1. How many rafters are to be installed at a chord distance of 6 ft. 3 1/8 in. on a 40-ft. diameter tank?
   A. 20
   B. 21
   C. 22
   D. 23

2. What is the working load limit (WLL) of 1/2 in. improved plow steel wire rope?
   A. 1.0 ton
   B. 1.5 tons
   C. 2.0 tons
   D. 3.0 tons

3. What length of plate 16 mm thick is required to form a cylinder with an OD of 2438 mm?
   A. 7560 mm
   B. 7607 mm
   C. 7627 mm
   D. 7657 mm

4. What is the mean diameter of a cylinder that is to be rolled to an OD of 74 in. if the material thickness is 3/4 in.?
   A. 72 1/2 in.
   B. 73 1/4 in.
   C. 74 in.
   D. 74 3/4 in.
5. A bulk storage tank has a mean diameter of 80 ft. and a shell plate thickness of 1 1/8 in. What is the inside radius to which the shell plates would be positioned?

A. 39 ft. 10 7/8 in.
B. 39 ft. 11 7/16 in.
C. 40 ft. 0 in.
D. 40 ft. 9/16 in.

6. What is done after installing the floor plates in a dry-bottom precipitator?

A. Wash, scrub and paint.
B. Vacuum test for leaks.
C. Test for leaks with water.
D. Remove all dogs and scabs.

7. What is done to temporarily suspend the steam drum on a bottom-supported boiler until the tack tubes are installed and expanded?

A. Suspend it from a crane.
B. Lash it to the mud drum.
C. Lash it to the structural steel.
D. Hold it up from the mud drum by columns.

8. The scale on a drawing is 1 in. = 1 ft. What is the length of the line on the drawing that represents an object with a dimension size of 18 in.?

A. 1 1/2 in.
B. 18 in.
C. 36 in.
D. 216 in.
9 Which instrument is used with a micrometer to determine precise ID measurements?
A. Flexible rule.
B. Depth gauge.
C. Inside micrometer.
D. Telescoping gauge.

10 What is the offset between cans when fitting circumferential seams on penstock sections with a 3/4 in. difference in diameter?
A. 1/8 in.
B. 1/4 in.
C. 3/8 in.
D. 3/4 in.

11 Given no direct crane access, what is the best method for landing and securing an 8 ft. by 8 ft. platform complete with grating and handrails?
A. Transfer load to local rigging and bolt up.
B. Transfer load to finger bars and bolt up.
C. Make accessible bolts, transfer load and bolt up.
D. Make accessible bolts and transfer load to tirfor.

12 What is used to move a light tray section along a high line assembly in a large diameter vessel?
A. Tag line.
B. Chainfall.
C. Come-along.
D. 4-ton air tugger.
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13 What is the welding sequence for scroll case sections?
A. Stress relieve, weld exterior complete, back gouge, weld interior complete.
B. Stress relieve, weld interior complete, back gouge, weld exterior complete.
C. Preheat, weld exterior complete, back gouge, weld interior complete.
D. Preheat, weld interior complete, back gouge, weld exterior complete.

14 What is inspected on an integral scaffold before starting penstock maintenance?
A. Scaffold clip weld integrity, decking, and explosion-proof lighting.
B. Scaffold clip weld integrity, decking, toeboard, midrails, and handrails.
C. Decking, toeboard, midrails, and scaffold frame.
D. Decking, scaffold frame, and fixed ladders.

15 What should be used to lift a completed 50 ft. stack section that is 10 ft. in diameter and constructed from 3/4 in. plate onto a structural support 100 ft. above the ground?
A. 30 ton boom truck.
B. 35 ton rough terrain crane.
C. 50 ton hydraulic crane.
D. 50 ton lattice boom crane.

16 What does the symbol Ø mean on a drawing?
A. Circle.
B. Radius.
C. Diameter.
D. Circumference.
17 A square plate has an area of 1 490 cm$^2$. What is the length of each side?
A. 383 mm
B. 386 mm
C. 391 mm
D. 405 mm

18 What must be done when the gravel base for a 40-ft. diameter tank varies by up to 3/8 in.?
A. Nozzle orientations/elevations must be realigned on each course to correct the out of level base.
B. Horizontal seam gaps must be fitted unevenly to make up the 3/8 in. variation.
C. After the first course, the shell plates must be shot and the base levelled.
D. Scaffold clips must be installed after the positioning of the shell plate.

19 After a heat exchanger is filled with water, test pressure is difficult to achieve. Assuming there are no leaks, what is the reason?
A. Trapped air.
B. Vessel too large.
C. Fill hose too large.
D. Insufficient pump capacity.
20 The first plate of the second ring on an 80-ft. diameter tank is being erected. When is the load line removed from the plate?

- A. After the butt straps have been tack welded to the shell.
- B. After the channels or flat bars have been welded in place.
- C. After the wedges have been installed on both sides and the key plates have been attached to the vertical seam.
- D. After the shell plate has been set on shims, the wedges have been installed and the strongbacks have been secured.

21 Where are curtain frames installed?

- A. Directly below the hot roof in the scrubber.
- B. Directly below the hot roof in the precipitator.
- C. Directly below the cold roof in the precipitator.
- D. Directly above the chain-fed hopper in a wet bottom precipitator.

22 What is done to prevent the generating tube from rotating prior to expansion into the drum?

- A. Peen the tube on two sides.
- B. Clamp the tube to the one next to it.
- C. Tack weld each tube to the tube sheet.
- D. Insert hardwood spacers between the tubes.

23 What is the centre-to-centre spacing for wire rope clips used on 1-in. diameter rope?

- A. 4 in.
- B. 6 in.
- C. 8 in.
- D. 10 in.
24 What must the hoist operator and the signaler do when using radio communication?
   A. Avoid communicating until the lift status changes.
   B. Keep in constant communication with each other.
   C. Keep a clear view of each other while communicating.
   D. Use abbreviated radio communication to relay messages.

25 The thickness of one section of a pressure vessel is 1/4 in. and the thickness of the abutting section is 1/2 in. What must be done?
   A. The thinner section must be built up to meet the thicker at a slope no greater than 1:2.
   B. The thicker section must be bevelled to meet the thinner at a slope of 1:3.
   C. The thicker section must be bevelled to meet the thinner at a slope of 1:4.
   D. The thinner section must be built up to meet the thicker at a slope greater than 1:6.

26 Which method would help control distortion in a welded component?
   A. Using larger electrodes and larger weld passes.
   B. Finishing each weld with lots of weld reinforcement.
   C. Using lower amperage and small consecutive passes.
   D. Welding in the same direction and staggering the welds.

27 Which type of fire can be put out with a fire extinguisher inscribed with a circle containing the letter C?
   A. Live electrical.
   B. Combustible metals.
   C. Gasoline, oil or grease.
   D. Wood, paper and textiles.
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28 What must be done before lifting a load over the side of a mobile crane?
   A. Remove the jib.
   B. Boom straight up.
   C. Block the counterweight.
   D. Fully extend the outriggers.

29 What could happen if a hydraulic boom is not extended with equal section lengths?
   A. Two-blocking.
   B. Overloaded longest section.
   C. Overloaded shortest section.
   D. Damage to the hydraulic system.

30 What is the final ID after expanding a tube with the following dimensions?

   Tube hole = 2.35 in.
   Tube OD = 2.25 in.
   Tube ID = 2.00 in.
   10% reduction for 2 tube wall thicknesses

   A. 2.015 in.
   B. 2.113 in.
   C. 2.125 in.
   D. 2.140 in.