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39	A	B	C	D	E

PRACTICE QUESTIONS

Technical Standards and Safety Authority (TSSA)

3B-1

OE 3rd Class B1

EDITION

Demo

QUESTIONS

9

FORMAT

Limited Edition PDF

Before you begin

What this is

9 practice questions for Technical Standards and Safety Authority (TSSA) 3B-1, each with its answer key and an explanation. Answer a question before you read its key — the explanation is worth more once you have committed.

If something looks wrong

Send us three things and we will check it:

- the exam code, 3B-1
- the question number
- the email address on your order

Write to **support@mometrix.net**. We reply within one business day.

QUESTION 1 SINGLE CHOICE

In a boiler system, which property of steam is defined as the total heat content of the steam measured above a reference temperature of 0 °C (32 °F)?

- ☐ A Latent heat of vaporization
- ☐ B Specific heat of saturated liquid
- ☒ C Total heat of steam (enthalpy)
- ☐ D Specific volume of saturated vapor

ANSWER C

WHY Total heat of steam (enthalpy) is the heat content of steam referenced from 0 °C (32 °F). Latent heat is the heat required to change water to steam at the same temperature, specific heat relates to the liquid, and specific volume is the volume per unit mass.

QUESTION 2 SINGLE CHOICE

Which boiler component is primarily responsible for preheating the incoming feedwater using heat from the flue gases before they exit the stack?

- ☐ A Mud drum
- ☒ B Economizer
- ☐ C Steam dome
- ☐ D Safety valve

ANSWER B

WHY The economizer is a heat exchanger that uses waste heat from the flue gases to preheat the boiler feedwater, improving thermal efficiency. A mud drum collects sediment, a steam dome collects steam, and a safety valve relieves excess pressure.

QUESTION 3

SINGLE CHOICE

Which water treatment method is most effective at removing dissolved gases such as oxygen from boiler feedwater to prevent corrosion?

- ☐ A Filtration
- ☐ B Softening by ion exchange
- ☒ C Deaeration
- ☐ D Coagulation and flocculation

ANSWER C

WHY Deaeration removes dissolved gases, especially oxygen and carbon dioxide, from feedwater to prevent pitting and corrosion in the boiler and condensate system. Softening removes hardness, filtration removes suspended solids, and coagulation/flocculation removes colloids.

QUESTION 4

SINGLE CHOICE

When burning a typical fuel oil in a boiler furnace, an excessive supply of air compared to the stoichiometric requirement will primarily result in which condition?

- ☐ A Formation of carbon monoxide and soot
- ☐ B Reduced flue gas temperature
- ☒ C Increased heat loss through the stack due to heated excess air
- ☐ D Reduced flame temperature below ignition point

ANSWER C

WHY Excess air beyond the optimum carries additional sensible heat out through the stack, raising stack temperature losses. Too little air (insufficient) produces CO and soot; excess air does not lower flame temperature below ignition nor reduce flue gas temperature—it raises it.

QUESTION 5

SINGLE CHOICE

On a low-pressure steam boiler, the low-water fuel cutoff (LWCO) is classified as which type of protective device?

- ☐ A An indicating device only
- ☐ B A modulating control device
- ☒ C A safety device required to interrupt the fuel supply on a dangerous condition
- ☐ D An efficiency optimization device

ANSWER C

WHY The LWCO is a safety device that shuts off the fuel supply if the water level drops below a safe minimum, preventing overheating of tubes and a dry-firing condition. It is not merely an indicator or efficiency device.

QUESTION 6

SINGLE CHOICE

In a typical forced-draft burner fuel train, what is the purpose of the pilot flame proving device?

- ☐ A To measure flame temperature for combustion efficiency
- ☒ B To confirm the presence of a stable pilot flame before the main fuel valve is permitted to open
- ☐ C To regulate the primary air damper position
- ☐ D To ignite the main burner on every start cycle

ANSWER B

WHY Flame proving (commonly flame rectification or a UV/IR flame sensor) verifies that the pilot has lit and is stable before the main fuel valve is allowed to open, preventing unburned fuel accumulation. It does not measure temperature, control air, or perform ignition.

QUESTION 7

SINGLE CHOICE

Which type of valve is most commonly used on a boiler feedwater line to provide positive shutoff and is typically the preferred isolation valve for boiler feedwater piping?

- ☒ **A Gate valve**
- ☐ B Globe valve
- ☐ C Swing check valve
- ☐ D Butterfly valve

ANSWER A

WHY Gate valves provide a straight-through flow path with minimal pressure drop and are the standard choice for full-open/full-closed isolation service on boiler feedwater lines. Globe valves are used for throttling, swing check valves prevent backflow, and butterfly valves are typically used on larger-diameter lower-pressure lines.

QUESTION 8

SINGLE CHOICE

During a routine operational check of a steam boiler, a 3rd Class Operator notices that the safety valve is leaking steam. What is the correct immediate action?

- ☐ A Tighten the adjusting screw to increase the set pressure
- ☒ **B Lift the valve manually to attempt to seat it, then report and record the finding**
- ☐ C Wire the valve lever down to stop the leak
- ☐ D Increase the firing rate to blow the valve clear

ANSWER B

WHY The correct action is to manually test (lift) the safety valve if the boiler design permits, then report and record the condition so it can be repaired or set by a qualified person. Tampering with the adjusting screw, wiring the valve down, or increasing firing rate are unsafe and prohibited actions.

QUESTION 9

MULTIPLE CHOICE

During a boiler startup, which two conditions should be verified before admitting fuel to an operating burner? (Choose two.)

- ☒ **A** The furnace has been adequately purged.
- ☒ **B** All required flame-safety interlocks are in the proper operating state.
- ☐ **C** The boiler feedwater pump has been isolated from the boiler.
- ☐ **D** The stack damper is fully closed.

ANSWER A • B

WHY Before fuel is introduced, the furnace must be purged to remove an explosive mixture, and the required burner-safety interlocks must be operational. Feedwater flow must remain available to the boiler, and the stack damper must not be fully closed because the boiler requires a safe outlet for combustion gases.