

# PRACTICE TEST 15: COMPREHENSIVE AIRFRAME REVIEW

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**Instructions:** Select the best answer for each question. Each question is based on the Airframe Mechanic Certification Standards

1. The primary structural members of a semi-monocoque fuselage are:
  - A. Stringers only
  - B. Skin only
  - C. Longerons only
  - D. Bulkheads, longerons, stringers, and stressed skin
2. Heat treatment designation T6 for aluminum indicates:
  - A. Annealed
  - B. Solution heat-treated and artificially aged
  - C. Strain-hardened
  - D. As-fabricated
3. The neutral axis in a beam under bending is where:
  - A. No stress occurs
  - B. Maximum stress occurs
  - C. Compression occurs
  - D. Tension occurs
4. Clad aluminum provides corrosion protection through:
  - A. Paint coating
  - B. Anodizing
  - C. Pure aluminum surface layer
  - D. Chemical treatment
5. When recovering an aircraft with fabric, rib lacing spacing should be:
  - A. Random
  - B. 6 inches maximum
  - C. 12 inches maximum
  - D. Per manufacturer specifications
6. Standard tapes on fabric-covered aircraft are applied:
  - A. Before dopping
  - B. After final coat

- C. Randomly
  - D. Over rib stitching and seams
7. Aircraft drawings with title block information provide:
- A. Color preferences
  - B. Random notes
  - C. Part identification, revision, approval data
  - D. Suggestions only
8. Sectional views in drawings show:
- A. Internal structure as if cut through
  - B. External appearance only
  - C. Random lines
  - D. No detail
9. Datum for aircraft weight and balance is:
- A. Firewall always
  - B. Imaginary vertical reference plane
  - C. Nose
  - D. Center of wing
10. Moment is calculated as:
- A. Weight only
  - B. Arm only
  - C. CG location
  - D. Weight times arm
11. Empty weight includes:
- A. Airframe, engine, required equipment, unusable fuel/oil
  - B. Payload
  - C. Usable fuel
  - D. Passengers
12. Rigging procedures ensure:
- A. Random alignment
  - B. Color match
  - C. Proper control surface alignment, travel, cable tension
  - D. Weight only
13. Control cable tension is measured with:
- A. Scale
  - B. Tensiometer
  - C. Ruler
  - D. Caliper

14. Turnbuckles must be safetied:
  - A. Never
  - B. Randomly
  - C. With paint only
  - D. With safety wire or clips preventing rotation
15. During an annual inspection, airworthiness is determined by:
  - A. Compliance with applicable regulations and airworthiness
  - B. Age only
  - C. Color
  - D. Owner preference
16. Inspection findings requiring:
  - A. No action
  - B. Random repairs
  - C. Repair, replacement, or further evaluation per standards
  - D. Ignoring
17. A rivet with insufficient upset shows:
  - A. Perfect installation
  - B. Excess length
  - C. Too much pressure
  - D. Inadequate bucking creating weak joint
18. Flush rivets require:
  - A. No preparation
  - B. Countersinking or dimpling
  - C. Raised installation
  - D. No tools
19. Grain direction in sheet metal bending:
  - A. Doesn't matter
  - B. Should be random
  - C. Should be perpendicular to bend for best results
  - D. Must be parallel
20. Minimum edge distance for rivets is typically:
  - A. Two times rivet diameter
  - B. One diameter
  - C. Random
  - D. No minimum
21. Gas welding flame adjustment for steel uses:
  - A. Oxidizing flame

- B. Random flame
- C. Carburizing flame
- D. Neutral flame

22. 4130 steel welding requires:

- A. No preheat
- B. Preheat and possible heat treatment
- C. Water cooling
- D. No preparation

23. Rosette welding is used to:

- A. Join inner and outer tubes through holes
- B. Create decoration
- C. Remove metal
- D. Polish surfaces

24. Wood aircraft structures primarily use:

- A. Pine
- B. Oak
- C. Sitka spruce for strength-to-weight
- D. Maple

25. Compression failure in wood appears as:

- A. Smooth grain
- B. Fine wrinkles perpendicular to grain
- C. Color change
- D. No visible signs

26. Composite materials cure times:

- A. Are instant
- B. Don't matter
- C. Are random
- D. Must follow manufacturer specifications

27. Surface preparation before painting requires:

- A. No cleaning
- B. Random wiping
- C. Cleaning, conversion coating, proper priming
- D. Paint over dirt

28. Zinc chromate primer provides:

- A. Excellent corrosion inhibition
- B. No protection

- C. Color only
  - D. Temporary coating
29. Voltage in a circuit equals:
- A. Power
  - B. Resistance
  - C. Frequency
  - D. Current times resistance
30. Circuit protection devices include:
- A. Resistors
  - B. Fuses and circuit breakers
  - C. Switches only
  - D. Wire only
31. Pitot-static system provides data for:
- A. Airspeed, altimeter, VSI instruments
  - B. Engine instruments
  - C. Fuel gauges
  - D. Temperature only
32. VOR provides:
- A. Distance only
  - B. Altitude
  - C. Magnetic bearing from station
  - D. Airspeed
33. Transponder Mode C transmits:
- A. Speed
  - B. Heading
  - C. Temperature
  - D. Altitude with identification code
34. Hydraulic system advantage is achieved through:
- A. Color
  - B. Different piston areas creating force multiplication
  - C. Temperature
  - D. Fluid type only
35. Oleo-pneumatic struts use:
- A. Springs only
  - B. Air only
  - C. Hydraulic fluid and compressed air/nitrogen
  - D. Solid construction

36. Pascal's Law states pressure in confined fluid:
- A. Is transmitted equally in all directions
  - B. Acts downward only
  - C. Varies randomly
  - D. Has no effect
37. Hydraulic filters remove:
- A. Heat
  - B. Contaminants from fluid
  - C. Pressure
  - D. Flow
38. Tricycle landing gear consists of:
- A. Tail wheel only
  - B. Single main gear
  - C. Tandem configuration
  - D. Two main gear and steerable nose gear
39. Landing gear down-locks:
- A. Mechanically secure gear DOWN for landing
  - B. Retract gear
  - C. Indicate position only
  - D. Control hydraulics
40. Anti-skid systems prevent:
- A. Gear extension
  - B. Steering
  - C. Wheel lock-up during braking
  - D. Tire inflation
41. Avgas 100LL appears:
- A. Red
  - B. Clear
  - C. Green
  - D. Blue
42. Fuel selector valves:
- A. Filter fuel
  - B. Direct fuel from selected tank to engine
  - C. Measure quantity
  - D. Control temperature
43. Fuel system vents prevent:
- A. Leaks only

- B. Overflow only
  - C. Vacuum formation and pressure buildup
  - D. Contamination only
44. Water in fuel appears as:
- A. Clear globules or cloudy suspension
  - B. Red color
  - C. Green color
  - D. No indication
45. Deicing systems remove ice:
- A. Before formation
  - B. After it has formed
  - C. Never
  - D. Continuously
46. Pneumatic deice boots:
- A. Use heat
  - B. Use chemicals
  - C. Are painted
  - D. Inflate breaking accumulated ice
47. Cabin pressurization maintains:
- A. Comfortable cabin altitude at high flight altitudes
  - B. Fuel pressure
  - C. Hydraulic pressure
  - D. Engine power
48. Bleed air for pressurization comes from:
- A. Exhaust
  - B. Fuel system
  - C. Engine compressor section
  - D. Hydraulic reservoir
49. Oxygen cylinder pressure when full at 70°F is typically:
- A. 50 psi
  - B. 500 psi
  - C. 1,000 psi
  - D. 1,800–2,200 psi
50. Fire requires three elements:
- A. Water, air, heat
  - B. Fuel, oxygen, heat

- C. Fuel, nitrogen, cold
- D. Air, metal, electricity

51. Class B fires involve:

- A. Wood
- B. Electrical equipment
- C. Flammable liquids and gases
- D. Metals

52. Halon 1301 extinguishes fire by:

- A. Interrupting chemical reaction of combustion
- B. Cooling only
- C. Adding oxygen
- D. Heating

53. Continuous-loop fire detectors:

- A. Are single-point
- B. Sense temperature change along entire length
- C. Measure pressure
- D. Detect color

54. Major repairs and alterations require:

- A. Verbal approval
- B. No documentation
- C. Random procedures
- D. FAA approval and Form 337

55. Corrosion on aluminum appears as:

- A. White or gray powdery deposits
- B. Red rust
- C. Green patina
- D. Black deposits

56. Fabric strength testing uses:

- A. Visual inspection only
- B. Random checks
- C. Punch tester measuring tear strength
- D. Weight measurement

57. Bill of materials lists:

- A. Colors
- B. Suggestions
- C. Random items
- D. All parts, materials, quantities for assembly

58. Maximum takeoff weight is limited by:
- A. Pilot preference
  - B. Structural and performance design limits
  - C. Fuel capacity only
  - D. Random selection
59. Center of gravity must remain:
- A. Within approved envelope for safe flight
  - B. At datum
  - C. At nose
  - D. Random
60. Cable swaging creates:
- A. Weak connection
  - B. Temporary fitting
  - C. Permanent terminal attachment
  - D. Decorative end
61. Dye penetrant inspection detects:
- A. Internal defects
  - B. Surface-breaking cracks
  - C. Magnetic properties
  - D. Conductivity
62. Eddy current inspection finds:
- A. Internal cracks only
  - B. Non-conductive materials
  - C. Random properties
  - D. Surface and near-surface defects in conductive materials
63. Rivet pitch is:
- A. Hole size
  - B. Edge distance
  - C. Distance between rivet centers in a row
  - D. Rivet length
64. Countersinking provides:
- A. Flush rivet installation
  - B. Raised rivets
  - C. Weak joints
  - D. Random results
65. GTAW (TIG) welding uses:
- A. Flux coating

- B. Stick electrodes
- C. Consumable wire
- D. Non-consumable tungsten electrode

66. Weld penetration should:

- A. Be shallow only
- B. Fuse through entire joint thickness
- C. Be random
- D. Not occur

67. Scarf joint in wood repair requires:

- A. 1:12 or shallower slope for strength
- B. 90-degree cut
- C. Random angle
- D. No preparation

68. Carbon fiber is:

- A. Heavy and weak
- B. Insulating
- C. Electrically conductive requiring lightning protection
- D. Transparent

69. Paint runs and sags result from:

- A. Thin coats
- B. Excessive film thickness or slow gun movement
- C. Fast movement
- D. Proper technique

70. Registration marks on U.S. aircraft begin with:

- A. Letter A
- B. Letter U
- C. Numbers only
- D. Letter N

71. Ohmmeter measures resistance and requires:

- A. Maximum voltage
- B. High current
- C. Circuit power off to avoid damage
- D. AC power only

72. Bonding provides:

- A. Electrical continuity between metal components
- B. Insulation

- C. Color coding
- D. Wire support

73. Gyroscopic instruments operate on principles of:

- A. Magnetic fields only
- B. Atmospheric pressure
- C. Temperature
- D. Rigidity in space and precession

74. GPS determines position using:

- A. Ground stations only
- B. Satellite ranging signals
- C. Magnetic fields
- D. VOR stations

75. Hydraulic relief valve:

- A. Prevents excessive pressure by opening at set limit
- B. Filters fluid
- C. Measures flow
- D. Controls direction

76. Accumulator nitrogen precharge:

- A. Uses oxygen
- B. Uses compressed air always
- C. Must be checked with system depressurized
- D. Is not important

77. Shock strut servicing requires:

- A. Random fluid level
- B. Cold strut
- C. No weight
- D. Aircraft weight on gear, proper fluid level

78. Brake master cylinders:

- A. Cool brakes
- B. Convert pedal motion to hydraulic pressure
- C. Store fluid only
- D. Support wheels

79. Fuel quantity indication errors result from:

- A. Perfect calibration
- B. Full tanks
- C. Aircraft attitude, sensor failure, or calibration
- D. New fuel

80. Fuel system icing inhibitor (FSII):
- A. Prevents ice crystal formation in fuel
  - B. Increases octane
  - C. Improves color
  - D. Cleans filters
81. Thermal anti-ice systems use:
- A. Pneumatic pressure
  - B. Heat to prevent ice formation
  - C. Chemicals
  - D. Mechanical scrapers
82. Air cycle cooling:
- A. Uses refrigerant
  - B. Uses electric cooling
  - C. Uses no components
  - D. Cools bleed air through expansion turbine
83. Aviator's breathing oxygen purity minimum:
- A. 99.5% oxygen
  - B. 90% oxygen
  - C. 50% oxygen
  - D. 95% oxygen
84. Smoke detection systems use:
- A. Heat only
  - B. Pressure changes
  - C. Optical or ionization sensors
  - D. Color recognition
85. APU fire protection includes:
- A. No protection
  - B. Manual extinguishers only
  - C. Visual monitoring
  - D. Automatic detection and suppression
86. Torque links on landing gear:
- A. Absorb shock
  - B. Prevent strut rotation while allowing compression
  - C. Retract gear
  - D. Apply brakes
87. Fuel sumps allow:
- A. Water and sediment drainage

- B. Refueling
- C. Venting
- D. Pressure relief

88. Pitot heat prevents:

- A. Engine icing
- B. Fuel icing
- C. Ice blockage ensuring airspeed indication
- D. Wing icing

89. Alternators produce:

- A. DC only
- B. Pulsating voltage
- C. No output
- D. AC requiring rectification to DC

90. Safety wire on fittings:

- A. Is decorative
- B. Prevents loosening from vibration
- C. Weakens connections
- D. Causes leaks

91. Composite repairs require:

- A. Random procedures
- B. No surface prep
- C. Moisture removal, proper surface prep, scarf ratio
- D. Paint only

92. Control surface rigging includes:

- A. Proper travel limits, neutral position, cable tension
- B. Color match
- C. Random alignment
- D. Weight only

93. Overcharged hydraulic accumulator:

- A. Improves performance
- B. Should be bled to proper pressure
- C. Is preferred
- D. Causes no problems

94. Emergency gear extension uses:

- A. Primary hydraulics
- B. Electric backup only

- C. Engine power
- D. Gravity, manual crank, or stored pressure

95. Proper rivet diameter for sheet metal is typically:

- A. Three times sheet thickness
- B. One times thickness
- C. Random
- D. Ten times thickness

96. Magneto timing adjustment requires:

- A. Random settings
- B. No tools
- C. Specific degrees BTDC per specifications
- D. Visual estimate

97. Lavatory fire extinguisher:

- A. Requires pilot activation
- B. Is not required
- C. Uses water only
- D. Automatically discharges into waste bin

98. VHF communication radios operate in:

- A. Any frequency
- B. 118–137 MHz
- C. 200–400 MHz
- D. 1–30 MHz

99. Primary flight control surfaces include:

- A. Flaps and slats
- B. Trim tabs
- C. Ailerons, elevator, rudder
- D. Speed brakes only

100. Airworthiness Directives are:

- A. Mandatory requirements addressing unsafe conditions
- B. Suggestions
- C. Optional improvements
- D. Preferences

# Answer Explanations

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- 1. D. Bulkheads, longerons, stringers, and stressed skin** Semi-monocoque fuselage primary structure includes bulkheads (forming cross-sectional shape), longerons (main longitudinal members), stringers (secondary longitudinal stiffeners), and stressed skin (carrying loads). Load distributed among all components.
- 2. B. Solution heat-treated and artificially aged** T6 heat treatment for aluminum alloys indicates solution heat treatment (dissolving alloying elements at high temperature), quenching, then artificial aging at elevated temperature achieving maximum strength.
- 3. A. No stress occurs** Neutral axis in beam under bending is where transition occurs between compression (top) and tension (bottom), experiencing zero stress. Located at centroid of cross-section for symmetrical beams.
- 4. C. Pure aluminum surface layer** Clad aluminum provides corrosion protection through thin pure aluminum layer (5-10% thickness per side) bonded to alloy core. Pure aluminum corrodes sacrificially protecting stronger alloy underneath.
- 5. D. Per manufacturer specifications** Rib lacing spacing follows manufacturer specifications or STC requirements, typically maximum spacing varies by aircraft type, wing loading, and rib chord. Not arbitrary measurement but engineered spacing.
- 6. B. After final coat** Standard tapes applied after final coat of dope has dried, covering rib stitching, seams, and fabric joints. Subsequent coats applied over tapes creating smooth aerodynamic surface.
- 7. C. Part identification, revision, approval data** Drawing title blocks provide essential information including part number, drawing number, revision level, approval signatures/dates, material specifications, scale, and manufacturing requirements.
- 8. A. Internal structure as if cut through** Sectional views show internal structure by cutting object along plane revealing interior details, hidden features, internal components not visible in external views.
- 9. B. Imaginary vertical reference plane** Datum is imaginary vertical reference plane from which all horizontal distances (arms) measured for weight and balance calculations. Location varies by aircraft manufacturer.
- 10. D. Weight times arm** Moment calculated as weight (pounds) times arm (inches from datum), measured in pound-inches. Sum of all moments divided by total weight determines center of gravity location.
- 11. A. Airframe, engine, required equipment, unusable fuel/oil** Empty weight includes complete airframe, installed engine(s), all required equipment, unusable fuel, and full oil. Does not include crew, passengers, usable fuel, or removable ballast.

**12. C. Proper control surface alignment, travel, cable tension** Rigging procedures ensure control surfaces properly aligned in neutral position, achieve specified travel limits in both directions, and cables maintain proper tension preventing slack or excessive tightness.

**13. B. Tensiometer** Control cable tension measured with tensiometer, calibrated tool measuring tension in pounds. Tension varies with temperature; follow manufacturer specifications for ambient temperature correction.

**14. D. With safety wire or clips preventing rotation** Turnbuckles must be safetied with safety wire (single or double wrap method) or safety clips preventing inadvertent rotation from vibration. Proper safetying ensures tension maintained.

**15. A. Compliance with applicable regulations and airworthiness** Annual inspection determines airworthiness by verifying compliance with applicable FARs, airworthiness directives, manufacturer service bulletins, and overall aircraft condition meeting safe operation standards.

**16. C. Repair, replacement, or further evaluation per standards** Inspection findings require appropriate action: minor defects repaired, worn components replaced, significant findings requiring engineering evaluation or manufacturer guidance, all documented properly.

**17. D. Inadequate bucking creating weak joint** Rivet with insufficient upset (shop head too small) indicates inadequate bucking force during installation creating weak joint susceptible to failure. Shop head should be 1.5× diameter wide, 0.5× diameter high.

**18. B. Countersinking or dimpling** Flush rivets require countersinking (machine cutting conical recess in thicker material) or dimpling (forming conical depression in thin material) allowing rivet head to sit flush with surface.

**19. C. Should be perpendicular to bend for best results** Grain direction perpendicular to bend line provides best results reducing cracking tendency. Bending parallel to grain increases crack risk along grain boundaries.

**20. A. Two times rivet diameter** Minimum edge distance typically two times rivet diameter (2D) from sheet edge to rivet center prevents edge tearing or distortion during riveting and operational loads.

**21. D. Neutral flame** Gas welding steel uses neutral flame (equal oxygen and acetylene) providing neither carburizing nor oxidizing conditions, producing clean strong welds without adding/removing carbon.

**22. B. Preheat and possible heat treatment** 4130 chrome-molybdenum steel welding requires preheat (300-400°F) preventing cracking, and may require post-weld heat treatment (normalizing) for structural applications restoring properties.

**23. A. Join inner and outer tubes through holes** Rosette welding joins outer tube sleeve to inner tube by welding through holes drilled in outer tube, creating strong connection without removing inner tube.

**24. C. Sitka spruce for strength-to-weight** Aircraft wood structures primarily use Sitka spruce for exceptional strength-to-weight ratio, straight grain, uniform texture. Douglas fir acceptable substitute with increased dimensions.

**25. B. Fine wrinkles perpendicular to grain** Compression failure in wood appears as fine wrinkles or folds perpendicular to grain direction from fiber buckling under compression overload. Wood must be rejected; no reliable repair.

**26. D. Must follow manufacturer specifications** Composite materials cure times must follow manufacturer specifications exactly. Temperature, time, and pressure affect final properties; deviations compromise structural integrity.

**27. C. Cleaning, conversion coating, proper priming** Surface preparation requires cleaning (removing oils, grease, contaminants), conversion coating (Alodine for corrosion resistance and adhesion), then proper primer application for paint system.

**28. A. Excellent corrosion inhibition** Zinc chromate primer provides excellent corrosion inhibition through chromate pigments passivating metal surface. Traditional aircraft primer, though environmental concerns driving chromate-free alternatives.

**29. D. Current times resistance** Voltage equals current times resistance per Ohm's Law ( $E = I \times R$ ). Fundamental relationship allowing calculation of any value when other two known.

**30. B. Fuses and circuit breakers** Circuit protection devices include fuses (single-use, melt at overcurrent) and circuit breakers (resettable, trip at overcurrent) protecting wiring and components from excessive current.

**31. A. Airspeed, altimeter, VSI instruments** Pitot-static system provides pressure data for three instruments: airspeed indicator (ram and static pressure), altimeter (static pressure), vertical speed indicator (static pressure rate of change).

**32. C. Magnetic bearing from station** VOR (VHF Omnidirectional Range) provides magnetic bearing (radial) information from ground station enabling navigation TO or FROM station along selected radials.

**33. D. Altitude with identification code** Transponder Mode C transmits pressure altitude information along with four-digit identification code responding to radar interrogation, displayed on controller's screen.

**34. B. Different piston areas creating force multiplication** Hydraulic advantage achieved through different piston areas. Small input piston creates pressure transmitted to larger output piston multiplying force. Force ratio equals area ratio.

**35. C. Hydraulic fluid and compressed air/nitrogen** Oleo-pneumatic struts use hydraulic fluid (damping through orifice flow) and compressed air or nitrogen (spring action) providing excellent shock absorption and controlled rebound.

**36. A. Is transmitted equally in all directions** Pascal's Law states pressure applied to confined fluid transmitted undiminished equally in all directions throughout fluid, acting perpendicular to all surfaces. Foundation of hydraulic systems.

**37. B. Contaminants from fluid** Hydraulic filters remove contaminants (dirt, metal particles, seal fragments, water) preventing component wear, valve malfunction, system damage. Critical for reliability and longevity.

**38. D. Two main gear and steerable nose gear** Tricycle landing gear consists of two main gear supporting most weight under wings or fuselage, plus steerable nose gear providing directional control and level ground attitude.

**39. A. Mechanically secure gear DOWN for landing** Landing gear down-locks mechanically secure gear in fully extended position for landing independent of hydraulic pressure, using over-center linkage or spring-loaded hooks.

**40. C. Wheel lock-up during braking** Anti-skid systems prevent wheel lock-up during braking by sensing wheel deceleration, automatically modulating brake pressure maintaining optimal slip ratio maximizing braking efficiency.

**41. D. Blue** Avgas 100LL appears blue from added dye providing positive visual identification during fueling, sampling, contamination checks. Color verification essential preventing misfueling.

**42. B. Direct fuel from selected tank to engine** Fuel selector valves direct fuel flow from pilot-selected tank(s) to engine allowing fuel management, maintaining proper CG, and isolating tanks if needed.

**43. C. Vacuum formation and pressure buildup** Fuel system vents prevent vacuum formation as fuel consumed (causing starvation) and allow pressure relief from thermal expansion or altitude changes preventing tank rupture.

**44. A. Clear globules or cloudy suspension** Water in fuel appears as clear globules settling to bottom (free water, denser than fuel) or cloudy/hazy suspension (emulsified water), detected during sump sampling.

**45. B. After it has formed** Deicing systems remove ice after accumulation on surfaces through mechanical breaking (pneumatic boots), heating, or chemical means. Reactive approach allowing controlled buildup.

**46. D. Inflate breaking accumulated ice** Pneumatic deice boots are rubber surfaces adhered to leading edges, inflated with pneumatic pressure (15-20 psi) breaking accumulated ice which airstream removes.

**47. A. Comfortable cabin altitude at high flight altitudes** Cabin pressurization maintains comfortable cabin altitude (typically 8,000 feet or lower) while aircraft flies at high altitudes, eliminating continuous supplemental oxygen need.

- 48. C. Engine compressor section** Bleed air for pressurization extracted from engine compressor section at high pressure/temperature, routed through air conditioning packs for cooling before cabin delivery.
- 49. D. 1,800-2,200 psi** Oxygen cylinder pressure when full at 70°F standard temperature typically 1,800-2,200 psi. Pressure varies with temperature requiring correction for accurate quantity determination.
- 50. B. Fuel, oxygen, heat** Fire requires three elements forming fire triangle: fuel (combustible material), oxygen (minimum 16% from air), heat (ignition temperature). Remove any element to extinguish fire.
- 51. C. Flammable liquids and gases** Class B fires involve flammable liquids (gasoline, oil, grease) and gases. Extinguish with CO<sub>2</sub>, dry chemical, or foam smothering oxygen; never use water (spreads fire).
- 52. A. Interrupting chemical reaction of combustion** Halon 1301 extinguishes fire by interrupting chemical chain reaction of combustion at molecular level, effectively suppressing fire at lower concentrations than smothering agents.
- 53. B. Sense temperature change along entire length** Continuous-loop fire detectors sense temperature along entire loop length through resistance changes, providing complete fire zone coverage detecting fire anywhere along element.
- 54. D. FAA approval and Form 337** Major repairs and alterations require FAA approval (IA signature, repair station, or field approval), Form 337 documentation filed with FAA and entered in aircraft records.
- 55. A. White or gray powdery deposits** Corrosion on aluminum appears as white or gray powdery deposits (aluminum oxide) on surface. Early stage corrosion easily removed but indicates need for protective treatment.
- 56. C. Punch tester measuring tear strength** Fabric strength testing uses punch tester (Maule tester) measuring force required to puncture fabric, indicating remaining strength and determining if recovering necessary.
- 57. D. All parts, materials, quantities for assembly** Bill of materials lists all parts, raw materials, hardware, and quantities required for assembly or fabrication, ensuring complete procurement and proper configuration.
- 58. B. Structural and performance design limits** Maximum takeoff weight limited by structural design (landing gear, wing, fuselage strength) and performance capabilities (climb rate, takeoff distance, ceiling) certified by manufacturer.
- 59. A. Within approved envelope for safe flight** Center of gravity must remain within approved forward and aft limits (CG envelope) throughout all flight phases ensuring controllability, stability, and structural load distribution.
- 60. C. Permanent terminal attachment** Cable swaging creates permanent terminal attachment by compressing metal sleeve onto cable using hydraulic swaging tool, forming strong reliable connection rated for cable strength.

**61. B. Surface-breaking cracks** Dye penetrant inspection detects surface-breaking cracks by capillary action drawing penetrant into defects, excess removed, developer applied revealing crack locations.

**62. D. Surface and near-surface defects in conductive materials** Eddy current inspection finds surface and near-surface defects (cracks, corrosion) in electrically conductive materials through electromagnetic induction changes without surface preparation.

**63. C. Distance between rivet centers in a row** Rivet pitch is distance between centers of adjacent rivets in same row, typically 3-4 times rivet diameter minimum providing adequate material between holes.

**64. A. Flush rivet installation** Countersinking provides flush rivet installation by creating conical recess allowing 100° countersunk rivet head to sit flush with or slightly below surface.

**65. D. Non-consumable tungsten electrode** GTAW (Gas Tungsten Arc Welding/TIG) uses non-consumable tungsten electrode (melting point 6170°F) with inert gas shielding (argon/helium), filler rod added separately.

**66. B. Fuse through entire joint thickness** Weld penetration should completely fuse through entire joint thickness ensuring full-strength connection. Incomplete penetration creates weak plane susceptible to failure.

**67. A. 1:12 or shallower slope for strength** Scarf joint in wood repair requires shallow slope ratio 1:12 or shallower (preferably 1:12) ensuring adequate glue surface area for strength matching parent material.

**68. C. Electrically conductive requiring lightning protection** Carbon fiber is electrically conductive requiring special lightning strike protection (conductive mesh, coatings) providing current paths preventing structural damage from lightning.

**69. B. Excessive film thickness or slow gun movement** Paint runs and sags result from excessive wet film thickness from too-close gun distance, slow movement, excessive overlap, or improper viscosity allowing gravity flow.

**70. D. Letter N** U.S. civil aircraft registration marks begin with letter N (nationality mark) followed by 1-5 additional characters (numbers or letters) assigned by FAA.

**71. C. Circuit power off to avoid damage** Ohmmeter measures resistance and requires circuit power off because ohmmeter supplies own test voltage. Measuring powered circuit damages meter and provides incorrect readings.

**72. A. Electrical continuity between metal components** Bonding provides electrical continuity between metallic aircraft components for static discharge, lightning protection, electromagnetic shielding, preventing radio frequency interference.

**73. D. Rigidity in space and precession** Gyroscopic instruments utilize rigidity in space (gyro maintains orientation) and precession (tilting reaction 90° from applied force in rotation direction) for attitude and heading references.

**74. B. Satellite ranging signals** GPS determines position by measuring precise distances to multiple satellites using timing of radio signals traveling at speed of light, triangulating position through satellite geometry.

**75. A. Prevents excessive pressure by opening at set limit** Hydraulic relief valve prevents excessive system pressure by automatically opening at predetermined limit (typically 10-15% above normal) returning fluid to reservoir protecting components.

**76. C. Must be checked with system depressurized** Accumulator nitrogen precharge checked with hydraulic system completely depressurized, measuring gas pressure with special gauge. Precharge typically 1/3 to 2/3 system operating pressure.

**77. D. Aircraft weight on gear, proper fluid level** Shock strut servicing requires aircraft weight on gear (strut compressed to operating position), filling fluid to specified level when compressed, then inflating gas to proper pressure.

**78. B. Convert pedal motion to hydraulic pressure** Brake master cylinders convert mechanical pedal force to hydraulic pressure. Piston in cylinder pressurizes fluid transmitting force to brake actuators proportional to pedal application.

**79. C. Aircraft attitude, sensor failure, or calibration** Fuel quantity indication errors result from extreme aircraft attitude (especially float-type), sensor failure, improper calibration, wiring problems, or fuel density variations.

**80. A. Prevents ice crystal formation in fuel** Fuel System Icing Inhibitor (FSII), typically diethylene glycol monomethyl ether, prevents ice crystal formation in jet fuel at high-altitude cold temperatures.

**81. B. Heat to prevent ice formation** Thermal anti-ice systems use heat (electric resistance or hot bleed air) continuously applied preventing ice formation, maintaining surfaces above freezing temperature.

**82. D. Cools bleed air through expansion turbine** Air cycle cooling cools hot bleed air through heat exchangers (ram air cooling) and expansion turbine where air expands doing work, temperature dropping significantly.

**83. A. 99.5% oxygen** Aviator's breathing oxygen must be minimum 99.5% pure oxygen with maximum water vapor content ensuring safe breathing without contaminants. Medical oxygen (99.0%) not approved.

**84. C. Optical or ionization sensors** Smoke detection systems use optical sensors (light scattering by particles) or ionization sensors (particles disrupting ionized air current) detecting smoke before temperature rise.

**85. D. Automatic detection and suppression** APU fire protection includes automatic fire detection and automatic suppression (extinguisher discharges without crew action if APU running and fire detected), protecting unmanned compartment.

**86. B. Prevent strut rotation while allowing compression** Torque links (scissors) connect outer and inner strut cylinders preventing rotation while allowing linear compression/extension, maintaining wheel alignment and preventing brake line twisting.

**87. A. Water and sediment drainage** Fuel sumps (drain points) at tank low points allow draining water (denser than fuel, settles to bottom) and sediment during preflight and maintenance inspections.

**88. C. Ice blockage ensuring airspeed indication** Pitot heat prevents ice formation blocking pitot tube ram air port ensuring accurate airspeed indication. Electric resistance heating maintains tube above freezing temperature.

**89. D. AC requiring rectification to DC** Alternators produce alternating current (AC) in stator windings requiring rectification through diodes converting to direct current (DC) for battery charging and powering DC systems.

**90. B. Prevents loosening from vibration** Safety wire on fittings prevents loosening from vibration, installed so tension on wire tightens rather than loosens fitting. Proper technique essential for flight safety.

**91. C. Moisture removal, proper surface prep, scarf ratio** Composite repairs require moisture removal (drying 150-200°F), proper surface preparation (sanding, cleaning), shallow scarf ratio (20:1 to 50:1), and proper curing.

**92. A. Proper travel limits, neutral position, cable tension** Control surface rigging includes establishing proper neutral position, verifying specified travel limits both directions, maintaining correct cable tension, and ensuring no binding.

**93. B. Should be bled to proper pressure** Overcharged hydraulic accumulator (excessive nitrogen pressure) should be bled to proper precharge pressure per specifications preventing reduced fluid capacity and improper operation.

**94. D. Gravity, manual crank, or stored pressure** Emergency gear extension uses gravity (free-fall after releasing up-locks), manual hand crank, or accumulator stored pressure providing hydraulic power if primary system fails.

**95. A. Three times sheet thickness** Proper rivet diameter for sheet metal typically three times sheet thickness (3t) providing adequate shear strength while minimizing stress concentration around holes.

**96. C. Specific degrees BTDC per specifications** Magneto timing adjustment requires setting ignition timing to specific degrees before top dead center (BTDC) per engine specifications, verified with timing light or marks.

**97. D. Automatically discharges into waste bin** Lavatory fire extinguisher automatically discharges Halon or equivalent agent into waste receptacle if smoke detector senses fire, suppressing fire from discarded smoking materials.

**98. B. 118-137 MHz** VHF communication radios operate in 118-137 MHz frequency band allocated for aeronautical communication, channels spaced 25 kHz or 8.33 kHz apart.

**99. C. Ailerons, elevator, rudder** Primary flight control surfaces include ailerons (roll control), elevator (pitch control), and rudder (yaw control). Essential for aircraft maneuvering and stability.

**100. A. Mandatory requirements addressing unsafe conditions** Airworthiness Directives are mandatory FAA regulations addressing known unsafe conditions in aircraft, engines, propellers, or appliances requiring inspection, modification, or replacement.