Trainee Name/EE#: Branden Akana **Date:** _____

OPERATOR TRAINEE TRAINING PROGRAM
POWER PLANT EQUIPMENT

BASIC INSTRUMENTATION
QUIZ - SECTION #7

INSTRUCTIONS: FILL IN THE CORRECT ANSWERS IN PROVIDED BLANKS OR CIRCLE THE CORRECT ANSWER IF PROVIDED.

1. Instruments normally used for measuring the difference between atmospheric pressure and the pressure in a pipe or vessel are called pressure gauge.

What are the three units commonly used for pressure measurement and what type(s) of situation is it used to measure?

2. psi — positive pressure
3. inches mercury — low, negative pressures
4. inches water — very low, negative pressures

5. What is the most common liquid level measuring device?

   gauge glass

6. Bubbler tubes are utilized for liquid level measurement _____.
   a. on large storage tanks.
   (b.) in inaccessible areas.
   c. for control purposes on boiler drum level.
   d. none of the above.

7. Level meters are used where considerable accuracy is required over a small range of level. (True) \ False

8. The electromechanical device that changes temperature, pressure, flow, or position to an electrical output signal is called a transducer.

9. Changing the temperature has an effect on _____ .
   a. solid material
   b. liquid
   c. the resistance to electrical flow
   (d.) all of the above

10. Provide three (3) reasons for the frequent use of thermocouples.

   a. accurate

   b. inexpensive

   c. wide temperature range

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OPERATOR TRAINEE TRAINING PROGRAM
POWER PLANT EQUIPMENT

HEAT EXCHANGERS
QUIZ - SECTION #8

INSTRUCTIONS: FILL IN THE CORRECT ANSWERS IN PROVIDED BLANKS OR CIRCLE THE CORRECT ANSWER IF PROVIDED.

1. The term heat exchanger can be applied to any piece of equipment designed to _____

   transfer heat.

2. At the saturation temperature, water cannot retain gases in solution. (True) \ False

3. The closed heater contains which of the following features? (Circle correct answer)
   a. U-tubes
   b. Drain outlet
   c. Water box
   (d.) All of the above

4. Why is each heater provided with an alternate drain disposal route, and where is this route usually directed?

   in order to perform maintenence on a heater.
   The alternative drain disposal route leads to the condenser.

List the two (2) major functions common to all condensers.

5. provides low pressure area

6. reclaiming condensate for re-use in the cycle

7. The condenser is usually located _____.
   a. directly after the main feed pump.
   (b.) directly below the turbine exhaust.
   c. as close as possible to the boiler.
   d. None of the above.

8. Why is the water side of a condenser divided into two separate halves?

   to allow to take one side out of service to perform maintenance

9. How are non-condensable gases able to enter the condenser?

through steam or leaks

10. Name at least two (2) differences between a plate heat exchanger and a shell and tube heat exchanger.

plate heat exchangers provide turbulent flow and use transfer plates

11. List the main components of the plate heat exchanger.

- heat transfer plates
- fixed covers
- support column
- moveable cover
- gaskets
- carrying bar
- tightening bolt

12. How is the heat exchange accomplished in a plate heat exchanger?

as the two liquids flow through the transfer plates, heat is transferred through conduction

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OPERATOR TRAINEE TRAINING PROGRAM
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PUMPS
QUIZ - SECTION #9

INSTRUCTIONS: FILL IN THE CORRECT ANSWERS IN PROVIDED BLANKS OR CIRCLE THE CORRECT ANSWER IF PROVIDED.

1. All pumps have one basic purpose. That purpose is to add energy to a liquid to raise its pressure

2. An essential part of a centrifugal pump is a rotating member with vanes called the impeller.

3. If the discharge valve of a centrifugal pump is closed, the pump will stop or something will burst. True \ (False)

4. Pumps that combine the radial flow of centrifugal pumps with axial flow and are frequently used for circulating water pump service in power plants are called mixed flow.

5. Sleeve bearings may be lubricated by either oil or grease while ball and roller bearings are always oil lubricated. True \ (False)

6. For the centrifugal pump to operate satisfactorily, it must _____.
   a. have pump suction under a positive pressure.
   b. be full of water during operation.
   c. be filled with water prior to starting.
   (d.) all of the above.

7. When a pump flashes, it becomes vapor-bound and ceases to operate.
   True \ (False)

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OPERATOR TRAINEE TRAINING PROGRAM
POWER PLANT EQUIPMENT

BOILER FUNDAMENTALS
QUIZ - SECTION #10

INSTRUCTIONS: FILL IN THE CORRECT ANSWERS IN PROVIDED BLANKS OR CIRCLE THE CORRECT ANSWER IF PROVIDED.

1. Describe, briefly, what would happen should the continuous flow of water and/or steam through the boiler cease. _____

   boiler would overheat due to being less heat exchanged from the flow of water

Identify the four (4) factors that determine boiler circulation.

2. height of unit
3. operation pressure
4. heat rate
5. friction losses

6. How does natural circulation differ from forced circulation and forced flow?

   natural circulation occurs due to the pressure differential between the water and steam. forced circulation would involve using a pump to force a flow.

7. Boiler walls are made up of riser tubes known as waterwalls.

8. The construction and operation of the reheater and the superheater is essentially the same. The major difference is that the reheater handles steam at much lower pressure.

Describe two (2) causes of steam contamination.

9. carry-over
10. contaminated feedwater

11. Air is supplied to the boiler through large ducts to an enclosure on the boiler known as the windbox.

12. The opening between the wind box and furnace is known as the burner throat.

13. Combustion takes place in the area enclosed by the water walls known as the furnace and the primary heat transfer method involved is radiation.

14. The superheater, reheater, and economizer are located in the convection section of the boiler.

15. Explain how water moves through the boiler and what causes the water to move.

feedwater is pushed through the downcomer due to the difference in pressure between the feedwater and steam in the steam drum. the feedwater is then heated making it lighter and pushing it up through the riser to the steam drum.

16. Explain all the components steam moves through from when it leaves the drum until it leaves the boiler as main steam.

it passes through the primary superheater which starts the superheat process then through the secondary superheater which is located on the hottest side of the convection section and ~~other~~ heats the steam to superheat temperatures

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OPERATOR TRAINEE TRAINING PROGRAM
POWER PLANT EQUIPMENT
STEAM TRAPS
QUIZ - SECTION #11

INSTRUCTIONS: FILL IN THE CORRECT ANSWERS IN PROVIDED BLANKS OR CIRCLE THE CORRECT ANSWER IF PROVIDED.

List the three (3) major functions that steam traps must serve.

1. let out condensate and hold back steam
2. ~~hold back steam~~ remove air, gas, condensate by responding promptly to changing conditions
3. eliminate air and gas quickly

4. Where, in the power plant, are steam traps installed?

   steam lines

5. The *bellows* is one type of mechanical trap. True \ (False)

6. All basic types of _____ traps have one principle in common; they operate on change of state of the fluid coming to the trap.

   a. Thermostatic
   (b.) Mechanical
   c. Thermodynamic

7. The bimetallic element is instrumental in opening and closing a valve in some thermostatic traps. (True) \ False

8. Which of the following plays an important part in the operation of *Thermodynamic traps*?

   a. Bimetallic element
   (b.) Flash steam
   c. Valve rod
   d. None of the above

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OPERATOR TRAINEE TRAINING PROGRAM
POWER PLANT EQUIPMENT

BOILERS AND ACCESSORIES
QUIZ - SECTION #12

INSTRUCTIONS: FILL IN THE CORRECT ANSWERS IN PROVIDED BLANKS OR CIRCLE THE CORRECT ANSWER IF PROVIDED.

1. The setting for safety valves on the superheater outlet is higher than any drum safety valve setting. True \ (False)

2. What does the term blowdown describe when discussing safety valves?
   The difference between the pressure needed to open the valve and the pressure where it shuts

3. Why is a safety valve "gagged"?
   In order to stop a safety valve from leaking

4. What is a major cause of stressing for the metal of the drum?
   rapid changes in temperature between top and bottom of the boiler

5. Why do we blow soot and how does the operation affect load?
   - to remove soot and ash from the boiler tubes
   - load must be at 50% or more so the furnace provides adequate flow

6. What are the basic objectives of boiler water treatment?
   - minimize corrosion
   - keep the boiler clean (minimize scale)
   - minimize carry-over from steam

7. What is done when a large amount of dissolved solids are identified in the boiler water?
   they are removed during boiler blowdown

8. Why are gauge glasses installed on the boiler drums?
   to measure the level in the drum

9. Explain the purpose of the air preheaters?

to preheat the air from the atmosphere using leftover heat from the flue gasses leaving the furnace

What are the three (3) alarms associated with Forced Draft and Induced Draft Fans?

10. bearing temps

11. motor overcurrent

12. undervoltage

13. What is a hydrostatic test and when is it used?

- a test done to test if there are any leaks on the water or steam side of the boiler
- done before a routine overhaul or ~~if~~ after a repair tube leak

14. Explain how the steam drum removes moisture entrained in the steam.

the steam drum removes moisture from the steam in 3 stages.

1. primary separation (cyclone seperator)
2. secondary seperation (scrubber)
3. dryer (screen dryer)

15. How many relief valves are found on the drum, superheater and reheat section of the boiler?

4 it varys between the units

16. You are a molecule of air in the FD fan suction. Explain what you flow through to get out of the stack.

FD fan → air ducts → steam air ~~heat~~ heaters → air preheaters → windbox → burner throat → furnace (combusts)

→ air preheater → ID fan → stack