UNITED STATES NUCLEAR REGULATORY COMMISSION
BOILING WATER REACTOR GENERIC FUNDAMENTALS EXAMINATION
MARCH 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 SHEET

EQUATIONS

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

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

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

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

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

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

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

$SUR = 26.06/\tau$

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

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

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

The difference between the setpoint pressure at which a safety valve opens and the pressure at which it closes is called...

A. blowdown.

B. accumulation.

C. setpoint tolerance.

D. setpoint deviation.

QUESTION: 2

In a comparison between ball valves and butterfly valves in the same liquid process system application, the valves that typically are more leak-tight when fully closed and under high differential pressure are _____ valves; and the valves that typically result in the higher system pressure drop when fully open are _____ valves.

A. ball; butterfly

B. ball; ball

C. butterfly; butterfly

D. butterfly; ball

QUESTION: 3

When comparing a 3-inch gate valve to a 3-inch globe valve in the same application in an operating cooling water system, if both valves are fully open, the gate valve produces the _____ head loss and the _____ flow rate.

A. smaller; larger

B. larger; smaller

C. smaller; smaller

D. larger; larger

QUESTION: 4

Refer to the drawing of a water storage tank with two differential pressure level indicators (see figure below).

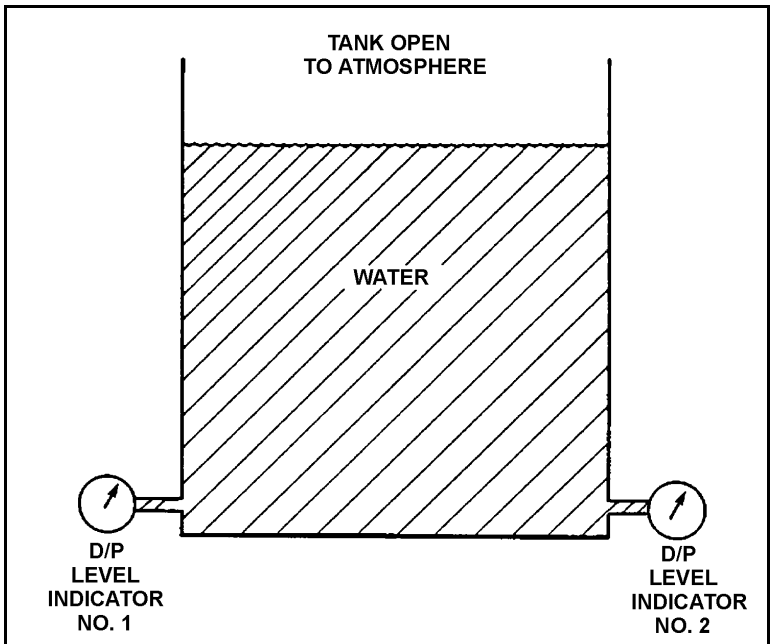
Indicator 1 was calibrated at 200°F and indicator 2 was calibrated at 100°F. If tank water temperature is 150°F, then...

A. indicator 1 will read greater than indicator 2.

B. indicator 2 will read greater than indicator 1.

C. indicators 1 and 2 will read the same.

D. both indicators will be inaccurate, but it is impossible to predict which indicator will read greater.



TANK DIFFERENTIAL PRESSURE LEVEL INDICATORS

QUESTION: 5

A bourdon tube works on the principle that when the pressure inside the tube decreases, the tube tends to: (Assume detected pressure remains above atmospheric pressure.)

A. coil due to an increased pressure-induced force on the outside of the tube.

B. straighten due to an increased pressure-induced force on the outside of the tube.

C. coil due to the spring action of the metal overcoming the pressure-induced force on the inside of the tube.

D. straighten due to the spring action of the metal overcoming the pressure-induced force on the inside of the tube.

QUESTION: 6

Refer to the drawing of a simple alumel-chromel 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.

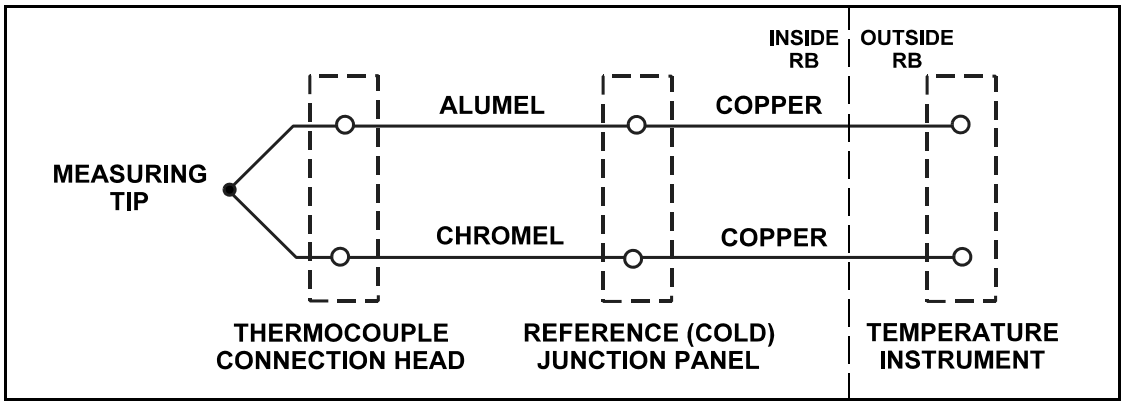
A steam leak inside the RB increases the temperatures of the thermocouple connection head and reference junction panel by 40°F, while the temperature at the measuring tip is unchanged. What is the resulting temperature indication?

A. 400°F

B. 440°F

C. 480°F

D. 520°F



QUESTION: 7

A reactor scrammed due to a loss-of-coolant accident one hour ago. To verify adequate reactor vessel water level, the source range monitors (SRMs) were inserted. As the SRMs entered the core, source range count rate increased and then became relatively stable as the SRMs continued upward into the water-filled region of the core.

If the SRMs enter a voided section of the core, count rate will suddenly...

A. decrease due to increased neutron leakage.

B. decrease due to decreased fast fission.

C. increase due to increased neutron migration length.

D. increase due to decreased moderator neutron absorption.

QUESTION: 8

An automatic flow controller is being used to position a valve in a cooling water system. A signal from the valve, that is proportional to valve position, is returned to the controller. This signal is referred to as...

A. gain.

B. bias.

C. feedback.

D. error.

QUESTION: 9

Given:

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

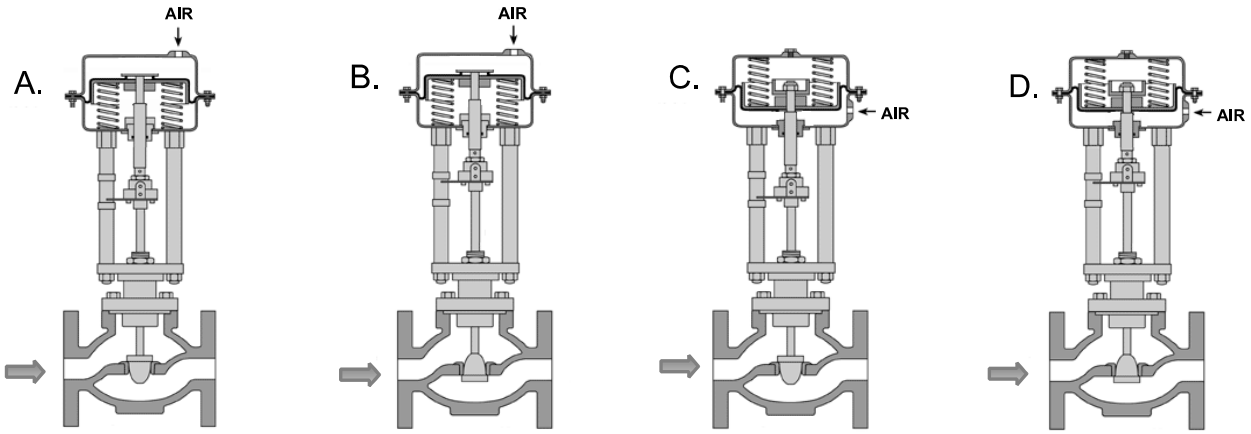
Which of the flow control valves shown below will be compatible with the controller in the above application?

A. A and B

B. B and C

C. C and D

D. D and A



QUESTION: 10

A centrifugal pump is operating with the following parameters:

Pump head: 50 psid
Flow rate: 200 gpm
Power input: 3 KW

Pump speed is increased and flow rate increases to 400 gpm. Which one of the following is the value of the new power consumption?

A. 6 KW

B. 9 KW

C. 24 KW

D. 27 KW

QUESTION: 11

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 105 amps. Which one of the following could be responsible for the observed increase in motor current?

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: 12

Which one of the following components of a centrifugal pump has the specific primary function of increasing the kinetic energy of a fluid?

A. Volute

B. Impeller

C. Diffuser

D. Discharge nozzle

QUESTION: 13

Use the following drawing of system and pump operating curves for a positive displacement pump with discharge relief valve protection to answer the following question.

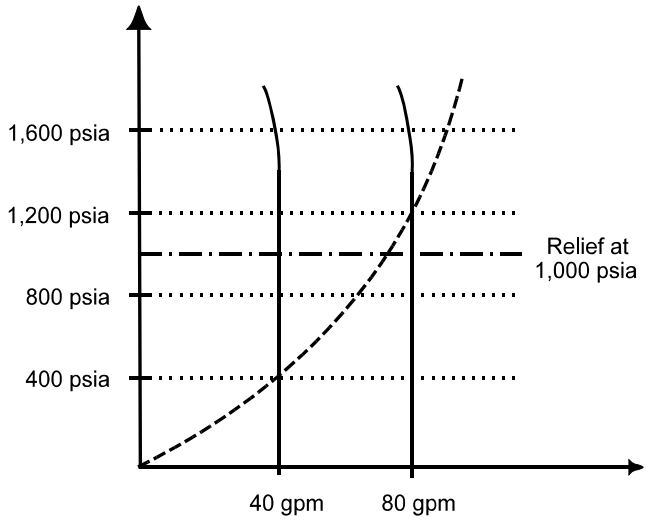
A positive displacement pump is initially supplying water at 40 gpm with a pump discharge pressure of 400 psia. Then, pump speed is increased until pump flow rate is 80 gpm. What is the pump discharge pressure at the new pump flow rate of 80 gpm?

A. 800 psia

B. 1,000 psia

C. 1,200 psia

D. 1,600 psia



QUESTION: 14

A nuclear power plant is operating at 80 percent power in the middle of a fuel cycle. The main turbine-generator is connected to an infinite power grid with the following main generator output parameters:

Real Load:	830 MW
Reactive Load:	248 MVAR (out)
Voltage:	25,000 VAC
Current:	20,000 Amps

Which one of the following will significantly increase main generator output current without a significant change in main generator real load?

A. Increasing the main turbine speed control setpoint.

B. Increasing the main generator voltage regulator setpoint.

C. A 10 percent decrease in typical power grid electrical loads.

D. A 10 percent increase in typical power grid electrical loads.

QUESTION: 15

A main generator is supplying 300 MVAR to the power grid with a 0.85 power factor. What is the approximate MW load on the main generator?

A. 186 MW

B. 353 MW

C. 484 MW

D. 569 MW

QUESTION: 16

Why is proper venting of a shell-and-tube heat exchanger important?

A. An air bubble reduces the heat transfer coefficient of the heat exchanger.

B. An air bubble causes pressure transients within the tubes as heat load changes.

C. An air bubble will cause thermal shock as it moves through the heat exchanger.

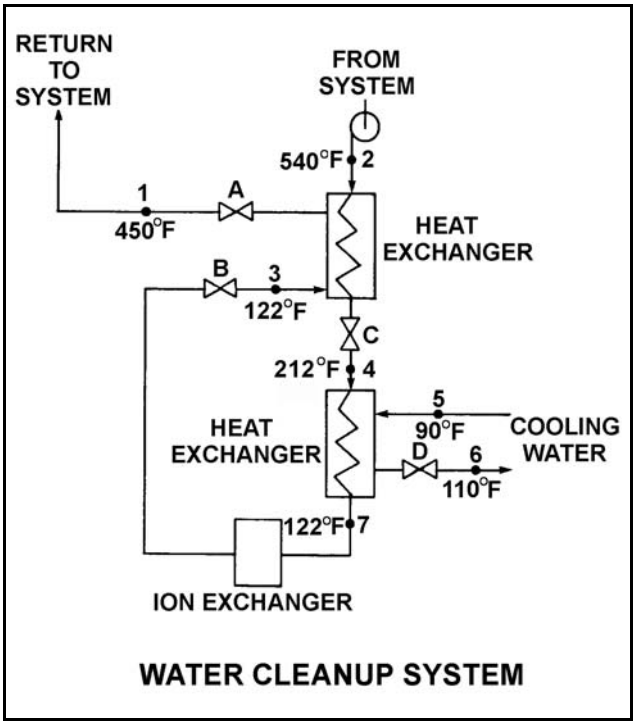
D. An air bubble will cause corrosion in the heat exchanger.

QUESTION: 17

Refer to the drawing of an operating water cleanup system (see figure below). Valves A, B, and D are fully open and valve C is 50 percent open.

If valve C is opened to 100 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



WATER CLEANUP SYSTEM

QUESTION: 18

A main turbine-generator is operating at 80 percent load with the following initial steady-state temperatures for the main turbine lube oil heat exchanger:

$T_{oil\ in}$ = 174°F
$T_{oil\ out}$ = 114°F
$T_{water\ in}$ = 85°F
$T_{water\ out}$ = 115°F

After six months of main turbine-generator operation, the following final steady-state lube oil heat exchanger temperatures are observed:

$T_{oil\ in}$ = 179°F
$T_{oil\ out}$ = 119°F
$T_{water\ in}$ = 85°F
$T_{water\ out}$ = 115°F

Assume that the final cooling water and lube oil flow rates are the same as the initial flow rates, and that the specific heat values for the cooling water and lube oil do not change.

Which one of the following could be responsible for the differences between the initial and final heat exchanger steady-state temperatures?

A. The heat exchanger tubes have become fouled with scale.

B. The temperature of the cooling water source has increased.

C. The final main turbine-generator load is higher than the initial load.

D. The final main turbine-generator load is lower than the initial load.

QUESTION: 19

A demineralizer is being used in a water purification system. How will accumulation of suspended solids in the demineralizer affect performance of the demineralizer?

A. The rate of resin depletion will increase.

B. The flow rate of water through the demineralizer will increase.

C. The differential pressure across the demineralizer will decrease.

D. The rate of unwanted ion removal from the system will decrease.

QUESTION: 20

After 12 months of operation at 100 percent power, a nuclear reactor was shut down and a plant cooldown is in progress. An operator reports that the general area radiation level near the in-service reactor coolant ion exchanger has increased significantly since the cooldown began several hours ago.

Which one of the following is a typical cause of these indications, resulting from the cooldown?

A. Increased radioactive tritium in the reactor coolant.

B. Increased radioactive oxygen-16 dissolved in the reactor coolant.

C. Increased radioactive nitrogen-16 dissolved in the reactor coolant.

D. Increased radioactive corrosion products suspended in the reactor coolant.

QUESTION: 21

Which one of the following describes the normal operation of a local breaker overcurrent trip flag indicator?

A. Actuates when no lockout is present; satisfies an electrical interlock to remotely close a breaker.

B. Actuates when a breaker overcurrent trip has occurred; can be manually reset when the overcurrent condition clears.

C. Actuates when a breaker has failed to trip on an overcurrent condition; can be manually reset when the overcurrent condition clears.

D. Actuates to cause a breaker trip when the overcurrent trip setpoint is reached; can be remotely reset when the overcurrent condition clears.

QUESTION: 22

A diesel generator (DG) was initially operating at 80 percent of rated load supplying an isolated electrical bus when a malfunction caused the DG output breaker to trip. The breakers for all of the bus loads--all of which are large motors--remained closed, preparing the motors to restart upon restoration of power to the bus.

The DG output breaker has been repaired. With all of the bus load breakers still closed, which one of the following will occur when the DG output breaker is closed to reenergize the bus?

A. The DG will become lightly loaded.

B. The DG will return directly to its initial load.

C. The DG will experience slight overload conditions.

D. The DG will experience severe overload conditions.

QUESTION: 23

The kinetic energy of thermal neutrons in a nuclear reactor operating at full power is...

A. less than 0.1 eV.

B. between 1 and 10 eV.

C. between 100 and 1,000 eV.

D. greater than 1 MeV.

QUESTION: 24

Which one of the following, if decreased, will <u>not</u> affect K_{eff}?

A. Fuel enrichment

B. Control rod worth

C. Neutron contribution from neutron sources

D. Shutdown margin when the reactor is subcritical

QUESTION: 25

The following data applies to a nuclear reactor core just prior to a refueling shutdown.

Nuclide	Delayed Neutron Fraction	Fraction of Total Fission Rate
U-235	0.0065	0.64
U-238	0.0148	0.07
Pu-239	0.0021	0.29

During the refueling, one-third of the fuel assemblies were offloaded and replaced with new fuel assemblies consisting of uranium having an average U-235 enrichment of 3.5 percent by weight.

Which one of the following describes how the above data will change as a result of completing the refueling outage?

A. The delayed neutron fraction for U-235 will decrease.

B. The delayed neutron fraction for Pu-239 will decrease.

C. The fraction of the total fission rate attributed to U-235 will increase.

D. The fraction of the total fission rate attributed to Pu-239 will increase.

QUESTION: 26

Which one of the following has the smallest microscopic cross section for absorption of a thermal neutron in an operating nuclear reactor?

A. Uranium-235

B. Uranium-238

C. Samarium-149

D. Xenon-135

QUESTION: 27

Refer to the drawing of microscopic cross section for absorption versus neutron energy for a resonance peak in U-238 in a nuclear reactor operating at 80 percent power (see figure below).

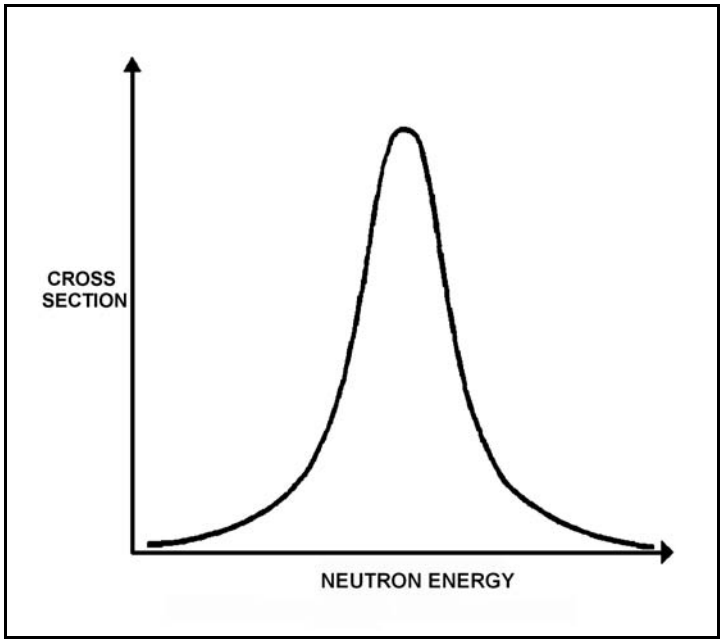
If reactor power is increased to 100 percent, the height of the curve will _____ and the area under the curve will _____.

A. increase; increase

B. increase; remain the same

C. decrease; decrease

D. decrease; remain the same



QUESTION: 28

A nuclear reactor is operating steady state at the point of adding heat (POAH) during a reactor startup near the beginning of core life. Reactor pressure is stable at 600 psig and the main steam isolation valves are closed (no steam flow from reactor).

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

The primary purpose for performing control rod program changes is to...

A. evenly burn up the fuel.

B. evenly burn up the control rods.

C. reduce excessive localized reactor vessel neutron irradiation.

D. reduce control rod shadowing.

QUESTION: 30

A nuclear power plant is being returned to operation following a refueling outage. Fuel preconditioning requires reactor power to be increased from 10 percent to full power gradually over a one week period.

During this slow power increase, most of the positive reactivity added by the operator is required to overcome the negative reactivity from...

A. fuel burnup.

B. xenon buildup.

C. fuel temperature increase.

D. moderator temperature increase.

QUESTION: 31

A nuclear reactor has been operating at 100 percent power for two months when a reactor scram occurs. Four hours later, the reactor is critical and stable at 10 percent power.

Which one of the following operator actions is required to maintain reactor power at 10 percent over the next 18 hours?

A. Add positive reactivity during the entire period.

B. Add negative reactivity during the entire period.

C. Add positive reactivity, then negative reactivity.

D. Add negative reactivity, then positive reactivity.

QUESTION: 32

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

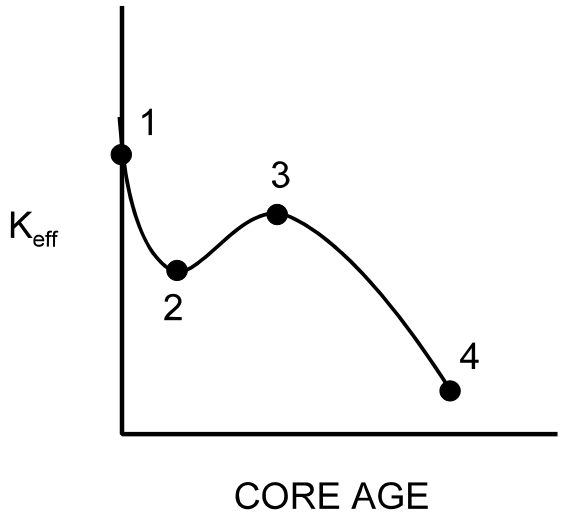
The major cause for the change in K_{eff} from point 3 to point 4 is...

A. depletion of U-235.

B. depletion of U-238.

C. burnout of burnable poisons.

D. buildup of fission product poisons.



QUESTION: 33

A nuclear reactor is critical in the source range during a reactor startup with a core effective delayed neutron fraction of 0.007. The operator then adds positive reactivity to establish a stable 60-second reactor period.

If the core effective delayed neutron fraction had been 0.005, what would be the approximate stable reactor period after the addition of the same amount of positive reactivity?

A. 28 seconds

B. 32 seconds

C. 36 seconds

D. 40 seconds

QUESTION: 34

As a nuclear reactor approaches criticality during a reactor startup, it takes longer to reach an equilibrium neutron count rate after each control rod withdrawal due to the increased...

A. length of time required to complete a neutron generation.

B. number of neutron generations required to reach a stable neutron level.

C. length of time from neutron birth to absorption.

D. fraction of delayed neutrons being produced as criticality is approached.

QUESTION: 35

A boiling water reactor is undergoing a startup with the reactor coolant initially saturated at 508°F. The main steam isolation valves are closed and reactor criticality has been achieved. The reactor currently has a stable positive 100-second reactor period with reactor power 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 coolant temperature will increase.

QUESTION: 36

A nuclear power plant that has been operating at rated power for two months experiences a reactor scram. Five minutes after the scram, with all control rods still fully inserted, a count rate of 5,000 cps is indicated on the source range nuclear instruments with a reactor period of negative 80 seconds.

The majority of the source range detector output is currently being caused by the interaction of _____ with the detector.

A. intrinsic source neutrons

B. fission gammas from previous power operation

C. fission neutrons from subcritical multiplication

D. delayed fission neutrons from previous power operation

QUESTION: 37

A water storage tank is vented to atmosphere. The tank is located at sea level and contains 100,000 gallons of water at 80°F. A pressure gauge at the bottom of the tank reads 9.0 psig. What is the approximate water level in the tank?

A. 13 feet

B. 17 feet

C. 21 feet

D. 25 feet

QUESTION: 38

Saturated steam (100 percent quality) is flowing through a reheater. The reheater inlet and outlet pressures are both 260 psia. If the reheater adds 60.5 Btu/lbm to the steam, what is the temperature of the steam exiting the reheater?

A. 405°F

B. 450°F

C. 465°F

D. 500°F

QUESTION: 39

During jet pump operation, high pressure and low velocity liquid flow is supplied to a _____ where the pressure drops and the velocity increases, creating a low pressure area in the _____.

A. nozzle; throat

B. nozzle; diffuser

C. diffuser; throat

D. diffuser; nozzle

QUESTION: 40

A main turbine consists of a high-pressure (HP) unit and several low-pressure (LP) units. The main turbine is most likely to experience stress-related failures of the rotor blades in the _____ stages of the _____ unit(s).

A. inlet; HP

B. inlet; LP

C. outlet; HP

D. outlet; LP

QUESTION: 41

Two identical centrifugal pumps (CPs) and two identical positive displacement pumps (PDPs) are able to take suction on a vented water storage tank and provide makeup water flow to a cooling water system. The pumps are capable of being cross-connected to provide multiple configurations. In single pump alignment, each pump will supply 100 gpm at a system pressure of 1,000 psig.

Given the following information:

Centrifugal Pumps

Shutoff head:	1,500 psig
Maximum design pressure:	2,000 psig

Positive Displacement Pumps

Maximum design pressure:	2,000 psig

Which one of the following pump configurations will supply the lowest makeup flow rate to the system if system pressure is at 1,700 psig?

A. Two CPs in series

B. Two CPs in parallel

C. One PDP and one CP in series (CP supplying PDP)

D. One PDP and one CP in parallel

QUESTION: 42

Water at 90°F and 50 psig is flowing through a 10-inch diameter pipe at 100 lbm/sec. The pipe then splits into two pipes, a 4-inch diameter pipe and an 8-inch diameter pipe.

Disregarding any flow restrictions other than pipe size, which one of the following lists the approximate flow rates through the 4-inch and 8-inch diameter pipes?

	4-inch Pipe (lbm/sec)	8-inch Pipe (lbm/sec)
A.	20	80
B.	25	75
C.	30	70
D.	33	67

QUESTION: 43

The order of reactor coolant heat transfer modes, from the most efficient to the least efficient, is...

A. nucleate boiling, transition boiling, stable film boiling.

B. stable film boiling, nucleate boiling, transition boiling.

C. nucleate boiling, stable film boiling, transition boiling.

D. stable film boiling, transition boiling, nucleate boiling.

QUESTION: 44

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: 45

Two nuclear reactors, A and B, are operating at 100 percent power with thermal neutron flux radially peaked in the center of each core. The reactors are identical except that reactor A has core orificing and reactor B does not. Both reactors have the same control rod pattern and density.

Compared to the center fuel bundle in reactor B, the center fuel bundle in reactor A will have the _____ exit steam quality and the _____ critical power.

A. lower; lower

B. lower; higher

C. higher; lower

D. higher; higher

QUESTION: 46

While a nuclear reactor is shut down, what effect will decreasing reactor water level to just below the steam separators have on natural circulation flow rate?

A. Flow rate will significantly decrease due to the loss of communication between the annulus and the core.

B. Flow rate will decrease initially and then increase to a new thermal equilibrium value slightly less than the original flow rate.

C. Flow rate will increase to a new stable value as the temperature of the water in the core increases to a new stable value.

D. Flow rate will not be significantly affected because the thermal driving head is primarily dependent on the differential temperature between the core and the annulus.

QUESTION: 47

A nuclear reactor is operating at steady-state 80 percent reactor power near the beginning of a fuel cycle with core power distribution peaked radially at the center of the core and axially in the bottom half of the core. Only reactor recirculation flow rate adjustments are used to maintain a constant reactor power over the next two months.

Neglecting any change in reactor poison distribution, during the next two months the maximum radial peaking factor will _____, and the maximum axial peaking factor will _____.

A. increase; decrease

B. increase; increase

C. decrease; decrease

D. decrease; increase

QUESTION: 48

Which one of the following must be maintained within limits to ensure that peak cladding temperature will not exceed 2,200°F after a design basis loss of coolant accident?

A. Linear heat generation rate

B. Average planar linear heat generation rate

C. Minimum critical power ratio

D. Maximum fraction of limiting critical power ratio

QUESTION: 49

For a nuclear reactor operating at 100 percent power, which one of the following combinations of axial power distribution and recirculation system flow rate will result in the smallest critical power ratio in a given fuel bundle? (Assume the maximum linear heat generation rate in the fuel bundle is the same for all cases.)

	Axial Power Distribution	Recirculation System Flow Rate
A.	Top-peaked	Low
B.	Top-peaked	High
C.	Bottom-peaked	Low
D.	Bottom-peaked	High

QUESTION: 50

Which one of the following comparisons yields a higher probability of brittle fracture for a reactor vessel?

A. A high reactor fast neutron flux rather than a high gamma flux.

B. A high reactor vessel material ductility rather than a high material strength.

C. A rapid 100°F reactor heatup at a high temperature rather than a low temperature.

D. A rapid 100°F reactor cooldown at a high temperature rather than a low temperature.

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

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

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