUESTION: 4

If the orifice in a differential pressure (D/P) flow sensor erodes such that the orifice opening becomes larger, indicated flow rate will _____ due to a _____ D/P across the orifice. (Assume actual flow rate remains the same.)

A. decrease; smaller

B. decrease; larger

C. increase; smaller

D. increase; larger

QUESTION: 5

Refer to the drawing of a reactor vessel differential pressure (D/P) level detection system that was calibrated at normal operating conditions (see figure below).

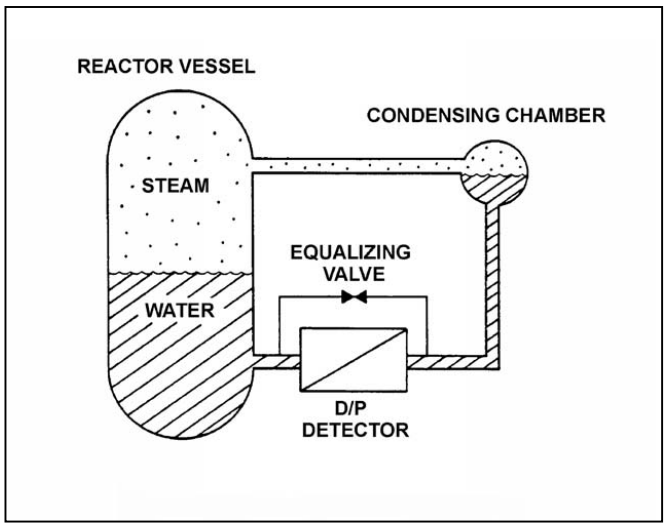
A reactor vessel cooldown has resulted in a decrease in reactor vessel pressure from 900 psia to 400 psia in one hour. Without density compensation of the level instrumentation, at the end of the cooldown reactor vessel level indication would indicate _____ than actual level because the density of the water in the _____ has changed significantly.

A. higher; reference leg

B. higher; reactor vessel

C. lower; reference leg

D. lower; reactor vessel



QUESTION: 6

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

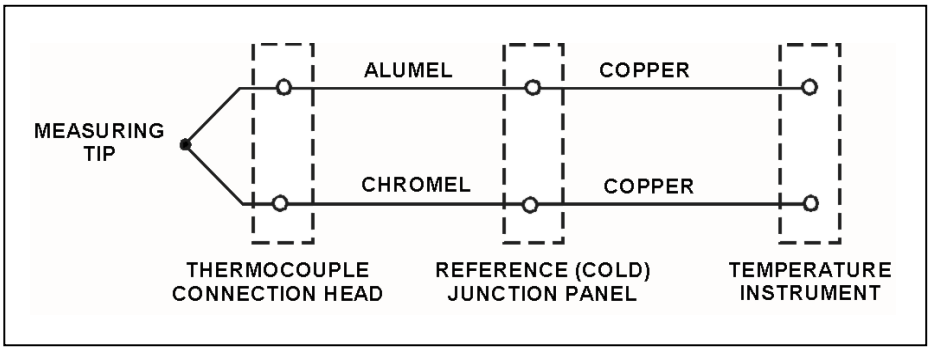
What is the effect on the thermocouple reference junctions if the copper extension wires from the reference junction panel to the temperature instrument are replaced with alumel (top) and chromel (bottom) extension wires?

A. The reference junctions will be located in the thermocouple connection head.

B. The reference junctions will still be located in the reference junction panel.

C. The reference junctions will be located in the temperature instrument.

D. There will no longer be any reference junctions.



QUESTION: 7

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

A. Near the TLD to add exposure to the TLD measurement.

B. Near the TLD to measure radiation affecting the same part of the body.

C. Away from the TLD to add exposure to the TLD measurement.

D. Away from the TLD to measure radiation affecting a different part of the body.

QUESTION: 8

Given:

A reverse-acting proportional pneumatic controller will be used to maintain level in a water storage tank by positioning an air-operated flow control valve in the tank's drain line.
The controller's input will vary directly with tank level.

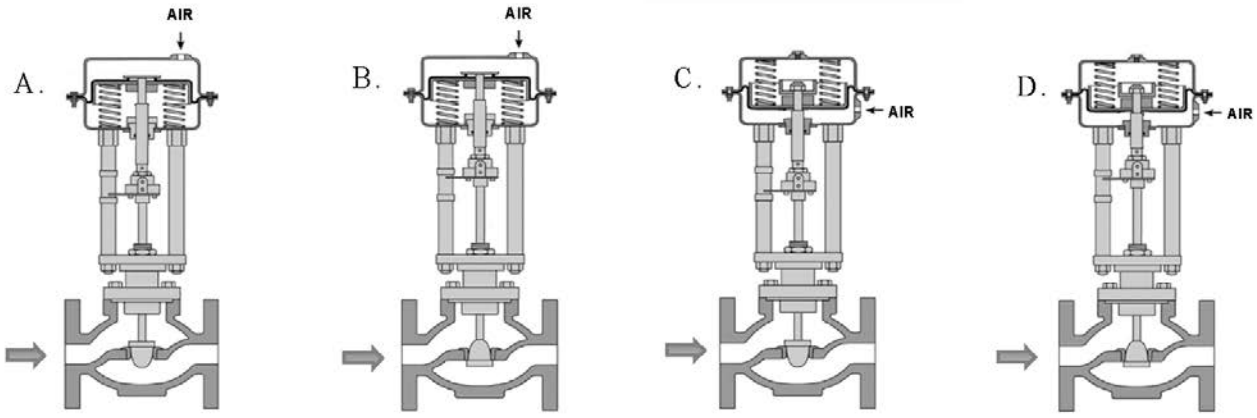
Which pair of flow control valves shown below will be compatible with the controller in the above application?

A. A and B

B. B and C

C. C and D

D. D and A



QUESTION: 9

Refer to the drawing of a pressure alarm circuit (see figure below). The orientation of the bistable symbol indicates the characteristics of the bistable, as is normal for a control circuit diagram.

The bistable turns on to actuate an alarm at a system pressure of 100 psig. The bistable has a 5 psig deadband, or neutral zone.

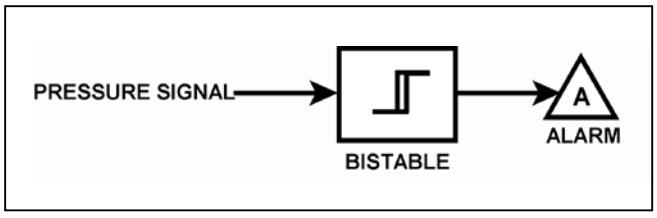
If system pressure increases to 105 psig, and subsequently decreases to _____; the status of the alarm will be _____.

A. 100 psig; off

B. 98 psig; off

C. 94 psig; on

D. 92 psig; off



QUESTION: 10

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

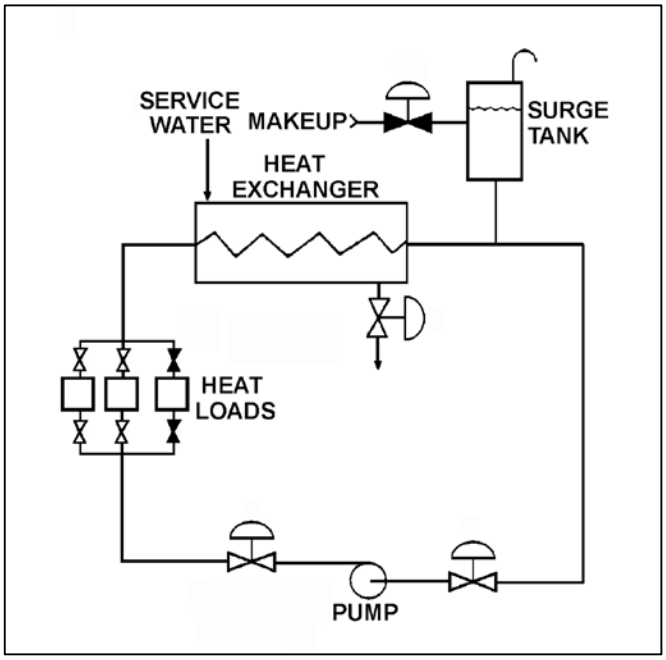
Which one of the following changes to the cooling water system will result in a higher cooling water pump flow rate and a reduced pump discharge head?

A. Increase pump speed by 20 percent.

B. Decrease pump speed by 20 percent.

C. Isolate one of the two in-service heat loads.

D. Place the third system heat load in service.



QUESTION: 11

A centrifugal pump is operating at rated conditions in an open system. If a system transient results in the pump operating at runout, which one of the following indications will be present?

A. Increased discharge pressure

B. Decreased pump motor current

C. Increased pump vibration

D. Decreased pump flow rate

QUESTION: 12

A centrifugal water pump is operating normally with the following parameters:

Inlet water pressure = 15 psia
Water temperature = 100°F
Pump head added = 100 feet

What is the pump discharge pressure?

A. 43 psia

B. 58 psia

C. 100 psia

D. 115 psia

QUESTION: 13

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: 14

A 4,000 KW rated diesel generator (DG) is supplying 2,000 KW to a 4.16 KV emergency bus. The DG governor is in the isochronous mode (no speed droop). The emergency bus is about to be synchronized with, and then connected to, an infinite offsite power grid by closing the emergency bus normal power feeder breaker.

The following stable emergency bus and normal power conditions currently exist:

Emergency Bus (from DG)	Normal Power (from Offsite)
4.16 KV	4.16 KV
60.1 Hz	59.9 Hz

When the emergency bus normal power feeder breaker is closed, the DG will… (Assume no additional operator action is taken.)

A. transfer KW load to the offsite power grid, but remain partially loaded.

B. transfer KW load to the offsite power grid until the DG is completely unloaded.

C. acquire KW load from the offsite power grid, but remain within its KW load rating.

D. acquire KW load from the offsite power grid and ultimately exceed its KW load rating.

QUESTION: 15

The rate of heat production in the stator windings of an AC induction motor is _____ proportional to the _____ of the stator current.

A. directly, square

B. directly; amount

C. inversely; square

D. inversely; amount

QUESTION: 16

The rate of heat transfer between two liquids in a heat exchanger will <u>increase</u> if the: (Assume single-phase conditions and a constant specific heat for each liquid.)

A. flow rate of the colder liquid decreases by 10 percent.

B. flow rate of the hotter liquid increases by 10 percent.

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

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

QUESTION: 17

A steam-driven turbine exhausts to a condenser. If the condenser vacuum improves, the turbine exhaust pressure will _____, and the turbine power output will _____.

A. increase; increase

B. increase; decrease

C. decrease; increase

D. decrease; decrease

QUESTION: 18

A nuclear power plant was initially operating at steady-state 50 percent power with 50 gpm of main condenser cooling water inleakage through a cooling water tube rupture. Power was then increased, and is currently stable at 60 percent.

Assume the size of the cooling water tube rupture does not change, and the main condenser cooling water inlet pressure and inlet temperature do not change.

When compared to the flow rate of main condenser cooling water inleakage at 50 percent power, the flow rate of cooling water inleakage at 60 percent power is _____ because the main condenser pressure at 60 percent power is _____.

A. lower; higher

B. lower; lower

C. higher; higher

D. higher; lower

QUESTION: 19

The temperature of the water passing through a demineralizer must be controlled because excessively hot water will...

A. reduce the affinity of the demineralizer resin for ion exchange.

B. degrade the corrosion inhibitor applied to the inner wall of the demineralizer.

C. increase the ion exchange rate for hydronium ions, thereby changing effluent pH.

D. result in excessive demineralizer retention element thermal expansion, thereby releasing resin.

QUESTION: 20

The anion exchange resin in a mixed-bed demineralizer releases desirable _____ ions into solution while removing undesirable _____ charged ions from solution.

A. hydroxide; negatively

B. hydroxide; positively

C. hydrogen; negatively

D. hydrogen; positively

QUESTION: 21

Which one of the following is an unsafe practice if performed while working on or near energized electrical equipment?

A. Using two hands for balance and to prevent dropping tools onto energized equipment.

B. Standing on insulating rubber material to increase the electrical resistance of the body to ground.

C. Having a person stand by to deenergize the equipment in the event of an emergency.

D. Covering exposed energized circuits with insulating material to prevent inadvertent contact.

QUESTION: 22

A main generator is about to be connected to an infinite power grid. Generator voltage is slightly higher than grid voltage and the synchroscope is rotating slowly in the clockwise direction. The generator breaker is closed just as the synchroscope pointer reaches the 12 o'clock position.

Which one of the following will occur after the breaker is closed?

A. The breaker will remain closed and the generator will supply only MW to the grid.

B. The breaker will remain closed and the generator will supply both MW and MVAR to the grid.

C. The breaker will open due to overcurrent.

D. The breaker will open due to reverse power.

QUESTION: 23

Delayed neutrons are neutrons that...

A. have reached thermal equilibrium with the surrounding medium.

B. are expelled within 1.0×10^{-14} seconds of the fission event.

C. are expelled with the lowest average kinetic energy of all fission neutrons.

D. are responsible for the majority of U-235 fissions.

QUESTION: 24

Which one of the following conditions describes a reactor that is exactly critical?

A. $K_{eff} = 0$; $\Delta K/K = 0$

B. $K_{eff} = 0$; $\Delta K/K = 1$

C. $K_{eff} = 1$; $\Delta K/K = 0$

D. $K_{eff} = 1$; $\Delta K/K = 1$

QUESTION: 25

A reactor core has a delayed neutron importance factor of 1.02. If the average delayed neutron fraction in the core is 0.0057, the effective delayed neutron fraction is...

A. equal to 0.0057.

B. less than 0.0057.

C. greater than 0.0057.

D. unpredictable without additional information.

QUESTION: 26

Which one of the following describes the initial reactivity effect of a moderator temperature increase in an overmoderated reactor?

A. Negative reactivity will be added because more neutron leakage will occur.

B. Negative reactivity will be added because more neutrons will be captured by the moderator.

C. Positive reactivity will be added because less neutron leakage will occur.

D. Positive reactivity will be added because fewer neutrons will be captured by the moderator.

QUESTION: 27

Which one of the following is the primary reason the void coefficient becomes less negative toward the end of a fuel cycle?

A. The control rod density decreases.

B. The fuel centerline temperature increases.

C. The thermal neutron flux increases.

D. The thermal diffusion length decreases.

QUESTION: 28

A reactor is operating steady-state at the point of adding heat (POAH) during a reactor startup near the beginning of a fuel cycle. Reactor pressure is stable at 600 psig and the main steam isolation valves are closed. There is a small but significant heat loss from the reactor vessel to the surroundings.

If a control rod is manually inserted for 5 seconds and the reactor does not scram, when conditions stabilize reactor power will be _____; and reactor vessel pressure will be _____.

A. at the POAH; 600 psig

B. at the POAH; less than 600 psig

C. less than the POAH; 600 psig

D. less than the POAH; less than 600 psig

QUESTION: 29

Which one of the following describes the change in magnitude (positive value) of integral rod worth during the complete withdrawal of a fully inserted control rod?

A. Increases, then decreases.

B. Decreases, then increases.

C. Increases continuously.

D. Decreases continuously.

QUESTION: 30

A reactor has been operating at 50 percent power for 15 hours following a rapid power reduction from steady-state 100 percent power. Which one of the following describes the current xenon-135 concentration?

A. Increasing toward a peak.

B. Decreasing toward an upturn.

C. Increasing toward equilibrium.

D. Decreasing toward equilibrium.

QUESTION: 31

A nuclear power plant was operating at 100 percent power for 3 months near the end of a fuel cycle when a reactor scram occurred. Eighteen hours later, the reactor is critical at the point of adding heat with normal operating reactor vessel temperature and pressure. Power level will be raised to 100 percent over the next 3 hours.

During this power level increase, most of the positive reactivity added by the operator will be required to overcome the negative reactivity from...

A. fuel burnup.

B. xenon-135 buildup.

C. fuel temperature increase.

D. moderator temperature increase.

QUESTION: 32

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

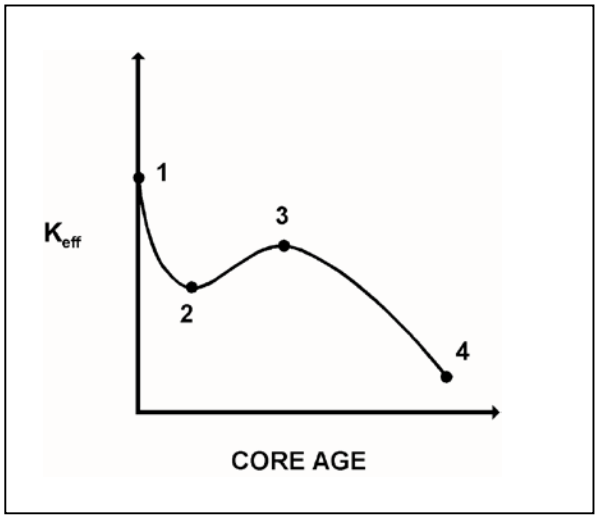
The major cause for the change in K_{eff} from point 3 to point 4 is the...

A. depletion of U-235.

B. depletion of U-238.

C. burnout of burnable poisons.

D. buildup of fission product poisons.



QUESTION: 33

A reactor is shutdown with a K_{eff} of 0.96. The source range count rate is stable at 480 cps. What percentage of the core neutron population is being contributed directly by neutron sources other than neutron-induced fission?

A. 4 percent

B. 50 percent

C. 96 percent

D. 100 percent

QUESTION: 34

After taking critical data during a reactor startup, the operator establishes a positive 26-second reactor period 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 that $\bar{\beta}_{eff}$ = 0.00579.)

A. -0.16 %ΔK/K

B. -0.19 %ΔK/K

C. -0.23 %ΔK/K

D. -0.29 %ΔK/K

QUESTION: 35

With a reactor on a constant period, which one of the following power changes requires the least amount of time to occur?

A. 1.0×10^{-8} percent to 6.0×10^{-8} percent

B. 1.0×10^{-7} percent to 2.0×10^{-7} percent

C. 2.0×10^{-7} percent to 3.5×10^{-7} percent

D. 4.0×10^{-7} percent to 6.0×10^{-7} percent

QUESTION: 36

Which one of the following parameter changes will occur if reactor power is increased from 70 percent to 90 percent by changing recirculation flow?

A. Core void fraction increases.

B. Feedwater temperature decreases.

C. Reactor vessel outlet steam pressure increases.

D. Condensate depression in the main condenser hotwell increases.

QUESTION: 37

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 being maintained at standard atmospheric pressure. All level detectors have been calibrated and are producing the same level indication.

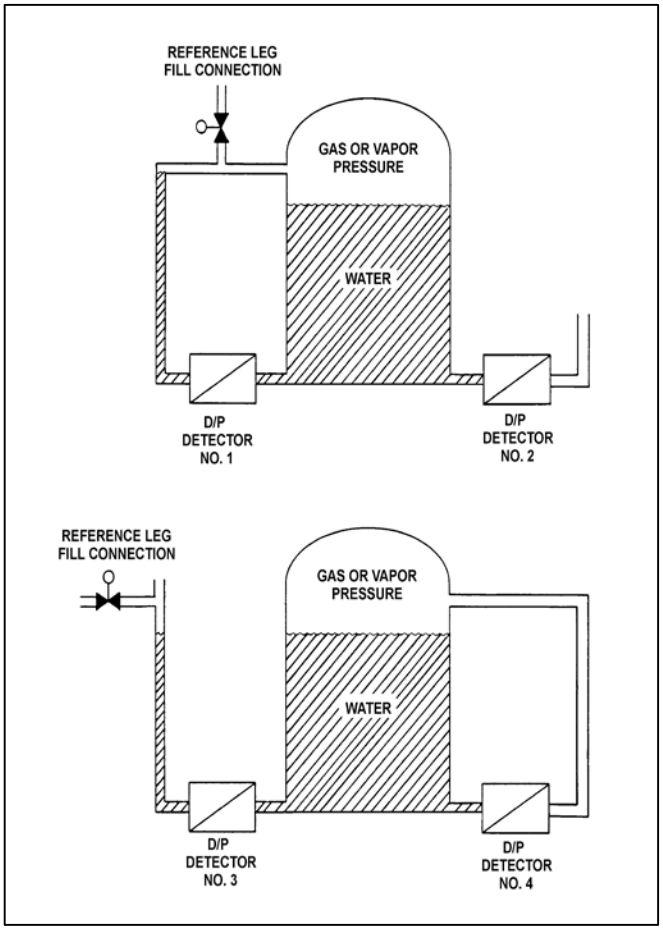
If a ventilation malfunction causes the containment structure pressure to decrease to 13 psia, which detectors will produce the highest level indications?

A. 1 and 2

B. 3 and 4

C. 1 and 4

D. 2 and 3



QUESTION: 38

Saturated steam at 900 psia enters a high pressure (HP) turbine and exhausts at 200 psia. The HP turbine exhaust passes through a 100 percent efficient moisture separator (with no heat gain or loss) before it enters a low pressure (LP) turbine. What is the enthalpy of the steam entering the LP turbine?

A. 1,028 Btu/lbm

B. 1,076 Btu/lbm

C. 1,107 Btu/lbm

D. 1,199 Btu/lbm

QUESTION: 39

The steam inlet nozzles used in steam jet air ejectors convert the _____ of the steam into _____.

A. kinetic energy; pressure

B. enthalpy; kinetic energy

C. kinetic energy; velocity

D. enthalpy; pressure

QUESTION: 40

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

QUESTION: 41

Which one of the following is most likely to cause cavitation in an operating centrifugal pump?

A. Lowering the suction temperature.

B. Throttling the pump suction valve.

C. Throttling the pump discharge valve.

D. Decreasing the pump speed.

QUESTION: 42

A nuclear power plant is operating at 100 percent power when a 200 gpm reactor vessel leak occurs, which results in a reactor scram and initiation of emergency coolant injection. Reactor vessel pressure stabilizes at 900 psia. All centrifugal injection pumps are operating with all pump miniflow paths isolated. The shutoff heads for the pumps are as follows:

High pressure coolant injection (HPCI) pumps = 800 psia
Low pressure coolant injection (LPCI) pumps = 200 psia

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

A. Only the LPCI pumps, due to pump overheating.

B. All LPCI and HPCI pumps, due to pump overheating.

C. Only the HPCI pumps, due to motor overheating.

D. All LPCI and HPCI pumps, due to motor overheating.

QUESTION: 43

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 indicated reactor power being <u>lower</u> than actual reactor power?

A. The feedwater temperature used in the heat balance calculation was 20°F lower than actual feedwater temperature.

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

C. The ambient heat loss value used in the heat balance calculation was only half the actual ambient heat loss.

D. The feedwater flow rates used in the heat balance calculation were 10 percent higher than actual flow rates.

QUESTION: 44

Subcooled reactor coolant enters the bottom of a fuel assembly and exits the top of the fuel assembly as a saturated steam-water mixture. How does the convective heat transfer coefficient change as the coolant travels upward through the fuel assembly?

A. Increases only

B. Increases, then decreases

C. Decreases only

D. Decreases, then increases

QUESTION: 45

How does critical heat flux vary from the bottom to the top of a typical fuel bundle while operating at 100 percent power?

A. Decreases continuously.

B. Decreases, then increases.

C. Increases continuously.

D. Increases, then decreases.

QUESTION: 46

Which one of the following describes the relationship between the feedwater mass flow rate entering the reactor vessel and the core mass flow rate at steady-state 100 percent reactor power?

A. The mass flow rates are about the same as long as the reactor vessel downcomer level is constant.

B. The mass flow rates are about the same as long as the reactor recirculation mass flow rate is constant.

C. The feedwater mass flow rate is much smaller than the core mass flow rate because most of the core mass flow is returned to the reactor vessel downcomer by the steam separators.

D. The feedwater mass flow rate is much larger than the core mass flow rate because the feedwater pump differential pressure is much larger than the core differential pressure.

QUESTION: 47

The axial peaking factor for a node of a fuel bundle is expressed mathematically as...

A. $\frac{\text{core average bundle power}}{\text{peak nodal power}}$

B. $\frac{\text{peak nodal power}}{\text{core average bundle power}}$

C. $\frac{\text{bundle average nodal power}}{\text{nodal power}}$

D. $\frac{\text{nodal power}}{\text{bundle average nodal power}}$

QUESTION: 48

At high core exposures, the maximum average planar linear heat generation rate (MAPLHGR) limit decreases with increasing core exposure. What is the reason for this decrease?

A. Fission product decay heat level decreases at higher core exposures.

B. Fission product gases lower the overall heat transfer coefficient of the fuel rod fill gas.

C. Cracking of fuel pellets at higher core exposures permits additional volume for fission product gases.

D. The zirconium-steam chemical reaction in cladding requires higher temperatures at higher core exposures.

QUESTION: 49

During a rapid increase in core flow rate in a reactor operating at 100 percent power, the most limiting thermal limit is the...

A. total peaking factor.

B. critical power ratio.

C. average planar linear heat generation rate.

D. linear heat generation rate.

QUESTION: 50

A reactor is shut down for refueling following 18 months of operation at an average power level of 85 percent. During the shutdown, a reactor vessel metal specimen was removed from the reactor vessel for testing. The tests determined that the nil-ductility transition (NDT) temperature of the specimen increased from 42°F to 72°F since the previous refueling shutdown.

Which one of the following conclusions is warranted?

A. The test results are credible and the reactor vessel is more likely to experience brittle fracture now than after the previous refueling shutdown.

B. The test results are credible and the reactor vessel is less likely to experience brittle fracture now than after the previous refueling shutdown.

C. The test results are questionable because the specimen NDT temperature would not increase during the described 18-month period of operation.

D. The test results are questionable because the specimen NDT temperature would increase by less than indicated during the described 18-month period of operation.

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

SEPTEMBER 2015 NRC GENERIC FUNDAMENTALS EXAMINATION
BOILING WATER REACTOR - ANSWER KEY

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