UNITED STATES NUCLEAR REGULATORY COMMISSION
PRESSURIZED WATER REACTOR GENERIC FUNDAMENTALS EXAMINATION
SEPTEMBER 2013--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. pressurized water reactor (PWR) 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

$°C = (5/9)(°F - 32)$

$°F = (9/5)(°C) + 32$

1 kg $= 2.21$ lbm

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

1 gal_{water} $= 8.35$ lbm

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

A typical motor-operated valve (MOV) has just been opened from the main control room, and the breaker for the MOV has been opened. A plant operator has been directed to close the MOV locally for a surveillance test.

If the operator attempts to turn the MOV handwheel in the clockwise direction without first operating the declutch lever, which one of the following will occur?

A. The handwheel will turn, but the valve stem will <u>not</u> move.

B. The handwheel will <u>not</u> turn, and the valve stem will <u>not</u> move.

C. The handwheel will turn, and the valve stem will move toward the closed position because the clutch is automatically engaged when the handwheel is turned.

D. The handwheel will turn, and the valve stem will move toward the closed position because the clutch is automatically engaged when the breaker is opened.

QUESTION: 3

A reactor is currently shut down with the reactor coolant system at 140°F and 150 psig. Pressurizer level is being monitored using a differential pressure detector with a wet reference leg. The pressurizer level instrument was calibrated at normal plant operating conditions.

The pressurizer level instrument currently indicates _____ than actual pressurizer level because, compared to the calibration conditions, there has been a significant change in the density of the fluid in the _____.

A. higher; pressurizer

B. higher; reference leg

C. lower; pressurizer

D. lower; reference leg

QUESTION: 4

For proper operation of a thermocouple circuit, the reference junction temperature…

A. must be less than the measuring junction temperature.

B. must be greater than the measuring junction temperature.

C. may be less than or greater than, but <u>not</u> equal to, the measuring junction temperature.

D. may be less than, greater than, or equal to the measuring junction temperature.

QUESTION: 5

A proportional detector with pulse height discrimination circuitry is being used in a constant field of neutron and gamma radiation to provide source range neutron count rate indication. Assume the pulse height discrimination value does not change.

If the detector voltage is decreased significantly, but maintained within the proportional region, the detector count rate indication will _____; and the detector will become _____ susceptible to the positive space charge effect.

A. decrease; less

B. decrease; more

C. remain the same; less

D. remain the same: more

QUESTION: 6

During power operation, a reactor coolant sample is taken and analyzed. Which one of the following lists three nuclides that are all indicative of a possible fuel cladding failure if found to be at elevated concentrations in the reactor coolant sample?

A. Oxygen-18, iron-59, and zirconium-95

B. Cobalt-60, iodine-131, and xenon-135

C. Krypton-85, strontium-90, and cesium-136

D. Hydrogen-2, hydrogen-3, and nitrogen-16

QUESTION: 7

Refer to the drawing of a pressure bistable in an 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.

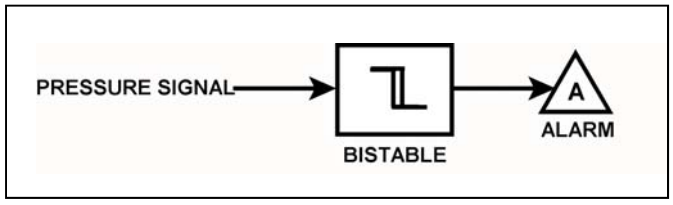
If current system pressure is 90 psig, which one of the following describes the alarm circuit response as system pressure slowly increases to 110 psig?

A. The alarm is currently actuated and will turn off at 95 psig.

B. The alarm will actuate at 100 psig and will <u>not</u> turn off.

C. The alarm is currently actuated and will turn off at 105 psig.

D. The alarm will actuate at 100 psig and will turn off at 105 psig.



QUESTION: 8

Which one of the following refers to the transfer of controller modes from Automatic to Manual or Manual to Automatic without causing a system perturbation?

A. A direct transfer

B. A deadband transfer

C. A bumpless transfer

D. An analog-to-digital transfer

QUESTION: 9

The level in a drain collection tank is being controlled by an automatic level controller, and is initially stable at the controller setpoint. Flow rate into the tank increases, slowly at first, and then faster until a stable higher flow rate is attained.

As tank level begins to increase, the level controller slowly opens a tank drain valve. The level controller output signal increases both as the tank level increases and as the rate of tank level change quickens. After a few minutes, tank level returns to, and remains at, the original level with the drain flow rate equal to the supply flow rate.

The controller in this system uses _____ control.

A. proportional only

B. proportional plus derivative only

C. proportional plus integral only

D. proportional plus integral plus derivative

QUESTION: 10

Which one of the following would result from operating a motor-driven radial-flow centrifugal pump in a water system for an extended period with the discharge valve shut and no recirculation flow?

A. No motor damage, but the pump will overheat and may be damaged.

B. No motor damage, but the pump will overspeed and may be damaged.

C. No pump damage, but the motor will overspeed and the motor bearings may fail.

D. No pump damage, but the motor windings will draw excessive current and may fail.

QUESTION: 11

Shutting the discharge valve on an operating motor-driven radial-flow centrifugal pump in a water system will cause the motor amps to _____ and the pump discharge pressure to _____.

A. decrease, increase

B. decrease, decrease

C. increase, increase

D. increase, decrease

QUESTION: 12

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

With the pump in operation, the pump will have the lowest initial discharge pressure if the pump is aligned to fill the tank via the _____ connection; and the tank will require the longest amount of time to become completely full if the pump is aligned to fill the tank via the _____ connection.

A. top; top

B. top; bottom

C. bottom; top

D. bottom; bottom

QUESTION: 13

Which one of the following describes the proper location for a relief valve that will be used to prevent exceeding the design pressure of a positive displacement pump and associated piping?

A. On the pump suction piping upstream of the suction isolation valve.

B. On the pump suction piping downstream of the suction isolation valve.

C. On the pump discharge piping upstream of the discharge isolation valve.

D. On the pump discharge piping downstream of the discharge isolation valve.

QUESTION: 14

A 4,000 KW 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
60.0 Hz	60.1 Hz

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

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

A large centrifugal pump is driven by a 200 horsepower AC induction motor. The motor breaker control circuit contains the following protection devices: instantaneous overcurrent relay, motor thermal overload relay, control power fuses, and an anti-pumping device.

The pump had been manually started and stopped several times during a 5 minute period when the motor breaker tripped. Which one of the following is the most likely cause of the breaker trip?

A. Motor thermal overload.

B. Instantaneous overcurrent.

C. Blown control power fuse.

D. Anti-pumping device actuation.

QUESTION: 16

A nuclear power plant is shut down with core decay heat being removed by the residual heat removal (RHR) system. Assume that only the RHR heat exchangers are removing heat from the reactor coolant system (RCS) and that the RHR system provides complete thermal mixing of the RCS.

Given the following information:

Reactor core rated thermal power	=	2,950 MW
Core decay heat rate	=	0.6 percent rated thermal power
RHR system heat removal rate	=	8.1×10^7 Btu/hr
RCS c_p	=	1.05 Btu/lbm-ºF
Combined RCS and RHR inventory	=	450,000 lbm

Which one of the following actions will establish an RCS cooldown rate between 20ºF/hour and 30ºF/hour?

A. Increase RHR heat exchanger flow rate to increase the cooldown rate by 10ºF/hour.

B. Increase RHR heat exchanger flow rate to increase the cooldown rate by 20ºF/hour.

C. Reduce RHR heat exchanger flow rate to decrease the cooldown rate by 10ºF/hour.

D. Reduce RHR heat exchanger flow rate to decrease the cooldown rate by 20ºF/hour.

QUESTION: 17

A nuclear power plant was initially operating at steady-state 100 percent power with the following reactor coolant system (RCS) and steam generator (SG) parameters:

RCS average coolant temperature	= 575°F
RCS hot leg temperatures	= 600°F
RCS cold leg temperatures	= 550°F
SG pressures	= 885 psig

The reactor was shut down for a maintenance outage, during which 7 percent of the tubes in each SG were plugged. The reactor was restarted and power was ramped to 100 percent. To establish the same SG pressure at 100 percent power, RCS average coolant temperature will have to be increased to...

A. 578°F.

B. 580°F.

C. 582°F.

D. 584°F.

QUESTION: 18

A mixed-bed ion exchanger is being used to process reactor coolant letdown. The ion exchanger is boron-saturated for the existing reactor coolant conditions.

If reactor coolant letdown temperature decreases by 20°F, the total number of boron atoms occupying the ion exchange sites will _____; and the boron concentration in the ion exchanger effluent will _____.

A. increase; decrease

B. increase; increase

C. decrease; decrease

D. decrease; increase

QUESTION: 19

Prior to a scheduled nuclear power plant shutdown, the reactor coolant system was chemically shocked to induce a crud burst. What effect will the crud burst have on the letdown purification ion exchangers?

A. Decreased radiation levels around the ion exchangers.

B. Increased flow rate through the ion exchangers.

C. Decreased ion exchanger outlet conductivity.

D. Increased pressure drop across the ion exchangers.

QUESTION: 20

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: 21

If a main generator output breaker is closed when the generator output is 5 degrees out of phase with the local power grid, the main generator will experience a sudden _____ stress; if the breaker remains closed and no additional operator action is taken, the main generator will _____ with the grid.

A minor; remain out of phase

B. minor; become locked into phase

C. potentially damaging; remain out of phase

D. potentially damaging; become locked into phase

QUESTION: 22

A 480 VAC motor control center supplies a load through a breaker and a manual disconnect switch. Which one of the following sequences will provide the greatest level of personnel safety when deenergizing the load for maintenance and when reenergizing the load after the maintenance?

	DEENERGIZING	REENERGIZING
A.	Open breaker first	Shut breaker first
B.	Open breaker first	Shut disconnect switch first
C.	Open disconnect switch first	Shut breaker first
D.	Open disconnect switch first	Shut disconnect switch first

QUESTION: 23

A neutron that is expelled 1.0×10^{-6} seconds after the associated fission event is a _____ neutron.

A. thermal

B. prompt

C. delayed

D. capture

QUESTION: 24

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 percent power with all control rods fully withdrawn.

If the total reactivity worth of the control rods is the same for both reactors, which reactor will have the greater K_{eff} five minutes after a reactor trip, and why?

A. Reactor A, because the pre-trip reactor coolant boron concentration is lower near the BOC.

B. Reactor A, because the power coefficient adds less positive reactivity after a trip near the BOC.

C. Reactor B, because the pre-trip reactor coolant boron concentration is higher near the EOC.

D. Reactor B, because the power coefficient adds more positive reactivity after a trip near the EOC.

QUESTION: 25

Given the following data for a reactor:

- The average delayed neutron fraction is 0.0052.
- The effective delayed neutron fraction is 0.0054.

The above data indicates that the reactor is operating near the _____ of a fuel cycle and that a typical delayed neutron is _____ likely than a typical prompt neutron to cause another fission in this reactor.

A. beginning; less

B. beginning; more

C. end; less

D. end; more

QUESTION: 26

Which one of the following contains the pair of nuclides that are the most significant contributors to the total resonance capture in the core near the end of a fuel cycle?

A. U-238 and Pu-239

B. U-238 and Pu-240

C. Pu-239 and U-235

D. Pu-239 and Pu-240

QUESTION: 27

Compared to operation at a low power level, the fuel temperature coefficient of reactivity at a high power level is _____ negative due to _____.

A. less; improved pellet-to-clad heat transfer

B. more; buildup of fission product poisons

C. less; higher fuel temperature

D. more; increased neutron flux

QUESTION: 28

With a nuclear power plant operating normally at full power, a 5°F decrease in moderator temperature will cause the differential control rod worth to become...

A. more negative due to better moderation of neutrons.

B. less negative due to shorter neutron migration length.

C. more negative due to increased neutron absorption in the moderator.

D. less negative due to increased resonance absorption of neutrons.

QUESTION: 29

Why are control rod insertion limits established for power operation?

A. To minimize the worth of a dropped control rod.

B. To maintain a negative moderator temperature coefficient.

C. To provide adequate shutdown margin after a reactor trip.

D. To ensure sufficient positive reactivity is available to compensate for the existing power defect.

QUESTION: 30

A reactor had been operating at 70 percent power for two weeks when power was increased to 100 percent over a two-hour period. To offset xenon-135 reactivity changes during the next 12 hours, which one of the following incremental control rod manipulations will be required?

A. Withdraw rods slowly during the entire period.

B. Withdraw rods slowly at first, and then insert rods slowly.

C. Insert rods slowly during the entire period.

D. Insert rods slowly at first, and then withdraw rods slowly.

QUESTION: 31

Fourteen hours after a reactor trip from 100 percent power with equilibrium xenon-135, the concentration of xenon-135 will be _____ than the 100 percent equilibrium xenon-135 concentration; and xenon-135 will have added a net _____ reactivity since the trip.

A. less; positive

B. less; negative

C. greater; positive

D. greater; negative

QUESTION: 32

A reactor has been operating at 100 percent power for three months following a refueling outage. If the reactor is operated at 100 percent power without making RCS boron additions or dilutions for the next month, RCS boron concentration will...

A. decrease, because irradiated boron-10 atoms undergo a neutron-alpha reaction.

B. decrease, because boron atoms decompose at normal RCS operating temperatures.

C. remain constant, because irradiated boron-10 atoms become stable boron-11 atoms.

D. remain constant, because irradiated boron-10 atoms still have large absorption cross sections for thermal neutrons.

QUESTION: 33

During a reactor startup, the first reactivity addition caused the stable source range count rate to increase from 20 cps to 40 cps. The second reactivity addition caused the stable count rate to increase from 40 cps to 160 cps.

Which one of the following statements accurately compares the two reactivity additions?

A. The first reactivity addition was larger.

B. The second reactivity addition was larger.

C. The first and second reactivity additions were equal.

D. There is not enough information given to determine the relationship of the reactivity values.

QUESTION: 34

With K_{eff} at 0.985, how much reactivity must be added to make a reactor exactly critical?

A. 1.54% ΔK/K

B. 1.52% ΔK/K

C. 1.50% ΔK/K

D. 1.48% ΔK/K

QUESTION: 35

Refer to the graph of neutron flux versus time (see figure below) for a nuclear power plant reactor that experienced a reactor trip from extended full power operation at time = 0 seconds. The neutron flux axis has a logarithmic scale while the time axis has a linear scale.

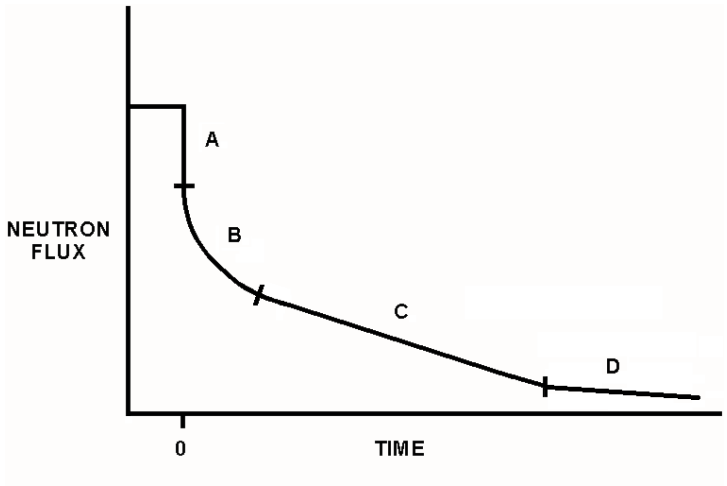
Which section(s) of the curve has/have a slope that is primarily determined by the production rate of delayed neutrons?

A. B only

B. B and C

C. C only

D. C and D



QUESTION: 36

Following a reactor shutdown from three months of operation at 100 percent power, the core decay heat production rate will depend on the...

A. amount of fuel that has been depleted.

B. decay rate of the fission product poisons.

C. time elapsed since K_{eff} decreased below 1.0.

D. decay rate of the photoneutron source.

QUESTION: 37

A pressure gauge on a condenser reads 27.0 inches Hg vacuum. What is the absolute pressure corresponding to this vacuum? (Assume a standard atmospheric pressure of 15.0 psia.)

A. 14.0 psia

B. 13.5 psia

C. 1.5 psia

D. 1.0 psia

QUESTION: 38

A steam-water mixture is initially saturated with a quality of 95 percent when a small amount of heat is added to the mixture. If the mixture remains saturated and pressure remains constant, the temperature of the mixture will _____; and the quality of the mixture will _____.

A. increase; remain the same

B. increase; increase

C. remain the same; remain the same

D. remain the same; increase

QUESTION: 39

Which one of the following will increase the subcooling of the condensate in the main condenser hotwell?

A. Isolate circulating water to one shell of the main condenser.

B. Increase circulating water inlet temperature.

C. Decrease circulating water flow rate.

D. Decrease main turbine steam flow rate.

QUESTION: 40

A nuclear power plant is operating with the following main steam parameters at a partially open main turbine steam inlet valve:

Pressure = 1,000 psia
Quality = 100 percent

The main turbine steam chest pressure is 50 psia. Which one of the following describes the steam in the steam chest?

A. Saturated, 98 percent quality

B. Saturated, 99 percent quality

C. Saturated, 100 percent quality

D. Superheated

QUESTION: 41

A nuclear power plant has a thermal power rating of 3,200 MW. When the plant operates at 100 percent power, the main generator produces 1,200 MW at a 0.95 power factor. Plant modifications are planned that will upgrade the feedwater heaters and moisture separator/reheaters without changing the plant's thermal power rating. If the plant modifications improve plant thermal efficiency by 2 percent, what will be the resulting main generator electrical output at 100 percent reactor power with the same power factor?

A. 1,204 MW

B. 1,224 MW

C. 1,244 MW

D. 1,264 MW

QUESTION: 42

Which one of the following will result in a higher probability and/or severity of water hammer in a flowing water system?

A. Gradual pipe bends rather than sharp pipe bends.

B. Shorter pipe lengths rather than longer pipe lengths.

C. Lower initial flow rates rather than higher initial flow rates.

D. Shorter valve stroke times rather than longer valve stroke times.

QUESTION: 43

Reactor coolant system (RCS) hot leg temperature is constant at 568°F while RCS pressure is decreasing due to a small reactor coolant leak. Which one of the following RCS pressure ranges includes the pressure at which two-phase flow will <u>first</u> occur in the hot leg?

A. 1,250 to 1,201 psig

B. 1,200 to 1,151 psig

C. 1,150 to 1,101 psig

D. 1,100 to 1,051 psig

QUESTION: 44

When performing a heat balance calculation to determine core thermal power, the measured thermal power is _____ by a value associated with the reactor coolant pumps (RCPs); the adjustment is needed because _____ of the flow energy added to the reactor coolant by the RCPs is converted to thermal energy of the reactor coolant.

A. decreased; nearly all

B. decreased; a small fraction

C. increased; nearly all

D. increased; a small fraction

QUESTION: 45

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

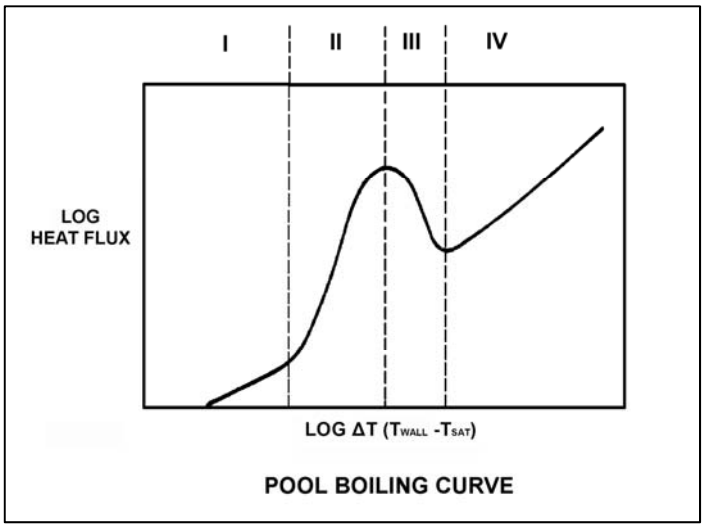
Which region of the curve contains the operating point at which the hottest locations of a reactor normally operate to transfer heat from the fuel cladding to the coolant at 100 percent power?

A. Region I

B. Region II

C. Region III

D. Region IV



QUESTION: 46

The departure from nucleate boiling (DNB) ratio is defined as the...

A. actual heat flux divided by the critical heat flux.

B. critical heat flux divided by the actual heat flux.

C. actual core thermal power divided by the rated core thermal power.

D. rated core thermal power divided by the actual core thermal power.

QUESTION: 47

Which one of the following will increase the reactor coolant system (RCS) subcooling margin with the reactor operating at full power?

A. Decreased RCS pressure.

B. Decreased RCS hot leg temperature.

C. Increased RCS cold leg temperature.

D. Increased concentration of soluble gases in the RCS.

QUESTION: 48

A reactor coolant system natural circulation cooldown is in progress with steam release from the steam generator (SG) atmospheric steam relief valves (operated in manual control).

If voids interrupt natural circulation, which one of the following will occur? (Assume feedwater flow rate, SG relief valve position, and decay heat level are constant.)

A. SG pressure will decrease and core exit thermocouple (CET) temperatures will increase.

B. SG pressure will decrease and CET temperatures will remain constant.

C. SG pressure will increase and CET temperatures will increase.

D. SG pressure will increase and CET temperatures will remain constant.

QUESTION: 49

Consider a new fuel rod operating at a constant power level for several weeks. During this period, fuel pellet densification in the fuel rod causes the heat transfer rate from the fuel pellets to the cladding to _____; this change 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 reactor coolant system (RCS) events would be most likely to cause a pressurized thermal shock to the reactor vessel?

A. Starting a reactor coolant pump in an idle RCS loop with the associated steam generator temperature less than the loop temperature.

B. Starting a reactor coolant pump in an idle RCS loop with the associated steam generator temperature greater than the loop temperature.

C. Continuous emergency coolant injection to the RCS during and after a complete and unisolable rupture of a steam generator steam outlet nozzle.

D. Continuous emergency coolant injection to the RCS during and after a complete and unisolable rupture of a reactor vessel coolant outlet nozzle.

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

SEPTEMBER 2013 NRC GENERIC FUNDAMENTALS EXAMINATION
PRESSURIZED WATER REACTOR - ANSWER KEY

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