UNITED STATES NUCLEAR REGULATORY COMMISSION
PRESSURIZED WATER REACTOR GENERIC FUNDAMENTALS EXAMINATION
MARCH 2015 – FORM A

Please Print

Name: _____

Docket No.: _____

Facility: _____

Start Time: _____   Stop Time: _____

INSTRUCTIONS TO APPLICANT

Answer all the test items using the answer sheet provided, ensuring a single answer is marked for each test item.   Each test item has equal point value.   A score of at least 80 percent is required to pass this portion of the NRC operator licensing written examination.   All examination materials will be collected 3 hours after the examination begins.   This examination applies to a typical U.S. 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.

EQUATIONS

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

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

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

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

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

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

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

$1/M = CR_1/CR_x$

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

$A = \pi r^2$

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

$F = PA$

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

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

$SUR = 26.06/\tau$

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

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

$P = IE$

$P_A = \sqrt{3}IE$

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

$P_T = \sqrt{3}IEpf$

$\ell^* = 1.0 \times 10^{-4}$ sec

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

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

Thermal Efficiency $=$ Net Work Out/Energy In

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

$\dfrac{g(z_2 - z_1)}{g_c} + \dfrac{(\vec{v}_2^2 - \vec{v}_1^2)}{2g_c} + \upsilon(P_2 - P_1) + (u_2 - u_1) + (q - w) = 0$

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

$g = 32.2$ ft/sec^2

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

$g_c = 32.2$ lbm-ft/lbf-sec^2

CONVERSIONS

- -

1 MW $= 3.41 \times 10^6$ Btu/hr	$°C = (5/9)(°F - 32)$	1 ft$^3_{water}$ $= 7.48$ gal
1 hp $= 2.54 \times 10^3$ Btu/hr	$°F = (9/5)(°C) + 32$	1 gal$_{water}$ $= 8.35$ lbm
1 Btu $= 778$ ft-lbf	1 kg $= 2.21$ 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 8 gpm.   The tank is protected by a relief valve <u>and</u> a safety valve that both discharge to the atmosphere.   The valves have the following characteristics:

- The relief valve opening setpoint is 220 psig with an accumulation of 5 percent.
- The safety valve opening setpoint is 260 psig with a blowdown of 5 percent.
- Both valves have a maximum discharge flow rate of 6 gpm.

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

After a few minutes with the PDP still running, the relief valve will be discharging a flow rate of approximately _____; and the safety valve will be _____.

A. 2 gpm; partially open

B. 6 gpm; partially open

C. 2 gpm; cycling between fully open and fully closed

D. 6 gpm; cycling between fully open and fully closed

QUESTION: 2

During a local inspection of a manually operated 12-inch gate valve, the valve stem is observed to extend outward from the valve handwheel by 1 inch.   The entire external valve stem is threaded, except for a 1-inch section that becomes smooth just before the valve stem enters the packing gland. Which one of the following describes the position of the gate valve?

A. The valve is fully open or nearly fully open.

B. The valve is fully closed or nearly fully closed.

C. The valve may be in any position because it is a rising stem gate valve.

D. The valve may be in any position because it is a non-rising stem gate valve.

QUESTION: 3

A properly calibrated differential pressure-type water flow detector is located several feet below a horizontal pipe containing the detector's sensing element.   The detector was removed for inspection and then reconnected to the sensing element with its low-pressure sensing line filled with air and its high-pressure sensing line filled with water.

When the water system is operating, indicated flow rate will be...

A. zero.

B. equal to actual flow rate.

C. lower than actual flow rate.

D. higher than actual flow rate.

QUESTION: 4

Refer to the drawing of a water storage tank with a differential pressure (D/P) level detection system (see figure below).

The water storage tank is 40 feet tall.   The level detection system is calibrated to provide a level indication of 30 feet when the tank and reference leg levels are equal.

If the tank is completely filled with water, the tank level will indicate...

A. less than 30 feet.

B. 30 feet.

C. greater than 30 feet, but less than 40 feet.

D. 40 feet.
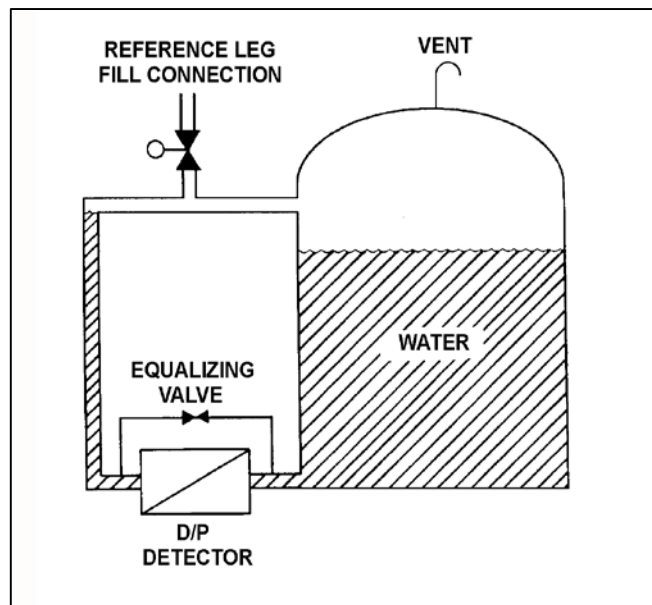
QUESTION: 5

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

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

A. There will no longer be any reference junctions.

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

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

D. The reference junctions will be located in the thermocouple connection head.
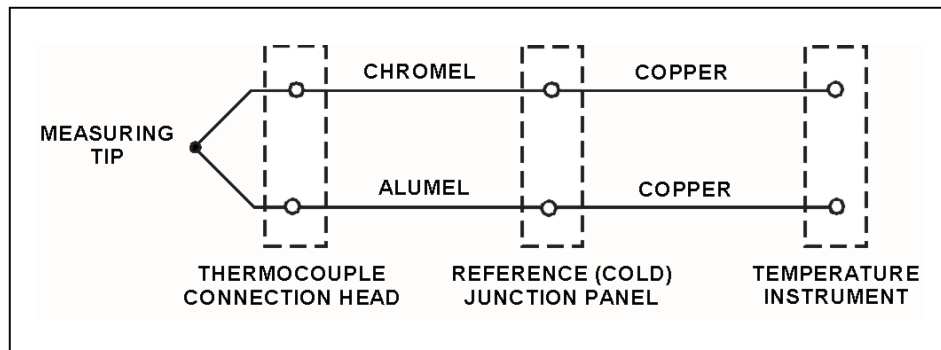
QUESTION: 6

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 increased 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. increase; less

B. increase; more

C. remain the same; less

D. remain the same: more

QUESTION: 7

A diesel generator (DG) is supplying an isolated electrical bus with the DG governor operating in the speed droop mode.   Assuming the DG does not trip, if a large electrical bus load trips, bus frequency will initially...

A. increase, then decrease and stabilize above the initial value.

B. increase, then decrease and stabilize below the initial value.

C. decrease, then increase and stabilize above the initial value.

D. decrease, then increase and stabilize below the initial value.

QUESTION: 8

Which one of the following is a characteristic that applies to a proportional-only controller, but <u>not</u> to a proportional-integral controller?
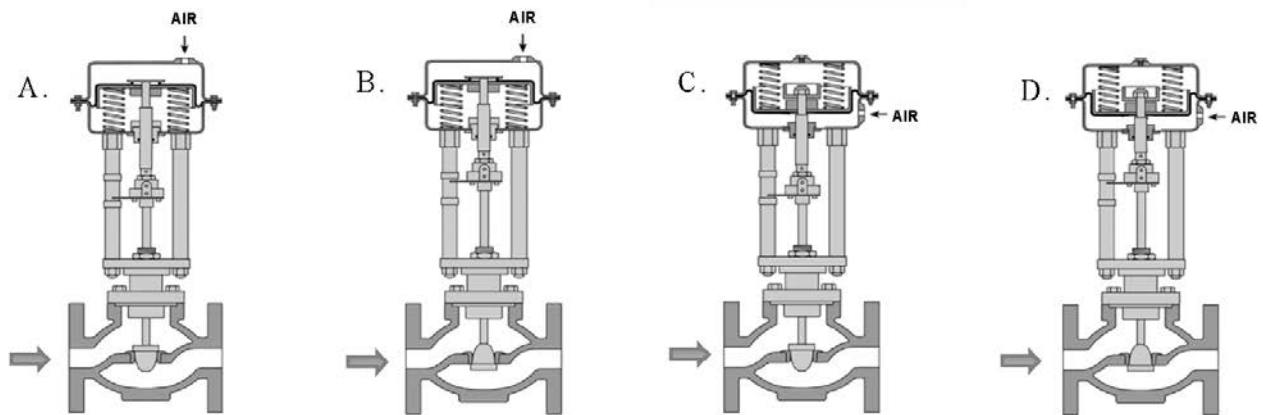
A. Gain

B. Offset

C. Rate component

D. Bistable component

QUESTION: 9

A reverse-acting proportional controller will be used to maintain level in a water storage tank by positioning an air-operated makeup water flow control valve.

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

A. A and B

B. B and C

C. C and D

D. D and A

QUESTION: 10

Refer to the drawing of a cooling water system and the associated pump/system operating curves (see figure below) in which pumps A and B are identical single-speed centrifugal pumps and only pump A is operating.

If pump B is started, system flow rate will be _____ and common pump discharge pressure will be _____.

A. the same; higher

B. higher; the same

C. the same; the same

D. higher; higher

COOLING WATER SYSTEM

OPERATING CURVES
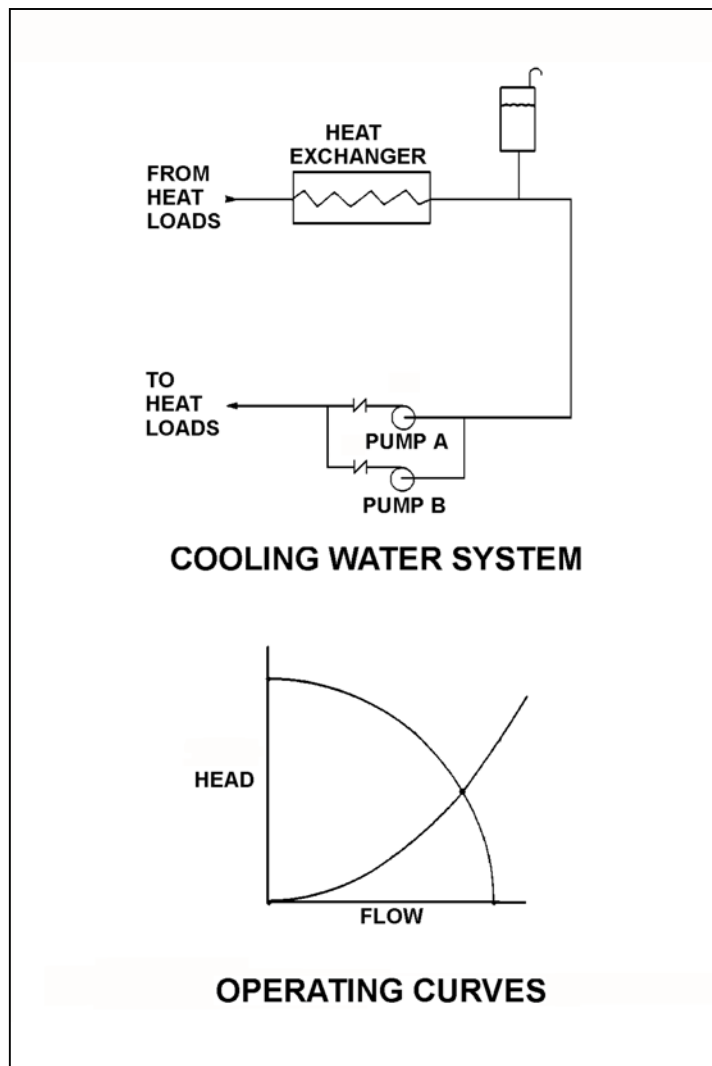
QUESTION: 11

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

How will the centrifugal pump flow rate be affected if the surge tank level decreases from 8 feet to 4 feet?   (Assume the pump maintains adequate net positive suction head.)

A. Pump flow rate will increase.

B. Pump flow rate will decrease.

C. Pump flow rate will remain the same.

D. Cannot be determined without additional information.
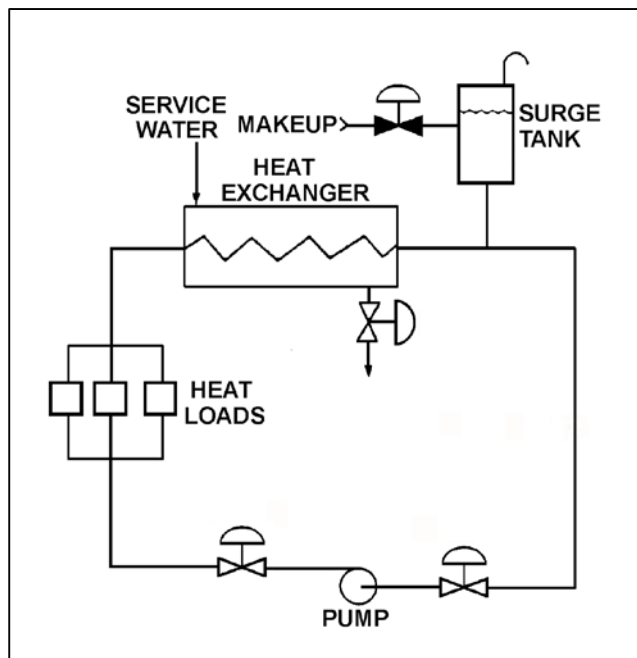
QUESTION: 12

Which one of the following specifies the proper pump discharge valve position and the basis for that position when starting a large motor-driven radial-flow centrifugal pump?

A. Discharge valve throttled to reduce motor power requirements.

B. Discharge valve fully open to reduce motor power requirements.

C. Discharge valve throttled to ensure adequate pump net positive suction head.

D. Discharge valve fully open to ensure adequate pump net positive suction head.

QUESTION: 13

Refer to the drawing of an operating curve for a positive displacement pump in a closed water system (see figure below).

Which one of the following describes the value of the head where the two curves cross?

A. The maximum amount of head that the pump can provide.

B. The amount of pump head that is required to avoid cavitation.

C. The amount of pump head that is converted to kinetic energy in the pump.

D. The amount of pump head that is converted to heat as the water circulates through the system.
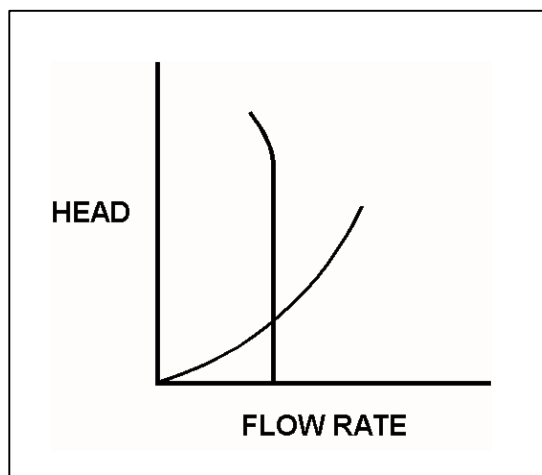
QUESTION: 14

Which one of the following trip signals will trip the breaker for an operating motor that experiences a seized rotor?

A. Undervoltage

B. Underfrequency

C. Time-delayed overcurrent

D. Instantaneous overcurrent

QUESTION: 15

A centrifugal pump is driven by a single-speed AC induction motor.   Pump flow rate is controlled by a throttled discharge flow control valve.

The following initial pump conditions exist:

    Pump motor current = 50 amps
    Pump flow rate   = 400 gpm

What will the resulting pump motor current be if the flow control valve is repositioned such that pump flow rate increases to 800 gpm?

A. 100 amps

B. 200 amps

C. 400 amps

D. Cannot be determined without additional information.

QUESTION: 16

A reactor 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   = 0.5% rated thermal power
    RHR system heat removal rate   = 5.7 x 10^7 Btu/hr
    RHR and reactor coolant c_p = 1.05 Btu/lbm-°F
    Combined RCS and RHR inventory = 450,000 lbm

Which one of the following actions will establish a reactor cooldown rate between 20°F/hour and 30°F/hour?

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

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

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

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

QUESTION: 17

Which one of the following will increase the heat transfer rate between two liquids in a heat exchanger? (Assume single-phase conditions and a constant specific heat for both liquids.)

A. The mass flow rate of the hotter liquid decreases by 10 percent.

B. The mass flow rate of the colder liquid decreases by 10 percent.

C. The inlet temperature of the hotter liquid increases by 20°F.

D. The inlet temperature of the colder liquid increases by 20°F.

QUESTION: 18

Which one of the following will cause a large pressure drop across a demineralizer that is in operation?

A. Channeling of flow through the demineralizer.

B. Decrease in flow rate through the demineralizer.

C. Accumulation of suspended solids filtered by the resin beads.

D. Improper demineralizer venting after resin fill.

QUESTION: 19

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. Which one of the following describes a system change and resulting effect that will cause the boron concentration in the ion exchanger outlet water to be greater than the boron concentration in the inlet water?

A. An increase in reactor coolant ionic impurities with higher relative affinities for the resin exchange sites will displace borate ions from the resin exchange sites.

B. An increase in reactor coolant suspended solids with greater mass than the borate ions will mechanically remove borate ions from the resin exchange sites.

C. A decrease in the temperature of the inlet water will lower the relative affinity of the resin for the borate ions, which releases borate ions from the resin exchange sites.

D. A decrease in the flow rate through the ion exchanger will lower the retention capacity of the resin, which releases borate ions from the resin exchange sites.

QUESTION: 20

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

A. Use insulated tools to prevent inadvertent contact with adjacent equipment.

B. Cover exposed energized circuits with insulating material to prevent inadvertent contact.

C. Attach a metal strap from your body to a nearby neutral ground to ensure that you are grounded.

D. Have a person standing by with the ability to remove you from the equipment in the event of an emergency.

QUESTION: 21

What is an advantage of using high-voltage disconnect switches instead of breakers to isolate main power transformers?

A. Disconnect switches can be operated either locally or remotely.

B. Disconnect switches provide direct visual indication that the circuit is broken.

C. Disconnect switches are cheaper and provide the same automatic protection as a breaker.

D. Disconnect switches are capable of interrupting a higher current flow with less heating than a breaker.

QUESTION: 22

Given the following indications for an open 4,160 VAC breaker:

   All phase overcurrent trip flags are reset.
   The control power fuses indicate blown.
   The line-side voltmeter indicates 4,160 VAC.
   The load-side voltmeter indicates 0 VAC.

Assuming <u>no</u> operator actions were taken since the breaker opened, which one of the following could have caused the breaker to open?

A. A ground fault caused an automatic breaker trip.

B. A loss of control power caused an automatic breaker trip.

C. An operator tripped the breaker manually at the breaker cabinet.

D. An operator tripped the breaker manually from a remote location.

QUESTION: 23

Which one of the following is the process that produces the majority of prompt neutrons in an operating nuclear plant reactor?

A. A thermal neutron is absorbed by a fuel nucleus.   Almost immediately, the nucleus fissions and emits one or more prompt neutrons.

B. A thermal neutron is absorbed by a fuel nucleus.   Almost immediately, the fuel nucleus fissions and produces fission products.   During the decay of the fission products, one or more prompt neutrons are emitted.

C. A fast neutron is absorbed by a fuel nucleus.   Almost immediately, the nucleus fissions and emits one or more prompt neutrons.

D. A fast neutron is absorbed by a fuel nucleus.   Almost immediately, the fuel nucleus fissions and produces fission products.   During the decay of the fission products, one or more prompt neutrons are emitted.

QUESTION: 24

With K_{eff} equal to 0.987, how much reactivity must be added to make the reactor critical? (Round answer to the nearest 0.01% ΔK/K.)

A. 1.01% ΔK/K

B. 1.03% ΔK/K

C. 1.30% ΔK/K

D. 1.32% ΔK/K

QUESTION: 25

Which one of the following is the neutron source that produces the greatest neutron flux for the first few days following a reactor trip from extended high power operations?

A. Spontaneous neutron emission from control rods.

B. Photo-neutron reactions in the moderator.

C. Spontaneous fission in the fuel.

D. Alpha-neutron reactions in the fuel.

QUESTION: 26

A reactor has an initial effective fuel temperature of 800EF. If the effective fuel temperature increases to 1,000EF, the fuel temperature coefficient will become _____ negative; because at higher effective fuel temperatures, a 1EF increase in effective fuel temperature produces a _____ change in Doppler broadening.

A. less; greater

B. less; smaller

C. more; greater

D. more; smaller

QUESTION: 27

A nuclear power plant has been operating at steady-state 50 percent power for one month following a refueling outage. Then, reactor power is ramped to 100 percent over a 2-hour period.

During the power increase, most of the positive reactivity added by the operator is necessary to overcome the negative reactivity associated with the...

A. increased reactor coolant temperature.

B. buildup of core xenon-135.

C. burnout of burnable poisons.

D. increased fuel temperature.

QUESTION: 28

The main reason for designing and operating a reactor with a flattened neutron flux distribution is to...

A. provide even burnup of control rods.

B. reduce neutron leakage from the core.

C. achieve a higher average power density.

D. provide more accurate nuclear power indication.

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 has been operating at full power for several weeks.   Xenon-135 is being directly produced as a fission product in approximately _____ percent of all fissions.

A. 100

B. 30

C. 3

D. 0.3

QUESTION: 31

A reactor has been shut down for 5 days to perform maintenance.   A reactor startup is performed, and power is ramped to 75 percent over a 16-hour period.

When power reaches 75 percent, the concentration of xenon-135 will be...

A. decreasing toward an upturn.

B. increasing toward a peak value.

C. decreasing toward an equilibrium value.

D. increasing toward an equilibrium value.

QUESTION: 32

During a six-month period of continuous 100 percent power operation in the middle of a fuel cycle, the reactor coolant boron concentration must be decreased periodically to compensate for...

A. buildup of fission product poisons and decreasing control rod worth.

B. fuel depletion and buildup of fission product poisons.

C. decreasing control rod worth and burnable poison burnout.

D. burnable poison burnout and fuel depletion.

QUESTION: 33

A reactor is shutdown with a K_{eff} of 0.8. The source range count rate is stable at 800 cps. What percentage of the core neutron population is being contributed directly by neutron-induced fission?

A. 10 percent

B. 20 percent

C. 80 percent

D. 100 percent

QUESTION: 34

A reactor is critical at a stable power level below the point of adding heat (POAH) when a small amount of positive reactivity is added.   Which one of the following reactivity coefficient(s) will stabilize reactor power at the POAH?

A. Moderator temperature only

B. Fuel temperature only

C. Moderator temperature and fuel temperature

D. Fuel temperature and moderator voids

QUESTION: 35

A high boron concentration is necessary at the beginning of a fuel cycle to...

A. compensate for excess reactivity in the fuel.

B. produce a negative moderator temperature coefficient.

C. flatten the axial and radial neutron flux distributions.

D. maximize control rod worth until fission product poisons accumulate.

QUESTION: 36

A nuclear power plant has been operating at 100 percent power for six months when a reactor trip occurs.   Which one of the following describes the source(s) of core heat generation 30 minutes after the reactor trip?

A. Fission product decay is the <u>only</u> significant source of core heat generation.

B. Delayed neutron-induced fission is the <u>only</u> significant source of core heat generation.

C. Fission product decay and delayed neutron-induced fission are <u>both</u> significant sources and produce approximately equal rates of core heat generation.

D. Fission product decay and delayed neutron-induced fission are <u>both</u> insignificant sources and generate core heat at rates that are less than the rate of ambient heat loss from the core.
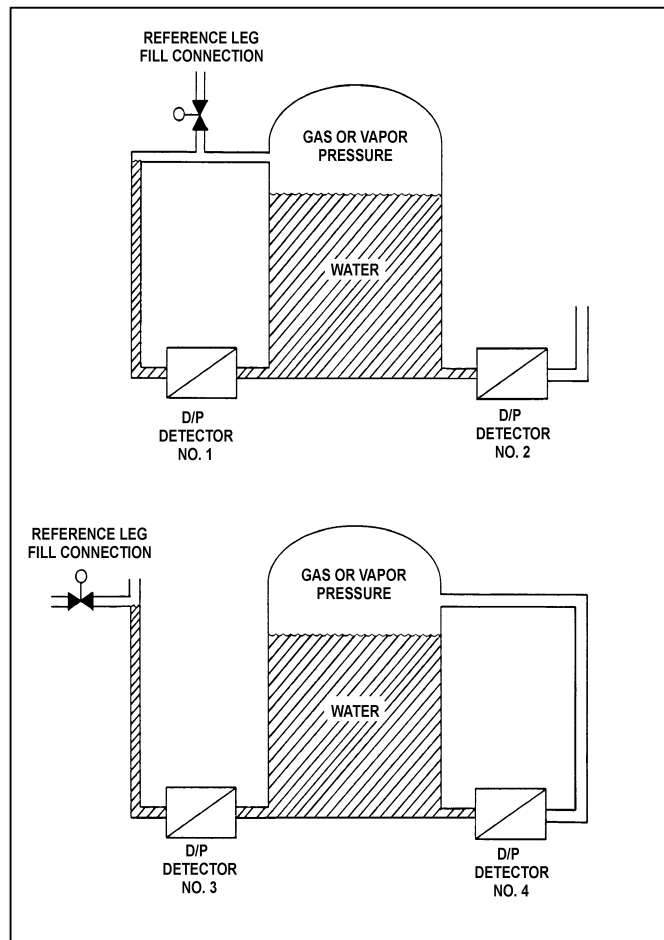
QUESTION: 37

Refer to the drawing of two water storage tanks with four differential pressure (D/P) level detectors (see figure below).

The tanks are identical and are being maintained at 17 psia and 70 percent water level (calibration conditions). They are located in a building that is currently at atmospheric pressure.

If the building ventilation system creates a vacuum in the building, which level detectors will provide the lowest level indications?

A. 1 and 3

B. 1 and 4

C. 2 and 3

D. 2 and 4

QUESTION: 38

A reactor is operating normally at 100 percent power. Reactor coolant enters the reactor vessel at a temperature of 556°F and a total flow rate of 320,000 gpm. The reactor coolant leaves the reactor vessel at 612°F.

What is the approximate flow rate of the reactor coolant leaving the reactor vessel?

A. 320,000 gpm

B. 330,000 to 339,000 gpm

C. 340,000 to 349,000 gpm

D. 350,000 to 359,000 gpm

QUESTION: 39

Dry saturated steam enters a turbine at 1000 psia with the turbine exhaust pressure at 2 psia. The efficiency of the turbine is 85 percent. What is the approximate specific work output of the turbine?

A. 329 Btu/lbm

B. 355 Btu/lbm

C. 387 Btu/lbm

D. 455 Btu/lbm

QUESTION: 40

A nuclear power plant is being maintained at 2,220 psig.   A pressurizer relief valve is leaking dry saturated steam to a collection tank, which is being held at 20 psig.

Which one of the following is the approximate temperature of the fluid downstream of the relief valve?

A. 162°F

B. 228°F

C. 259°F

D. 320°F

QUESTION: 41

A nuclear power plant is initially operating at 85 percent reactor power when extraction steam to a high-pressure feedwater heater is isolated.   Main generator load is returned to its initial value.   When the plant stabilizes, reactor power will be _____ than 85 percent; and the steam cycle thermal efficiency will be _____.

A. greater; lower

B. greater; higher

C. less; lower

D. less; higher

QUESTION: 42

A centrifugal water pump was returned to service after maintenance.   However, the operator failed to vent the pump.

Compared to normal pump operating conditions, after the pump is started the operator will see a _____ flow rate and a _____ discharge head.

A. lower; lower

B. lower; higher

C. higher; lower

D. higher; higher

QUESTION: 43

A plant shutdown will be performed because of leakage from the main condenser cooling water system into the main condenser via a tube leak.

Given the following initial conditions:

- Main condenser pressure is 1.7 psia.
- Atmospheric pressure is 14.7 psia
- Main condenser cooling water pressure at the location of the tube leak is 18 psig.
- Cooling water leak rate into the main condenser is 80 gpm.

If the main condenser is brought to atmospheric pressure, with <u>no</u> changes to the main condenser cooling water system parameters, what will be the approximate rate of cooling water leakage into the main condenser?

A. 36 gpm

B. 52 gpm

C. 61 gpm

D. 72 gpm

QUESTION: 44

Which one of the following describes a heat transfer flow path in which conduction is the dominant mode of heat transfer?

A. From the fuel rods to the core barrel during core uncovery.

B. From the main turbine exhaust steam to the atmosphere via main condenser cooling water and a cooling tower during normal operation.

C. From the fuel rods to the steam outlet of the steam generators during a station blackout.

D. From a fuel pellet to the fuel cladding via the fuel rod fill gas during normal operation.

QUESTION: 45

If the fission rate in a 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: 46

Assume that a 30°F subcooling margin is maintained in the reactor coolant system (RCS) hot legs during each of the following shutdown reactor cooldown operations.   Which one of the following will maintain the greatest subcooling margin in the reactor vessel head?

A. Performing a 25°F/hr RCS cooldown with natural circulation using one steam generator.

B. Performing a 25°F/hr RCS cooldown with all reactor coolant pumps running.

C. Performing a 100°F/hr RCS cooldown with natural circulation using all steam generators.

D. Performing a 100°F/hr RCS cooldown with one reactor coolant pump running.
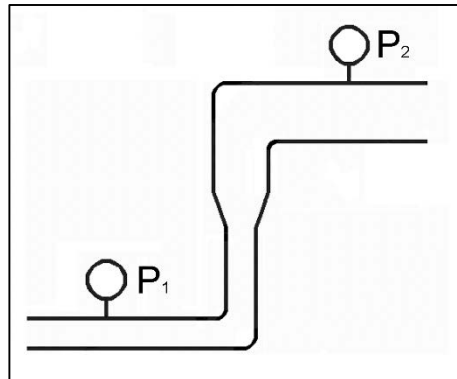
QUESTION: 47

Refer to the drawing of a section of pipe that contains flowing subcooled water (see figure below).

Given:

- The pressure at P_1 is 20 psig.
- The pressure at P_2 is 20 psig.
- The pressure change caused by the change in velocity is 2 psig.
- The pressure change caused by the change in elevation is 8 psig.

The pressure decrease due to friction head loss between P_1 and P_2 is _____; and the direction of flow is from _____.

A. 6 psig; left to right

B. 6 psig; right to left

C. 10 psig; left to right

D. 10 psig; right to left

QUESTION: 48

Adequate core bypass flow is needed to...

A. cool the excore nuclear instrument detectors.

B. provide reactor coolant pump minimum flow requirements.

C. prevent stratification of reactor coolant inside the reactor vessel lower head.

D. equalize the temperatures between the reactor vessel and the reactor vessel upper head.

QUESTION: 49

A nuclear power plant is operating at steady-state 80 percent power in the middle of a fuel cycle.   All control rods are fully withdrawn and in manual control.   Core axial power distribution is peaked below the core midplane.

Which one of the following will cause the maximum axial peaking (or hot channel) factor to initially decrease?

A. One bank of control rods is inserted 10 percent.

B. Turbine load/reactor power is reduced by 10 percent.

C. Reactor coolant system boron concentration is reduced by 10 ppm.

D. A control rod located at the edge of the core fully inserts into the core.

QUESTION: 50

Which one of the following reactor coolant system (RCS) events would be <u>most</u> 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 ***

MARCH 2015 NRC GENERIC FUNDAMENTALS EXAMINATION
PRESSURIZED WATER REACTOR - ANSWER KEY

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