UNITED STATES NUCLEAR REGULATORY COMMISSION
BOILING WATER REACTOR GENERIC FUNDAMENTALS EXAMINATION
JUNE 2010--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 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

Given the following pressure specifications for operation of a main steam safety valve (MSSV):

Setpoint pressure (MSSV starts to open): 1,200 psia
Maximum pressure (MSSV will be fully open): 1,230 psia
Reseat pressure (MSSV will be fully closed): 1,140 psia

Which one of the following is the percent blowdown for the MSSV?

A. 2.5 percent

B. 5.0 percent

C. 7.5 percent

D. 10.0 percent

QUESTION: 2

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 6 gpm. The tank is protected by two relief valves that discharge to the atmosphere. The relief valves have the following characteristics:

- Relief valve A opening setpoint is 200 psig with an accumulation of 1.5 percent.
- Relief valve B opening setpoint is 200 psig with an accumulation of 3.0 percent.
- Each valve has linear flow characteristics and a maximum discharge flow rate of 6 gpm.

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

With the PDP running continuously, what will be the discharge flow rates of the relief valves when tank pressure stabilizes?

	Relief Valve A	Relief Valve B
A.	1 gpm	5 gpm
B.	2 gpm	4 gpm
C.	3 gpm	3 gpm
D.	4 gpm	2 gpm

QUESTION: 3

A typical motor-operated valve has been returned to service following a complete maintenance overhaul of the valve and actuator. The valve was remotely opened and closed to verify operability. The measured valve stroke time in each direction was 15 seconds, which is 25 percent longer than normal.

Which one of the following could have caused the increased stroke time?

A. The valve position limit switches were removed and were <u>not</u> reinstalled.

B. The valve torque limit switches were misadjusted to open at half their normal setpoints.

C. The valve was packed with improved packing material having a lower friction coefficient.

D. The valve stem packing gland was overtightened after the packing material was replaced.

QUESTION: 4

Refer to the drawing of a differential pressure (D/P) level detection system for a reactor vessel at normal operating temperature and pressure (see figure below).

A nuclear power plant uses several differential pressure detectors like the one below to provide multiple channels of reactor vessel water level indication. A hot channel was calibrated when the reactor vessel was at normal operating temperature. A cold channel was calibrated when the reactor vessel was at 160°F.

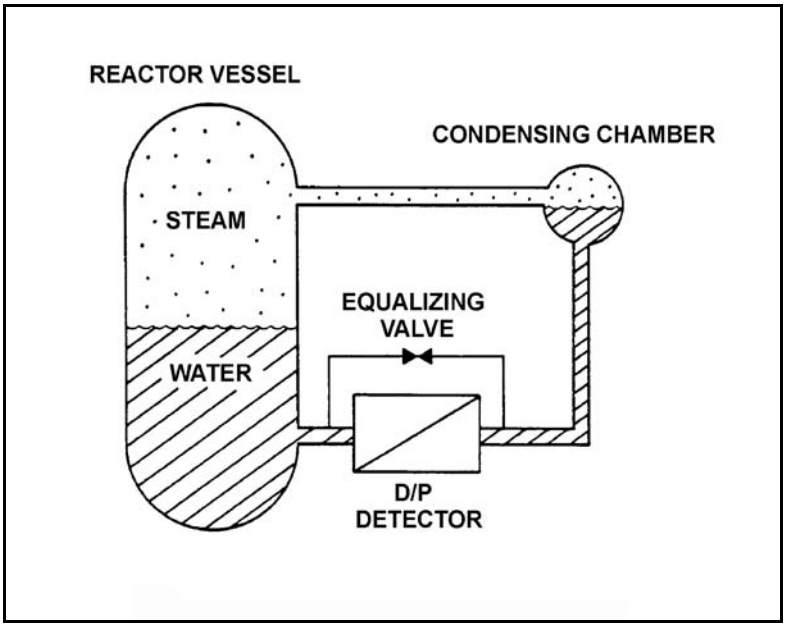
How will the level indications on the two channels compare when the reactor vessel is at normal operating temperature?

A. The cold channel will indicate lower than the hot channel due to the difference in reactor vessel water density at the two calibration temperatures.

B. The cold channel will indicate lower than the hot channel due to the difference in reference leg water density at the two calibration temperatures.

C. The cold channel will indicate higher than the hot channel due to the difference in reactor vessel water density at the two calibration temperatures.

D. The cold channel will indicate higher than the hot channel due to the difference in reference leg water density at the two calibration temperatures.



QUESTION: 5

A resistance temperature detector (RTD) is used in a balanced bridge circuit to indicate temperature. If the RTD develops an open circuit (bridge circuit remains intact), temperature indication will fail...

A. high.

B. low.

C. as is.

D. to midscale.

QUESTION: 6

Reed switches are being used in an electrical measuring circuit to monitor the position of a control rod in a nuclear reactor. The reed switches are mounted in a column below the reactor vessel such that the control rod drive shaft passes by the reed switches as the control rod is withdrawn.

Which one of the following describes the action that causes the electrical output of the measuring circuit to change as the control rod is withdrawn?

A. An ac coil on the control rod drive shaft induces a voltage into each reed switch as the drive shaft passes by.

B. A metal tab on the control rod drive shaft mechanically closes each reed switch as the drive shaft passes by.

C. The primary and secondary coils of each reed switch attain maximum magnetic coupling as the drive shaft passes by.

D. A permanent magnet on the control rod drive shaft attracts the movable contact arm of each reed switch as the drive shaft passes by.

QUESTION: 7

A fission chamber detector is located in a constant neutron radiation field and is initially operating in the proportional region of the gas-filled detector ionization curve. If the voltage applied to the detector is changed such that the detector operates in the ion chamber region of the curve, the rate of neutron interactions in the detector will _____, and the amplitude of each neutron-induced detector pulse will _____.

A. increase; increase

B. decrease; decrease

C. remain the same; increase

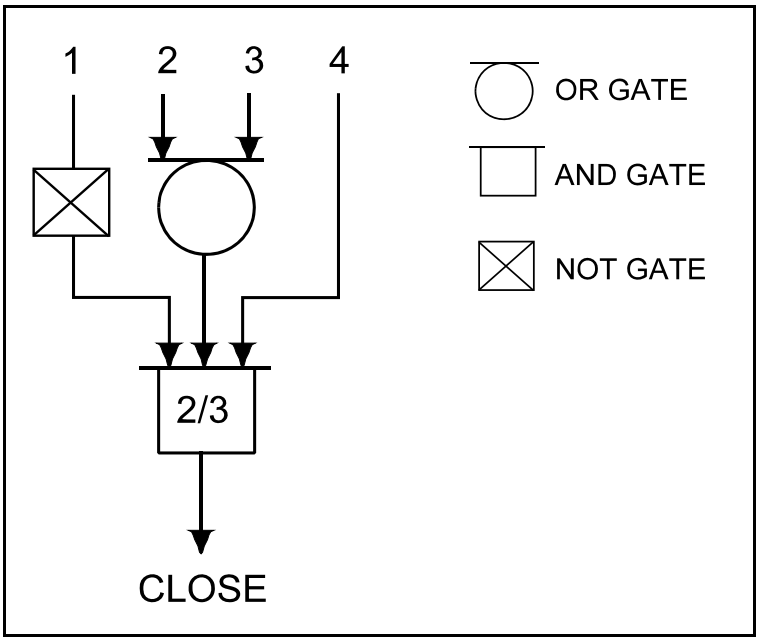
D. remain the same; decrease

QUESTION: 8

Refer to the valve controller logic diagram (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	Off	Off
B.	Off	Off	On	Off
C.	On	Off	Off	On
D.	On	On	On	Off



QUESTION: 9

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

The temperature controller is a direct-acting proportional-integral controller with a gain of 1.0. A step increase in lube oil temperature results in an initial controller demand for the temperature control valve (TCV) to open an additional 10 percent. After the lube oil temperature stabilizes, the final TCV position is 60 percent open.

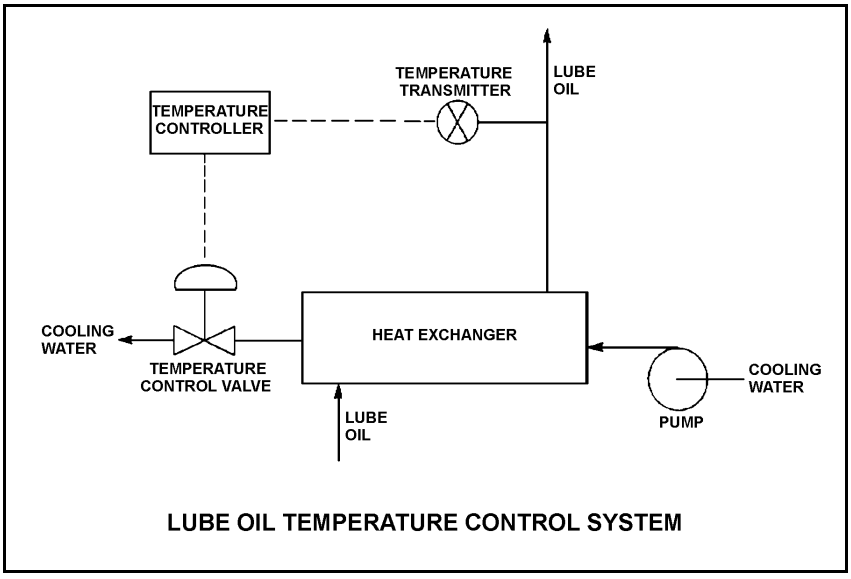
If the controller gain was 2.0 rather than 1.0, the initial controller demand for the above temperature transient would be for the TCV to open an additional _____ percent, and the final TCV position would be _____ percent open.

A. 5; 60

B. 5; less than 60

C. 20; 60

D. 20; more than 60



LUBE OIL TEMPERATURE CONTROL SYSTEM

QUESTION: 10

An operating centrifugal pump has a net positive suction head (NPSH) requirement of 150 ft-lbf/lbm. Water at 300°F is entering the pump. Which one of the following is the lowest listed pump inlet pressure that will ensure adequate NPSH for the pump?

A. 60 psia

B. 83 psia

C. 108 psia

D. 127 psia

QUESTION: 11

A constant-speed centrifugal pump motor draws the most current when the pump is...

A. at maximum rated flow conditions.

B. operating at runout flow.

C. accelerating to normal speed during start.

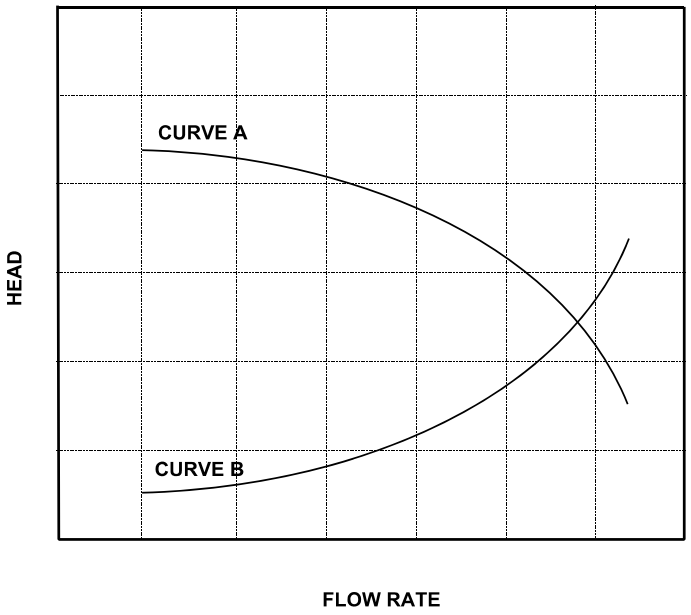
D. at shutoff head with no recirculation flow.

QUESTION: 12

Refer to the graph that represents the head-capacity characteristics for a single-speed centrifugal cooling water pump (see figure below).

Which one of the following lists a pair of parameters that could be represented by curves A and B? (Note: NPSH = net positive suction head.)

	Curve A	Curve B
A.	Pump Head	Available NPSH
B.	Available NPSH	Required NPSH
C.	Required NPSH	System Head Loss
D.	System Head Loss	Pump Head



QUESTION: 13

A pump that moves liquid by means of a piston within a cylinder that displaces a given volume of fluid for each stroke is a _____ pump.

A. centrifugal

B. screw

C. reciprocating

D. radial

QUESTION: 14

The starting current in a typical ac induction motor is typically much higher than the full-load running current because...

A. starting torque is lower than full-load running torque.

B. starting torque is higher than full-load running torque.

C. rotor speed during start is too low to generate significant counter electromotive force in the stator.

D. rotor current during start is too low to generate significant counter electromotive force in the stator.

QUESTION: 15

A main generator has the following output parameters:

Power: 830 MW
Voltage: 25,000 V
Current: 20,000 A

What is the reactive power for this generator?

A. 36 MVAR

B. 143 MVAR

C. 247 MVAR

D. 330 MVAR

QUESTION: 16

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

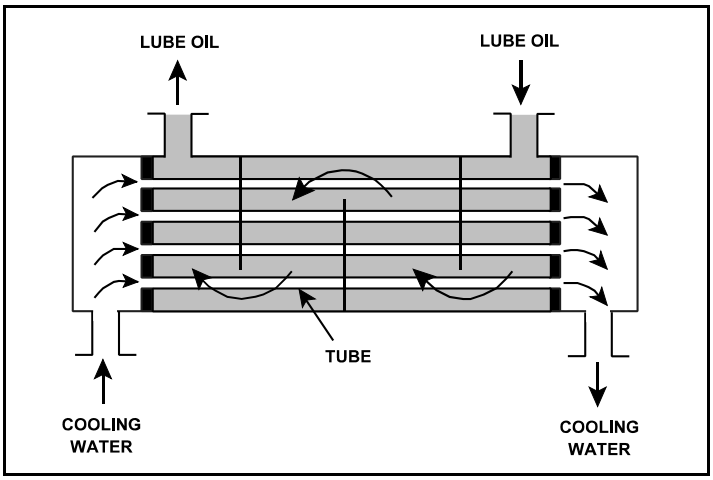
Assume that the inlet lube oil and inlet cooling water temperatures are constant and cooling water flow rate remains the same. Decreasing the oil flow rate through the heat exchanger will cause the lube oil outlet temperature to _____ and the cooling water outlet temperature to _____.

A. increase, increase

B. increase, decrease

C. decrease, increase

D. decrease, decrease



QUESTION: 17

Steam has been admitted to a main condenser for 25 minutes with no cooling water. Initiating full cooling water flow rate at this time will...

A. reduce the stress on the condenser shell by rapidly cooling the shell.

B. reduce the stress on the condenser tubes by rapidly cooling the tubes.

C. induce large thermal stresses on the condenser shell.

D. induce large thermal stresses on the junctions between the condenser tubes and the tubesheet.

QUESTION: 18

Tube scaling in a parallel flow heat exchanger causes heat transfer rate to decrease because the...

A. surface area of the tubes decreases.

B. cooling fluid outlet temperature decreases.

C. thermal conductivity of the scale is very low.

D. flow through the heat exchanger becomes more turbulent.

QUESTION: 19

Water is passing through an ion exchanger that contains only cation exchange resin. Currently, every available ion exchange site in the resin has exchanged its original cation and is occupied by a sodium (Na^+) ion. Assuming that water temperature does not change, what will be the effect on the ion exchanger if a new cation impurity, other than Na^+, is introduced into the water entering the ion exchanger?

A. The new cations will bypass the occupied ion exchange sites under all circumstances.

B. The new cations will take the place of the Na^+ ions on the ion exchange sites under all circumstances.

C. The new cations will take the place of the Na^+ ions on the ion exchange sites only if the new cations have a greater positive charge than the Na^+ ions.

D. The new cations will take the place of the Na^+ ions on the ion exchange sites only if the resin has a greater affinity for the new cations.

QUESTION: 20

As the operating time of a demineralizer resin bed increases, the differential pressure across the bed...

A. increases due to trapping of suspended solids.

B. increases due to depletion of the resin ion exchange sites.

C. decreases due to gradual resin breakdown.

D. decreases due to erosion of the resin ion exchange sites.

QUESTION: 21

Two identical 1,000 MW electrical generators are being connected to the same electrical bus. Generator A is currently supplying the bus. Generator A and B output indications are as follows:

Generator A	Generator B
4,160 Volts	4,140 Volts
60.2 Hertz	60.8 Hertz
25 MW	0 MW
10 MVAR	0 MVAR

When the output breaker for generator B is closed, which generator is more likely to trip on reverse power?

A. Generator A, due to the higher initial voltage.

B. Generator A, due to the lower initial frequency.

C. Generator B, due to the lower initial voltage.

D. Generator B, due to the higher initial frequency.

QUESTION: 22

A 480 VAC motor is supplied power via an electrical disconnect in series with a circuit breaker. Which one of the following describes the proper operations to isolate power to the motor?

A. Open the disconnect first, then the breaker.

B. Open the breaker first, then the disconnect.

C. Open the breaker and disconnect at the same time.

D. Sequence is not important as long as the motor is operating.

QUESTION: 23

The ideal moderator has a _____ macroscopic absorption cross section for thermal neutrons and a _____ average logarithmic energy decrement.

A. large; small

B. large; large

C. small; small

D. small; large

QUESTION: 24

A 1.5 MeV neutron is about to interact with a U-238 nucleus in an operating nuclear reactor core. Which one of the following describes the most likely interaction and the effect on core K_{eff}?

A. The neutron will be scattered, thereby leaving K_{eff} unchanged.

B. The neutron will be absorbed and the nucleus will fission, thereby decreasing K_{eff}.

C. The neutron will be absorbed and the nucleus will fission, thereby increasing K_{eff}.

D. The neutron will be absorbed and the nucleus will decay to Pu-239, thereby increasing K_{eff}.

QUESTION: 25

The effective delayed neutron fraction (β_{eff}) takes into account two factors not considered in calculating the delayed neutron fraction (β). These factors consider that:

Delayed neutrons are _____ likely to cause fast fission than prompt neutrons;
Delayed neutrons are _____ likely to leak from the core than prompt neutrons.

A. less; more

B. less; less

C. more; more

D. more; less

QUESTION: 26

If the average temperature of a fuel pellet decreases by 50°F, the microscopic cross-section for absorption of neutrons at a resonance energy of U-238 will _____; and the microscopic cross-sections for absorption of neutrons at energies that are slightly higher or lower than a U-238 resonance energy will _____.

A. increase; increase

B. increase; decrease

C. decrease; increase

D. decrease; decrease

QUESTION: 27

For a normal reactor power increase from 20 percent to 100 percent, the smallest change in negative reactivity at steady-state conditions will be caused by...

A. void content.

B. fuel temperature.

C. xenon concentration.

D. moderator temperature.

QUESTION: 28

A control rod is positioned in a nuclear reactor with the following neutron flux parameters:

Core average thermal neutron flux = 1.0×10^{12} n/cm^2-sec
Control rod tip thermal neutron flux = 5.0×10^{12} n/cm^2-sec

If the control rod is slightly inserted such that the control rod tip is located in a thermal neutron flux of 1.0×10^{13} n/cm^2-sec, then the differential control rod worth will increase by a factor of _____. (Assume the average flux is constant.)

A. 2

B. 4

C. 10

D. 100

QUESTION: 29

A nuclear reactor is operating at 60 percent power with thermal neutron flux peaked in the bottom half of the core. Partial withdrawal of a deep control rod will primarily affect total (versus local) core power because _____ is relatively high in the area of withdrawal.

A. void content

B. fuel enrichment

C. thermal neutron flux

D. moderator temperature

QUESTION: 30

Nuclear reactors A and B are operating at steady-state 100 percent power with equilibrium core Xe-135. The reactors are identical except that reactor A is operating near the end of core life (EOL) and reactor B is operating near the beginning of core life (BOL).

Which reactor has the smaller concentration of equilibrium core Xe-135?

A. Reactor A (EOL) due to the smaller 100 percent power thermal neutron flux.

B. Reactor A (EOL) due to the larger 100 percent power thermal neutron flux.

C. Reactor B (BOL) due to the smaller 100 percent power thermal neutron flux.

D. Reactor B (BOL) due to the larger 100 percent power thermal neutron flux.

QUESTION: 31

A nuclear reactor has been operating at steady-state 50 percent power for 12 hours following a one-hour power reduction from steady-state 100 percent power. Which one of the following describes the current core xenon-135 concentration?

A. Increasing toward a peak.

B. Decreasing toward an upturn.

C. Increasing toward equilibrium.

D. Decreasing toward equilibrium.

QUESTION: 32

Just prior to refueling, control rods are nearly fully withdrawn at 100 percent power. After refueling, the control rods are inserted much farther into the core at 100 percent power.

Which one of the following is the primary reason for the change in full power control rod position?

A. Reactivity from the power defect at the beginning of a fuel cycle (BOC) is much greater than at the end of a fuel cycle (EOC).

B. Reactivity from the void coefficient at EOC is much greater than at BOC.

C. The excess reactivity in the core at BOC is much greater than at EOC.

D. The integral control rod worth at EOC is much greater than at BOC.

QUESTION: 33

A nuclear reactor startup is being performed by adding equal amounts of positive reactivity and waiting for neutron population to stabilize. As the reactor approaches criticality, the numerical change in stable neutron population after each reactivity addition _____, and the time required for the neutron population to stabilize after each reactivity addition _____.

A. increases; increases

B. increases; remains the same

C. remains the same; increases

D. remains the same; remains the same

QUESTION: 34

A nuclear reactor is critical near the end of a fuel cycle with power level stable at 1.0×10^{-10} percent. Which one of the following is the smallest listed amount of positive reactivity that is capable of increasing reactor power level to the point of adding heat?

A. 0.001 %ΔK/K

B. 0.003 %ΔK/K

C. 0.005 %ΔK/K

D. 0.007 %ΔK/K

QUESTION: 35

A nuclear reactor is critical well below the point of adding heat when a small amount of positive reactivity is added to the core. If the same amount of negative reactivity is added to the core approximately one minute later, reactor power will stabilize at...

A. the initial power level.

B. somewhat higher than the initial power level.

C. somewhat lower than the initial power level.

D. the subcritical multiplication equilibrium level.

QUESTION: 36

A nuclear power plant has been operating for one hour at 50 percent of rated power following six months of operation at steady-state 100 percent power. What percentage of rated thermal power is currently being generated by fission product decay heat?

A. 1% to 2%

B. 3% to 5%

C. 6% to 8%

D. 9% to 11%

QUESTION: 37

Refer to the drawing of four identical tank differential pressure (D/P) level detectors with different piping configurations (see figure below).

The tanks are identical and are presently at 2 psig overpressure, the same constant water level, and a temperature of 60°F. They are surrounded by atmospheric pressure. All level detectors have been calibrated and are producing the same level indication. A leak in the top of each tank causes a complete loss of overpressure in both tanks.

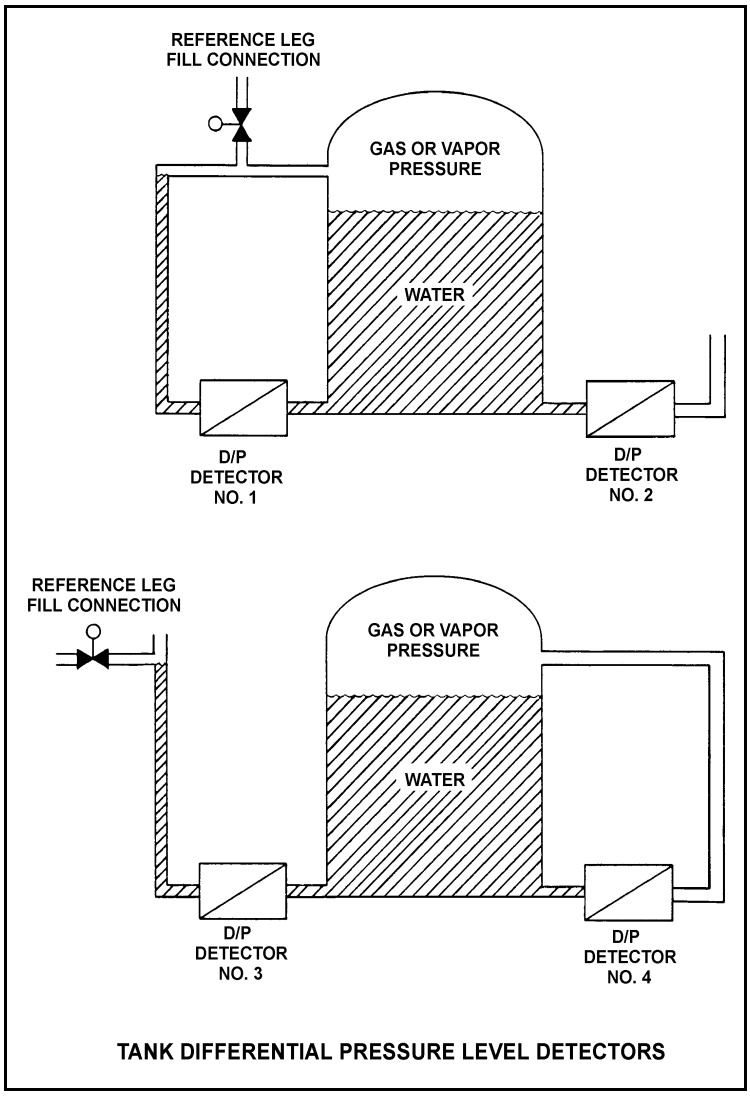
Which level detector(s) will produce the highest level indication?

A. No. 1 only

B. No. 2 only

C. No. 1 and 4

D. No. 2 and 3



TANK DIFFERENTIAL PRESSURE LEVEL DETECTORS

QUESTION: 38

An open vessel contains 5.0 lbm of water at constant standard atmospheric pressure. The water has been heated to the saturation temperature. If an additional 1,600 Btu is added to the water, the water temperature will _____, and _____ than 50 percent of the water will vaporize.

A. increase significantly; less

B. increase significantly; more

C. remain approximately constant; less

D. remain approximately constant; more

QUESTION: 39

A nuclear power plant is operating normally at 80 percent power. Which one of the following will result in the most rapid initial loss of condenser vacuum?

A. All air ejectors are isolated from the main condenser.

B. All feed and condensate pumps are stopped.

C. All condenser cooling water flow is stopped.

D. All condenser hotwell makeup water flow is stopped.

QUESTION: 40

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

A. first; high

B. first; low

C. last; high

D. last; low

QUESTION: 41

An ac motor-driven centrifugal pump is operating at rated flow and pressure in a cooling water system. A break occurs in the pump discharge piping resulting in a loss of pump backpressure.

As a result of the break, the pump will operate at a _____ flow rate and the pump motor will draw _____ electrical power.

A. higher; more

B. higher; less

C. lower; more

D. lower; less

QUESTION: 42

A nuclear power plant is operating at full power when a 200 gpm reactor coolant leak occurs, which results in a reactor scram and initiation of emergency coolant injection. Reactor vessel pressure stabilizes at 900 psia and 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: 1,200 psia
Low pressure coolant injection (LPCI) pumps: 200 psia

Which pumps are currently threatened for operability 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: 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 lower than actual reactor power?

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

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

QUESTION: 44

Subcooled reactor coolant flows into the bottom of a fuel assembly coolant channel and exits the top of the channel as a saturated steam-water mixture with a 98 percent moisture content. How does the convective heat transfer coefficient in the coolant channel change as the coolant travels upward along the channel?

A. Increases only.

B. Increases, then decreases.

C. Decreases only.

D. Decreases, then increases.

QUESTION: 45

The magnitude of the local fuel pin heat flux that is necessary to cause the onset of transition boiling is...

A. largest at the top of the core and smallest at the bottom of the core.

B. largest at the bottom of the core and smallest at the top of the core.

C. largest at the core midplane and smallest at the top and bottom of the core.

D. largest at the top and bottom of the core and smallest at the core midplane.

QUESTION: 46

Core inlet subcooling is defined as the difference between the temperature of the fluid _____ and the saturation temperature of the fluid in the core inlet plenum.

A. in the core inlet plenum

B. at the feedwater pump discharge

C. in the downcomer area

D. in the lower fuel channel area

QUESTION: 47

Maintaining the average planar linear heat generation rate (APLHGR) below the technical specification limiting condition for operation (LCO) ensures that...

A. plastic strain (deformation) of the cladding will not exceed 1 percent.

B. axial peaking factors will not exceed those assumed in the safety analyses.

C. during transients, more than 99.9 percent of the fuel rods are expected to avoid transition boiling.

D. peak clad temperature after the design basis loss of coolant accident will not exceed 2,200°F.

QUESTION: 48

A nuclear power plant is operating at 90 percent power near the end of a fuel cycle when a turbine control system malfunction opens the turbine control valves an additional 5 percent. Assuming the reactor does not scram immediately, the critical power ratio will initially _____ due to a(n) _____ latent heat of vaporization.

A. increase; increased

B. increase; decreased

C. decrease; increased

D. decrease; decreased

QUESTION: 49

Consider a new fuel rod operating at a constant power level for several weeks. During this period, fuel densification in the fuel rod causes the heat transfer rate from the fuel pellets to the cladding to _____; which causes the average fuel temperature in the fuel rod to _____.

A. decrease; increase

B. decrease; decrease

C. increase; increase

D. increase; decrease

QUESTION: 50

Which one of the following will apply a compressive stress to the outside wall of the reactor vessel?

A. Neutron embrittlement of the reactor vessel.

B. Increasing reactor coolant system (RCS) pressure.

C. Performing an RCS cooldown.

D. Performing an RCS heatup.

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

JUNE 2010 NRC GENERIC FUNDAMENTALS EXAMINATION
BOILING WATER REACTOR - ANSWER KEY

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