Practice Test 5

Core Examination

Instructions: Select the best answer for each question. You have 90 minutes to complete this section.

1. What type of soil generally provides the highest bearing capacity for crane operations?
   A. Organic soil
   B. Saturated clay
   C. Compact gravel or bedrock
   D. Fill material

2. When power lines are less than 350 kilovolts, what minimum clearance is required?
   A. 5 feet
   B. 10 feet
   C. 15 feet
   D. 20 feet

3. What must be determined before selecting crane position for operations?
   A. Fuel requirements only
   B. Operator preferences
   C. Load weights, radii, and required reach
   D. Weather forecast

4. When should crane mats be inspected for damage or deterioration?
   A. Before each use
   B. Monthly
   C. Annually
   D. Mat inspection not required

5. What action is required if outrigger reaction forces exceed ground capacity?
   A. Continue slowly
   B. Add counterweight
   C. Reduce boom length
   D. Use larger mats or relocate crane

6. During lift planning, what determines the required boom length?
   A. Crane age
   B. Operating radius and required lift height
   C. Fuel level

D. Time of day

7. When must crane stability be recalculated during operations?
   A. Hourly
   B. Daily
   C. When configuration or conditions change
   D. Stability calculations not required

8. What is the primary hazard when operating cranes near excavations?
   A. Ground failure and loss of support
   B. Noise levels
   C. Dust
   D. Visibility

9. When lifting loads in areas with overhead obstructions, what must be verified?
   A. Load weight only
   B. Ground conditions only
   C. Rigging color
   D. Adequate clearance throughout lift and swing paths

10. What must be established before crane operations in congested areas?
   A. Overtime schedules
   B. Parking arrangements
   C. Communication protocols and coordination procedures
   D. Lunch schedules

11. During high-consequence lifts, what documentation is typically required?
   A. Insurance forms only
   B. Detailed written lift plan
   C. Verbal agreement
   D. No documentation required

12. When must barricades be adjusted during crane operations?
   A. Never
   B. Annually
   C. As swing radius or hazard zones change
   D. Barricades are permanent

13. What determines if a spotter is needed during crane travel?
   A. Crane size only

B. Limited operator visibility or tight clearances
C. Time of day
D. Fuel level

14. When operating multiple cranes, what must be prevented?
A. Using same model cranes
B. Working on same shift
C. Using different operators
D. Boom or load contact between cranes

15. What is required when crane operations occur near railroads?
A. Railroad notification and coordination
B. Night operations only
C. Operations prohibited
D. No special requirements

16. During crane setup, what must be verified about counterweight?
A. Color
B. Age
C. Correct amount per load chart requirements
D. Manufacturer only

17. When must wind speed monitoring equipment be calibrated?
A. Never
B. Per manufacturer specifications
C. Weekly
D. Wind equipment not required

18. What is required before lifting loads over water?
A. Special rigging and recovery plans
B. Standard procedures apply
C. Operations prohibited
D. Swimming certification

19. When should pre-operational meetings be held?
A. Weekly only
B. Monthly only
C. Before complex operations or when conditions change
D. Meetings not required

20. What must be done if actual site conditions differ from lift plan assumptions?
A. Continue as planned
B. Revise plan or stop operations
C. Document differences only
D. Increase capacity margin

21. When lifting in high-wind conditions, what additional precaution is necessary?
A. Use tag lines for load control
B. Operate faster
C. Increase capacity
D. Wind does not affect operations

22. What determines maximum allowable crane travel speed?
A. Operator preference
B. Project schedule
C. Traffic conditions
D. Manufacturer specifications and surface conditions

23. When must emergency procedures be reviewed with crane crews?
A. Annually only
B. Before operations and when hazards change
C. Never required
D. Monthly only

24. What is required when crane operations may affect public utilities?
A. Operations unrestricted
B. Visual inspection only
C. Verbal notification
D. Utility location and notification

25. During lift operations, who has authority to stop unsafe activities?
A. Anyone observing unsafe conditions
B. Only supervisors
C. Only OSHA inspectors
D. Only crane owner

26. What must be verified before each day's operations?
A. Previous day's production
B. Next week's schedule
C. All personnel are qualified and briefed

D. Fuel prices

27. When operating near airports, what may be required?
A. Special crane color
B. Height restrictions and notification
C. Night operations only
D. Airport operations not restricted

28. What determines if additional outrigger extension is needed?
A. Crane color
B. Operator preference
C. Time available
D. Load chart requirements for planned lifts

29. When must ground conditions be tested for bearing capacity?
A. When conditions are uncertain or questionable
B. Testing not required
C. Monthly
D. Annually

30. What is required when crane boom must pass over buildings?
A. Higher insurance only
B. Night operations
C. Building evacuation or boom blockage
D. No restrictions

31. What is the standard hand signal for "retract boom"?
A. Arms extended forward
B. Circular motion
C. Thumb pointing up
D. Both fists in front pulling back

32. When using radio communication, what must operators do before executing commands?
A. Repeat back and receive confirmation
B. Execute immediately
C. Wait 30 seconds
D. Check with supervisor

33. What is required when signal person position must change during operations?
A. Continue without interruption

B. Change at any time
C. Document change only
D. Stop and establish new position before continuing

34. When must backup hand signals be established?
A. Never required
B. Only for large cranes
C. When using radio as primary communication
D. Backup signals not permitted

35. What is the standard hand signal for "use auxiliary hoist"?
A. Both arms raised
B. Tap elbow with one hand
C. Point at ground
D. Circular motion overhead

36. During night operations, what must signal persons use?
A. Louder voice commands
B. Standard daytime signals
C. Whistle signals only
D. Illuminated or lighted signal devices

37. When can non-qualified personnel give crane signals?
A. Never under any circumstances
B. In emergencies
C. With operator approval
D. During training with supervision

38. What must be done if signal person cannot maintain visual contact with operator?
A. Signal louder
B. Move closer
C. Continue current position
D. Use additional signal person or stop operations

39. What takes priority when multiple signals are given simultaneously?
A. Stop signal
B. Directional signal
C. Radio signal
D. Hand signal

40. When should signal persons be replaced during extended operations?
A. Every 4 hours automatically
B. Never during operations
C. When fatigued or unable to perform effectively
D. Signal persons cannot be replaced

41. What must be demonstrated before using modified or special signals?
A. Signals and mutual understanding with all parties
B. Insurance coverage
C. OSHA approval
D. Special signals prohibited

42. When using voice communication, what must be avoided?
A. Technical terms
B. Specific directions
C. Complete sentences
D. Unclear or ambiguous language

43. What is required for signal person qualification?
A. Age requirement only
B. Written test only
C. Knowledge evaluation and demonstrated ability
D. No qualification required

44. During adverse weather, what may be necessary for signaling?
A. Stop all operations
B. Enhanced communication methods
C. Reduce crew size
D. Weather does not affect signals

45. When must signal persons wear high-visibility clothing?
A. At all times during operations
B. Only at night
C. Only in traffic areas
D. High-visibility clothing optional

46. Under OSHA Subpart CC, what must be assessed before crane use?
A. Insurance coverage
B. Operator preferences
C. Fuel efficiency

D. Ground conditions and hazards

47. What does OSHA require for crane operator qualification?
A. Experience only
B. Age requirement only
C. Certification and employer evaluation
D. No requirements specified

48. According to OSHA, when must shift inspections be performed?
A. Inspections optional
B. Before each shift when crane is in use
C. Weekly
D. Monthly

49. What must employers verify regarding crane operators per OSHA?
A. Salary requirements
B. Union membership
C. Transportation method
D. Certification is current and valid

50. Under OSHA, who must approve crane assembly procedures?
A. Any supervisor
B. Equipment owner
C. Qualified A/D director
D. Insurance company

51. What does OSHA require when crane capacity must be derated?
A. Operations prohibited
B. Verbal notification
C. Operations within derated capacity
D. No specific requirements

52. According to OSHA, when can boom be lowered over personnel?
A. With supervisor approval
B. Never permitted
C. During emergencies only
D. With increased capacity margin

53. What must be documented per OSHA crane inspection requirements?
A. Date, equipment ID, findings, and corrective actions

B. Operator names only
C. Weather only
D. Fuel consumption

54. Under OSHA, who must be present during assembly/disassembly?
A. Any mechanic
B. Insurance representative
C. Equipment owner
D. Qualified A/D director

55. What does OSHA require regarding crane modifications?
A. Modifications prohibited
B. Verbal approval sufficient
C. Manufacturer or engineer approval and documentation
D. Owner approval sufficient

56. According to OSHA, when must fall protection be provided?
A. Only above 10 feet
B. Above 6 feet during A/D operations
C. Never on cranes
D. Fall protection optional

57. What must OSHA-required inspections include?
A. Paint condition only
B. Age documentation
C. Safety-critical items per regulations
D. Fuel system only

58. Under OSHA, what action is required for equipment deficiencies?
A. Document only
B. Correct or remove from service
C. Continue with reduced capacity
D. Deficiencies ignored if minor

59. What does OSHA require for operator recertification?
A. Annual
B. Every three years or when deficiencies occur
C. Every 10 years
D. Recertification not required

60. According to OSHA, when can uncertified trainees operate cranes?
A. During training with certified operator present
B. In emergencies
C. Never under any circumstances
D. With 30 days experience

61. Under ASME B30.5, what defines a crane's rated capacity?
A. Operator estimation
B. Any load crane lifts
C. Load plus 25 percent
D. Maximum load per manufacturer specifications

62. What does ASME B30.5 require for wire rope inspection frequency?
A. Each shift when in regular use
B. Weekly
C. Monthly
D. Annually

63. According to ASME B30.5, when must equipment be removed from service?
A. Monthly for maintenance
B. Quarterly for inspection
C. Annually for testing
D. When unsafe conditions are identified

64. What does ASME B30.5 require regarding crane modifications?
A. Modifications unrestricted
B. Verbal approval adequate
C. Manufacturer or engineer approval required
D. Owner approval sufficient

65. Under ASME B30.5, what is required before personnel hoisting?
A. Standard procedures apply
B. Special requirements per ASME B30.23
C. Personnel hoisting prohibited
D. Verbal agreement only

66. What does ASME B30.5 specify about operating near capacity limits?
A. No restrictions
B. Increase speed
C. Operate normally

D. Extra caution and qualified supervision

67. According to ASME B30.5, when must boom angle indicators be functional?
A. Before operations for capacity determination
B. Monthly
C. Annually
D. Indicators optional

68. What does ASME B30.5 require for maintenance records?
A. Records optional
B. Verbal reports sufficient
C. Documentation of inspections and repairs
D. Records prohibited

69. Under ASME B30.5, what determines critical lift designation?
A. Load weight only
B. Risk, complexity, or potential consequences
C. Crane size
D. Time of day

70. What does ASME B30.5 require regarding side loading?
A. Minimize or eliminate side loading
B. Side loading permitted up to 50 percent
C. Increases capacity
D. No restrictions on side loading

71. According to ASME B30.5, when must load testing occur?
A. Weekly
B. After installation and major modifications
C. Monthly
D. Load testing not required

72. What does ASME B30.5 specify about unattended loads?
A. Acceptable for breaks
B. Acceptable overnight
C. No restrictions
D. Loads shall not be left suspended unattended

73. Under ASME B30.5, what must operators do if uncertain about operations?
A. Stop and obtain direction from qualified person

B. Proceed slowly
C. Document concerns
D. Consult coworkers

74. What does ASME B30.5 require for rope replacement?
A. Annual replacement
B. Monthly replacement
C. Based on deterioration criteria
D. Rope lasts indefinitely

75. According to ASME B30.5, who authorizes return to service after repairs?
A. Any mechanic
B. Qualified person
C. Operator
D. Owner only

76. When reading load charts, what information is essential first?
A. Previous lifts
B. Weather conditions
C. Fuel level
D. Current crane configuration and setup

77. On load charts, how is operating radius typically measured?
A. From boom tip
B. Horizontal distance from center of rotation
C. Vertical distance
D. Diagonal measurement

78. What happens to capacity as operating radius increases?
A. Capacity increases
B. No change
C. Capacity decreases
D. Capacity doubles

79. When using jibs, what chart information is required?
A. Main boom charts apply
B. No charts needed
C. Estimate capacity
D. Separate jib charts or deductions

80. What must be deducted from gross capacity?
A. Hook block and rigging weight
B. Fuel weight
C. Counterweight
D. Operator weight

81. On load charts, what do special symbols typically indicate?
A. Crane color
B. Manufacturing date
C. Notes, limitations, or special conditions
D. Operator requirements

82. When boom angle changes, what is affected?
A. Only height
B. Radius and capacity
C. Only capacity
D. Nothing changes

83. What capacity should be used when radius falls between chart values?
A. Lower capacity or interpolate
B. Higher capacity
C. Average both values
D. Estimate capacity

84. On telescopic crane charts, how is information organized?
A. Randomly
B. By boom length with radii
C. Alphabetically
D. By crane age

85. What indicates structural versus stability limits on charts?
A. Page number
B. Chart color
C. Bold numbers or notation
D. Font size only

86. When counterweight changes, what must be verified?
A. Correct chart section for configuration
B. Counterweight color
C. Counterweight age

D. No verification needed

87. What must be considered for loads with large surface areas?
A. Load color
B. Load temperature
C. Load manufacturer
D. Wind loading effects on capacity

88. On load charts, what do footnotes provide?
A. Crane history
B. Important conditions and restrictions
C. Maintenance schedules
D. Operator qualifications

89. When using multiple configurations daily, what is essential?
A. Reference correct chart for each configuration
B. Use first chart for all
C. Estimate capacity
D. Charts not needed

90. What must be verified when load dimensions are non-standard?
A. Color
B. Temperature
C. Age
D. Effect on stability and capacity

91. In hydraulic systems, what converts mechanical to hydraulic power?
A. Motor
B. Cylinder
C. Pump
D. Valve

92. What indicates hydraulic system problems?
A. Normal operation
B. Slow function, noise, or leaks
C. Proper temperature
D. Clean fluid

93. What is the purpose of hydraulic fluid filtration?
A. Increase pressure

B. Cool fluid
C. Add lubrication
D. Remove contaminants

94. What causes hydraulic overheating?
A. Excessive demand or inadequate cooling
B. Cold weather
C. Low hours
D. Clean filters

95. What do hydraulic relief valves control?
A. Maximum system pressure
B. Fluid level
C. Flow direction
D. Temperature

Specialty Examination

Instructions: Select the best answer for each question. You have 60 minutes to complete this section.

1. What is the primary operational advantage of crawler cranes over wheeled cranes?
A. Superior stability and ability to work on soft ground
B. Faster highway travel
C. Lower purchase cost
D. Simpler maintenance

2. On hydraulic telescopic cranes, what system synchronizes boom section extension?
A. Manual controls
B. Hydraulic flow control and position sensors
C. Wire rope system
D. Gravity

3. What is the typical weight relationship between lattice and telescopic booms of similar length?
A. Equal weight
B. Telescopic is lighter
C. Weight varies by color
D. Lattice is significantly lighter

4. When operating all-terrain cranes in off-road mode, what provides traction?

A. All-wheel drive and differential locking systems
B. Front wheels only
C. Rear wheels only
D. Boom weight distribution

5. What allows lattice boom cranes to achieve extreme heights?
A. Hydraulic pressure
B. Wind assistance
C. Operator skill
D. Modular boom sections that can be assembled to length

6. On telescopic cranes, what prevents uncontrolled boom retraction?
A. Friction only
B. Manual locks
C. Hydraulic holding valves and mechanical locks
D. Operator strength

7. What advantage do fixed cabs provide on some mobile cranes?
A. Simpler design and lower maintenance
B. Better visibility during swing
C. Higher capacity
D. Faster operations

8. When installing lattice boom sections, what ensures structural integrity?
A. Speed of installation
B. Proper pin installation and manufacturer sequence
C. Section color matching
D. Installation can be done in any order

9. What is the function of boom pendants on lattice cranes?
A. Carry counterweights
B. Store tools
C. Increase speed
D. Support boom from mast at various angles

10. On all-terrain cranes, what coordinates multiple axle steering?
A. Mechanical linkages
B. Manual controls at each axle
C. Electronic or hydraulic control systems
D. Separate steering wheels

11. What is the primary benefit of luffing jibs over fixed jibs?
A. Lower cost
B. Variable radius without main boom movement
C. Simpler operation
D. Higher maximum capacity

12. When reading charts for offset jibs, what additional factor affects capacity?
A. Offset angle from boom centerline
B. Wind speed only
C. Time of day
D. Operator position

13. What determines maximum boom length for mobile cranes?
A. Operator preference
B. Paint color
C. Structural and stability limits
D. Fuel capacity

14. On rough-terrain cranes, what feature provides maneuverability in confined spaces?
A. Long wheelbase
B. Multiple axles
C. Fixed steering
D. Tight turning radius and crab steering

15. What provides boom angle control on lattice boom cranes?
A. Boom hoist system through mast
B. Hydraulic cylinders only
C. Manual cranks
D. Counterweight movement

16. When operating with fly jibs, how do capacities typically compare?
A. Capacity increases
B. No capacity change
C. Slight capacity reduction
D. Significant capacity reduction

17. What determines safe jib length for a given configuration?
A. Jib color
B. Manufacturer specifications and structural analysis

C. Operator experience
D. Wind conditions only

18. On crawler cranes with track extensions, what does wider gauge provide?
A. Increased stability and lifting capacity
B. Faster travel speed
C. Lower fuel consumption
D. Reduced ground pressure only

19. What setup advantage do telescopic cranes offer?
A. Higher capacity
B. Longer boom
C. Rapid deployment without boom assembly
D. Lower cost

20. When using boom extensions, what must be verified?
A. Extension color
B. Extension weight only
C. Extension age
D. Proper installation and correct load chart

21. What type of hoist typically provides faster line speeds?
A. Main hoist
B. Auxiliary hoist
C. Manual hoist
D. All equal speed

22. On hydraulic cranes, what provides swing control?
A. Manual rotation
B. Wire rope
C. Hydraulic motor with proportional control
D. Electric motor only

23. When changing crawler track spacing, what is critical?
A. Paint matching
B. Use appropriate capacity chart for configuration
C. Track spacing does not affect capacity
D. Verbal notification only

24. When operating with boom inserts, what is essential?

A. Insert color
B. Correct installation and chart section
C. Insert age
D. Manufacturer location

25. What guides boom sections during telescopic extension?
A. Operator vision
B. External tracks
C. Internal wear pads and guide systems
D. Gravity

26. On lattice boom cranes, which members carry primary axial loads?
A. Lacing members
B. Battens
C. Bolts
D. Main chord members

Practical Examination

Instructions: Select the best answer for each question. This section evaluates your understanding of hands-on operating procedures and inspection requirements.

1. When inspecting wire rope, what indicates the rope should be immediately removed?
A. Six randomly distributed broken wires in one lay or three in one strand
B. Light surface oxidation
C. Minor discoloration
D. Normal wear patterns

2. What is the proper technique for inspecting internal wire rope condition?
A. Visual exterior inspection only
B. Weight measurement
C. Length measurement
D. Opening strands to examine interior wires and core

3. During pre-operational checks, what hydraulic fluid condition requires immediate attention?
A. Proper level
B. Clear appearance
C. Milky or contaminated appearance
D. Correct temperature

4. When inspecting load hooks, what requires immediate replacement?
   A. Cracks, deformation, or excessive throat opening
   B. Minor scratches
   C. Normal wear marks
   D. Proper latch function

5. What indicates load moment indicator malfunction?
   A. Display is illuminated
   B. Display shows numbers
   C. Display has power
   D. No response to boom movement or erratic readings

6. During swing brake testing, what indicates proper function?
   A. Immediate stop and hold when control released
   B. Gradual stopping
   C. Continued coasting
   D. Delayed engagement

7. When testing boom hoist brake, what procedure verifies function?
   A. Visual inspection only
   B. Listen for sounds
   C. Raise boom then release control to verify hold
   D. Lower boom slowly

8. What is the first action in proper crane startup?
   A. Start engine immediately
   B. Check all controls neutral before starting
   C. Test horn
   D. Extend boom

9. During engine warm-up, what must be monitored?
   A. Radio function
   B. Oil pressure and temperature gauges
   C. Time only
   D. Fuel gauge only

10. When deploying outriggers, what must be continuously verified?
   A. Crane level remains within specifications
   B. Deployment speed

C. Paint condition
D. Serial numbers

11. What is the proper method for testing hoist function?
A. Maximum speed only
B. Minimum speed only
C. Variable speeds with smooth control
D. Testing not required

12. During control function testing, what indicates problems?
A. Erratic response or binding
B. Smooth operation
C. Normal sounds
D. Proper speed

13. When checking boom length indicators, what must be verified?
A. Indicator color
B. Indicator age
C. Indicator location
D. Accurate display of current length

14. What wire rope condition requires immediate replacement?
A. Proper flexibility
B. Kinking or bird-caging
C. Normal lubrication
D. Correct diameter

15. During hydraulic inspection, what indicates water contamination?
A. Milky or foamy fluid appearance
B. Clear fluid
C. Proper level
D. Correct color

16. When testing anti-two-block systems, what indicates proper operation?
A. Device is visible
B. Device is labeled
C. Warnings and cutout before contact
D. Device makes noise

17. What is the correct procedure for checking outrigger locks?

A. Visual inspection only
B. Paint condition check
C. Listen for sounds
D. Verify engagement and attempt retraction

18. During boom inspection, what requires immediate attention?
A. Normal paint wear
B. Cracks or structural deformation
C. Minor surface rust
D. Proper labels

19. When inspecting wire rope terminations, what is critical?
A. Termination color
B. Termination age
C. Secure attachment with no loosening
D. Termination weight

20. What must be verified about LMI displays?
A. Display size
B. Display color
C. Display age
D. Display is functional and readable

21. During boom hoist rope inspection, what requires attention?
A. Rope not properly seated in sheaves
B. Proper lubrication
C. Correct color
D. Manufacturer markings

22. When checking hydraulic hoses, what indicates replacement needed?
A. Hoses are flexible
B. Hoses have fittings
C. Cracking, bulging, or deterioration
D. Hoses are labeled

23. What is proper procedure for end-of-shift shutdown?
A. Leave engine running
B. Lower boom, secure controls, document issues
C. Secure controls only
D. Lower boom only

24. During swing testing, what indicates proper operation?
A. Continuous rotation
B. Smooth operation with immediate brake
C. Delayed response
D. Jerky movement

25. When inspecting fire extinguishers, what requires service?
A. Extinguisher is mounted
B. Extinguisher is visible
C. Low pressure or expired inspection
D. Extinguisher is labeled

26. What must be verified about boom locking pins?
A. Pin color
B. Pin age
C. Pin manufacturer
D. Full insertion with retention devices

27. During final verification, what must be confirmed?
A. Crane is painted
B. Crane is expensive
C. Crane is large
D. All systems functional and area clear

28. When inspecting lattice boom pins, what indicates problems?
A. Wear, cracks, or elongated holes
B. Proper paint
C. Correct labels
D. Original installation

29. What indicates proper boom cylinder function?
A. Cylinders are visible
B. Cylinders are painted
C. Smooth operation without leaks
D. Cylinders are labeled

30. During high-wind shutdown, what is proper boom position?
A. Maximum height
B. Per manufacturer to minimize wind load

C. Horizontal position
D. Fully extended

Answers & Explanations - Practice Test 5

Core Examination

1. **Correct Answer: C (Compact gravel or bedrock)**

Compact gravel or bedrock generally provides the highest bearing capacity for crane operations. Bedrock can support thousands of pounds per square foot, while compact gravel typically supports 3,000 to 8,000 pounds per square foot depending on compaction. These materials provide reliable support with minimal settlement. Organic soils, saturated clay, and fill material have dramatically lower bearing capacities requiring extensive ground preparation.

2. **Correct Answer: D (20 feet)**

When power lines are less than 350 kilovolts, OSHA 1926.1408 requires a minimum clearance of 20 feet. This clearance accounts for electrical arc potential at voltages in the 50 to 345 kilovolt range. Specific clearances vary by exact voltage, with 20 feet applying to lines in the 200 to 350 kilovolt range.

3. **Correct Answer: C (Load weights, radii, and required reach)**

Before selecting crane position for operations, load weights, operating radii, and required reach must be determined. These factors establish what crane capacity is needed and where the crane must be positioned to access all lift locations. Optimal positioning allows completion of all lifts without repositioning while maintaining adequate capacity margins.

4. **Correct Answer: A (Before each use)**

Crane mats should be inspected for damage or deterioration before each use. Mats can crack, split, or deteriorate from weather exposure and loading cycles. Damaged mats have reduced load distribution capability and may fail suddenly under load. Pre-use inspection identifies problems before mats are placed under crane support points.

5. **Correct Answer: D (Use larger mats or relocate crane)**

If outrigger reaction forces exceed ground capacity, solutions include using larger mats to distribute loads over greater areas reducing bearing pressure, or relocating the crane to areas with better ground conditions.

Operating with insufficient ground support causes settlement or complete ground failure leading to crane tipping.

6. **Correct Answer: B (Operating radius and required lift height)**

During lift planning, required boom length is determined by operating radius and required lift height. Longer booms are needed to reach distant loads or achieve greater heights. The relationship between boom length, angle, and resulting radius and height determines the boom length required for specific lift locations.

7. **Correct Answer: C (When configuration or conditions change)**

Crane stability must be recalculated when configuration changes such as boom length or counterweight adjustments, or when conditions change including ground settlement, wind increases, or level changes. Changed conditions alter stability margins requiring reassessment to ensure operations remain within safe limits.

8. **Correct Answer: A (Ground failure and loss of support)**

The primary hazard when operating cranes near excavations is ground failure and loss of support where the excavation undermines soil supporting the crane. Excavations create zones of reduced soil strength extending beyond excavation edges. If crane support falls within these weakened zones, sudden ground collapse can occur causing crane tipping.

9. **Correct Answer: D (Adequate clearance throughout lift and swing paths)**

When lifting loads in areas with overhead obstructions, adequate clearance throughout the entire lift and swing paths must be verified. This includes accounting for load dimensions, boom deflection, and swing radius. Contact with overhead obstructions can cause load drops, boom damage, or crane tipping.

10. **Correct Answer: C (Communication protocols and coordination procedures)**

Before crane operations in congested areas, communication protocols and coordination procedures must be established. These procedures define how crane operators, signal persons, riggers, and other workers communicate and coordinate movements. Clear protocols prevent confusion and conflicts that cause accidents in busy work environments.

11. **Correct Answer: B (Detailed written lift plan)**

During high-consequence lifts where failure would result in significant injury, death, or property damage, detailed written lift plans are typically required. These plans document all aspects of the operation including equipment configuration, rigging, procedures, personnel responsibilities, and emergency measures. Written plans ensure thorough planning and provide reference during execution.

12. **Correct Answer: C (As swing radius or hazard zones change)**

Barricades must be adjusted during crane operations as swing radius or hazard zones change with boom length adjustments or load size variations. Barricades must consistently prevent unauthorized access to actual hazard areas. Fixed barricades that do not account for changing conditions may allow personnel into hazardous zones.

13. **Correct Answer: B (Limited operator visibility or tight clearances)**

A spotter is needed during crane travel when operator visibility is limited preventing clear view of travel path or obstructions, or when tight clearances require precise guidance. Spotters positioned where they can see the travel path and clearances guide operators safely through challenging conditions.

14. **Correct Answer: D (Boom or load contact between cranes)**

When operating multiple cranes, boom or load contact between cranes must be prevented. This requires coordination of swing radii, lift paths, and timing ensuring cranes do not interfere. Boom or load collisions can cause serious damage, load drops, or crane tipping creating catastrophic accidents.

15. **Correct Answer: A (Railroad notification and coordination)**

When crane operations occur near railroads, railroad notification and coordination are required. Railroads must be aware of crane presence, and procedures must ensure that cranes do not extend into railroad clearance zones when trains pass. Coordination prevents boom or load contact with trains causing derailments or severe accidents.

16. **Correct Answer: C (Correct amount per load chart requirements)**

During crane setup, the correct counterweight amount per load chart requirements for planned operations must be verified. Load charts show capacities for specific counterweight configurations. Operating with incorrect counterweight amounts creates serious overload or stability risks. Physical verification ensures counterweight matches chart requirements.

17. **Correct Answer: B (Per manufacturer specifications)**

Wind speed monitoring equipment must be calibrated per manufacturer specifications. Anemometers require periodic calibration ensuring accurate wind speed readings. Inaccurate measurements can result in operating during excessive winds or unnecessarily stopping during acceptable conditions. Calibration schedules vary by equipment type and manufacturer requirements.

18. **Correct Answer: A (Special rigging and recovery plans)**

Before lifting loads over water, special rigging and recovery plans are required. Rigging must account for potential water immersion, and recovery plans establish procedures if loads are dropped in water. These preparations address unique hazards of overwater operations ensuring loads can be recovered if incidents occur.

19. **Correct Answer: C (Before complex operations or when conditions change)**

Pre-operational meetings should be held before complex operations requiring coordination or special procedures, and when conditions change from routine work. These meetings review procedures, hazards, assignments, and communication methods ensuring all personnel understand their roles before beginning challenging operations.

20. **Correct Answer: B (Revise plan or stop operations)**

If actual site conditions differ from lift plan assumptions including ground conditions, clearances, or load characteristics, the plan must be revised to address actual conditions or operations must stop. Operating based on incorrect assumptions creates serious accident risks. Plans must reflect reality for effective safety management.

21. **Correct Answer: A (Use tag lines for load control)**

When lifting in high-wind conditions, using tag lines for load control is a necessary additional precaution. Tag lines prevent wind-induced load spinning or swinging, maintaining control during placement. Personnel handling tag lines must be positioned to avoid being pulled if wind forces become excessive.

22. **Correct Answer: D (Manufacturer specifications and surface conditions)**

Maximum allowable crane travel speed is determined by manufacturer specifications based on crane design, and by actual surface conditions encountered. Manufacturers establish maximum speeds for different conditions, while operators must reduce speeds when surfaces, grades, or obstacles require. Safe travel balances efficiency with control.

23. **Correct Answer: B (Before operations and when hazards change)**

Emergency procedures must be reviewed with crane crews before operations begin at new sites and when hazards change such as proximity to new power lines or changes in work areas. Regular review ensures personnel understand evacuation routes, emergency contacts, and response procedures for site-specific emergencies.

24. **Correct Answer: D (Utility location and notification)**

When crane operations may affect public utilities including underground lines, overhead cables, or pipelines, utility location and notification are required. Utilities must be marked preventing accidental

damage, and utility companies must be notified allowing them to monitor operations or de-energize lines if necessary.

25. **Correct Answer: A (Anyone observing unsafe conditions)**

During lift operations, anyone observing unsafe conditions has authority to stop unsafe activities. This principle recognizes that different personnel have different perspectives, and that hazards may be visible to ground workers, signal persons, or bystanders that operators cannot see. Immediate stopping prevents accidents.

26. **Correct Answer: C (All personnel are qualified and briefed)**

Before each day's operations, it must be verified that all personnel are qualified for their assignments and briefed on the day's operations. This verification ensures competent personnel perform critical tasks and that everyone understands procedures, hazards, and coordination requirements for planned work.

27. **Correct Answer: B (Height restrictions and notification)**

When operating near airports, height restrictions under FAA regulations and notification to airport authorities may be required. Cranes can interfere with flight paths or navigation systems requiring coordination. Cranes exceeding certain heights may require lighting or painting for aircraft visibility.

28. **Correct Answer: D (Load chart requirements for planned lifts)**

Whether additional outrigger extension is needed is determined by load chart requirements for planned lifts. Charts show different capacities for various outrigger extensions. If loads exceed capacity with partial extension, full extension may provide adequate capacity. Charts guide proper outrigger deployment.

29. **Correct Answer: A (When conditions are uncertain or questionable)**

Ground conditions must be tested for bearing capacity when conditions are uncertain or questionable including unfamiliar soil types, visible settlement, proximity to excavations, or recent weather affecting soil. Testing provides actual bearing values allowing proper mat sizing and setup verification.

30. **Correct Answer: C (Building evacuation or boom blockage)**

When crane boom must pass over buildings, OSHA requires building evacuation removing personnel from under the boom path, or physical boom blockage preventing passage over occupied structures. This requirement prevents injuries from dropped loads, falling components, or boom failure over occupied spaces.

31. **Correct Answer: D (Both fists in front pulling back)**

The standard hand signal for "retract boom" consists of both fists positioned in front of the body with a pulling back motion. This signal simulates pulling the boom sections inward, providing an intuitive visual representation of the desired boom retraction movement.

32. **Correct Answer: A (Repeat back and receive confirmation)**

When using radio communication, operators must repeat back commands and receive confirmation before executing movements. This repeat-back protocol ensures that communications were heard accurately and understood correctly. Confirmation completes the communication loop before potentially hazardous movements begin.

33. **Correct Answer: D (Stop and establish new position before continuing)**

When signal person position must change during operations, movements must stop and the new position must be established before continuing. This ensures operators know where to look for signals and that signal persons have adequate visibility from new positions. Continuing during position changes risks loss of communication.

34. **Correct Answer: C (When using radio as primary communication)**

Backup hand signals must be established when using radio as primary communication. Radio systems can fail from equipment malfunction, interference, or dead batteries. Predetermined hand signals provide backup ensuring communication can continue if radio communication is lost during operations.

35. **Correct Answer: B (Tap elbow with one hand)**

The standard hand signal for "use auxiliary hoist" consists of tapping the elbow with one hand. This distinctive signal indicates that the operator should switch from main hoist to auxiliary hoist function, clearly differentiating auxiliary hoist operations from main hoist operations.

36. **Correct Answer: D (Illuminated or lighted signal devices)**

During night operations, signal persons must use illuminated or lighted signal devices allowing operators to clearly see signals in darkness. This includes lighted wands, flashlights, or chemical light sticks making hand signals visible. Signal persons should also wear reflective or illuminated clothing for visibility.

37. **Correct Answer: A (Never under any circumstances)**

Non-qualified personnel can never give crane signals under any circumstances. Signal persons must be qualified through training and evaluation demonstrating knowledge of signals and crane operations. Allowing unqualified personnel to direct crane movements creates serious accident risks from incorrect signals.

38. **Correct Answer: D (Use additional signal person or stop operations)**

If signal persons cannot maintain visual contact with operators, an additional signal person must relay signals maintaining the communication chain, or operations must stop. Visual contact between operator and signal person is essential. Operating without this contact creates serious hazards from miscommunication.

39. **Correct Answer: A (Stop signal)**

When multiple signals are given simultaneously, the stop signal takes priority. When stop is given by any person for any reason, operators must stop immediately without attempting to determine which other signal to follow. This absolute priority ensures immediate response to safety concerns.

40. **Correct Answer: C (When fatigued or unable to perform effectively)**

Signal persons should be replaced during extended operations when they become fatigued reducing attention and reaction time, or when unable to perform effectively due to environmental conditions, personal issues, or other factors. Effective signaling requires full attention and clear communication ability.

41. **Correct Answer: A (Signals and mutual understanding with all parties)**

Before using modified or special signals, the signals must be demonstrated and mutual understanding established with all parties including operators, other signal persons, and supervisors. This demonstration ensures everyone understands signal meanings preventing misinterpretation during actual operations.

42. **Correct Answer: D (Unclear or ambiguous language)**

When using voice communication, unclear or ambiguous language must be avoided. All communications should use clear, specific terminology that cannot be misinterpreted. Standard terms for directions and functions ensure instructions are understood correctly preventing potentially dangerous misunderstandings.

43. **Correct Answer: C (Knowledge evaluation and demonstrated ability)**

Signal person qualification requires knowledge evaluation verifying understanding of standard signals and crane operations, and demonstrated ability showing the person can effectively perform signal person duties. Both components ensure competency before individuals direct crane operations.

44. **Correct Answer: B (Enhanced communication methods)**

During adverse weather reducing visibility or creating wind noise interfering with communication, enhanced communication methods may be necessary. This includes illuminated signals for visibility,

increased signal size or exaggeration for clarity, or switching communication methods adapting to conditions.

45. **Correct Answer: A (At all times during operations)**

Signal persons must wear high-visibility clothing at all times during operations ensuring operators can clearly see them against backgrounds and in varying lighting conditions. High-visibility apparel in colors like orange or lime with reflective striping makes signal persons readily identifiable in busy work environments.

46. **Correct Answer: D (Ground conditions and hazards)**

Under OSHA Subpart CC, ground conditions and site hazards including power lines, fall hazards, and obstructions must be assessed before crane use. This hazard assessment identifies conditions requiring special precautions or control measures. The assessment establishes foundation for safe operations.

47. **Correct Answer: C (Certification and employer evaluation)**

OSHA requires crane operator qualification through certification by accredited testing organizations and employer evaluation on specific equipment and site hazards. Both components ensure operators possess necessary knowledge and can safely operate in actual site conditions with equipment they will use.

48. **Correct Answer: B (Before each shift when crane is in use)**

According to OSHA, shift inspections must be performed before each shift when cranes are in use. These inspections identify problems that developed since last use through wear, damage, or vandalism. Shift inspections ensure equipment is safe before operations begin each day.

49. **Correct Answer: D (Certification is current and valid)**

Employers must verify regarding crane operators per OSHA that certifications are current and valid for the type and capacity of equipment being operated. This verification ensures operators hold appropriate qualifications. Expired or incorrect certifications do not meet regulatory requirements.

50. **Correct Answer: C (Qualified A/D director)**

Under OSHA, crane assembly procedures must be approved and supervised by a qualified assembly/disassembly director. This individual has specific knowledge of assembly procedures and ensures manufacturer procedures are followed correctly. The A/D director verifies connection integrity throughout assembly operations.

51. **Correct Answer: C (Operations within derated capacity)**

When crane capacity must be derated due to conditions such as out-of-level setup or adverse weather, OSHA requires that operations remain within the derated capacity. Operators must determine reduced capacities accounting for actual conditions and operate within these reduced limits.

52. **Correct Answer: B (Never permitted)**

According to OSHA, boom can never be lowered over personnel. This prohibition prevents injuries from dropped loads, boom failure, or falling components. All personnel must remain clear of areas under boom movement. Operations must stop or personnel must move to safe locations.

53. **Correct Answer: A (Date, equipment ID, findings, and corrective actions)**

OSHA crane inspection requirements specify that documentation must include inspection date, equipment identification, findings identifying any defects or unsafe conditions, and corrective actions taken to address problems. This documentation provides accountability, history, and verification of compliance.

54. **Correct Answer: D (Qualified A/D director)**

Under OSHA, a qualified assembly/disassembly director must be present during assembly/disassembly operations. This requirement ensures personnel with specific A/D expertise oversee these high-risk operations, following manufacturer procedures and verifying proper assembly sequence and connection integrity.

55. **Correct Answer: C (Manufacturer or engineer approval and documentation)**

OSHA requires regarding crane modifications that manufacturer or qualified engineer approval and documentation must be obtained. Only these qualified parties can verify that modifications maintain adequate safety factors and do not adversely affect structural integrity or stability. Documentation must be maintained.

56. **Correct Answer: B (Above 6 feet during A/D operations)**

According to OSHA 1926.1423, fall protection must be provided above 6 feet during assembly and disassembly operations. Personal fall arrest systems or guardrail systems protect workers from fall hazards during boom assembly and other elevated A/D work.

57. **Correct Answer: C (Safety-critical items per regulations)**

OSHA-required inspections must include safety-critical items specified in regulations including structural elements, mechanical systems, safety devices, controls, and wire rope. These inspections identify defects or conditions affecting safe operations requiring correction before work continues.

58. **Correct Answer: B (Correct or remove from service)**

Under OSHA, equipment deficiencies must be corrected before continued use or equipment must be removed from service until corrections are made. Operating with known defects violates safety requirements and creates serious hazards. Equipment cannot return to service until verified safe.

59. **Correct Answer: B (Every three years or when deficiencies occur)**

OSHA requires operator recertification every three years or when performance deficiencies are observed. This periodic recertification ensures operators maintain competency and identifies skill deterioration requiring additional training. Deficiency-triggered evaluation addresses problems as they arise.

60. **Correct Answer: A (During training with certified operator present)**

According to OSHA, uncertified trainees can operate cranes during training when directly supervised by a certified operator who is physically present at the controls. This allows hands-on training under expert supervision. The certified operator must be able to take control immediately if necessary.

61. **Correct Answer: D (Maximum load per manufacturer specifications)**

Under ASME B30.5, a crane's rated capacity is defined as the maximum load for which the crane is designed and built by the manufacturer for specific configurations. Rated capacities account for all operating conditions including boom length, radius, and configuration, and include appropriate safety factors.

62. **Correct Answer: A (Each shift when in regular use)**

ASME B30.5 requires wire rope inspection each shift when equipment is in regular use. This frequent inspection allows operators to identify rope deterioration including broken wires, kinking, wear, or corrosion before defects progress to failure. Daily inspection is fundamental to rope management.

63. **Correct Answer: D (When unsafe conditions are identified)**

According to ASME B30.5, equipment must be removed from service when unsafe conditions are identified including malfunction, damage, or defects affecting safe operation. Equipment cannot return to service until conditions are corrected and verified by qualified personnel ensuring safe operations can resume.

64. **Correct Answer: C (Manufacturer or engineer approval required)**

ASME B30.5 requires regarding crane modifications that manufacturer or qualified engineer approval is required. Only these qualified parties can verify through analysis that modifications maintain adequate safety factors and do not adversely affect crane structural integrity, stability, or other critical characteristics.

65. **Correct Answer: B (Special requirements per ASME B30.23)**

Under ASME B30.5, before personnel hoisting, special requirements detailed in ASME B30.23 must be followed. These requirements include platform design standards, capacity reductions, safety devices, operational procedures, and other provisions ensuring personnel safety during these high-risk operations.

66. **Correct Answer: D (Extra caution and qualified supervision)**

ASME B30.5 specifies regarding operating near capacity limits that extra caution and qualified supervision should be employed. Operating near maximum capacity leaves minimal margin for errors or unexpected conditions. Enhanced oversight and careful procedures reduce risks when operating with reduced safety margins.

67. **Correct Answer: A (Before operations for capacity determination)**

According to ASME B30.5, boom angle indicators must be functional before operations for accurate capacity determination. Operators rely on boom angle information for chart reading and capacity verification. Indicators must function properly and display accurate information within manufacturer tolerances.

68. **Correct Answer: C (Documentation of inspections and repairs)**

ASME B30.5 requires for maintenance records that documentation of inspections and repairs must be maintained. These records provide equipment history documenting inspection compliance, maintenance performed, and repairs completed. Records verify that equipment receives required attention and provide traceability.

69. **Correct Answer: B (Risk, complexity, or potential consequences)**

Under ASME B30.5, critical lift designation is determined by risk factors, operational complexity, or potential consequences of failure. This includes heavy lifts, complex rigging, proximity to hazards, or operations where failure would cause significant damage or injury requiring special planning and procedures.

70. **Correct Answer: A (Minimize or eliminate side loading)**

ASME B30.5 requires regarding side loading that it must be minimized or eliminated. Side loading creates bending stresses in booms not designed to resist such loads. Even minor side loads can cause structural failure requiring operators to maintain vertical load line alignment.

71. **Correct Answer: B (After installation and major modifications)**

According to ASME B30.5, load testing must occur after initial installation and after major modifications or repairs affecting capacity. These tests verify that structural and mechanical components can support rated loads with appropriate margins after changes to equipment or configuration.

72. **Correct Answer: D (Loads shall not be left suspended unattended)**

ASME B30.5 specifies that loads shall not be left suspended when cranes are unattended. Leaving loads suspended creates hazards from rigging failure, equipment malfunction, or unauthorized access. Loads must be landed and secured before leaving cranes unattended for any period.

73. **Correct Answer: A (Stop and obtain direction from qualified person)**

Under ASME B30.5, if operators are uncertain about operations safety, they must stop and obtain direction from qualified persons or supervisors. Proceeding with uncertainty creates serious accident risks. Operations resume only after safety is confirmed through consultation with knowledgeable parties.

74. **Correct Answer: C (Based on deterioration criteria)**

ASME B30.5 requires wire rope replacement based on specific deterioration criteria including numbers of broken wires, diameter reduction, kinking, corrosion, and other defined defects. These objective criteria identify when rope strength has deteriorated to unsafe levels requiring replacement.

75. **Correct Answer: B (Qualified person)**

According to ASME B30.5, a qualified person must authorize crane return to service after repairs. This individual verifies that repairs were performed correctly, that equipment is safe for operations, and that all safety systems function properly before authorizing work resumption.

76. **Correct Answer: D (Current crane configuration and setup)**

When reading load charts, the current crane configuration and setup including boom length, counterweight amount, outrigger extension, and attachments is essential information to determine first. Configuration determines which chart section applies and what capacity is available for planned operations.

77. **Correct Answer: B (Horizontal distance from center of rotation)**

On load charts, operating radius is typically measured as the horizontal distance from the center of rotation to the vertical centerline of the hoist line at ground level. This horizontal measurement determines capacity for the operating condition and must be calculated accurately.

78. **Correct Answer: C (Capacity decreases)**

As operating radius increases, capacity decreases. Greater radius increases the overturning moment that loads create, reducing the load that stability or structural capacity can support. This fundamental inverse relationship means capacity at maximum radius may be small fraction of minimum radius capacity.

79. **Correct Answer: D (Separate jib charts or deductions)**

When using jibs, separate jib charts or specific deductions are required. Jibs significantly alter capacity compared to main boom alone, requiring consultation of special chart sections showing jib capacities or applying deduction factors. Main boom charts do not apply with jibs installed.

80. **Correct Answer: A (Hook block and rigging weight)**

Hook block and rigging weight must be deducted from gross capacity to determine net capacity available for loads. The hook block and any rigging above the load are supported by the crane consuming capacity. Only remaining net capacity is available for actual loads being lifted.

81. **Correct Answer: C (Notes, limitations, or special conditions)**

On load charts, special symbols typically indicate notes, capacity limitations, or special conditions requiring operator attention. These markings identify special requirements, deductions, restrictions, or transition points. All symbols must be understood as they convey critical capacity or operational information.

82. **Correct Answer: B (Radius and capacity)**

When boom angle changes, both radius and capacity are affected. Raising boom angle decreases radius bringing load closer to crane and generally increases capacity. Lowering boom angle increases radius moving load outward and decreases capacity. This relationship allows operators to adjust working position.

83. **Correct Answer: A (Lower capacity or interpolate)**

When radius falls between chart values, the lower more conservative capacity should be used, or proportional interpolation can be performed if procedures permit. Using lower capacity ensures adequate safety margins accounting for measurement uncertainties and dynamic forces during operations.

84. **Correct Answer: B (By boom length with radii)**

On telescopic crane charts, information is organized by boom length sections showing capacities at various operating radii for each length. This format allows operators to find their boom length section, then read capacity for their specific radius within that section.

85. **Correct Answer: C (Bold numbers or notation)**

Load charts indicate structural versus stability limits through bold numbers or special notation such as footnotes or lines. Understanding which factor limits capacity helps operators recognize when configuration changes might increase available capacity or when limits are absolute.

86. **Correct Answer: A (Correct chart section for configuration)**

When counterweight changes, it must be verified that the correct chart section for that counterweight configuration is being used. Different counterweight amounts provide substantially different capacities. Using the wrong chart section creates serious overload risks or unnecessarily restricts operations.

87. **Correct Answer: D (Wind loading effects on capacity)**

For loads with large surface areas, wind loading effects on capacity must be considered. Large surfaces create wind forces that add to overturning moments. Manufacturers may specify capacity reductions for loads exceeding certain surface areas or when operating in winds with large loads.

88. **Correct Answer: B (Important conditions and restrictions)**

On load charts, footnotes provide important conditions and restrictions that apply to operations. Footnotes contain critical information including outrigger requirements, configuration restrictions, environmental limits, and other factors affecting safe operations. All footnotes must be read and understood.

89. **Correct Answer: A (Reference correct chart for each configuration)**

When using multiple configurations daily, it is essential to reference the correct chart for each configuration. Each boom length, counterweight amount, or attachment requires consulting appropriate chart sections. Using wrong charts creates serious overload risks from incorrect capacity information.

90. **Correct Answer: D (Effect on stability and capacity)**

When load dimensions are non-standard with unusual shapes or dimensions, their effect on stability and capacity must be verified. Loads with offset centers of gravity, extreme dimensions, or large wind-catching surfaces may require capacity reductions beyond normal chart values.

91. **Correct Answer: C (Pump)**

In hydraulic systems, the pump converts mechanical power from the engine to hydraulic power. The pump draws fluid from the reservoir and pressurizes it, creating flow that drives cylinders and motors throughout the hydraulic system performing work.

92. **Correct Answer: B (Slow function, noise, or leaks)**

Hydraulic system problems are indicated by slow function speed suggesting inadequate pressure or flow, unusual noise indicating cavitation or component damage, or fluid leaks showing seal failure. Any of these symptoms requires investigation and correction before continued operations.

93. **Correct Answer: D (Remove contaminants)**

The purpose of hydraulic fluid filtration is removing contaminants from fluid protecting components from wear and damage. Filters capture particles from external contamination and internal wear debris, maintaining fluid cleanliness essential for system reliability, component longevity, and proper function.

94. **Correct Answer: A (Excessive demand or inadequate cooling)**

Hydraulic overheating is caused by excessive demand creating high heat generation, or inadequate cooling from low fluid levels, dirty coolers, or continuous operation without cooling periods. Overheating damages seals, degrades fluid, and reduces system efficiency requiring immediate attention.

95. **Correct Answer: A (Maximum system pressure)**

Hydraulic relief valves control maximum system pressure. Relief valves open when pressure exceeds settings, dumping excess flow to reservoir preventing pressure spikes. This protection prevents damage to pumps, hoses, cylinders, and other components from excessive pressure.

Specialty Examination

1. **Correct Answer: A (Superior stability and ability to work on soft ground)**

The primary operational advantage of crawler cranes over wheeled cranes is superior stability provided by the wide tracked base and ability to work on soft ground through low ground pressure. Crawler tracks distribute crane weight over large areas creating ground pressures as low as 5-15 psi, allowing operations on soils that would not support wheeled cranes. The wide track base provides exceptional stability for heavy lifting.

2. **Correct Answer: B (Hydraulic flow control and position sensors)**

On hydraulic telescopic cranes, boom section extension is synchronized through hydraulic flow control systems and position sensors. These systems coordinate extension cylinders ensuring sections extend smoothly together rather than one section extending completely before others begin. Position sensors monitor section positions while flow control manages hydraulic distribution maintaining synchronization.

3. **Correct Answer: D (Lattice is significantly lighter)**

The typical weight relationship between lattice and telescopic booms of similar length is that lattice booms are significantly lighter. The open lattice framework provides exceptional strength-to-weight ratios through efficient triangulated structure. This weight advantage allows lattice cranes to achieve greater heights and capacities for their overall crane weight compared to heavier telescopic designs.

4. **Correct Answer: A (All-wheel drive and differential locking systems)**

When operating all-terrain cranes in off-road mode, all-wheel drive with power to multiple axles and differential locking systems provide traction. These systems ensure power reaches wheels with grip even when some wheels lose traction on uneven terrain. Differential locks prevent power loss through spinning wheels maintaining forward motion.

5. **Correct Answer: D (Modular boom sections that can be assembled to length)**

Lattice boom cranes achieve extreme heights through modular boom sections that can be assembled to required lengths. Sections connect with pins creating continuous boom structures. This modularity allows boom lengths exceeding 400 feet for some cranes, with configurations customized to specific job requirements by selecting appropriate section combinations.

6. **Correct Answer: C (Hydraulic holding valves and mechanical locks)**

On telescopic cranes, hydraulic holding valves prevent uncontrolled boom retraction by maintaining pressure in extension cylinders preventing reverse flow. Mechanical locks provide additional security engaging when sections reach desired positions, ensuring positive retention independent of hydraulic pressure. These dual systems ensure controlled safe boom extension.

7. **Correct Answer: A (Simpler design and lower maintenance)**

Fixed cabs provide the advantage of simpler design and lower maintenance compared to swing cabs. Fixed cabs require no rotating connections for hydraulic lines, electrical systems, or controls that must function through continuous rotation. This simpler design reduces maintenance requirements and potential failure points while reducing initial cost.

8. **Correct Answer: B (Proper pin installation and manufacturer sequence)**

When installing lattice boom sections, structural integrity is ensured by proper pin installation through all connection holes with retention devices engaged, and following manufacturer assembly sequence exactly. Boom sections must be assembled in specific sequences ensuring proper load paths. Any deviation or incomplete connections can cause structural failure during operations.

9. **Correct Answer: D (Support boom from mast at various angles)**

The function of boom pendants on lattice cranes is supporting the boom from the mast structure at various angles. Pendants are wire ropes connecting boom tip to mast top, carrying compressive boom forces in tension. Adjusting pendant length through the boom hoist changes boom angle while pendants provide positive support preventing uncontrolled lowering.

10. **Correct Answer: C (Electronic or hydraulic control systems)**

On all-terrain cranes, electronic or hydraulic control systems coordinate multiple axle steering. These sophisticated systems can steer axles simultaneously for tight turns or independently for different maneuvers. Advanced systems automatically coordinate axle steering angles based on vehicle speed, turn radius, and operator inputs optimizing maneuverability.

11. **Correct Answer: B (Variable radius without main boom movement)**

The primary benefit of luffing jibs over fixed jibs is variable radius capability without requiring main boom movement. Luffing jibs can change angle independently through their own hoist system, allowing radius adjustment while maintaining constant hook height or adjusting both parameters. This versatility proves valuable for precision placement in confined areas.

12. **Correct Answer: A (Offset angle from boom centerline)**

When reading charts for offset jibs, the additional factor affecting capacity is the offset angle from boom centerline. As jibs offset from straight ahead positions, capacity decreases due to altered loading patterns and increased structural stress. Charts show capacity values at various offset angles requiring operators to match actual offset to chart values.

13. **Correct Answer: C (Structural and stability limits)**

Maximum boom length for mobile cranes is determined by structural capacity of boom members to support loads without failure and overall crane stability. Longer booms create greater overturning moments and impose higher structural loads. Manufacturers establish maximum lengths through analysis ensuring adequate strength and stability margins across operating ranges.

14. **Correct Answer: D (Tight turning radius and crab steering)**

On rough-terrain cranes, tight turning radius from short whebase and crab steering capability provide maneuverability in confined spaces. Crab steering allows the rear wheels to steer opposite the front wheels or in the same direction, enabling tight turns, sideways movement, or coordinated steering. This versatility allows operation in restricted areas.

15. **Correct Answer: A (Boom hoist system through mast)**

Boom angle control on lattice boom cranes is provided by the boom hoist system working through the mast structure. The boom hoist rope runs from the drum over sheaves at the mast top to the boom point. Adjusting rope length through the hoist raises or lowers boom angle while the mast provides the leverage point.

16. **Correct Answer: D (Significant capacity reduction)**

When operating with fly jibs, capacities are significantly reduced compared to main boom alone. Fly jibs add weight at the boom tip, extend the total boom length, and create additional structural loading. These factors combine to reduce capacity dramatically, often to 20-40 percent of main boom capacity at similar radii.

17. **Correct Answer: B (Manufacturer specifications and structural analysis)**

Safe jib length for a given configuration is determined by manufacturer specifications based on structural analysis. Manufacturers establish maximum jib lengths through engineering analysis ensuring that combined boom and jib loading remains within structural capacity limits and that stability is maintained throughout the operating range for each configuration.

18. **Correct Answer: A (Increased stability and lifting capacity)**

On crawler cranes with track extensions, wider gauge provides increased stability and lifting capacity by increasing the base of support. Greater track spacing increases the moment arm for resisting overturning moments allowing higher capacities. Wide-track configurations typically provide 15-30 percent greater capacity than narrow-track configurations.

19. **Correct Answer: C (Rapid deployment without boom assembly)**

The setup advantage telescopic cranes offer is rapid deployment without boom assembly requirements. Telescopic cranes arrive with boom mounted and extend hydraulically in minutes, while lattice cranes require boom assembly taking hours or days. This speed advantage makes telescopic cranes ideal for projects requiring mobility and quick setup.

20. **Correct Answer: D (Proper installation and correct load chart)**

When using boom extensions, it must be verified that extensions are properly installed per manufacturer requirements and that the correct load chart section for extended configuration is being used. Extensions affect boom strength and capacity requiring specific chart sections. Improper installation or wrong charts create serious safety risks.

21. **Correct Answer: B (Auxiliary hoist)**

Auxiliary hoist systems typically provide faster line speeds than main hoists. Auxiliaries are designed for lighter loads using smaller ropes and drums allowing higher speeds. Line speeds may be 50-100 percent faster than main hoists, making auxiliaries efficient for handling rigging, tools, or lighter materials while main hoists handle primary loads.

22. **Correct Answer: C (Hydraulic motor with proportional control)**

On hydraulic cranes, swing control is provided by a hydraulic motor with proportional control responding to operator inputs. The motor drives the swing mechanism with speed proportional to control deflection. Smooth proportional control allows precise swing positioning while automatic braking stops and holds position when controls return to neutral.

23. **Correct Answer: B (Use appropriate capacity chart for configuration)**

When changing crawler track spacing, it is critical to use the appropriate capacity chart for the track configuration. Wide-track and narrow-track configurations provide substantially different capacities requiring different chart sections. Using the wrong chart creates serious overload risks or unnecessarily restricts operations with available capacity.

24. **Correct Answer: B (Correct installation and chart section)**

When operating with boom inserts, it is essential to verify correct installation per manufacturer requirements and to use the appropriate chart section for the configuration with inserts. Inserts affect boom structural characteristics and capacity. Proper installation and correct chart use ensure safe operations within actual equipment capabilities.

25. **Correct Answer: C (Internal wear pads and guide systems)**

Boom sections during telescopic extension are guided by internal wear pads and guide systems. Wear pads made of low-friction materials ride on machined surfaces inside boom sections allowing smooth extension while maintaining alignment. These guides prevent binding and ensure sections extend concentrically without jamming.

26. **Correct Answer: D (Main chord members)**

On lattice boom cranes, main chord members carry primary axial loads. These large angle or tube members running the length of the boom at its corners form the main load-carrying framework. Chords resist bending and compression forces from boom weight and loads while lacing members and battens provide lateral support maintaining chord spacing and overall geometry.

Practical Examination

1. **Correct Answer: A (Six randomly distributed broken wires in one lay or three in one strand)**

When inspecting wire rope, the rope should be immediately removed when six randomly distributed broken wires are found in one rope lay length, or three broken wires in one strand in one lay. These ASME B30.5 removal criteria indicate that wire rope strength has deteriorated to unsafe levels. Broken wires result from fatigue, overload, or corrosion, and their presence indicates progressive failure requiring immediate replacement.

2. **Correct Answer: D (Opening strands to examine interior wires and core)**

The proper technique for inspecting internal wire rope condition is opening the rope at intervals using a spike or tool to separate strands, allowing visual inspection of interior wires and core condition. This examination reveals internal corrosion, broken wires, or core deterioration not visible from exterior inspection. Internal damage often progresses hidden from view making periodic internal inspection essential.

3. **Correct Answer: C (Milky or contaminated appearance)**

During pre-operational checks, milky or contaminated hydraulic fluid appearance requires immediate attention. Milky appearance indicates water contamination that causes corrosion and reduces lubrication. Other contamination including dirt or wear particles accelerates component wear. Contaminated fluid must be drained, the system flushed, and contamination sources corrected before refilling with clean fluid.

4. **Correct Answer: A (Cracks, deformation, or excessive throat opening)**

When inspecting load hooks, cracks in any area of the hook body, permanent deformation indicating overload, or excessive throat opening beyond specifications require immediate replacement. Throat opening increase above 15 percent or manufacturer limits indicates permanent stretching from overloads. Any of these conditions compromises hook integrity requiring replacement before operations.

5. **Correct Answer: D (No response to boom movement or erratic readings)**

Load moment indicator malfunction is indicated by no response to boom movement or erratic readings not corresponding to actual crane positions. Properly functioning LMI systems track boom angle and radius changes displaying current capacity utilization. Systems that fail to respond or display erratic values cannot provide reliable capacity information requiring repair before operations.

6. **Correct Answer: A (Immediate stop and hold when control released)**

During swing brake testing, proper function is indicated by immediate stop and hold when the control is released to neutral. The brake should engage automatically without operator action and hold position

without drift. Any delay in engagement, continued coasting, or inability to hold position indicates brake adjustment or repair is needed.

7. **Correct Answer: C (Raise boom then release control to verify hold)**

When testing boom hoist brake, the procedure verifying function is raising the boom using elevation control, then releasing control to neutral and verifying that the boom immediately stops and holds position without drift. The automatic brake should engage instantly preventing any boom lowering. Drift or delayed stopping indicates brake problems requiring adjustment or repair.

8. **Correct Answer: B (Check all controls neutral before starting)**

The first action in proper crane startup is checking that all control levers are in neutral positions before starting the engine. This verification prevents unintended crane movements when hydraulic systems pressurize after engine start. Operators should physically check each control position ensuring neutral before attempting engine start.

9. **Correct Answer: B (Oil pressure and temperature gauges)**

During engine warm-up, oil pressure and temperature gauges must be monitored. Oil pressure should stabilize quickly indicating proper lubrication system function. Temperature gauges should show gradual warming toward operating temperature. Abnormal pressure or temperature readings indicate problems requiring attention before placing systems under load.

10. **Correct Answer: A (Crane level remains within specifications)**

When deploying outriggers, it must be continuously verified that crane level remains within manufacturer specifications as jacks extend and lift the carrier. Real-time level monitoring allows immediate adjustment of jack heights on different corners achieving proper level. Most manufacturers limit level to one percent grade requiring careful adjustment during deployment.

11. **Correct Answer: C (Variable speeds with smooth control)**

The proper method for testing hoist function is operating at variable speeds with smooth control response. Operators should verify that hoist responds smoothly to control inputs at both slow and fast speeds, that controls return to neutral properly, and that brakes engage automatically stopping load movement when controls are released.

12. **Correct Answer: A (Erratic response or binding)**

During control function testing, erratic response not proportional to inputs or binding preventing smooth movement indicates problems requiring repair. Controls should respond smoothly and proportionally to

inputs without delays, binding, or erratic behavior. Problems suggest control valve issues, hydraulic system problems, or mechanical binding requiring correction.

13. **Correct Answer: D (Accurate display of current length)**

When checking boom length indicators, it must be verified that indicators accurately display current boom length matching actual extended length. These indicators are essential for capacity determination using load charts. Operators must know exact boom length to read capacities correctly. Inaccurate indicators create serious overload risks requiring calibration or repair.

14. **Correct Answer: B (Kinking or bird-caging)**

Wire rope condition requiring immediate replacement is kinking or bird-caging showing permanent distortion with strands separating from rope body. Kinks create severe localized stress concentrations dramatically reducing rope strength. Kinked or bird-caged rope can fail suddenly under loads well below normal capacity. Any rope showing these conditions must be removed immediately.

15. **Correct Answer: A (Milky or foamy fluid appearance)**

During hydraulic inspection, water contamination is indicated by milky or foamy fluid appearance. Water enters hydraulic systems through damaged seals, condensation, or improper maintenance. Water contamination causes corrosion, reduces lubrication effectiveness, and can lead to component failure. Contaminated fluid requires system draining, flushing, and seal repair.

16. **Correct Answer: C (Warnings and cutout before contact)**

When testing anti-two-block systems, proper operation is indicated by visual and audible warnings activating well before contact occurs and automatic hoist cutout preventing actual boom tip contact with the hook block. The device should provide adequate warning allowing operator response, then prevent two-blocking through automatic function cutout.

17. **Correct Answer: D (Verify engagement and attempt retraction)**

The correct procedure for checking outrigger locks is verifying that locks engage properly when beams reach extended positions, then attempting to retract beams while locks are set. This testing confirms that locking mechanisms prevent beam movement. Locks that fail to engage or allow movement despite engagement require immediate repair.

18. **Correct Answer: B (Cracks or structural deformation)**

During boom inspection, cracks in structural members or permanent deformation suggesting overload or impact damage require immediate attention. Structural cracks can propagate rapidly under load causing

catastrophic failure. Deformation indicates the boom has been loaded beyond design limits. Any structural damage requires engineering evaluation before equipment can return to service.

19. **Correct Answer: C (Secure attachment with no loosening)**

When inspecting wire rope terminations, it is critical to verify secure attachment with no loosening between rope and socket or wedge, no cracks in termination components, and no deformation. Terminations must maintain full grip on rope. Any loosening, cracks, or damage compromises termination strength allowing rope pullout requiring replacement.

20. **Correct Answer: D (Display is functional and readable)**

Regarding LMI displays, it must be verified that the display is functional showing appropriate information and readable from the operator's position under all lighting conditions. Non-functional displays prevent capacity monitoring creating serious overload risks. Illegible displays cannot be used effectively. Both conditions require repair ensuring operators can monitor capacity utilization.

21. **Correct Answer: A (Rope not properly seated in sheaves)**

During boom hoist rope inspection, rope not properly seated in sheave grooves or running on sheave flanges requires attention. Improper seating causes concentrated wear on both rope and sheaves and can lead to rope jumping from sheaves during operations creating sudden load drops. All rope must seat fully in intended grooves throughout reeving path.

22. **Correct Answer: C (Cracking, bulging, or deterioration)**

When checking hydraulic hoses, cracking particularly in bend areas, bulging indicating internal reinforcement failure, or other visible deterioration indicates replacement is needed. These conditions indicate imminent hose failure under pressure. Age-related hardening reducing flexibility also warrants replacement before pressure-induced failure occurs.

23. **Correct Answer: B (Lower boom, secure controls, document issues)**

The proper procedure for end-of-shift shutdown is lowering boom to safe storage angle, securing all controls in neutral positions, and documenting any issues requiring attention. This sequence protects equipment from wind damage, prevents unauthorized operation, ensures safe configuration, and provides communication about equipment status for next shift.

24. **Correct Answer: B (Smooth operation with immediate brake)**

During swing testing, proper operation is indicated by smooth acceleration responding to control input, smooth operation at commanded speeds, smooth deceleration as control reduces, and immediate brake

engagement when control returns to neutral. The entire swing cycle should be smooth without jerking, binding, or delays in brake application.

25. **Correct Answer: C (Low pressure or expired inspection)**

When inspecting fire extinguishers, low gauge pressure indicating charge loss or expired inspection tags indicating service is overdue require service. Fire extinguishers must maintain proper charge and receive required inspections. Low pressure or expired inspection indicate extinguishers may not function properly in emergencies requiring immediate servicing.

26. **Correct Answer: D (Full insertion with retention devices)**

Regarding boom locking pins, it must be verified that pins are fully inserted through all holes with no gaps visible and that retention devices such as clips, bolts, or pins are properly engaged. Partial insertion or missing retention allows pins to back out during operations causing sudden boom collapse. This verification is critical for preventing catastrophic failures.

27. **Correct Answer: D (All systems functional and area clear)**

During final verification, it must be confirmed that all required inspections are complete with no unresolved defects, all systems are functional and ready for operations, and the work area is clear of personnel and obstacles within operating radii. This comprehensive final verification ensures complete readiness before beginning lift operations.

28. **Correct Answer: A (Wear, cracks, or elongated holes)**

When inspecting lattice boom pins, wear reducing pin diameter, cracks in pin bodies, or elongated pin holes indicate problems requiring correction. Excessive wear or cracks require pin replacement. Elongated holes indicate overloading or fatigue damage requiring boom section evaluation and possible repair or replacement before returning to service.

29. **Correct Answer: C (Smooth operation without leaks)**

Proper boom cylinder function is indicated by smooth operation responding proportionally to controls without binding or jerking, no hydraulic leaks from seals or fittings, and no unusual sounds suggesting cavitation or mechanical problems. Cylinders should extend and retract smoothly throughout their stroke providing precise boom control.

30. **Correct Answer: B (Per manufacturer to minimize wind load)**

During high-wind shutdown, the proper boom position is per manufacturer specifications to minimize wind loading. Manufacturers typically recommend lowering boom to moderate angles that reduce wind

sail area while maintaining adequate ground clearance. Proper positioning protects boom structure from wind damage during storms while maintaining crane stability.