# Practice Test 11

## Core Examination

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

1. What soil condition is unsuitable for crane operations?
   A. Compacted gravel
   B. Dense sand
   C. Bedrock
   D. Saturated clay or organic material

2. When must competent persons inspect setups?
   A. Weekly
   B. Monthly
   C. Before operations and when conditions change
   D. Annually

3. What determines safe distance from excavations?
   A. Standard 5-foot rule
   B. Soil analysis and excavation depth
   C. Visual inspection only
   D. Distance optional

4. When operating on slabs, what must be verified?
   A. Slab capacity for concentrated loads
   B. Slab color
   C. Slab age
   D. Surface temperature

5. What is required under outrigger floats?
   A. Any surface
   B. Gravel only
   C. Concrete only
   D. Solid bearing across entire surface

6. During operations, when must level be monitored?
   A. Once daily
   B. Weekly
   C. Continuously or after configuration changes
   D. Monthly

7. What clearance applies to 50-200 kilovolt lines?
   A. 10 feet
   B. 15 feet or de-energization
   C. 5 feet
   D. 20 feet

8. When planning lifts, what is essential?
   A. Crane color
   B. Time available
   C. Weather forecast
   D. Total weight including rigging

9. What determines boom length selection?
   A. Boom color
   B. Fuel level
   C. Required reach and height
   D. Time of day

10. When must traffic be controlled?
   A. Never required
   B. Only at night
   C. When operations impact public access
   D. Monthly

11. What is required near property boundaries?
   A. Verbal notification
   B. Permission and clearance verification
   C. Higher insurance
   D. Night operations

12. During near-capacity lifts, what is essential?
   A. Detailed planning and supervision
   B. Verbal agreement
   C. Standard procedures
   D. No special requirements

13. When must travel routes be surveyed?
   A. Monthly
   B. Annually

C. Survey optional
D. Before travel for hazards

14. What indicates spotter need?
A. Crane size
B. Time of day
C. Limited visibility or blind spots
D. Fuel level

15. What must be installed for safety?
A. Parking areas
B. Barriers around hazard zones
C. Break rooms
D. Offices

16. When operating near roadways, what is required?
A. Night operations
B. Special insurance
C. Traffic control coordination
D. No requirements

17. What is needed near airports?
A. Night operations
B. FAA notification if required
C. Special paint
D. Higher insurance

18. When must wind be monitored?
A. Never required
B. When approaching limits
C. Monthly
D. Annually

19. When does weather stop operations?
A. When visibility or safety is compromised
B. Any precipitation
C. Never
D. Monthly

20. What is required for night operations?

A. Operations prohibited
B. Reduced capacity
C. Special permits
D. Adequate illumination

21. When are dual-crane plans required?
A. Complex critical tandem lifts
B. Never
C. All dual lifts
D. Optional

22. What must be verified after changes?
A. Insurance
B. Fuel level
C. Crane color
D. Appropriate load charts

23. What is prohibited during operations?
A. Radio use
B. Signal persons
C. Personnel under loads
D. Daytime operations

24. What establishes maximum wind limits?
A. General guidelines
B. Manufacturer specifications
C. Operator preference
D. Project schedule

25. When must rescue plans be ready?
A. Never required
B. Monthly
C. Annually
D. Before high-risk operations

26. What must be verified about counterweight?
A. Secure installation per specifications
B. Color
C. Age
D. Manufacturer name

27. What may be required near heliports?
A. Night operations
B. Special paint
C. Height limits and coordination
D. Higher insurance

28. What determines blocking needs?
A. Block color
B. Load characteristics and geometry
C. Block age
D. Block manufacturer

29. When must briefings occur?
A. Before each day's operations
B. Monthly
C. Annually
D. Weekly

30. What is required for boom over structures?
A. Verbal warning
B. Clearance or protective measures
C. Special permits
D. Higher insurance

31. What is the standard signal for "lower load"?
A. Arms overhead
B. Circular motion
C. One fist
D. Arm extended downward, finger pointing down

32. When using radios, what is critical?
A. Clear language with confirmations
B. Fast speech
C. Abbreviated terms
D. Any style

33. What must signal persons do without visibility?
A. Continue signaling
B. Estimate position

C. Stop or reposition
D. Signal faster

34. When must signals be reviewed?
A. Never
B. Before new site or personnel
C. Monthly
D. Annually

35. What is the standard signal for "extend boom"?
A. Arms overhead
B. Circular motion
C. One arm extended
D. Both fists pushing forward

36. During poor visibility, what is required?
A. No signaling possible
B. Illuminated or enhanced signals
C. Voice only
D. Standard signals adequate

37. When can special signals be used?
A. Never
B. Anytime
C. After demonstration and agreement
D. Only emergencies

38. What signal has absolute priority?
A. Radio commands
B. Hand signals
C. Horn signals
D. Stop from anyone

39. When must signal person qualifications be checked?
A. Before giving signals
B. Weekly
C. Monthly
D. Annually

40. What is required if signal person moves?

A. Continue signaling
B. Move quickly
C. Stop and establish visibility
D. No action needed

41. When are relief personnel needed?
A. Every hour
B. When fatigue affects performance
C. Never during operations
D. End of shift

42. What must operators confirm?
A. Understanding before executing
B. Weather
C. Fuel level
D. Time

43. When using voice commands, what is avoided?
A. Complete sentences
B. Unclear or ambiguous language
C. Specific terms
D. Slow speech

44. What ensures signal person visibility?
A. Position only
B. Voice volume
C. High-visibility clothing
D. Hand size

45. When must backup communication exist?
A. When primary may fail
B. Never needed
C. Only large cranes
D. Optional

46. Under OSHA, what must be assessed initially?
A. Fuel costs
B. Operator salary
C. Project budget
D. Ground conditions and hazards

47. What does OSHA require for operators?
A. Experience only
B. Certification and evaluation
C. Age only
D. No requirements

48. According to OSHA, when are inspections documented?
A. Shift, annual, and after events
B. Never
C. Monthly only
D. Optional

49. What must employers provide?
A. Transportation
B. Lunch
C. Housing
D. Equipment familiarization

50. Under OSHA, who supervises assembly?
A. Any worker
B. Owner
C. Qualified A/D director
D. Insurance agent

51. What does OSHA require for capacity?
A. Verbal adequate
B. Accessible charts
C. Memory sufficient
D. Optional

52. According to OSHA, when is fall protection required?
A. Never
B. Only above 10 feet
C. Optional
D. Above 6 feet during A/D

53. What must OSHA inspections include?
A. Deficiency documentation
B. Operator preferences

C. Fuel type
D. Crane color

54. Under OSHA, who approves modifications?
A. Manufacturer or engineer
B. Operator
C. Owner
D. Any supervisor

55. What does OSHA require for defects?
A. Document only
B. Continue cautiously
C. Correction or removal from service
D. Ignore if minor

56. According to OSHA, when must re-evaluation occur?
A. Never
B. Every 10 years
C. Monthly
D. Every three years or when deficiencies arise

57. What must OSHA inspections evaluate?
A. Paint only
B. Age only
C. Safety-critical systems
D. Fuel capacity

58. Under OSHA, what is required near power lines?
A. Clearances or de-energization
B. Verbal notification
C. Higher insurance
D. No requirements

59. What does OSHA require for load data?
A. Verbal adequate
B. Memory sufficient
C. Optional
D. Current accessible charts

60. According to OSHA, when can trainees operate?

A. Never
B. With certified operator present
C. After 1 week
D. Anytime

61. Under ASME B30.5, rated capacity means what?
A. Any load
B. Load plus 50 percent
C. Maximum manufacturer-rated load
D. Operator decision

62. What does ASME B30.5 require for rope?
A. Shift inspection when in use
B. Monthly
C. Annually
D. Optional

63. According to ASME B30.5, when must equipment stop?
A. Monthly
B. Quarterly
C. Annually
D. When unsafe conditions exist

64. What does ASME B30.5 require for modifications?
A. Verbal approval
B. Owner approval
C. Manufacturer or engineer approval
D. No approval

65. Under ASME B30.5, what governs platforms?
A. Standard procedures
B. ASME B30.23 requirements
C. Verbal agreement
D. Platforms prohibited

66. What does ASME B30.5 specify about rated loads?
A. Can exceed slightly
B. Operator discretion
C. Shall not be exceeded
D. Optional limits

67. According to ASME B30.5, when must indicators work?
A. Monthly
B. Before operations
C. Annually
D. Optional

68. What does ASME B30.5 require for maintenance?
A. Verbal reports
B. No records
C. Records prohibited
D. Written documentation

69. Under ASME B30.5, critical lifts are based on what?
A. Risk and consequences
B. Weight only
C. Time
D. Crane age

70. What does ASME B30.5 state about side loading?
A. Permitted
B. Increases capacity
C. Must be minimized
D. No restrictions

71. According to ASME B30.5, when are tests required?
A. Weekly
B. After installation and major repairs
C. Monthly
D. Optional

72. What does ASME B30.5 prohibit?
A. Leaving loads unattended
B. Tag lines
C. Radio use
D. Signal persons

73. Under ASME B30.5, uncertain operators must do what?
A. Continue slowly
B. Document later

C. Stop and seek direction
D. Consult anyone

74. What does ASME B30.5 require for rope removal?
A. Monthly
B. When deterioration criteria met
C. Annually
D. Never

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

76. When reading charts, what is identified first?
A. Operator
B. Current configuration
C. Fuel level
D. Weather

77. On charts, radius is defined as what?
A. Vertical distance
B. Diagonal measure
C. Boom length
D. Horizontal distance from center

78. What happens as radius increases?
A. Capacity decreases
B. Both increase
C. No relationship
D. Capacity doubles

79. When using attachments, what is needed?
A. Main boom charts
B. No charts
C. Separate charts or deductions
D. Estimate

80. What must be deducted for net capacity?

A. Fuel
B. Hook block and rigging
C. Counterweight
D. Operator weight

81. On charts, special marks indicate what?
A. Highest capacity
B. Lowest capacity
C. Recommended capacity
D. Notes or conditions

82. When angle changes, what else changes?
A. Nothing
B. Color only
C. Radius and capacity
D. Speed only

83. Between chart values, what applies?
A. Lower capacity or conservative interpolation
B. Higher capacity
C. Average
D. Estimate freely

84. How are telescopic charts organized?
A. Alphabetically
B. Randomly
C. By age
D. By boom length with radii

85. What indicates capacity limits?
A. Color
B. Bold text or notation
C. Page number
D. Font size

86. When counterweight changes, what is needed?
A. Insurance
B. Color change
C. Appropriate chart section
D. No action

87. What must be considered for large loads?
A. Wind effects
B. Color
C. Age
D. Manufacturer

88. What do footnotes contain?
A. Critical restrictions
B. Crane history
C. Operator names
D. Maintenance logs

89. When configurations change, what is essential?
A. Insurance update
B. Correct chart reference
C. Color change
D. No action

90. What affects capacity for unbalanced loads?
A. Color
B. Age
C. Manufacturer
D. Center of gravity location

91. What converts power to hydraulic?
A. Engine-driven pump
B. Manual crank
C. Electric motor
D. Gravity

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

93. What do hydraulic filters do?
A. Remove contaminants
B. Increase pressure

C. Cool fluid
D. Add lubrication

94. What causes hydraulic overheating?
A. Proper operation
B. Clean filters
C. Excessive load or poor cooling
D. Low hours

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

## Specialty Examination

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

1. What advantage do crawler cranes provide?
A. High road speed
B. Compact storage
C. Low maintenance
D. Excellent stability and low ground pressure

2. On telescopic cranes, what ensures extension control?
A. Manual coordination
B. Gravity
C. Hydraulic flow control and sensors
D. Operator skill alone

3. What gives lattice booms strength?
A. Triangulated structural design
B. Solid construction
C. Heavy materials
D. Compact design

4. On all-terrain cranes, what enables off-road travel?
A. Single axle
B. All-wheel drive and suspension

C. Manual transmission
D. Fixed differential

5. How do lattice cranes achieve height?
A. Telescoping sections
B. Hydraulic extension
C. Fixed lengths
D. Modular section assembly

6. On telescopic cranes, what prevents retraction?
A. Friction only
B. Gravity
C. Holding valves and locks
D. Manual brakes

7. What advantage do fixed cabs provide?
A. Better visibility
B. Lower maintenance
C. Higher capacity
D. Improved comfort

8. When assembling lattice booms, what is critical?
A. Proper pins and assembly sequence
B. Speed
C. Visual inspection only
D. Experience alone

9. What do boom pendants provide?
A. Boom extension
B. Rigging storage
C. Capacity increase
D. Angular support from mast

10. On all-terrain cranes, what manages steering?
A. Manual linkages
B. Electronic control systems
C. Separate operators
D. Mechanical cables

11. What capability do luffing jibs offer?

A. Radius adjustment without boom movement
B. Higher capacity
C. Lower cost
D. Simpler operation

12. When using offset jibs, what affects capacity?
A. Time of day
B. Offset angle
C. Wind alone
D. Operator skill

13. What limits boom length?
A. Operator preference
B. Fuel capacity
C. Structural and stability constraints
D. Boom color

14. What provides rough-terrain maneuverability?
A. Compact size with crab steering
B. Long wheelbase
C. Multiple axles
D. Fixed suspension

15. What controls lattice boom angle?
A. Manual cranks
B. Counterweight position
C. Hydraulic cylinders only
D. Boom hoist system

16. How do fly jib capacities compare?
A. No change
B. Increased
C. Significantly reduced
D. Slight increase

17. What establishes safe jib length?
A. Jib color
B. Manufacturer specifications
C. Operator decision
D. Ground conditions

18. What does wider track spacing provide?
   A. Greater stability and capacity
   B. Faster travel
   C. Lower fuel use
   D. Reduced maintenance

19. What is the telescopic crane advantage?
   A. Higher capacity
   B. Longer boom
   C. Lower cost
   D. Quick setup without assembly

20. When using boom extensions, what is critical?
   A. Extension color
   B. Proper installation and charts
   C. Extension age
   D. Extension weight

21. Which hoist offers faster speeds?
   A. Main hoist
   B. Manual hoist
   C. Auxiliary hoist
   D. All equal

22. What provides hydraulic crane swing?
   A. Manual rotation
   B. Wire rope
   C. Electric motor only
   D. Hydraulic motor with brake

23. When changing track width, what is essential?
   A. Appropriate capacity chart
   B. Track color
   C. Insurance notification
   D. Width irrelevant

24. When using boom inserts, what is critical?
   A. Insert color
   B. Correct installation and charts

C. Insert age
D. Manufacturer location

25. What guides boom telescoping?
A. External rails
B. Operator vision
C. Gravity
D. Internal wear pads and guides

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

## 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 requires removal?
A. Proper flexibility
B. Adequate lubrication
C. Damage exceeding removal criteria
D. Manufacturer markings visible

2. What is the proper rope inspection frequency?
A. Each shift when in regular use
B. Weekly
C. Monthly
D. Annually

3. During pre-operational checks, what is acceptable?
A. Milky appearance
B. Empty reservoir
C. Overfilled condition
D. Clean fluid at proper level

4. When inspecting hooks, what requires replacement?
A. 15 percent or manufacturer limit exceeded

B. 5 percent throat increase
C. 10 percent increase
D. 12 percent increase

5. What indicates proper LMI function?
A. Display illuminated
B. Power on
C. Accurate configuration and load tracking
D. Alarm sounds

6. During brake testing, what is proper function?
A. Gradual stopping
B. Immediate stop and hold
C. Continued movement
D. Delayed engagement

7. What verifies hoist brake function?
A. Visual inspection
B. Load hold without drift
C. Noise check
D. Fluid level check

8. What is verified before engine start?
A. Controls in neutral
B. Horn tested
C. Boom extended
D. Radio on

9. During warm-up, what is monitored?
A. Ambient temperature
B. Fuel level only
C. Oil pressure and temperature
D. Radio signal

10. When deploying outriggers, what is verified?
A. Crane level maintained
B. Deployment speed
C. Paint condition
D. Serial numbers

11. What is proper hoist testing?
A. Maximum speed only
B. Minimum speed only
C. Visual inspection adequate
D. Variable speeds with brake test

12. During control testing, what is acceptable?
A. Delayed response
B. Smooth proportional response
C. Binding movement
D. Erratic function

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

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

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

16. When testing anti-two-block, what indicates proper function?
A. Device visible
B. Device labeled
C. Device makes sound
D. Warnings and cutout activation

17. What is proper lock verification?
A. Visual only
B. Engagement verification with load test
C. Paint check

D. Listen for sounds

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

19. When inspecting terminations, what is critical?
A. Secure attachment without loosening
B. Termination color
C. Termination age
D. Termination weight

20. What must LMI displays provide?
A. Display color
B. Display size
C. Display age
D. Functional readable information

21. During rope inspection, what seating is required?
A. Can ride flanges
B. Seating not critical
C. Proper seating in all grooves
D. Visual adequate

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

23. What is proper shutdown procedure?
A. Lower boom, secure controls, document
B. Leave running
C. Secure controls only
D. Lower boom only

24. During swing testing, what indicates proper operation?
A. Continuous rotation

B. Jerky movement
C. Delayed response
D. Smooth operation with immediate brake

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

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

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

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

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

30. During high winds, what is proper positioning?
A. Maximum height
B. Horizontal
C. Fully extended
D. Per manufacturer specifications

# Answers & Explanations - Practice Test 11

## Core Examination

1. **Correct Answer: D (Saturated clay or organic material)**

Saturated clay or organic material is unsuitable for crane operations. Saturated clay has very low bearing capacity, typically 500-1,500 pounds per square foot when soft. Water saturation reduces soil strength dramatically. Organic materials contain decomposing vegetation creating voids and continuing to compress under loads. These soils require extensive preparation including excavation, replacement with engineered fill, or ground improvement systems before supporting crane operations.

2. **Correct Answer: C (Before operations and when conditions change)**

Competent persons must inspect setups before operations and when conditions change such as weather affecting ground, detected settlement, or configuration modifications. Each inspection verifies ground adequacy, proper level, correct outrigger deployment, and absence of hazards. Inspections when conditions change ensure setup remains safe as circumstances evolve throughout operations.

3. **Correct Answer: B (Soil analysis and excavation depth)**

Safe distance from excavations is determined by soil analysis and excavation depth. Excavations create failure zones extending laterally beyond visible edges. The distance depends on soil type, excavation depth, slope angle, and loading conditions. Engineering analysis determines safe setback preventing ground failure. General guidance suggests distance at least equal to excavation depth in stable soils, greater in weak soils.

4. **Correct Answer: A (Slab capacity for concentrated loads)**

When operating on slabs, slab capacity for concentrated loads must be verified. Slabs designed for distributed floor loads may fail under concentrated crane loads from outriggers. Engineering evaluation confirms slab thickness, reinforcement, and underlying support can handle anticipated loads. Additional support such as load-spreading cribbing may be required if capacity is inadequate.

5. **Correct Answer: D (Solid bearing across entire surface)**

Under outrigger floats, solid bearing across entire surface is required. The entire float must rest on prepared solid surface with no voids, uneven areas, or soft spots. Partial support creates concentrated loading causing excessive bearing pressure and potential failure. Full contact ensures uniform load distribution across the complete mat area maximizing effective bearing surface.

6. **Correct Answer: C (Continuously or after configuration changes)**

During operations, level must be monitored continuously through monitoring systems and after configuration changes. Real-time monitoring identifies developing problems from ground settlement or changes. Crane level directly affects stability margins requiring immediate attention if specifications are exceeded. Continuous monitoring allows prompt corrective action maintaining safe operations.

7. **Correct Answer: B (15 feet or de-energization)**

For 50-200 kilovolt lines, OSHA requires 15 feet clearance or de-energization by utility company. This increased clearance compared to lower voltages accounts for greater electrical arc potential at higher voltages. Lines must be de-energized if adequate clearance cannot be maintained throughout all boom movements and operating conditions.

8. **Correct Answer: D (Total weight including rigging)**

When planning lifts, total weight including rigging is essential to calculate. Total suspended weight includes the actual load plus all rigging components such as slings, shackles, spreader bars, and lifting beams. This complete weight determines required crane capacity. Failing to account for rigging weight results in overloading beyond safe capacity limits.

9. **Correct Answer: C (Required reach and height)**

Boom length selection is determined by required reach to operating radius and height needed for placement. Longer booms reach greater distances and achieve higher elevations. The combination of boom length and angle determines both radius and height capabilities. Configuration must provide adequate capacity at required radius while achieving necessary vertical clearance.

10. **Correct Answer: C (When operations impact public access)**

Traffic must be controlled when operations impact public access through boom swing across roadways, load placement blocking lanes, or crane positioning obstructing traffic flow. Traffic control prevents vehicles from entering hazardous areas and maintains safe orderly movement around operations. Coordination with authorities ensures proper implementation of control measures.

11. **Correct Answer: B (Permission and clearance verification)**

Near property boundaries, permission and clearance verification are required. Clearance verification ensures operations remain within authorized areas. Permissions from adjacent property owners are needed if boom or loads will swing over or affect their property. Written agreements establish authorization, responsibilities, and protective measures. Operating without permission creates legal liability.

12. **Correct Answer: A (Detailed planning and supervision)**

During near-capacity lifts, detailed planning and supervision are essential. Operating near maximum capacity leaves minimal margin for errors or unexpected conditions. Detailed planning documents all procedures while qualified supervision provides expert oversight. Comprehensive planning and experienced supervision reduce risks when operating with reduced safety margins.

13. **Correct Answer: D (Before travel for hazards)**

Travel routes must be surveyed before travel for hazards including overhead wires, clearance obstructions, and surface strength to support crane weight. Route surveys identify hazards requiring removal, route modification, or special precautions. This verification prevents contact with overhead obstructions and ground failure during crane movement.

14. **Correct Answer: C (Limited visibility or blind spots)**

Limited visibility or blind spots indicate spotter need. When blind spots prevent operators from seeing travel paths, loads, or surrounding areas, or when visibility is restricted by weather or obstructions, spotters are needed. Spotters positioned where they can see provide guidance ensuring safe movements through areas operators cannot directly observe.

15. **Correct Answer: B (Barriers around hazard zones)**

For safety, barriers around hazard zones must be installed preventing unauthorized personnel from entering swing radius, fall zones, or areas where they could be struck. Physical barriers such as fencing, barricades, or caution tape create visible boundaries. These barriers provide positive protection against inadvertent access to dangerous areas.

16. **Correct Answer: C (Traffic control coordination)**

When operating near roadways, traffic control coordination is required. Plans define traffic routing, lane closures, and control methods. Coordination with traffic authorities ensures compliance with regulations and proper implementation. Trained flaggers or traffic control devices direct vehicles safely around operations preventing entry into hazardous zones.

17. **Correct Answer: B (FAA notification if required)**

Near airports, FAA notification if required must be provided. Cranes can interfere with aircraft navigation, approach paths, or radar systems requiring notification to aviation authorities. Cranes exceeding certain heights in approach zones may require special lighting, marking, or operational restrictions. Notification requirements depend on crane height and proximity to airport.

18. **Correct Answer: B (When approaching limits)**

Wind must be monitored when approaching limits allowing operators to track actual wind speeds. Continuous monitoring provides data for informed decisions about continuing or stopping operations. This prevents operating in winds exceeding manufacturer limits that compromise stability or control. Monitoring equipment provides objective wind speed data.

19. **Correct Answer: A (When visibility or safety is compromised)**

Weather stops operations when visibility or safety is compromised through visibility reduction preventing clear view, or equipment function is affected through ice accumulation, electrical problems, or reduced friction. Safety must not be compromised by adverse weather regardless of project schedules or pressures to continue working.

20. **Correct Answer: D (Adequate illumination)**

For night operations, adequate illumination is required including crane, loads, landing areas, rigging operations, and personnel positions. Lighting must allow clear visibility of operations, load positions, hazards, and hand signals. Adequate illumination prevents accidents from reduced visibility maintaining equivalent safety standards to daylight operations.

21. **Correct Answer: A (Complex critical tandem lifts)**

Dual-crane plans are required for complex critical tandem lifts where load distribution, rigging configuration, or operational complexity require engineering analysis. Engineering ensures load sharing is calculated correctly, rigging is adequate for divided loading, and procedures account for coordination requirements. Complex tandem operations demand formal engineering and planning.

22. **Correct Answer: D (Appropriate load charts)**

After changes, appropriate load charts must be verified. Configuration changes such as boom length adjustments or counterweight modifications require different chart sections. Charts must match actual configuration to provide accurate capacity information. Using charts for previous configurations after changes creates serious overload risks from incorrect capacity data.

23. **Correct Answer: C (Personnel under loads)**

During operations, personnel under loads is prohibited by OSHA and ASME standards. This fundamental safety requirement prevents injuries from dropped loads or rigging failures. All personnel must remain clear of areas under suspended loads or boom paths. Operations stop until personnel move to safe locations outside load zones.

24. **Correct Answer: B (Manufacturer specifications)**

Manufacturer specifications establish maximum wind limits. Manufacturers determine maximum wind speeds through engineering analysis and testing based on crane design, stability characteristics, and structural capacity. These specifications ensure adequate stability and control margins under wind loading. Manufacturer limits must be followed for safe operations in windy conditions.

25. **Correct Answer: D (Before high-risk operations)**

Rescue plans must be ready before high-risk operations such as proximity to hazards, remote locations, or situations where standard emergency response may be delayed or inadequate. Plans ensure personnel understand response protocols and necessary equipment is available. Preparation allows effective response if emergencies develop during high-risk activities.

26. **Correct Answer: A (Secure installation per specifications)**

About counterweight, secure installation per specifications must be verified. Counterweight must be properly positioned and fastened per manufacturer instructions preventing movement or detachment during operations. Loose counterweight can shift creating sudden stability loss or fall causing catastrophic accidents. All fasteners must be properly installed and torqued.

27. **Correct Answer: C (Height limits and coordination)**

Near heliports, height limits and coordination may be required. Cranes can interfere with helicopter approach and departure paths. Notification allows heliport operators to adjust operations, establish restrictions, or coordinate timing. Height limits may apply in certain zones. Coordination ensures both crane and helicopter operations proceed safely.

28. **Correct Answer: B (Load characteristics and geometry)**

Blocking needs are determined by load characteristics and geometry including shape, weight distribution, and rigging configuration. Loads with irregular shapes or uneven weight distribution may require blocking to prevent tipping or rotation. Rigging geometry may necessitate blocking for proper load positioning and stability during lifting and placement operations.

29. **Correct Answer: A (Before each day's operations)**

Briefings must occur before each day's operations. Daily briefings ensure personnel understand hazards, procedures, assignments, and communication methods for that day's work. Conditions, personnel, and tasks may change daily requiring fresh communication of safety information. Daily briefings ensure everyone starts with current operational information.

30. **Correct Answer: B (Clearance or protective measures)**

For boom over structures, clearance or protective measures are required. Clearance verification ensures adequate distance throughout movement paths preventing contact. Protective measures such as padding, temporary removal of fragile items, or evacuation of personnel may be needed if adequate clearance cannot be maintained. Either clearance or protection prevents damage or injury.

31. **Correct Answer: D (Arm extended downward, finger pointing down)**

The standard hand signal for "lower load" consists of arm extended downward with finger pointing down. This signal clearly indicates the downward direction of desired load movement. The extended arm and pointing finger provide intuitive visual communication of the lowering action distinguishing it from other signals.

32. **Correct Answer: A (Clear language with confirmations)**

When using radios, clear language with confirmations is critical. Communications must use unambiguous terminology and operators must confirm understanding through acknowledgment or repeat-back before executing commands. This protocol ensures communications are understood correctly completing the communication loop before potentially hazardous movements begin.

33. **Correct Answer: C (Stop or reposition)**

Without visibility, signal persons must stop or reposition where they can see loads and operations. Someone with clear view must monitor load position and movements throughout lift cycles. Continuing without visibility creates serious hazards from inability to detect problems or provide appropriate direction to operators.

34. **Correct Answer: B (Before new site or personnel)**

Signals must be reviewed before new site or personnel to ensure mutual understanding of signals that will be used. This review prevents misunderstandings from unfamiliarity with standard signals, regional variations, or site-specific signals. All parties must demonstrate understanding of signal meanings before operations begin.

35. **Correct Answer: D (Both fists pushing forward)**

The standard hand signal for "extend boom" consists of both fists positioned in front of body making a pushing forward motion away from body. This signal simulates pushing boom sections outward, providing an intuitive visual representation of the desired extension movement distinguishing it from retraction signals.

36. **Correct Answer: B (Illuminated or enhanced signals)**

During poor visibility, illuminated or enhanced signals are required. This includes lighted wands, flashlights, reflective clothing, or additional lighting making signals visible despite fog, darkness, dust, or other visibility-reducing conditions. Enhanced visibility maintains effective communication when normal signals would be difficult or impossible to see clearly.

37. **Correct Answer: C (After demonstration and agreement)**

Special signals can be used after demonstration and agreement. Special signals must be demonstrated to all parties ensuring operators, signal persons, and supervisors understand their meanings. All personnel must agree on signal meanings before using special signals during operations. This prevents misunderstandings that could cause dangerous actions.

38. **Correct Answer: D (Stop from anyone)**

Stop from anyone has absolute priority over all other signals. 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. Anyone observing danger can stop operations.

39. **Correct Answer: A (Before giving signals)**

Signal person qualifications must be checked before giving signals. This verification ensures individuals directing crane movements are qualified through training and evaluation demonstrating knowledge and ability. Operating with unqualified signal persons creates serious accident risks from incorrect signals, poor judgment, or inadequate understanding of operations.

40. **Correct Answer: C (Stop and establish visibility)**

If signal person moves, stop and establish visibility is required. Operations must stop and new visibility must be confirmed. Operators must know where to look for signals and signal persons must verify adequate visibility from new positions. Clear communication must be re-established before continuing operations.

41. **Correct Answer: B (When fatigue affects performance)**

Relief personnel are needed when fatigue affects performance reducing attention, reaction time, or communication clarity. Effective signaling requires full mental acuity and physical capability. Fatigued personnel create safety risks through reduced performance, slower reactions, impaired judgment, and increased likelihood of errors during critical signaling activities.

42. **Correct Answer: A (Understanding before executing)**

Operators must confirm understanding before executing signals. This verification through acknowledgment or repeat-back ensures signals were received and understood correctly. The communication loop must be complete confirming mutual understanding before potentially hazardous movements begin. Confirmation prevents misunderstandings that could cause accidents.

43. **Correct Answer: B (Unclear or ambiguous language)**

When using voice commands, unclear or ambiguous language is avoided. All communications should use specific unambiguous terminology that cannot be misinterpreted. Standard terms for directions and functions ensure instructions are understood correctly. Ambiguous language creates confusion and dangerous misunderstandings during operations.

44. **Correct Answer: C (High-visibility clothing)**

High-visibility clothing ensures signal person visibility. High-visibility apparel in orange or lime with reflective striping makes signal persons readily identifiable allowing operators to locate them quickly. This visibility is essential against backgrounds and in varying lighting conditions. Reflective materials enhance visibility in low light.

45. **Correct Answer: A (When primary may fail)**

Backup communication must exist when primary may fail from equipment malfunction, interference, environmental conditions, or battery depletion. Predetermined backup methods ensure communication can continue if primary systems fail during operations. This redundancy maintains safe control under all circumstances preventing loss of communication during critical operations.

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

Under OSHA, ground conditions and hazards must be assessed initially. This hazard assessment identifies conditions requiring special precautions including ground bearing capacity, power line proximity, fall hazards, and proximity hazards. The assessment establishes foundation for comprehensive safe operation planning identifying all significant hazards.

47. **Correct Answer: B (Certification and evaluation)**

OSHA requires for operators certification and evaluation. Certification by accredited organizations ensures operators have been tested to national standards. Employer evaluation verifies operators can safely operate specific equipment in actual site conditions with site-specific hazards. Both components ensure operator competency.

48. **Correct Answer: A (Shift, annual, and after events)**

According to OSHA, inspections are documented during shift inspections before daily use, annual comprehensive inspections, and after events such as repairs, incidents, or modifications. Documentation provides accountability, history, and verification of compliance with inspection requirements. Records demonstrate due diligence in equipment maintenance.

49. **Correct Answer: D (Equipment familiarization)**

Employers must provide equipment familiarization per OSHA. This training supplements certification ensuring operators understand controls, capacities, characteristics of actual equipment, and site-specific hazards and procedures. Familiarization bridges certification knowledge to actual working conditions and specific equipment ensuring safe effective operations.

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

Under OSHA, qualified assembly/disassembly director must supervise assembly. This individual has specific knowledge of assembly procedures ensuring manufacturer instructions are followed correctly, verifying connection integrity, and coordinating assembly activities. The A/D director ensures safe assembly practices preventing accidents during high-risk assembly work.

51. **Correct Answer: B (Accessible charts)**

OSHA requires for capacity accessible charts. Charts must be readily available to operators during operations for reference allowing capacity determination for planned lifts. Charts must match equipment configuration providing accurate capacity information. Operators need this information for lift planning and execution throughout workdays.

52. **Correct Answer: D (Above 6 feet during A/D)**

According to OSHA, fall protection is required above 6 feet during assembly/disassembly operations. Personal fall arrest systems or guardrail systems protect workers from fall hazards during boom assembly and other elevated A/D work. This requirement recognizes the serious injury potential from falls during assembly activities.

53. **Correct Answer: A (Deficiency documentation)**

OSHA inspections must include deficiency documentation identifying all defects, wear, or unsafe conditions affecting safe operations. Documentation records what was found and how issues were addressed. This provides accountability and verification that equipment is maintained safely with proper follow-through on identified problems.

54. **Correct Answer: A (Manufacturer or engineer)**

Under OSHA, manufacturer or engineer must approve modifications. Only these parties have expertise to verify through analysis that modifications maintain adequate safety factors and do not adversely affect structural integrity, stability, or other critical characteristics. Unauthorized modifications void certifications and create serious hazards.

55. **Correct Answer: C (Correction or removal from service)**

OSHA requires for defects correction or removal from service. Defects must be corrected before continued use or equipment must be removed from service until repairs are completed. Operating with known defects violates safety requirements and creates serious hazards. Equipment cannot return until verified safe.

56. **Correct Answer: D (Every three years or when deficiencies arise)**

According to OSHA, re-evaluation must occur every three years or when deficiencies arise. Periodic re-evaluation ensures operators maintain competency. Deficiency-triggered evaluation addresses problems immediately requiring assessment and potential additional training. This ensures ongoing operator competency throughout their careers.

57. **Correct Answer: C (Safety-critical systems)**

OSHA inspections must evaluate safety-critical systems including structural elements, mechanical systems, safety devices, controls, and wire rope. Comprehensive inspections identify defects or conditions affecting safe operations. All systems essential for safe operation must be thoroughly evaluated during inspections.

58. **Correct Answer: A (Clearances or de-energization)**

Under OSHA near power lines, clearances or de-energization must be established. Clearances meeting voltage-based requirements or de-energization procedures prevent electrocution from electrical contact or arcing. These measures protect personnel and equipment from electrocution hazards which are among the most serious crane-related risks.

59. **Correct Answer: D (Current accessible charts)**

OSHA requires for load data current accessible charts. Charts must match equipment configuration and be available for operator reference. Accurate current capacity information is essential for lift planning and safe execution. Outdated or inaccessible charts prevent proper capacity verification creating overload risks.

60. **Correct Answer: B (With certified operator present)**

According to OSHA, trainees can operate with certified operator present who is physically at controls. This allows hands-on training under expert supervision. The certified operator must be able to take

immediate control if necessary. Physical presence ensures immediate intervention capability during training.

61. **Correct Answer: C (Maximum manufacturer-rated load)**

Under ASME B30.5, rated capacity means maximum manufacturer-rated load for specific configurations. Rated capacities are established by manufacturers through design analysis and testing accounting for all operating conditions and including appropriate safety factors. These ratings ensure safe operations within designed limits.

62. **Correct Answer: A (Shift inspection when in use)**

ASME B30.5 requires for rope shift inspection when in use. This frequent inspection allows operators to identify rope deterioration including broken wires, wear, kinking, or corrosion before defects progress to dangerous levels. Daily inspection is fundamental to rope management ensuring early problem detection.

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

According to ASME B30.5, equipment must stop when unsafe conditions exist including malfunction, damage, or defects affecting safe operation. Equipment cannot return to service until conditions are corrected and verified by qualified personnel. This requirement prevents operation with known hazards.

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

ASME B30.5 requires for modifications manufacturer or engineer approval. Only these qualified parties can verify through analysis that modifications maintain adequate safety factors and do not adversely affect structural integrity or other critical characteristics. Proper approval ensures modifications are safe.

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

Under ASME B30.5, ASME B30.23 requirements govern platforms. These special requirements include platform design standards, capacity reductions, safety devices, and operational procedures ensuring personnel safety during high-risk personnel hoisting operations. Special requirements address unique hazards of personnel hoisting.

66. **Correct Answer: C (Shall not be exceeded)**

ASME B30.5 specifies about rated loads they shall not be exceeded. This fundamental requirement prevents overloading that could cause equipment failure, instability, or structural damage. Operating within rated capacity maintains designed safety margins essential for safe operations.

67. **Correct Answer: B (Before operations)**

According to ASME B30.5, indicators must work before operations. Operators rely on boom angle, length, and other indicator information for accurate chart reading and capacity verification. Non-functional indicators prevent proper capacity determination creating serious overload risks requiring repair before operations.

68. **Correct Answer: D (Written documentation)**

ASME B30.5 requires for maintenance written documentation. These records document inspections, maintenance performed, and repairs completed providing equipment history and verification of required maintenance compliance. Written records provide accountability and demonstrate proper equipment care.

69. **Correct Answer: A (Risk and consequences)**

Under ASME B30.5, critical lifts are based on risk and consequences. This includes operational complexity, proximity to hazards, or situations where failure would cause significant injury, death, or property damage. Risk assessment determines when lifts require special planning and procedures beyond standard operations.

70. **Correct Answer: C (Must be minimized)**

ASME B30.5 states about side loading it must be minimized. Side loading creates dangerous bending stresses in booms not designed for such loads. Even minor side loads can cause structural failure. Operators must maintain vertical load line alignment preventing side loading throughout operations.

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

According to ASME B30.5, tests are required after installation and major repairs. These tests verify structural and mechanical components can support rated loads with appropriate margins after changes affecting capacity or structural integrity. Load testing confirms equipment safety after significant work.

72. **Correct Answer: A (Leaving loads unattended)**

ASME B30.5 prohibits leaving loads unattended. Leaving loads suspended when cranes are unattended creates hazards from rigging failure, equipment malfunction, or unauthorized access. Loads must be landed and secured before leaving cranes unattended. This prevents accidents during unattended periods.

73. **Correct Answer: C (Stop and seek direction)**

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

74. **Correct Answer: B (When deterioration criteria met)**

ASME B30.5 requires for rope removal when deterioration criteria met. Specific criteria including numbers of broken wires, diameter reduction, kinking, corrosion, and other defined defects identify when rope strength has deteriorated to unsafe levels. Meeting criteria mandates immediate replacement.

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

According to ASME B30.5, qualified person authorizes return. This individual verifies repairs were performed correctly, equipment is safe for operations, and all safety systems function properly before authorizing work resumption. Qualified verification ensures equipment is actually safe before returning to service.

76. **Correct Answer: B (Current configuration)**

When reading charts, current configuration is identified first including boom length, counterweight amount, outrigger extension, and attachments. Configuration determines which chart section applies and what capacity is available. Accurate configuration identification is essential for proper chart use.

77. **Correct Answer: D (Horizontal distance from center)**

On charts, radius is defined as horizontal distance from center of rotation to vertical centerline of hoist line. This horizontal measurement determines capacity for operating conditions. Radius changes with boom angle variations even if boom length remains constant.

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

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

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

When using attachments, separate charts or deductions are needed. Jibs, extensions, and other attachments significantly alter capacity compared to main boom alone. Special chart sections or specified deduction factors provide accurate capacity for configurations with attachments.

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

Hook block and rigging must be deducted for net capacity. Hook block and any rigging above the load are supported by crane consuming capacity. Only remaining net capacity after these deductions is available for actual loads being lifted.

81. **Correct Answer: D (Notes or conditions)**

On charts, special marks indicate notes or conditions requiring operator attention. These markings identify special requirements, capacity limitations, operational restrictions, or transition points between limiting factors. All special markings must be understood as they convey critical operational information.

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

When angle changes, radius and capacity change. Raising boom angle decreases radius bringing load closer and generally increases capacity. Lowering boom angle increases radius moving load outward and decreases capacity. These parameters are directly interdependent requiring coordinate consideration.

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

Between chart values, lower capacity or conservative interpolation applies. Using lower capacity ensures adequate safety margins accounting for measurement uncertainties and dynamic forces. Conservative approaches maintain safety when operating between specific chart values where exact capacity is not listed.

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

Telescopic charts are organized by boom length sections showing capacities at various operating radii for each length. This organization allows operators to find their boom length section, then read capacity for their specific radius within that section.

85. **Correct Answer: B (Bold text or notation)**

Capacity limits are indicated by bold text or notation showing whether structural capacity or stability limits capacity at specific points. Understanding which factor limits capacity helps operators recognize when configuration changes might increase available capacity or when limits are absolute.

86. **Correct Answer: C (Appropriate chart section)**

When counterweight changes, appropriate chart section must be used. Different counterweight amounts provide substantially different capacities requiring different chart sections. Using wrong chart sections creates serious overload risks or unnecessarily limits operations with capacity actually available.

87. **Correct Answer: A (Wind effects)**

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

88. **Correct Answer: A (Critical restrictions)**

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

89. **Correct Answer: B (Correct chart reference)**

When configurations change, correct chart reference is essential. Each boom length, counterweight amount, or attachment requires consulting appropriate chart sections. Using wrong charts creates serious overload risks from incorrect capacity information for actual configuration.

90. **Correct Answer: D (Center of gravity location)**

For unbalanced loads, center of gravity location affects capacity. Loads with offset centers of gravity, unusual shapes, or uneven weight distribution may require capacity reductions beyond normal chart values. Load positioning must account for actual center of gravity location.

91. **Correct Answer: A (Engine-driven pump)**

Engine-driven pump converts power to hydraulic. The pump draws fluid from reservoir and pressurizes it, converting mechanical power from engine to hydraulic power. Pressurized fluid flows through system driving cylinders and motors performing work throughout the crane.

92. **Correct Answer: D (Slow function or leaks)**

Slow function or leaks indicate hydraulic problems. Slow function suggests inadequate pressure or flow from pump wear or system restrictions. Leaks show seal failure or fitting problems. Unusual noise indicates cavitation or component damage. These symptoms require investigation and correction.

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

Hydraulic filters remove 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: C (Excessive load or poor cooling)**

Excessive load or poor cooling causes hydraulic overheating. Excessive demand creates high heat generation while inadequate cooling from low fluid, dirty coolers, or continuous operation prevents heat dissipation. Overheating damages seals, degrades fluid, reduces efficiency, and can cause system failure.

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

Relief valves control maximum 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 conditions that could cause catastrophic failures.

## Specialty Examination

1. **Correct Answer: D (Excellent stability and low ground pressure)**

Crawler cranes provide the advantage of excellent stability and low ground pressure. Wide track bases create exceptional resistance to tipping through increased moment arms for stability calculations. Tracks distribute crane weight over large surface areas creating ground pressures as low as 5-15 psi allowing operations on soft soils. This combination of superior stability and low ground pressure enables crawler cranes to handle heavier loads on challenging ground conditions where wheeled cranes would sink or tip.

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

On telescopic cranes, hydraulic flow control and sensors ensure extension control. Flow control valves regulate hydraulic fluid distribution to multiple extension cylinders ensuring proportional synchronized movement. Position sensors monitor actual section positions allowing control systems to adjust flow rates maintaining synchronization. This coordination prevents one section from extending ahead of others ensuring smooth controlled extension throughout the boom length.

3. **Correct Answer: A (Triangulated structural design)**

Lattice booms achieve strength through triangulated structural design. The open framework with diagonal lacing members creates efficient load paths utilizing triangulated geometry principles. This design efficiently resists both compression and tension forces while minimizing weight. Triangulation provides exceptional strength-to-weight ratios making lattice structures ideal for achieving extreme heights and heavy capacities.

4. **Correct Answer: B (All-wheel drive and suspension)**

On all-terrain cranes, all-wheel drive and suspension enable off-road travel. All-wheel drive ensures power reaches wheels with traction even on uneven surfaces preventing stuck conditions. Advanced suspension systems adjust to ground contours maintaining wheel contact and allowing independent axle articulation. This combination enables operation on rough, soft, or unprepared terrain where standard wheeled vehicles cannot function effectively.

5. **Correct Answer: D (Modular section assembly)**

Lattice cranes achieve height through modular section assembly. Individual sections connect with pins creating continuous structures of varying lengths. Sections can be added or removed customizing boom length for specific jobs. This modularity allows configurations exceeding 400 feet for some crane models with heights adjusted by selecting and assembling appropriate section combinations for job requirements.

6. **Correct Answer: C (Holding valves and locks)**

On telescopic cranes, holding valves and locks prevent retraction. Hydraulic holding valves maintain pressure in extension cylinders preventing reverse flow that would cause retraction under boom weight. Mechanical locks engage at extended positions providing positive retention independent of hydraulic pressure. These dual safety systems ensure boom sections remain extended preventing dangerous uncontrolled retraction.

7. **Correct Answer: B (Lower maintenance)**

Fixed cabs provide the advantage of lower maintenance compared to swing cabs. Fixed cabs eliminate rotating connections for hydraulic lines, electrical systems, and controls that must function through continuous rotation and wear from movement. This simpler design reduces maintenance requirements, potential failure points, and associated costs. No rotating seals or electrical slip rings need periodic service or replacement.

8. **Correct Answer: A (Proper pins and assembly sequence)**

When assembling lattice booms, proper pins and assembly sequence are critical. Pins must be fully inserted through all connection holes with retention devices such as clips or cotter pins properly engaged. Manufacturer assembly sequence must be followed exactly ensuring proper load paths and structural integrity. Incomplete connections or wrong sequence can cause structural failure during operations creating catastrophic collapse.

9. **Correct Answer: D (Angular support from mast)**

Boom pendants provide angular support from mast. Pendants are wire ropes connecting boom tip to mast top, supporting the boom at various angles. These ropes carry compressive boom forces in tension preventing boom collapse under its own weight and loads. Adjusting pendant length through the boom hoist changes boom angle while pendants provide positive constant support.

10. **Correct Answer: B (Electronic control systems)**

On all-terrain cranes, electronic control systems manage steering. These sophisticated systems coordinate steering of multiple axles simultaneously based on vehicle speed, turn radius, and operator inputs. Systems can steer axles together for tight turns or independently for various maneuvers. Advanced algorithms optimize steering angles for each axle maximizing maneuverability for different conditions and speeds.

11. **Correct Answer: A (Radius adjustment without boom movement)**

Luffing jibs offer the capability of radius adjustment without boom movement. Luffing jibs have independent angle adjustment through dedicated hoist systems allowing operators to change jib angle varying operating radius while main boom remains stationary. This capability allows radius adjustment while maintaining hook height or adjusting both parameters simultaneously for precision placement in confined spaces or around obstructions.

12. **Correct Answer: B (Offset angle)**

When using offset jibs, offset angle affects capacity. As jibs offset from straight ahead centerline positions, capacity decreases due to altered loading patterns creating side loads and increased structural stress on offset mechanisms. Charts show capacity values at various offset angles with greater offsets resulting in significantly lower capacities requiring operators to reference appropriate capacity values for actual offset being used.

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

Structural and stability constraints limit boom length. Longer booms create greater overturning moments affecting stability and impose higher structural loads on boom members. Structural members must resist bending and compression forces without exceeding material strength limits. Manufacturers establish maximum lengths through engineering analysis ensuring adequate safety margins for both structural strength and stability throughout the operating range.

14. **Correct Answer: A (Compact size with crab steering)**

Compact size with crab steering provides rough-terrain maneuverability. Compact dimensions and short wheelbase enable tight turns in restricted areas where larger cranes cannot operate. Crab steering allows rear wheels to steer opposite front wheels for minimum turn radius or in the same direction for sideways movement. This combination allows effective operation in challenging terrain and confined spaces.

15. **Correct Answer: D (Boom hoist system)**

Boom hoist system controls lattice boom angle. The boom hoist rope runs from drum over mast top sheaves through pendants to boom point. Winding rope on drum shortens pendants raising boom angle. Paying out rope lengthens pendants lowering boom angle. The mast structure provides the leverage point and support for angle changes throughout the operating range.

16. **Correct Answer: C (Significantly reduced)**

Fly jib capacities are significantly reduced from main boom capacities. Fly jibs add substantial weight at boom tip extending leverage, extend total boom length increasing structural loading, and create additional bending moments on the system. These factors combine to reduce capacity dramatically with fly jib

capacities often 20-40 percent of main boom capacity at comparable radii requiring careful capacity planning and verification.

17. **Correct Answer: B (Manufacturer specifications)**

Manufacturer specifications establish safe jib length. Manufacturers determine maximum jib lengths through structural analysis ensuring combined boom and jib loading remains within structural capacity limits and stability is maintained throughout the operating range. Engineering analysis verifies structural members can support loads and connections are adequate for each specific configuration and loading condition.

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

Wider track spacing provides greater stability and capacity. Increased track width enlarges the stability base extending the moment arm for resisting overturning forces allowing higher lifting capacities before tipping limits are reached. Wide-track configurations typically provide 15-30 percent greater capacity than narrow-track settings for the same crane model due to improved stability geometry.

19. **Correct Answer: D (Quick setup without assembly)**

Quick setup without assembly is the telescopic crane advantage. Telescopic cranes arrive with boom mounted and extend hydraulically in minutes achieving full operational length quickly without assembly. Lattice cranes require boom section assembly taking hours or days depending on configuration. This speed advantage makes telescopic cranes ideal for projects requiring mobility between multiple locations or quick response to changing needs.

20. **Correct Answer: B (Proper installation and charts)**

When using boom extensions, proper installation and charts are critical. Extensions must be installed per manufacturer specifications with all connections complete and properly secured. Appropriate load chart sections for extended configurations must be used as extensions significantly affect boom structural characteristics, weight distribution, and capacity. Both proper installation and correct chart reference are essential for safe operations.

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

Auxiliary hoist offers faster speeds than main hoists. Auxiliaries are designed for lighter loads using smaller diameter ropes and smaller drums allowing higher line speeds. Speed advantages may be 50-100 percent faster than main hoists making auxiliaries efficient for handling rigging, tools, or lighter materials. Main hoists provide greater capacity but slower speeds for heavy primary loads.

22. **Correct Answer: D (Hydraulic motor with brake)**

Hydraulic motor with brake provides hydraulic crane swing. The motor drives swing mechanism with speed proportional to control input allowing smooth acceleration and deceleration. Proportional control allows precise swing positioning for accurate load placement. Automatic brake engages when controls return to neutral stopping rotation immediately and holding position preventing drift or unwanted movement.

23. **Correct Answer: A (Appropriate capacity chart)**

When changing track width, appropriate capacity chart is essential. Wide-track and narrow-track configurations provide substantially different capacities due to different stability bases and tipping fulcrums. Different chart sections show capacities for each configuration. Using incorrect charts creates serious overload risks or unnecessarily limits operations with capacity actually available from proper configuration.

24. **Correct Answer: B (Correct installation and charts)**

When using boom inserts, correct installation and charts are critical. Inserts must be installed per manufacturer specifications with all connections complete and properly secured. Appropriate chart sections for configurations with inserts must be used as inserts affect boom structural characteristics, weight distribution, and capacity. Both proper installation and correct chart reference ensure safe operations.

25. **Correct Answer: D (Internal wear pads and guides)**

Internal wear pads and guides guide boom telescoping. Wear pads made of low-friction materials ride on machined surfaces inside boom sections allowing smooth extension while maintaining proper alignment. These guides prevent binding and ensure sections extend concentrically without jamming, misalignment, or damage to boom surfaces. Proper guide function is essential for smooth reliable extension.

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

Main chord members carry primary loads on lattice booms. These large structural members running the full length of the boom at its corners form the primary load-carrying framework. Chords resist bending and compression forces from boom weight, loads, and operational dynamics. Lacing members and battens provide lateral support maintaining chord spacing and overall structural geometry while chords carry the primary longitudinal forces.

## Practical Examination

1. **Correct Answer: C (Damage exceeding removal criteria)**

When inspecting wire rope, damage exceeding removal criteria requires removal. ASME B30.5 establishes specific removal criteria including numbers of broken wires exceeding limits, diameter reduction of 7 percent or more from nominal, severe kinking, bird-caging, corrosion, or other defined deterioration. When rope condition exceeds any removal criterion, rope must be removed immediately regardless of other factors preventing catastrophic failure under load.

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

The proper rope inspection frequency is each shift when in regular use per ASME B30.5 requirements. This daily inspection allows operators to identify rope deterioration including broken wires, kinking, wear, or corrosion before defects progress to failure levels. Frequent inspection is fundamental to rope management ensuring problems are detected early when they can be addressed safely before becoming critical.

3. **Correct Answer: D (Clean fluid at proper level)**

During pre-operational checks, clean fluid at proper level is acceptable. Hydraulic fluid should appear clear or amber depending on type, free from contamination, and maintained between minimum and maximum reservoir markings. This appearance and level indicate the system is properly serviced, adequately filled for thermal expansion, and ready for safe operations without contamination issues affecting performance.

4. **Correct Answer: A (15 percent or manufacturer limit exceeded)**

When inspecting hooks, 15 percent or manufacturer limit exceeded requires replacement. Throat opening increase of 15 percent beyond original dimension or manufacturer specified limit indicates permanent stretching from overloads. ASME B30.10 establishes this removal criterion ensuring hooks are replaced before failure risk becomes unacceptable through reduced holding capability and weakened structure from permanent deformation.

5. **Correct Answer: C (Accurate configuration and load tracking)**

Proper LMI function is indicated by accurate configuration and load tracking. The system should respond immediately to boom angle changes, radius adjustments, and load additions displaying current capacity utilization accurately reflecting actual crane configuration and loading conditions. Systems providing accurate real-time information allow effective capacity monitoring preventing overload situations through timely warnings.

6. **Correct Answer: B (Immediate stop and hold)**

During brake testing, immediate stop and hold is proper function. Properly functioning brakes engage automatically when controls return to neutral stopping movement immediately without delay and holding

position without drift or movement under load. Any delay in engagement, continued coasting after control release, or inability to hold position indicates brake adjustment or repair is needed before operations.

7. **Correct Answer: B (Load hold without drift)**

Load hold without drift verifies hoist brake function. The proper procedure involves raising a load or unloaded hook to working height, releasing control to neutral, and verifying hoist immediately stops and holds position without drift or lowering. The automatic brake must engage instantly preventing any downward movement demonstrating proper function under actual loading conditions and gravity forces.

8. **Correct Answer: A (Controls in neutral)**

Before engine start, controls in neutral is verified. Operators must physically verify all control levers are in neutral positions before starting engine. This verification prevents unintended crane movements when hydraulic systems pressurize after engine start. Physical verification of each control position ensures safe startup preventing dangerous unexpected movements that could cause injury or damage.

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

During warm-up, oil pressure and temperature are monitored. Oil pressure should stabilize quickly indicating proper lubrication system function providing adequate flow to engine and hydraulic components. Temperature gauges should show gradual warming toward operating range. Both engine coolant and hydraulic oil temperatures must reach proper levels before placing systems under full load ensuring adequate viscosity and lubrication for component protection.

10. **Correct Answer: A (Crane level maintained)**

When deploying outriggers, crane level maintained is verified. Real-time level monitoring during jack extension allows immediate adjustment of individual jack heights achieving proper level as crane lifts off tires or tracks. Most manufacturers limit out-of-level to one percent grade requiring careful monitoring and adjustment throughout the deployment process ensuring crane remains within specifications.

11. **Correct Answer: D (Variable speeds with brake test)**

Proper hoist testing is variable speeds with brake test. Operators verify hoist responds smoothly to control inputs at slow and fast speeds demonstrating proportional control, controls return to neutral properly without sticking, brakes engage automatically when controls are released, and loads stop and hold without drift demonstrating complete system function under various operating conditions.

12. **Correct Answer: B (Smooth proportional response)**

During control testing, smooth proportional response is acceptable. Controls should respond smoothly and proportionally to operator inputs with immediate response, no delays, no binding, and no jerking.

Functions should accelerate and decelerate smoothly with movements proportional to control inputs. This smooth response demonstrates proper control valve and hydraulic system function without internal wear or contamination issues.

13. **Correct Answer: C (Accurate length display)**

When checking boom indicators, accurate length display is verified. Indicators must accurately display actual boom length matching physically extended length within acceptable tolerances typically plus or minus one inch. These indicators are essential for capacity determination using load charts. Operators must know exact boom length to read capacities correctly making accurate indicators critical for preventing overload situations.

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

Kinking or bird-caging requires immediate rope removal. Kinks show permanent distortion with severe localized stress concentrations dramatically reducing rope strength at kinked locations to fractions of normal capacity. Bird-caging where strands separate from rope body forming a birdcage pattern indicates core failure and structural collapse. Either condition can cause sudden catastrophic failure under loads well below normal rated capacity.

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

During hydraulic inspection, milky or cloudy fluid indicates contamination. Milky appearance shows water contamination causing corrosion, reduced lubrication properties, and accelerated component wear. Cloudiness indicates other contaminants including dirt, wear particles, or chemical breakdown products. Contaminated fluid must be drained, system flushed, and contamination sources corrected before refilling with clean fluid.

16. **Correct Answer: D (Warnings and cutout activation)**

When testing anti-two-block, warnings and cutout activation indicates proper function. Visual and audible warnings should activate well before contact occurs providing operator warning to stop hoisting. Automatic hoist cutout should prevent actual two-blocking through function interruption. The device provides warning allowing operator response then prevents contact through automatic cutout protecting equipment and preventing boom damage.

17. **Correct Answer: B (Engagement verification with load test)**

Proper lock verification is engagement verification with load test. Locks must engage properly when components reach extended or set positions with positive engagement. Testing involves attempting to move locked components against locks confirming locks prevent movement under force. Locks failing to engage properly or allowing movement despite engagement require immediate repair before operations preventing accidental retraction.

18. **Correct Answer: C (Cracks or deformation)**

During structural inspection, cracks or deformation requires attention. Structural cracks in boom members, turret components, or other structural elements can propagate rapidly under load causing catastrophic failure without warning. Permanent deformation indicates loading beyond design limits compromising structural integrity. Any structural damage requires engineering evaluation before equipment can safely return to service.

19. **Correct Answer: A (Secure attachment without loosening)**

When inspecting terminations, secure attachment without loosening is critical. Terminations must maintain full grip on rope with no loosening between rope and socket or wedge, no cracks in termination components, and no deformation indicating overstress. Any loosening compromises termination strength potentially allowing rope pullout under load requiring replacement before operations continue preventing catastrophic load drops.

20. **Correct Answer: D (Functional readable information)**

LMI displays must provide functional readable information. Displays must be operational showing appropriate capacity and configuration data including boom length, angle, radius, and capacity utilization. Information must be readable from operator's position under all lighting conditions including direct sunlight. Non-functional or illegible displays prevent capacity monitoring creating serious overload risks requiring immediate repair.

21. **Correct Answer: C (Proper seating in all grooves)**

During rope inspection, proper seating in all grooves is required. Rope must seat fully in intended sheave grooves throughout entire reeving paths from drum through all sheaves to hook. Improper seating with rope running on sheave flanges causes concentrated wear on both rope and sheaves and can lead to rope jumping from sheaves during operations creating sudden load drops or equipment damage.

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

When checking hoses, cracking, bulging, or deterioration requires replacement. Cracking particularly in bend areas where flexing is greatest, bulging indicating internal reinforcement failure weakening hose structure, or other visible deterioration indicates imminent hose failure under pressure. Age-related hardening reducing flexibility also warrants replacement. Failed hoses under pressure can cause sudden loss of function or create safety hazards.

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

Proper shutdown procedure is lower boom, secure controls, document. This sequence includes lowering boom to safe storage angle protecting from wind damage, securing all controls in neutral or off positions

preventing unauthorized operation or inadvertent movements, and documenting any issues or defects requiring attention providing communication about equipment status and needed work for next operations.

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

During swing testing, smooth operation with immediate brake indicates proper operation. Testing should show smooth acceleration responding to control without jerking, smooth operation at commanded speeds without binding or unusual noise, smooth deceleration as control reduces, and immediate brake engagement when control returns to neutral stopping rotation instantly demonstrating coordinated system function without wear or adjustment issues.

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

When inspecting extinguishers, low pressure or expired inspection requires service. Fire extinguishers must maintain proper charge pressure indicated by gauge in green zone and receive required periodic inspections documented on inspection tags. Low pressure indicates charge loss compromising effectiveness or expired inspection indicates service is overdue. Either condition means extinguishers may not function properly requiring immediate professional servicing.

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

Regarding pins, full insertion with retention devices must be verified. Pins must be fully inserted through all connection holes with no gaps visible and retention devices such as clips, bolts, or cotter pins properly engaged preventing pins from backing out during operations. Partial insertion or missing retention allows pins to work out during operations causing sudden structural connection failure and potential catastrophic boom collapse.

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

During final verification, all systems functional and area clear is confirmed. This comprehensive verification confirms all required inspections are complete with no unresolved defects, all safety and operating systems are functional and ready for operations, and work area is clear of personnel and obstacles within operating radii, swing paths, and load zones before beginning lift operations ensuring safe startup.

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

When inspecting pins, wear, cracks, or elongated holes indicates problems. Excessive wear reducing pin diameter below specifications compromises connection strength. Cracks in pin bodies indicate fatigue or overstress requiring replacement. Elongated pin holes indicate overloading, impact damage, or fatigue damage requiring boom section or structural evaluation and possible repair or replacement before returning to service preventing failure.

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

Proper cylinder operation is indicated by smooth operation without leaks. Cylinders should respond proportionally to controls without binding, jerking, or hesitation throughout the full stroke, show no hydraulic leaks from rod seals, glands, or tube fittings, and produce no unusual sounds suggesting cavitation, air entrainment, or mechanical problems. Smooth consistent extension and retraction demonstrates proper internal condition.

30. **Correct Answer: D (Per manufacturer specifications)**

During high winds, proper positioning is per manufacturer specifications. Manufacturers recommend positioning that minimizes wind loading typically lowering boom to moderate angles reducing wind sail area and structural loading while maintaining adequate ground clearance. Proper positioning protects boom structure from wind-induced damage during storms while maintaining crane stability through reduced overturning moments from wind forces on boom surfaces.