UNITED STATES NUCLEAR REGULATORY COMMISSION
PRESSURIZED WATER REACTOR GENERIC FUNDAMENTALS EXAMINATION
MARCH 2007--FORM A

Please Print

Name: _____

Docket No.: _____

Facility: _____

Start Time: _____ Stop Time: _____

INSTRUCTIONS TO APPLICANT

Answer all the test items using the answer sheet provided, ensuring a single answer is marked for each test item. Each test item has equal point value. A score of at least 80% is required to pass this portion of the NRC operator licensing written examination. All examination papers will be collected 3.0 hours after the examination starts. This examination applies to a typical 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 GUIDELINES FOR THE NRC
GENERIC FUNDAMENTALS EXAMINATION

During the administration of this examination the following rules apply:

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

1. Print your name in the blank provided on the cover sheet of the examination.

2. Fill in your individual docket number.

3. Fill in the name of your facility.

4. Fill in your start and stop times at the appropriate time.

5. Two aids are provided for your use during the examination:

   (1) An equations and conversions sheet contained within the examination copy, and

   (2) Steam tables and Mollier Diagram provided by your proctor.

6. Place your answers on the answer sheet provided. Credit will only be given for answers properly marked on this sheet. Follow the instructions for filling out the answer sheet.

7. Scrap paper will be provided for calculations.

8. Cheating on the examination will result in the automatic forfeiture of this examination. Cheating could also result in severe penalties.

9. Restroom trips are limited. Only **ONE** examinee may leave the room at a time. In order to avoid the appearance or possibility of cheating, avoid all contact with anyone outside of the examination room.

10. After you have completed the examination, sign the statement on the cover sheet indicating that the work is your own and you have neither given nor received any assistance in completing the examination. Either pencil or pen may be used.

11. Turn in your examination materials, answer sheet on top, followed by the examination booklet, then examination aids - steam table booklets, handouts, and scrap paper used during the examination.

12. After turning in your examination materials, leave the examination area, as defined by the proctor. If after leaving you are found in the examination area while the examination is in progress, your examination may be forfeited.

GENERIC FUNDAMENTALS EXAMINATION
EQUATIONS AND CONVERSIONS HANDOUT SHEET

EQUATIONS

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

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

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

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

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

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

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

$SUR = 26.06/\tau$

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

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

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

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

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

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

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

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

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

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

$1/M = CR_1/CR_X$

$A = \pi r^2$

$F = PA$

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

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

$E = IR$

Eff. = 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

Which one of the following valves is used to control the direction of fluid flow and prevent backflow in a system?

A. Gate valve

B. Relief valve

C. Globe valve

D. Check valve

QUESTION: 2

Which one of the following is <u>not</u> a generally accepted method for locally verifying that a valve is open?

A. Observe local flow rate instrumentation.

B. Check the local valve position indicator indicates "open."

C. Turn the valve operator in the "close" direction and verify that some movement occurs.

D. Attempt to turn the valve operator in the "open" direction and verify that no movement occurs.

QUESTION: 3

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

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

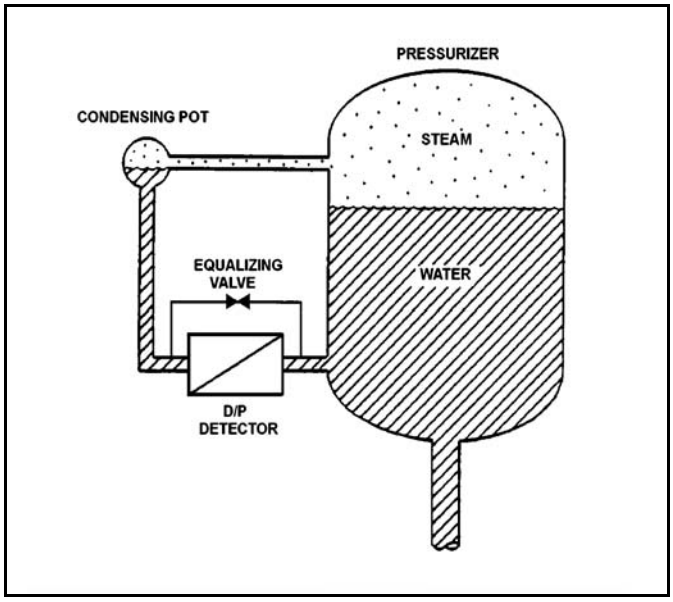
How will the level indications on the two channels compare when the pressurizer is at 160°F?

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

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

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

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



QUESTION: 4

A simple bellows pressure detector is connected to a cooling water system. The detector is located in the reactor containment and has its low pressure side vented to the containment atmosphere. Current system pressure indication is 100 psig.

If a main steam line break raises containment pressure by 40 psig, the system pressure indication will: (Disregard any temperature effect on the pressure detector.)

A. increase by 40 psig.

B. increase by the square root of 40 psig.

C. decrease by 40 psig.

D. decrease by the square root of 40 psig.

QUESTION: 5

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

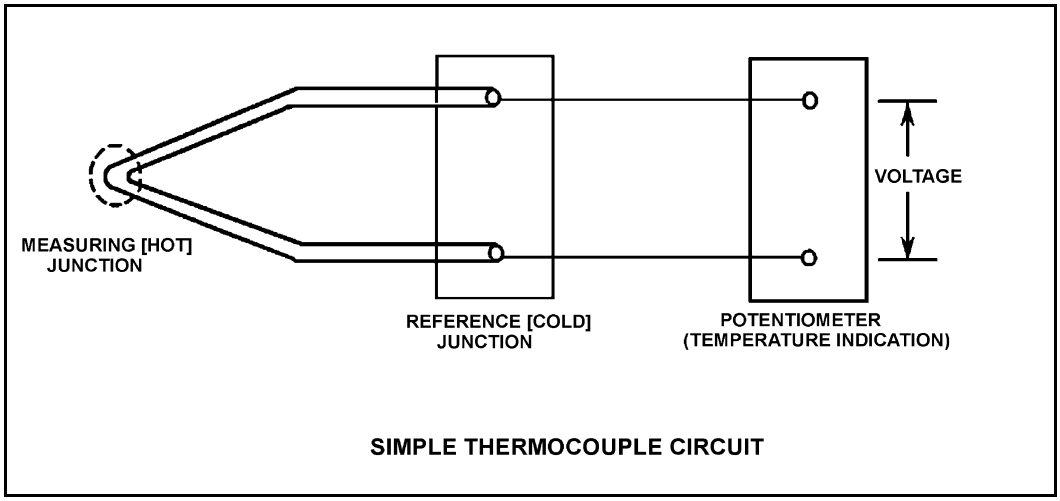
Thermocouple temperature indication is 410°F with the reference (cold) junction at 125°F. An ambient temperature decrease lowers reference junction temperature to 110°F. Assume the measuring junction temperature remains constant. Without temperature compensation for the reference junction, the new thermocouple temperature indication will be...

A. 380°F.

B. 395°F.

C. 410°F.

D. 425°F.



SIMPLE THERMOCOUPLE CIRCUIT

QUESTION: 6

Which one of the following devices is capable of providing remote indication of valve position on an analog meter in units of "percent of full open"?

A. Reed switch

B. Limit switch

C. Resistance temperature detector

D. Linear variable differential transformer

QUESTION: 7

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

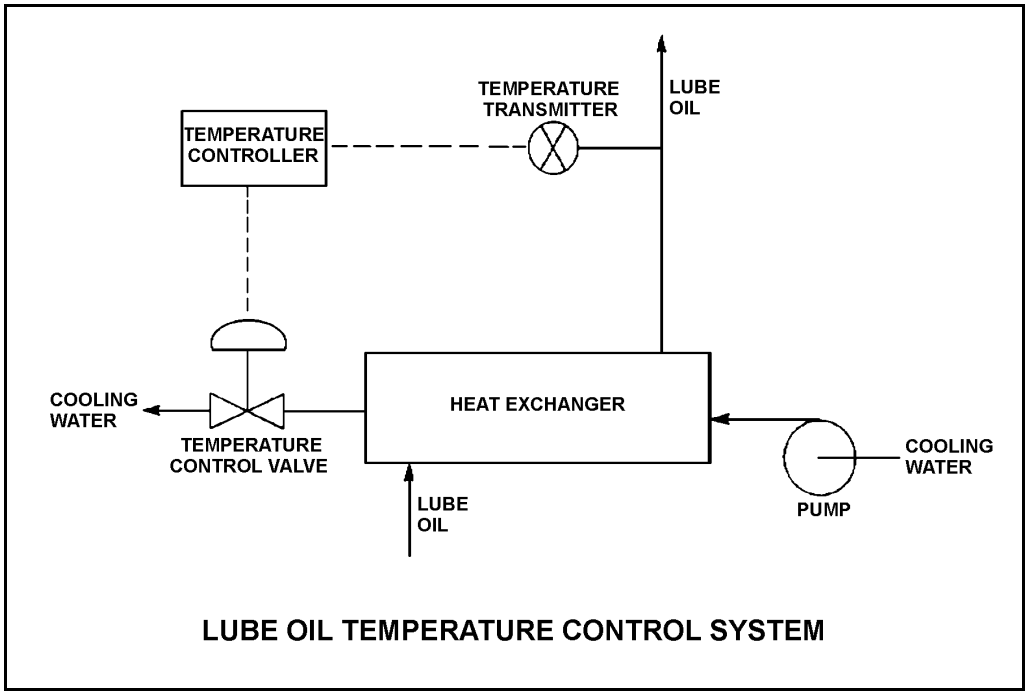
The temperature controller is a direct-acting proportional controller with a gain of 1.0. Which one of the following describes the effect of changing the gain to 2.0?

A. Half the temperature deviation from setpoint will produce a given controller output.

B. Twice the temperature deviation from setpoint will produce a given controller output.

C. The temperature control valve will move half as far for a given change in controller output.

D. The temperature control valve will move twice as far for a given change in controller output.



LUBE OIL TEMPERATURE CONTROL SYSTEM

QUESTION: 8

The water level in a water storage tank is being controlled by an automatic bistable level controller. If water level increases to 70%, the controller bistable turns on to open a tank drain valve. When water level decreases to 60%, the controller bistable turns off to close the drain valve.

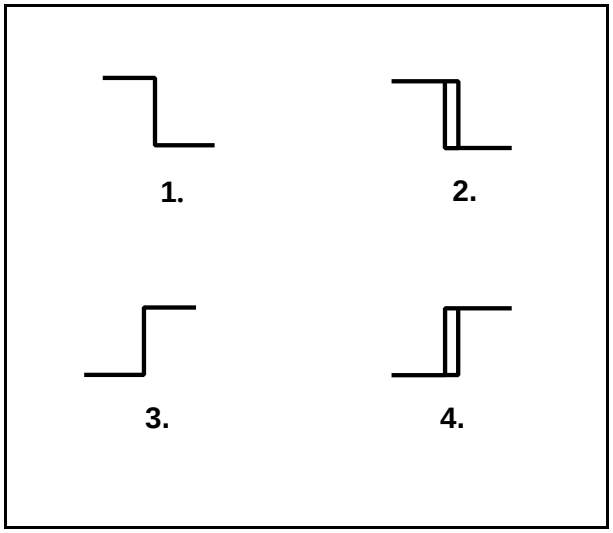
Which one of the following bistable symbols indicates the characteristics of the bistable used in the level controller?

A. 1.

B. 2.

C. 3.

D. 4.



QUESTION: 9

Prior to shifting a valve controller from automatic to manual control, why should the automatic and manual controller output signals be matched?

A. To prevent a sudden valve repositioning during the transfer.

B. To move the valve to the new position prior to the transfer.

C. To ensure the valve will operate in manual control upon demand.

D. To ensure valve position indication is accurate in manual control.

QUESTION: 10

A centrifugal fire water pump takes a suction on an open storage tank and discharges through a fire hose. Which one of the following will cause the pump to operate at shutoff head?

A. A firefighter inadvertently severs the fire hose.

B. The fire hose becomes partially crimped in a fire door.

C. Fire water storage tank level drops below the pump suction tap.

D. A firefighter adjusts the fire hose nozzle spray pattern from “deluge” to “off”.

QUESTION: 11

A flow-limiting venturi in the discharge piping of a centrifugal pump decreases the potential for the pump to experience...

A. runout

B. reverse flow

C. shutoff head

D. water hammer

QUESTION: 12

Which one of the following describes a reason for designing centrifugal pumps with suction nozzles that are larger than their discharge nozzles?

A. Increases total pump head by increasing the velocity head at the suction of the pump.

B. Increases the differential pressure across the pump by decreasing pump head loss.

C. Increases pump available net positive suction head by decreasing head loss at the pump suction.

D. Increases pump capacity by decreasing turbulence at the suction of the pump.

QUESTION: 13

An ideal (no slip) reciprocating positive displacement pump is operating to provide makeup water to a reactor coolant system that is being maintained at 2,200 psig. The discharge valve of the pump was found to be throttled to 80% open.

If the valve is subsequently fully opened, pump flow rate will _____ and pump head will _____.

A. increase; decrease

B. remain constant; decrease

C. increase; remain constant

D. remain constant; remain constant

QUESTION: 14

A multi-speed motor-driven centrifugal pump is operating with the following parameters:

Motor current = 27 amps
Pump head = 50 psi
Pump flow rate = 880 gpm

Which one of the following will be the approximate new value of pump head if pump speed is increased such that the motor current is now 64 amperes?

A. 89 psi

B. 119 psi

C. 211 psi

D. 281 psi

QUESTION: 15

A large centrifugal pump is driven by a 200 horsepower 4.16 kV ac 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 unexpectedly tripped. In this situation, which one of the following is the most likely cause of the breaker trip?

A. Motor thermal overload

B. Blown control power fuse

C. Instantaneous overcurrent

D. Anti-pumping device actuation

QUESTION: 16

Refer to the drawing of two system curves for a typical main condenser cooling water system (see figure below).

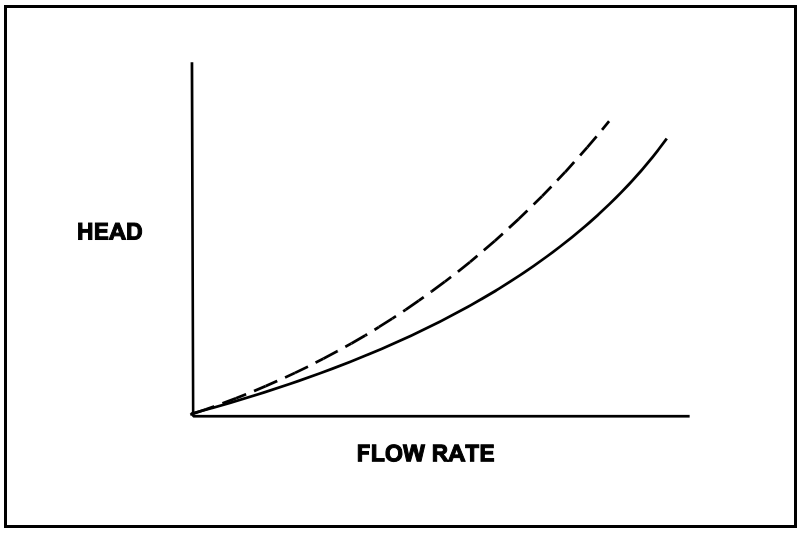
Which one of the following will result in the system curve shifting from the solid curve toward the dashed curve?

A. The main condenser tubes are cleaned.

B. The main condenser tubes become increasingly fouled.

C. Cooling water system flow rate is increased by 25% by starting an additional cooling water pump.

D. Cooling water system flow rate is decreased by 25% by stopping one of the operating cooling water pumps.



QUESTION: 17

A nuclear power plant is operating normally at 50% power. Which one of the following will result from a cooling water tube rupture in the main condenser?

A. Increased condenser vacuum

B. Increased conductivity of the condensate

C. Decreased condensate pump net positive suction head

D. Decreased condensate pump flow rate

QUESTION: 18

How does demineralizer differential pressure indicate the condition of a demineralizer resin bed?

A. Low differential pressure indicates flow blockage in the demineralizer.

B. Low differential pressure indicates that the demineralizer resin bed is exhausted.

C. High differential pressure indicates flow blockage in the demineralizer.

D. High differential pressure indicates that the demineralizer resin bed is exhausted.

QUESTION: 19

A nuclear power plant is operating at a stable 70% power level when the temperature of the reactor coolant letdown passing through a boron-saturated mixed bed ion exchanger increases by 20°F.

As a result, the boron concentration in the effluent of the ion exchanger will _____ because the affinity of the ion exchanger for boron atoms has _____.

A. decrease; decreased

B. decrease; increased

C. increase; decreased

D. increase; increased

QUESTION: 20

Refer to the drawing of a motor and its control circuit (see figure below).

Note: Relay contacts are shown open/closed according to the standard convention for control circuit drawings.

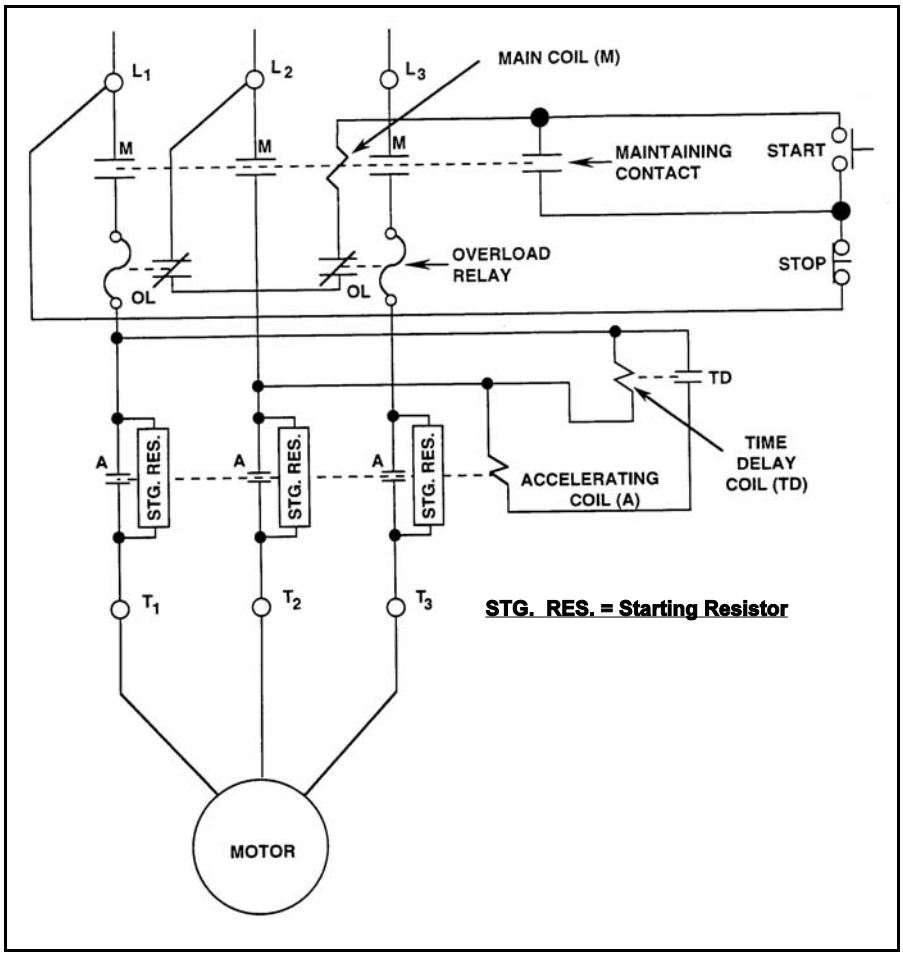
The motor has been idle for several days when it is decided to start the motor. What is the status of the starting resistors before and after the motor START pushbutton is depressed?

A. Initially bypassed; bypass is removed immediately after the START pushbutton is depressed.

B. Initially bypassed; bypass is removed following a preset time delay after the START pushbutton is depressed.

C. Initially inserted in the motor circuit; bypassed immediately after the START pushbutton is depressed.

D. Initially inserted in the motor circuit; bypassed following a preset time delay after the START pushbutton is depressed.



QUESTION: 21

A main generator is about to be connected to an infinite power grid. Generator output frequency is slightly higher than grid frequency and generator output voltage is equal to grid voltage.

Which one of the following situations will exist when the main generator electrical conditions stabilize immediately after the generator output breaker is closed? (Assume no additional operator actions are taken.)

A. Generator output current will be 0.

B. Generator power factor will be 0.

C. Generator output MVAR will be 0.

D. Generator output MW will be 0.

QUESTION: 22

The following indications are observed for a motor breaker in the control room:

Red position indicating light is off.
Green position indicating light is off.
Load amps indicate normal load current.

Assuming one of the indicating lights is burned out, what is the condition of the breaker?

A. Closed and racked in

B. Open and racked in

C. Closed and racked to "test" position

D. Open and racked to "test" position

QUESTION: 23

Which one of the following types of neutrons in a nuclear reactor is more likely to cause fission of a U-238 nucleus in the reactor fuel? (Assume that each type of neutron remains in the reactor core until it interacts with a U-238 nucleus.)

A. Thermal neutron

B. Neutron at a U-238 resonance energy

C. Prompt fission neutron beginning to slow down

D. Delayed fission neutron beginning to slow down

QUESTION: 24

A nuclear reactor is initially subcritical with the effective multiplication factor (K_{eff}) equal to 0.998. After a brief withdrawal of control rods, K_{eff} equals 1.002. The reactor is currently...

A. prompt critical.

B. supercritical.

C. exactly critical.

D. subcritical.

QUESTION: 25

A xenon-free shutdown nuclear power plant is slowly cooling down due to an unisolable steam leak. The leak began when reactor coolant temperature was 400°F and the readings on all source range channels were 80 cps. Currently, reactor coolant temperature is 350°F and all source range channels indicate 160 cps.

Assume that the moderator temperature coefficient remains constant throughout the cooldown, and no operator action is taken. What will be the status of the reactor when reactor coolant temperature reaches 290°F?

A. Subcritical, with source range count rate below 320 cps.

B. Subcritical, with source range count rate above 320 cps.

C. Supercritical, with source range count rate below 320 cps.

D. Supercritical, with source range count rate above 320 cps.

QUESTION: 26

Which one of the following isotopes is the most significant contributor to resonance capture of fission neutrons in a nuclear reactor core at the end of a fuel cycle?

A. U-235

B. U-238

C. Pu-239

D. Pu-240

QUESTION: 27

Neglecting the effects of core Xe-135, which one of the following power changes requires the greatest amount of positive reactivity addition?

A. 3% power to 10% power

B. 10% power to 25% power

C. 25% power to 60% power

D. 60% power to 100% power

QUESTION: 28

Which one of the following parameters typically has the greatest effect on the shape of a differential rod worth curve?

A. Core xenon distribution

B. Burnable poison distribution

C. Core axial neutron flux distribution

D. Core radial neutron flux distribution

QUESTION: 29

A nuclear reactor has been operating at 100% power for 3 weeks shortly after a refueling outage. All control rods are fully withdrawn,. Which one of the following describes why most of the power is being produced in the lower half of the core?

A. The fuel loading in the lower half of the core contains a higher U-235 enrichment.

B. Reactor coolant boron is adding more negative reactivity in the upper half of the core.

C. There is a greater concentration of Xe-135 in the upper half of the core.

D. The moderator temperature coefficient of reactivity is adding more negative reactivity in the upper half of the core.

QUESTION: 30

Which one of the following explains why core Xe-135 oscillations are a concern in a nuclear reactor?

A. They can adversely affect core power distribution and can require operation below full rated power.

B. They can adversely affect core power distribution and can prevent a reactor startup following a reactor trip.

C. They can cause rapid reactor power changes during power operation and can require operation below full rated power.

D. They can cause rapid reactor power changes during power operation and can prevent a reactor startup following a reactor trip.

QUESTION: 31

A nuclear reactor has been operating at 100% power for two months. A manual reactor trip is required for a test. The trip will be followed immediately by a reactor startup with criticality scheduled to occur 8 hours after the trip.

The greater assurance that fission product poison reactivity will permit criticality during the startup will exist if the reactor is operated at _____ power for one week prior to the trip and if criticality is rescheduled for _____ hours after the trip.

A. 80%; 6

B. 80%; 10

C. 90%; 6

D. 90%; 10

QUESTION: 32

A nuclear reactor has been shut down for 8 hours following a loss of offsite power. A reactor coolant system (RCS) cooldown on single-phase natural circulation is in progress.

Compared to adding boric acid to the RCS during forced circulation, adding boric acid during natural circulation requires _____ time to achieve complete mixing in the RCS; and, once completely mixed at a given coolant temperature, a 1 ppm increase in RCS boron concentration during natural circulation will cause a/an _____ change in core reactivity.

A. less; equal

B. less; smaller

C. more; equal

D. more; smaller

QUESTION: 33

A nuclear power plant was operating at steady-state 100% power near the end of a fuel cycle when a reactor trip occurred. Four hours after the trip, with reactor coolant temperature at normal no-load temperature, which one of the following will cause the fission rate in the reactor core to increase?

A. The operator fully withdraws the shutdown control rods.

B. Reactor coolant temperature is allowed to increase by 3°F.

C. Reactor coolant boron concentration is increased by 10 ppm.

D. An additional two hours is allowed to pass with no other changes in plant parameters.

QUESTION: 34

A nuclear reactor is critical at the point of adding heat (POAH) when a small amount of negative reactivity is added to the core. If the same amount of positive reactivity is added to the core approximately 5 minutes later, reactor power will...

A. increase and stabilize at the POAH.

B. quickly stabilize at a power level below the POAH.

C. continue to decrease on a negative 80 second period until the shutdown equilibrium neutron level is reached.

D. continue to decrease with an unknown period until the shutdown equilibrium neutron level is reached.

QUESTION: 35

A nuclear power plant is operating at 100% power near the end of core life. The greatest contribution to core heat production is being provided by the fission of...

A. U-235 and U-238.

B. U-235 and Pu-239.

C. U-238 and Pu-239.

D. U-238 and Pu-241.

QUESTION: 36

A nuclear reactor is initially critical in the source range during a reactor startup when the control rods are inserted a small amount. Reactor startup rate stabilizes at -0.15 dpm. Assuming startup rate remains constant, how long will it take for source range count rate to decrease by one-half?

A. 0.3 minutes

B. 2.0 minutes

C. 3.3 minutes

D. 5.0 minutes

QUESTION: 37

Refer to the drawing of four differential pressure (D/P) level detectors (see figure below).

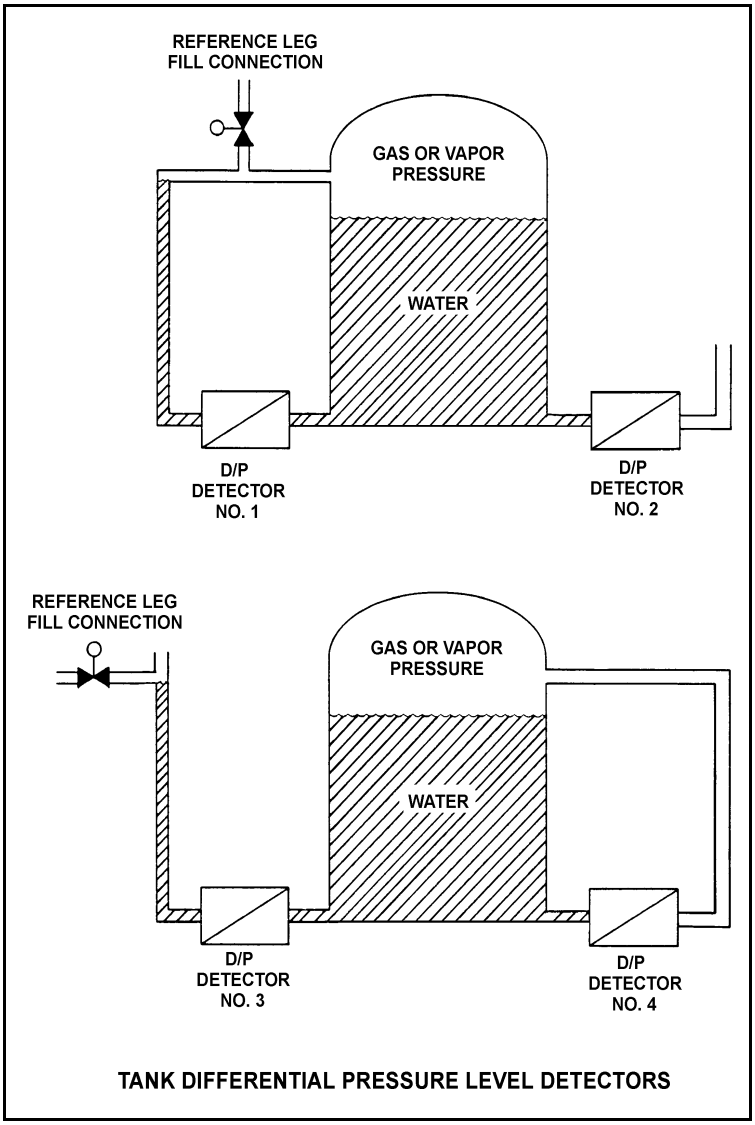
The tanks are identical and are being maintained at 17 psia and 50% water level. They are surrounded by atmospheric pressure. Which one of the level detectors will sense the greatest D/P?

A. 1

B. 2

C. 3

D. 4



TANK DIFFERENTIAL PRESSURE LEVEL DETECTORS

QUESTION: 38

A nuclear power plant is shut down with the following pressurizer conditions:

Pressurizer liquid temperature: 588°F
Pressurizer vapor temperature: 607°F
Pressurizer pressure: 1,410 psia

If the pressurizer is vented until pressure equals 1,200 psia, pressurizer liquid temperature will...

A. increase due to evaporation of liquid.

B. increase due to condensation of vapor.

C. decrease due to evaporation of liquid.

D. decrease due to condensation of vapor.

QUESTION: 39

A feedwater pump discharges into a 16-inch diameter discharge line. Given the following:

Pump discharge pressure: 950 psia
Feedwater temperature: 300°F
Feedwater velocity: 15.2 ft/sec

What is the feedwater pump discharge flow rate in pounds-mass per hour (lbm/hr)?

A. 1.1×10^6 lbm/hr

B. 4.4×10^6 lbm/hr

C. 1.8×10^7 lbm/hr

D. 5.3×10^7 lbm/hr

QUESTION: 40

Refer to the drawing of two 1,000 ft^3 pressure vessels with relief protection (see figure below).

Both vessels are in saturated conditions at 281°F and approximately 35 psig. Vessel A is completely filled with saturated water. Vessel B contains one-half saturated steam (100% quality) volume and one-half saturated water (0% quality) volume. Both vessels are protected by identical relief valves.

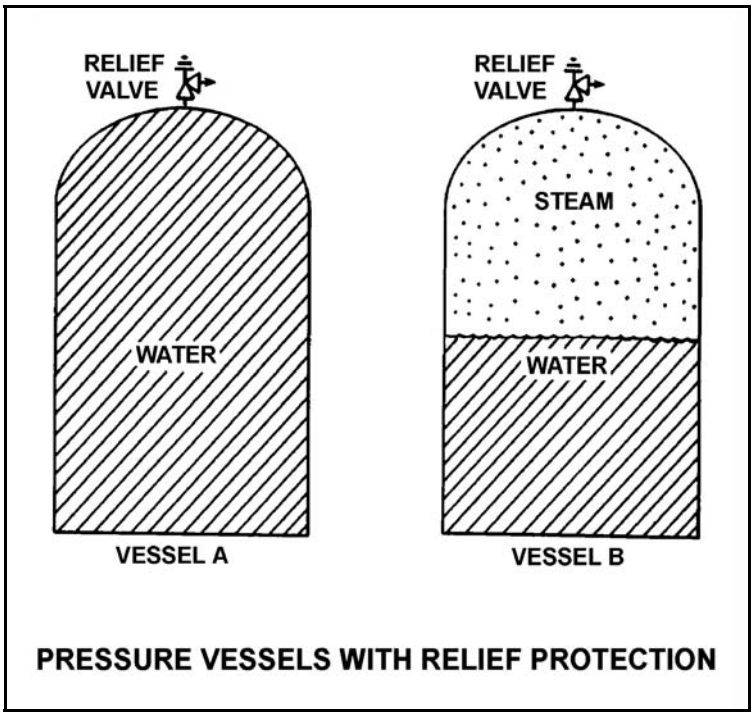
If both relief valves begin to leak at a rate of 0.1% of design flow, the higher temperature fluid will initially be leaving the relief valve of vessel _____. And, if 100 lbm of fluid is released through both relief valves, the larger pressure decrease will occur in vessel _____.

A. A; A

B. A; B

C. B; A

D. B; B



PRESSURE VESSELS WITH RELIEF PROTECTION

QUESTION: 41

Consider the thermal efficiency of a nuclear power plant operating at rated power.

If the pressure at which saturated steam is produced in the steam generators is increased, thermal efficiency will _____; and if the temperature of the feedwater entering the steam generators is increased, thermal efficiency will _____.

A. increase; increase

B. increase; decrease

C. decrease; increase

D. decrease; decrease

QUESTION: 42

A 47 gpm leak to atmosphere has developed from a cooling water system that is operating at 150 psig. Which one of the following will be the approximate leak rate when system pressure has decreased to 75 psig?

A. 23.5 gpm

B. 33.2 gpm

C. 36.5 gpm

D. 37.3 gpm

QUESTION: 43

Reactor coolant system (RCS) hot leg temperature is 568°F and RCS pressure is decreasing due to a small leak. Which one of the following pressure ranges includes the pressure at which two-phase flow will first 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

A nuclear power plant is operating near 100% power. Main turbine extraction steam is being supplied to a feedwater heater. Extraction steam parameters are as follows:

Steam pressure: 500 psia
Steam flow rate: 7.0×10^5 lbm/hr
Steam enthalpy: 1,135 Btu/lbm

Assume the extraction steam condenses to a saturated liquid at 500 psia and then leaves the feedwater heater via a drain line.

Assuming an ideal heat transfer process, what is the heat transfer rate from the extraction steam to the feedwater in the feedwater heater?

A. 3.2×10^8 Btu/hr

B. 4.8×10^8 Btu/hr

C. 5.3×10^8 Btu/hr

D. 7.9×10^8 Btu/hr

QUESTION: 45

How does the convective heat transfer coefficient vary from the bottom to the top of a fuel rod if subcooled reactor coolant enters the coolant channel and exits as superheated steam?

A. Decreases continuously

B. Decreases, then increases

C. Increases continuously

D. Increases, then decreases

QUESTION: 46

A nuclear power plant is operating with the following initial conditions:

- Reactor power is 55% in the middle of a fuel cycle.
- Axial and radial power distributions are peaked in the center of the core.

Which one of the following will increase the steady-state departure from nucleate boiling ratio?

A. A reactor trip occurs and one control rod remains fully withdrawn from the core.

B. A pressurizer malfunction decreases reactor coolant system pressure by 20 psig.

C. The operator decreases reactor coolant boron concentration by 5 ppm with no rod motion.

D. Core Xe-135 depletes in proportion to the axial and radial power distribution with no rod motion.

QUESTION: 47

Which one of the following describes a function of core bypass flow?

A. Prevents excessive reactor vessel wall differential temperature

B. Prevents boron precipitation in the core baffle area

C. Provides a means of measuring core flow

D. Provides cooling to various reactor vessel internal components

QUESTION: 48

A nuclear reactor had been operating at a constant power level for the last two weeks when a loss of all ac power occurred, thereby causing a reactor trip and a loss of forced reactor coolant flow. Natural circulation reactor coolant flow developed and stabilized 30 minutes after the trip.

Which one of the following combinations of initial reactor power and post-trip steam generator pressure will result in the lowest stable natural circulation flow rate 30 minutes after the trip? (Assume constant steam generator water levels.)

	INITIAL REACTOR POWER	POST-TRIP STEAM GENERATOR PRESSURE
A.	100%	1,100 psia
B.	25%	1,100 psia
C.	100%	1,000 psia
D.	25%	1,000 psia

QUESTION: 49

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

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

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

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

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

C. Explosive hydrogen concentration inside the reactor vessel

D. Explosive hydrogen concentration inside the reactor containment building

QUESTION: 50

Which one of the following comparisons will result in a higher probability of brittle fracture failure of the reactor vessel?

A. An RCS pH of 8.5 rather than 9.0

B. A high reactor coolant oxygen content rather than a low oxygen content

C. A 50°F/hr RCS cooldown rather than a 100°F/hr heatup

D. A high gamma flux rather than a high neutron flux

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

MARCH 2007 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	D	27	41	D
3	17	D	28	42	C
4	18	C	29	43	D
5	19	D	30	44	A
6	20	D	31	45	A
7	21	A	32	46	C
8	22	D	33	47	A
9	23	A	34	48	B
10	24	D	35	49	B
11	25	A	36	50	B
12	26	C	37	1	B
13	27	B	38	2	C
14	28	A	39	3	B
15	29	A	40	4	D
16	30	B	41	5	A
17	31	B	42	6	B
18	32	C	43	7	B
19	33	C	44	8	B
20	34	D	45	9	D
21	35	C	46	10	A
22	36	A	47	11	D
23	37	C	48	12	B
24	38	B	49	13	A
25	39	D	50	14	C