UNITED STATES NUCLEAR REGULATORY COMMISSION
BOILING WATER REACTOR GENERIC FUNDAMENTALS EXAMINATION
MARCH 2008 --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% is required to pass this portion of the NRC operator licensing written examination. All examination papers will be collected 3.0 hours after the examination begins. This examination applies to a typical 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 GUIDELINES FOR THE NRC
GENERIC FUNDAMENTALS EXAMINATION

During the administration of this examination the following rules apply:

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

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 time.

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 - steam table booklets, handouts, and scrap paper used during the examination.

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

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

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

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

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

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

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

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

$SUR = 26.06/\tau$

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

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

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

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

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

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

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

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

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

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

$1/M = CR_1/CR_X$

$A = \pi r^2$

$F = PA$

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

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

$E = IR$

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 Curie = 3.7×10^{10} dps
1 hp = 2.54×10^3 Btu/hr	1 kg = 2.21 lbm
1 Btu = 778 ft-lbf	1 gal_{water} = 8.35 lbm
°C = (5/9)(°F - 32)	1 ft^3_{water} = 7.48 gal
°F = (9/5)(°C) + 32	

QUESTION: 1

Refer to the drawing of a cooling water system in which both centrifugal pumps A and B are operating (see figure below).

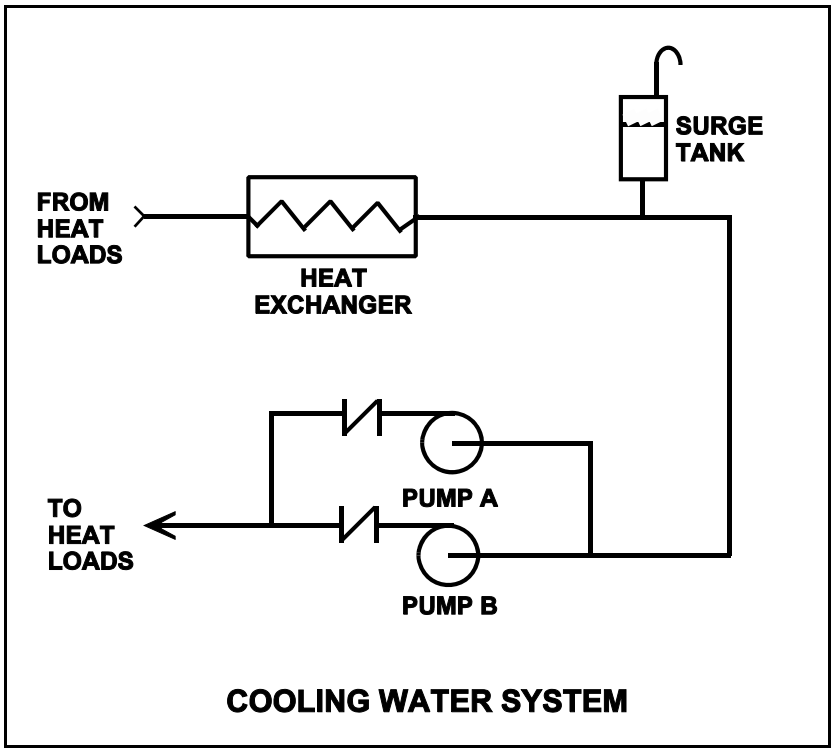
An operator stops pump B, but the pump B check valve fails to close. In comparison to normal operation with only pump A running, operation with the failed pump B check valve will result in pump A flow rate being _____ than normal; and heat exchanger flow rate being _____ than normal.

A. lower; higher

B. lower; lower

C. higher; higher

D. higher; lower



QUESTION: 2

Refer to the drawing of four air-operated valves (see figure below). **Note:** The valve actuators may be shown with or without air pressure applied.

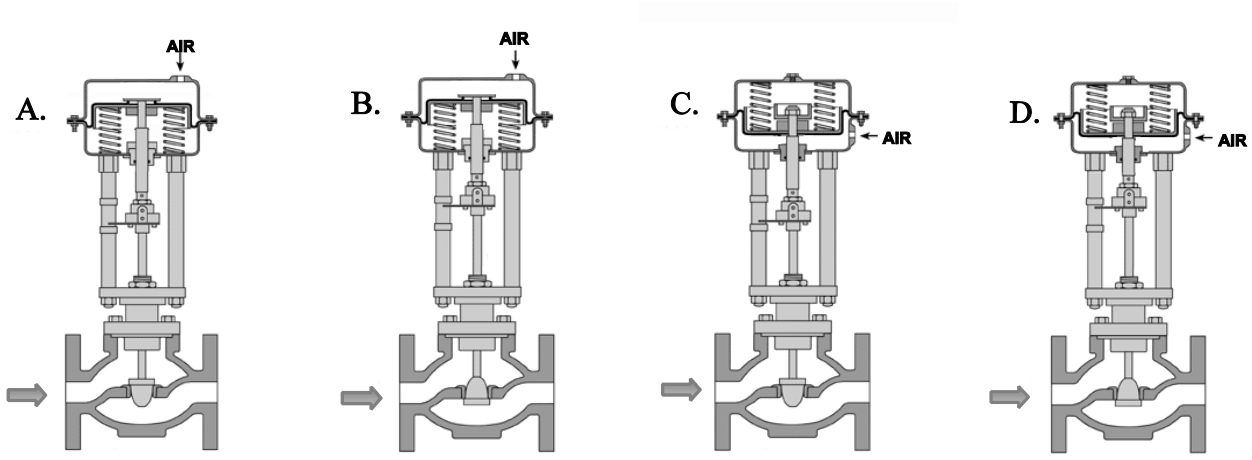
Which valves are currently shown in their failed (i.e., no air pressure applied to the actuator) positions?

A. A and B

B. B and C

C. C and D

D. D and A



QUESTION: 3

When manually positioning a motor-operated valve, why must care be taken to avoid using excessive valve seating/backseating force?

A. Limit switch settings may change.

B. The valve may not operate on demand.

C. The motor may not reengage.

D. Torque switch settings may change.

QUESTION: 4

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: 5

Refer to the drawing of a reactor vessel (RV) differential pressure (D/P) level detection system (see figure below).

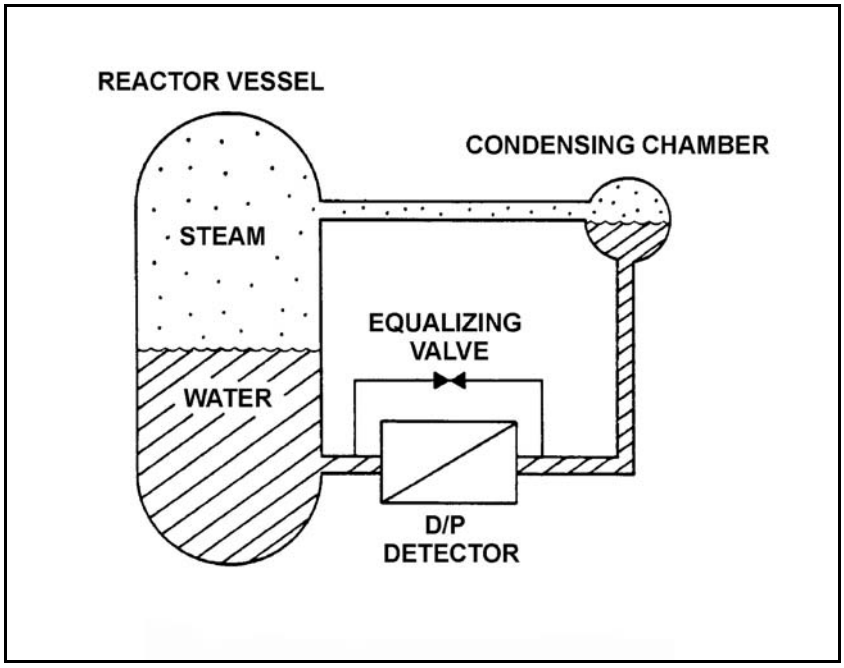
The reactor vessel is supplying steam at normal operating temperature and pressure and the level instrumentation has just been calibrated. Which one of the following events will result in a vessel level indication that is lower than actual level?

A. RV saturation pressure increases by 50 psi.

B. Actual RV water level decreases by 6 inches.

C. The external pressure surrounding the D/P detector decreases by 2 psi.

D. The temperature surrounding the reference leg increases by 20°F.



QUESTION: 6

Refer to the drawing of a bellows-type differential pressure (D/P) detector (see figure below).

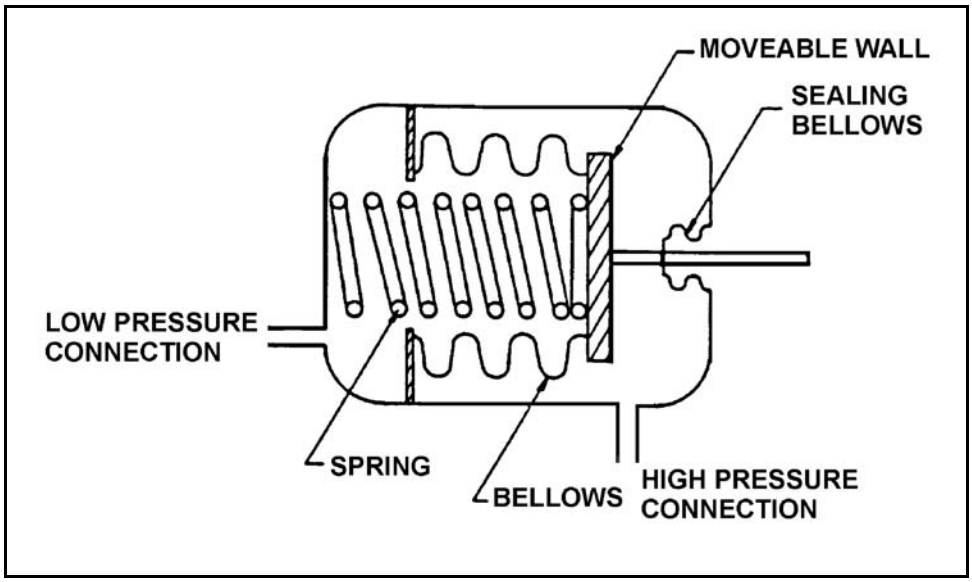
The spring in this detector (shown in a compressed state) has weakened from long-term use. If the actual D/P is constant, how will indicated D/P respond as the spring weakens?

A. Decrease, because the spring will expand more

B. Increase, because the spring will expand more

C. Decrease, because the high pressure will compress the spring more

D. Increase, because the high pressure will compress the spring more



QUESTION: 7

Refer to the drawing of a Chromel-Alumel thermocouple circuit (see figure below).

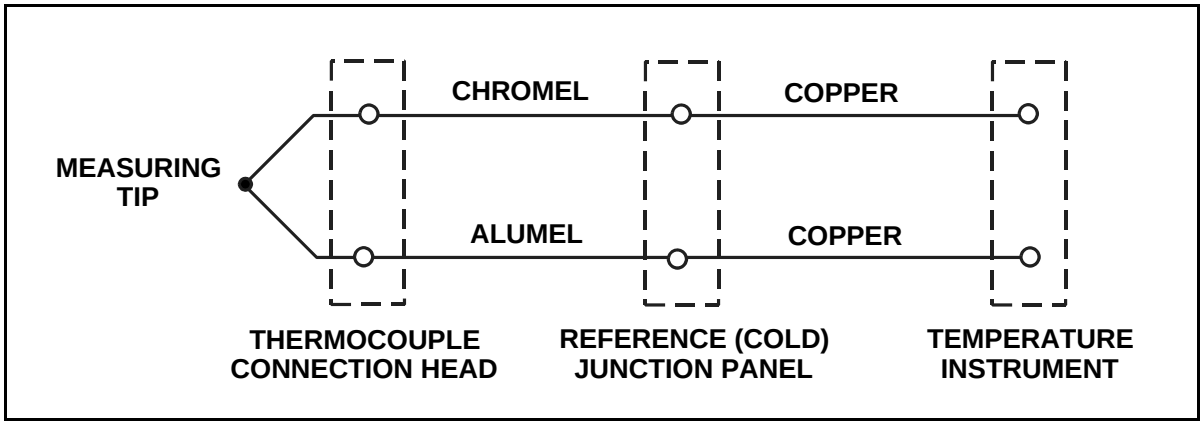
What is the effect on the thermocouple reference junctions if the chromel and alumel extension wires from the thermocouple connection head to the reference junction panel are replaced with copper wires?

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: 8

The range of values around the set point of a measured variable where no action occurs in an automatic flow controller is called...

A. deviation.

B. error.

C. deadband.

D. bias.

QUESTION: 9

A reverse-acting proportional controller is being used to control the temperature of lube oil exiting a heat exchanger. The controller's proportional band is 70°F to 120°F.

Which one of the following will be the controller output when the measured lube oil temperature is 83°F?

A. 13%

B. 26%

C. 74%

D. 87%

QUESTION: 10

Refer to the drawing of a steam condenser, hotwell, and condensate pump (see figure below).

Given the following:

- The eye of the pump impeller is located 6.0 feet below the bottom of the hotwell.
- The pump requires 10.0 ft-lbf/lbm of net positive suction head (NPSH).
- Condenser pressure is 1.2 psia.
- Hotwell water temperature is 90°F.
- Fluid velocity and friction head losses are zero.

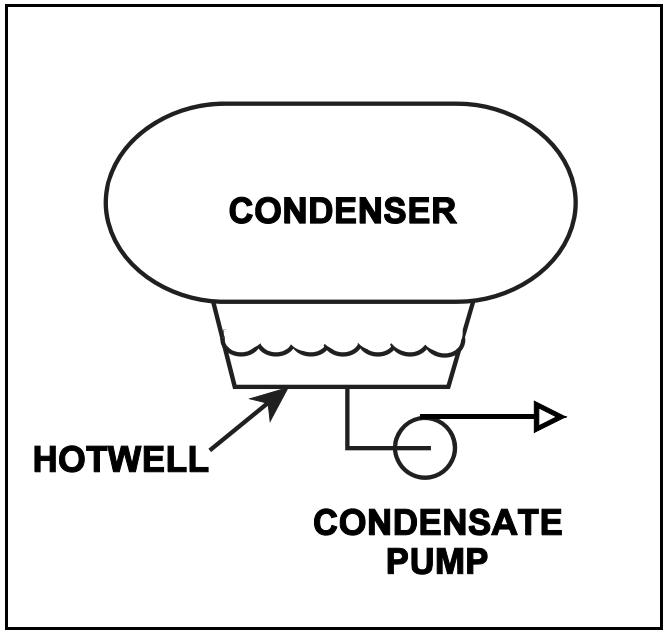
What is the minimum hotwell water level necessary to provide the required NPSH?

A. 1.2 feet

B. 2.8 feet

C. 4.0 feet

D. 5.2 feet



QUESTION: 11

A typical single-stage radial-flow centrifugal pump is being returned to service following maintenance on its three-phase ac induction motor. Which one of the following will occur when the pump is started if two of the three motor power leads were inadvertently swapped during restoration?

A. The motor breaker will trip on instantaneous overcurrent.

B. The motor will not turn and will emit a humming sound.

C. The pump will rotate in the normal direction with reduced flow rate.

D. The pump will rotate in the reverse direction with reduced or no flow rate.

QUESTION: 12

A positive displacement pump (PDP) is operating in an open system. PDP parameters are as follows:

PDP speed	= 480 rpm
PDP discharge pressure	= 1,000 psig
PDP suction pressure	= 10 psig
PDP flow rate	= 60 gpm

Which one of the following changes will cause PDP flow rate to exceed 100 gpm?

A. A second identical discharge path is opened.

B. PDP speed is increased to 900 rpm.

C. PDP suction pressure is increased to 40 psig.

D. Downstream system pressure is decreased to 500 psig.

QUESTION: 13

A pump is needed to supply fuel oil from a day tank to a diesel engine fuel injection system. The pump must maintain a nearly constant flow rate with a minimum of discharge pressure fluctuations as system pressure varies between 200 psig and 1,900 psig.

Which one of the following types of pumps would typically be used in this application?

A. Axial flow centrifugal

B. Radial flow centrifugal

C. Rotary positive displacement

D. Reciprocating positive displacement

QUESTION: 14

Which one of the following will result from prolonged operation of an ac motor with excessively high stator temperatures?

A. Decreased electrical current demand due to reduced counter electromotive force

B. Increased electrical current demand due to reduced counter electromotive force

C. Decreased electrical resistance to ground due to breakdown of winding insulation

D. Increased electrical resistance to ground due to breakdown of winding insulation

QUESTION: 15

A 120 Vdc battery is rated at 625 amp-hours for a continuous 50 kW load. Approximately how long will the fully charged battery be able to supply a continuous 50 kW load before the battery rating is exceeded?

A. 115 minutes

B. 90 minutes

C. 75 minutes

D. 60 minutes

QUESTION: 16

Which one of the following describes the proper sequence for placing a steam (shell) and water (tube) heat exchanger into service?

A. The water side is valved in before the steam side to minimize thermal shock.

B. The water side is valved in before the steam side to ensure adequate venting.

C. The steam side is valved in before the water side to minimize scale buildup on the heat exchanger tubes.

D. The steam side is valved in before the water side to ensure that the cooldown rate does not exceed 100°F/hr.

QUESTION: 17

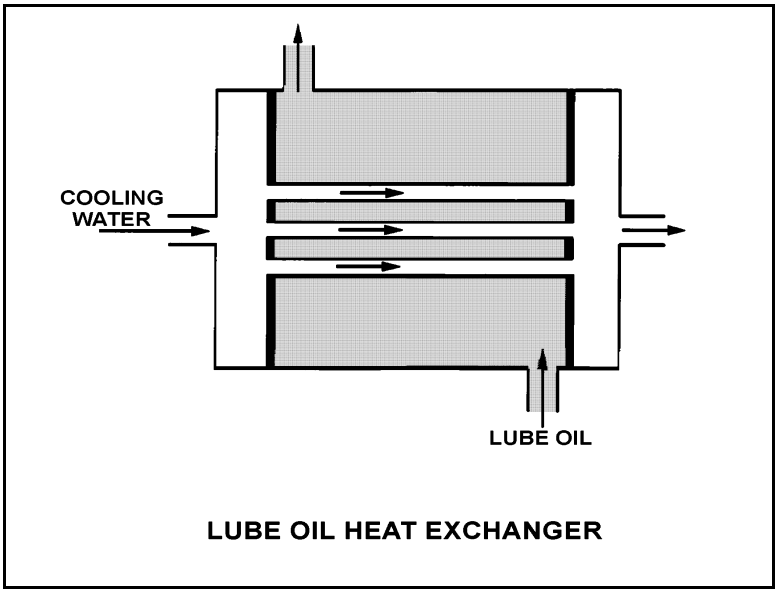
Refer to the drawing of a lube oil heat exchanger (see figure below).

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

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

Given that cooling water mass flow rate is greater than lube oil mass flow rate, which one of the following pairs of heat exchanger outlet temperatures is <u>not</u> possible? (Neglect any difference between the fluid specific heat capacities.)

	Lube Oil Outlet Temp	Cooling Water Outlet Temp
A.	90°F	105°F
B.	90°F	100°F
C.	110°F	95°F
D.	110°F	85°F



LUBE OIL HEAT EXCHANGER

QUESTION: 18

A nuclear power plant is initially operating at 100% of rated power when air inleakage results in the buildup of noncondensible gases in the main condenser. Which one of the following will decrease as a result of this air inleakage? (Assume that no operator actions are taken.)

A. Condensate temperature

B. Pressure in the main condenser

C. Suction pressure at the condensate pumps

D. Condenser cooling water outlet temperature

QUESTION: 19

Which one of the following describes the process of regenerating a mixed-resin deep bed demineralizer? (Assume the demineralizer has already been backwashed.)

A. Alternating the flow of acidic and caustic solutions through the demineralizer to remove suspended solids and colloidal matter.

B. Alternating the flow of acidic and caustic solutions through the demineralizer to remove ionic impurities.

C. Reversing the flow of pure water through the demineralizer to remove suspended solids and colloidal matter.

D. Reversing the flow of pure water through the demineralizer to remove ionic impurities.

QUESTION: 20

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

A. decreases due to resin breakdown.

B. decreases due to resin bead surface erosion.

C. increases due to trapping of suspended solids.

D. increases due to depletion of ion exchange sites.

QUESTION: 21

Which one of the following will cause a loss of indication from the remote breaker position indicating lights associated with a typical 480 Vac load supply breaker?

A. Locally opening the breaker

B. Loss of breaker line voltage

C. Removing the breaker control power fuses

D. Burnout of the local breaker position indicating lights

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 operation to isolate power to the load?

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 motor is operating.

QUESTION: 23

Which one of the following describes the energy level of a thermal neutron in a nuclear reactor operating at full power?

A. The kinetic energy of the neutron has decreased until it is in equilibrium with its surroundings.

B. The potential energy of the neutron has decreased to nearly zero as the neutron approaches equilibrium with its surroundings.

C. The kinetic energy of the neutron has decreased sufficiently to allow the neutron to be resonantly absorbed by U-238.

D. The potential energy of the neutron has decreased to a level that will allow the neutron to be absorbed by U-235.

QUESTION: 24

Nuclear reactors A and B are identical except that reactor A is operating near the beginning of a fuel cycle (BOC) and reactor B is operating near the end of a fuel cycle (EOC). Both reactors are operating at 100% thermal power.

Which reactor would have the lower K_{eff} five minutes after a reactor scram?

A. Reactor A, because the control rods will add more negative reactivity near the BOC.

B. Reactor A, because the power coefficient is more negative near the BOC.

C. Reactor B, because the control rods will add more negative reactivity near the EOC.

D. Reactor B, because the power coefficient is more negative near the EOC.

QUESTION: 25

Which characteristic of delayed neutrons is primarily responsible for enhancing the stability of a nuclear reactor following a reactivity change?

A. They are born at a lower average energy than prompt neutrons.

B. They are more likely to experience resonance absorption than prompt neutrons.

C. They comprise a smaller fraction of the total neutron flux than prompt neutrons.

D. They require more time to be produced following a fission event than prompt neutrons.

QUESTION: 26

Which one of the following describes the overall core reactivity effect of a moderator temperature increase in an undermoderated nuclear reactor core?

A. Positive reactivity will be added because fewer neutrons will be captured by the moderator while slowing down.

B. Positive reactivity will be added because fewer neutrons will be absorbed by U-238 at resonance energies while slowing down.

C. Negative reactivity will be added because more neutrons will be captured by the moderator while slowing down.

D. Negative reactivity will be added because more neutrons will be absorbed by U-238 at resonance energies while slowing down.

QUESTION: 27

Factors that affect resonance absorption of a neutron by a nucleus include...

A. kinetic energy of the nucleus, kinetic energy of the neutron, and excitation energy of the nucleus.

B. kinetic energy of the neutron, excitation energy of the nucleus, and excitation energy of the neutron.

C. excitation energy of the nucleus, excitation energy of the neutron, and kinetic energy of the nucleus.

D. excitation energy of the neutron, kinetic energy of the nucleus, and kinetic energy of the neutron.

QUESTION: 28

Control rod density is a measure of the...

A. percentage of control rods inserted into the core.

B. percentage of control rods withdrawn from the core.

C. number of control rods fully inserted divided by the number of control rods fully withdrawn.

D. number of control rods fully withdrawn divided by the number of control rods fully inserted.

QUESTION: 29

A nuclear reactor is operating at equilibrium full power when a single control rod fully inserts (from the fully withdrawn position). Reactor power is returned to full power with the control rod still fully inserted.

Compared to the initial axial neutron flux shape, the current flux shape will have a...

A. minor distortion, because a fully inserted control rod has zero reactivity worth.

B. minor distortion, because the fully inserted control rod is an axially uniform poison.

C. major distortion, because the upper and lower core halves are loosely coupled.

D. major distortion, because power production along the length of the rod drastically decreases.

QUESTION: 30

Following a two-week shutdown, a nuclear reactor is taken critical and ramped to full power in 6 hours. How long will it take to achieve an equilibrium xenon condition after the reactor reaches full power?

A. 70 to 80 hours

B. 40 to 50 hours

C. 8 to 10 hours

D. 1 to 2 hours

QUESTION: 31

If a nuclear reactor that has operated at 100% power for 10 days is shut down rapidly, xenon concentration will...

A. ramp down with reactor power.

B. increase to a new equilibrium in 3 days.

C. slowly decay away to almost zero in 3 days.

D. peak in about a half day, then decay to almost zero in 3 days.

QUESTION: 32

Just prior to a refueling outage the control rod density at 100% power is relatively low. However, immediately following the outage the control rod density at 100% power is much higher.

Which one of the following contributes to the need for a much higher 100% power control rod density at the beginning of a fuel cycle (BOC) compared with the end of a fuel cycle (EOC)?

A. The negative reactivity from burnable poisons is greater at BOC than at EOC.

B. The negative reactivity from fission product poisons is smaller at BOC than at EOC.

C. The positive reactivity from the fuel in the core is smaller at BOC than at EOC.

D. The positive reactivity from a unit withdrawal of a typical control rod is greater at BOC than at EOC.

QUESTION: 33

During an initial fuel load, the subcritical multiplication factor increases from 1.0 to 4.0 as the first 100 fuel assemblies are loaded. What is the corresponding final k_{eff}?

A. 0.25

B. 0.5

C. 0.75

D. 1.0

QUESTION: 34

A nuclear reactor is currently operating in the source range with a stable period of 90 seconds. The core effective delayed neutron fraction ($\bar{\beta}_{eff}$) is 0.006. How much additional positive reactivity must be added to establish a stable period of 60 seconds?

A. 0.00026 ΔK/K

B. 0.00033 ΔK/K

C. 0.00067 ΔK/K

D. 0.00086 ΔK/K

QUESTION: 35

Which one of the following is the purpose of a rod sequence exchange?

A. Ensures proper rod coupling

B. Prevents rod shadowing

C. Promotes even fuel burnout

D. Minimizes water hole peaking

QUESTION: 36

A nuclear power plant has been operating for one hour at 50% of rated power following six months of operation at steady-state 100% power. Which one of the following is the percentage of rated thermal power currently being generated by 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 level detectors (see figure below).

The tanks are identical and they are presently at 2 psig overpressure, 60°F, and the same constant water level. They are located within a sealed containment structure that is being maintained at atmospheric pressure. All level detectors have been calibrated and are producing the same level indication. A ventilation malfunction causes containment structure pressure to decrease to 12 psia.

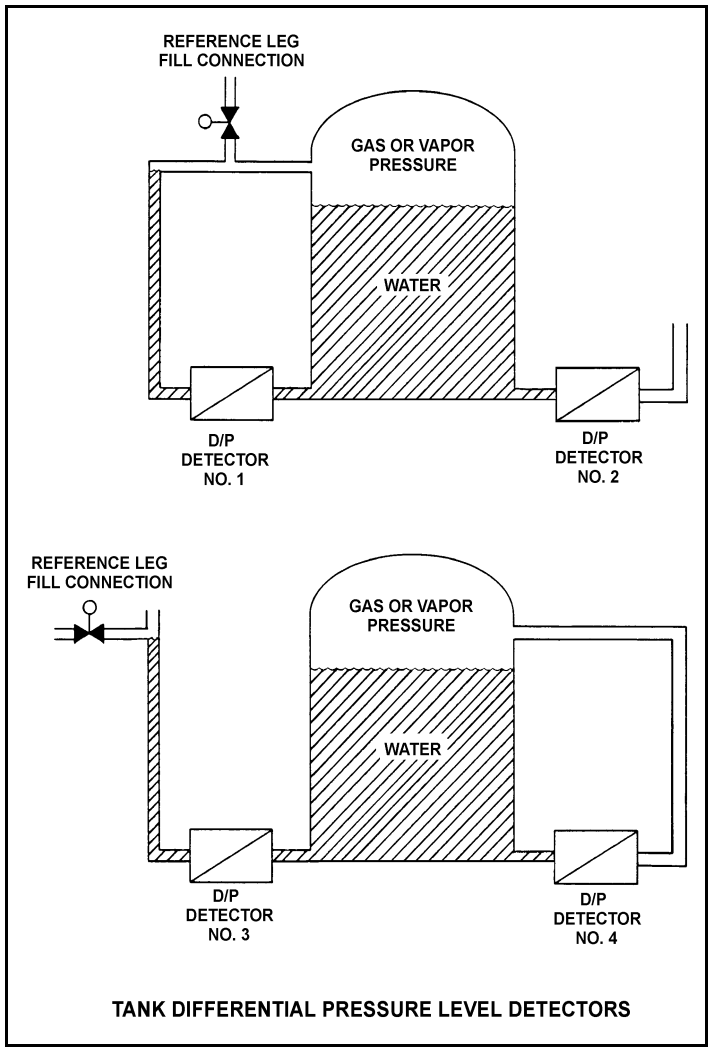
Which level detectors will produce the lowest level indication?

A. 1 and 2

B. 3 and 4

C. 1 and 4

D. 2 and 3



TANK DIFFERENTIAL PRESSURE LEVEL DETECTORS

QUESTION: 38

1.0×10^6 lbm/hr saturated steam at 30% steam quality is leaving a main turbine and entering a condenser at 2.0 psia. Condensate is entering the hotwell at 118°F.

Which one of the following is the approximate condenser heat transfer rate?

A. 3.1×10^8 Btu/hr

B. 5.8×10^8 Btu/hr

C. 7.2×10^8 Btu/hr

D. 9.9×10^8 Btu/hr

QUESTION: 39

Which one of the following is the approximate condensate subcooling in a steam condenser operating at 26 inches Hg vacuum with a condensate temperature of 100°F?

A. 2°F

B. 19°F

C. 25°F

D. 53°F

QUESTION: 40

A nuclear power plant is operating at 85% of rated thermal power when the extraction steam to a high-pressure feedwater heater is isolated. After the transient, the operator returns reactor power to 85% and stabilizes the plant. Compared to conditions just prior to the transient, current main turbine generator output (MWe) is...

A. higher because increased steam flow causes the turbine generator to pick up load.

B. lower because decreased steam flow causes the turbine generator to reject load.

C. higher because plant efficiency has increased.

D. lower because plant efficiency has decreased.

QUESTION: 41

If the discharge valve of an operating ideal positive displacement pump is repositioned from fully open to 75% open, pump head will _____ and pump flow rate will _____.

A. increase; remain the same

B. increase; decrease

C. remain the same; remain the same

D. remain the same; decrease

QUESTION: 42

A vented water storage tank contains 60 feet of water at 70°F. A cracked weld at the bottom rim of the tank results in a leak rate of 12 gpm. If makeup water flow rate is 5 gpm, at what water level will the tank stabilize? (Ignore any frictional head losses as the water exits the tank.)

A. 38.7 feet

B. 25.0 feet

C. 10.4 feet

D. 0.0 feet

QUESTION: 43

Which one of the following pairs of fluids undergoing heat transfer in typical cross-flow design heat exchangers will yield the smallest heat exchanger overall heat transfer coefficient? (Assume comparable heat exchanger sizes and fluid flow rates.)

A. Oil to water in a lube oil cooler

B. Air to water in an air compressor after-cooler

C. Steam to water in a turbine exhaust steam condenser

D. Water to water in a cooling water heat exchanger

QUESTION: 44

If the fission rate in a nuclear reactor core steadily increases, the mode of heat transfer that occurs immediately after the critical heat flux is reached is called...

A. transition boiling.

B. subcooled nucleate boiling.

C. saturated nucleate boiling.

D. stable film boiling.

QUESTION: 45

Which one of the following will directly reduce core inlet subcooling?

A. Raise reactor vessel downcomer level until carryover occurs

B. Lower reactor vessel downcomer level until carryunder occurs

C. Increase core recirculation flow

D. Isolate steam to one feedwater heater

QUESTION: 46

Two nuclear reactors have the same rated power level and are currently operating at 50% power with the same power distribution in each core. The reactors are identical except that one reactor has core orifices and the other core does not. Each reactor has the same core mass flow rate.

The orificed core will have the _____ critical power and the _____ core differential pressure.

A. higher; higher

B. higher; lower

C. lower; higher

D. lower; lower

QUESTION: 47

A nuclear reactor has experienced a loss of coolant accident. Inadequate core cooling has resulted in the following core temperatures one hour into the accident:

- 90% of the fuel clad has remained below 1,800°F.
- 10% of the fuel clad has exceeded 1,800°F.
- 5% of the fuel clad has exceeded 2,000°F.
- 0.5% of the fuel clad has reached 2,200°F.
- 0.0% of the fuel clad has exceeded 2,200°F.
- Peak centerline fuel temperature is 4,650°F.

Which one of the following is an adverse consequence that will occur if the above fuel and clad temperature conditions remain constant for 24 additional hours followed by the injection of emergency cooling water directly to the top of the core?

A. Release of radioactive fission products due to rupture of the fuel clad

B. Release of radioactive fission products due to melting of the fuel pellets and fuel clad

C. Explosive hydrogen concentration inside the reactor vessel

D. Explosive hydrogen concentration inside the reactor containment building

QUESTION: 48

The presence of embrittling isotopes is one of the initiating factors of pellet-clad interaction. Which one of the following describes the primary source of the embrittling isotopes?

A. Created during fission of the reactor fuel

B. Introduced during the fuel manufacturing process

C. Migrate from reactor coolant through cladding

D. Produced as corrosion products inside fuel rod

QUESTION: 49

The most limiting thermal limit for a loss of feedwater heating transient is...

A. average planar linear heat generation rate.

B. linear heat generation rate.

C. critical power ratio.

D. core thermal power.

QUESTION: 50

Two identical nuclear reactors are currently shut down for refueling. Reactor A has an average lifetime power capacity of 90% and has been operating for 24 years. Reactor B has an average lifetime power capacity of 72% and has been operating for 30 years.

Which reactor, if any, will have the lowest reactor vessel nil ductility transition temperature?

A. Reactor A because it has produced the greater total number of fissions.

B. Reactor B because it has produced the fewer total number of fissions.

C. Both reactors will have approximately the same nil ductility transition temperature because fast neutron irradiation in a shut down core is not significant.

D. Both reactors will have approximately the same nil ductility transition temperature because each core has produced approximately the same total number of fissions.

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

MARCH 2008 NRC GENERIC FUNDAMENTALS EXAMINATION
BOILING WATER REACTOR - ANSWER KEY

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