PRACTICE EXAM 14 SIMULATION (60 QUESTIONS)

1. In a series circuit, an open anywhere in the path will _____.

A. Leave the other components operating normally

B. Increase the total current

C. Stop all current flow in the circuit

D. Lower the total resistance to zero

2. The center of gravity of an aircraft is calculated by dividing _____.

A. Total weight by total moment

B. Total arm by total weight

C. The datum by the total moment

D. Total moment by total weight

3. An Airworthiness Directive is best described as a _____.

A. Manufacturer recommendation that may be deferred

B. Mandatory FAA regulation correcting an unsafe condition

C. Advisory notice with no compliance requirement

D. Optional bulletin once an annual is signed

4. Aircraft tubing is deburred after cutting so that _____.

A. The tube becomes lighter in weight

B. The wall thickness is increased

C. The flare angle changes to 45 degrees

D. Flow is unrestricted and the flare seats properly

5. Magnetic particle inspection can be used only on materials that are _____.

A. Ferromagnetic and iron-based

B. Transparent and non-porous

C. Non-magnetic such as aluminum

D. Composite or plastic

6. A circuit breaker is sized to protect _____.

A. The most expensive component in the circuit

B. The battery from overcharging

C. The wire's safe current-carrying capacity

D. The voltage regulator from heat

7. Oil must be kept away from high-pressure oxygen because the combination can _____.

A. Ignite spontaneously and violently

B. Slowly dilute the oxygen purity

C. Freeze the system regulator

D. Cause the gauge to read low

8. Empty weight includes the structure, powerplant, fixed equipment, and _____.

A. Unusable fuel and full operating fluids

B. The crew and passengers

C. All usable fuel and cargo

D. The maximum payload

9. A 37-degree flare is used on aircraft tubing because it is _____.

A. Interchangeable with the automotive flare

B. Used only on flareless fittings

C. The aircraft standard and seals against the fitting

D. Designed to require no nut or sleeve

10. Safety wire must always be routed so that any loosening tendency _____.

A. Slackens the wire and frees the bolt

B. Pulls the bolt heads laterally apart

C. Holds the fasteners in a neutral state

D. Increases wire tension and tightens the fastener

11. Total resistance in a parallel circuit is always _____.

A. Less than the smallest branch resistance

B. The sum of the branch resistances

C. Equal to the largest branch resistance

D. Greater than any single branch

12. A major alteration must be accomplished using _____.

A. FAA-approved data specific to the alteration

B. Any general handbook of acceptable methods

C. A verbal description from a coworker

D. The aircraft sales brochure

13. Corrosion requires four conditions: an anode, a cathode, a conductive path, and _____.

A. A coat of primer

B. An inert gas atmosphere

C. An electrolyte such as moisture

D. A completely dry environment

14. A self-locking fiber-insert nut must not be used where _____.

A. The fastener is easily accessible

B. High heat could degrade the fiber insert

C. The panel is non-structural

D. The bolt diameter is under one inch

15. Bonding and grounding an aircraft before fueling serves to _____.

A. Dissipate static and prevent vapor ignition

B. Increase the fuel flow rate

C. Calibrate the fuel quantity gauges

D. Remove water from the fuel

16. Exfoliation corrosion is dangerous because it _____.

A. Leaves only a harmless surface stain

B. Appears solely on copper alloys

C. Lifts the metal into layers in advanced intergranular attack

D. Wipes away easily with a cloth

17. A maintenance record entry approving return to service must include the work description, the date, and _____.

A. The aircraft's estimated resale value

B. The names of all observers present

C. The signer's signature, certificate number, and certificate type

D. The serial numbers of all tools used

18. Mass differs from weight in that mass _____.

A. Changes with the gravitational field

B. Is measured only in pounds-force

C. Equals weight in every location

D. Stays constant regardless of location

19. A diode is used in a circuit to _____.

A. Store energy in a magnetic field

B. Allow current to flow in one direction only

C. Increase the circuit's voltage

D. Convert mechanical energy to electrical

20. A castellated nut on a critical bolt is safetied with _____.

A. A flat washer beneath the nut

B. A cotter pin through the drilled bolt and slots

C. A drop of thread adhesive only

D. Reliance on applied torque alone

21. The arm used in a weight-and-balance calculation is the horizontal distance from _____.

A. The center of gravity to the wingtip

B. The nose to the tail of the aircraft

C. The main wheels to the nose wheel

D. The datum to the item's center of gravity

22. A green or blue-green corrosion deposit indicates corrosion of _____.

A. Aluminum

B. Steel

C. A copper alloy

D. Magnesium

23. The gas laws must be applied using temperature expressed _____.

A. In degrees Fahrenheit

B. On an absolute scale such as Rankine

C. In degrees Celsius

D. As a relative percentage

24. A 100-hour inspection differs from an annual in that the 100-hour _____.

A. Must always be signed by an IA holder

B. Is required for all private aircraft

C. May be signed by an A&P mechanic

D. May never be overflown for any reason

25. A stall occurs when the wing exceeds _____.

A. Its maximum structural load factor

B. The speed of sound locally

C. The critical angle of attack

D. The maximum gross weight

26. Aircraft loads are wired in parallel across the bus so that _____.

A. Identical current flows through each load

B. The total resistance is increased

C. Circuit protection can be eliminated

D. One load failing open does not interrupt the others

27. Tare weight must be subtracted when weighing an aircraft because it is _____.

A. Part of the aircraft's useful load

B. Included in the maximum gross weight

C. The weight of the usable fuel

D. The weight of chocks or blocks on the scale

28. Hardening a metal increases its hardness and strength but also increases its _____.

A. Brittleness

B. Ductility

C. Toughness

D. Malleability

29. A conversion coating such as alodine is applied to aluminum to _____.

A. Add structural strength to the part

B. Increase the part's overall weight

C. Inhibit corrosion and improve paint adhesion

D. Replace the need for surface cleaning

30. An aircraft over maximum gross weight but within CG limits is _____.

A. Airworthy because the CG is correct

B. Not airworthy until the overweight is corrected

C. Airworthy if the excess is fuel

D. Within limits because weight is unregulated

31. Pascal's Law states that pressure applied to a confined fluid is transmitted _____.

A. Only in the direction of the applied force

B. With steady loss over the line length

C. Through gases but not liquids

D. Undiminished and equally in all directions

32. A piston-engine aircraft must be fueled with _____.

A. Jet A turbine fuel

B. Automotive diesel fuel

C. 100LL avgas, dyed blue

D. Kerosene of any grade

33. The first step when corrosion is found on a panel is to _____.

A. Apply primer over the corrosion immediately

B. Clean the area to assess the full extent

C. Return the aircraft to service and monitor

D. Paint the panel to seal the corrosion

34. A self-tapping screw is inappropriate for primary structure because it is _____.

A. Too expensive for production use

B. Designed for non-structural attachment only

C. Unable to be torqued correctly

D. Made of non-magnetic material

35. Empty weight excludes the _____.

A. Unusable fuel

B. Permanently installed equipment

C. Powerplant and structure

D. Crew, passengers, and usable fuel

36. A flexible hose installed with a spiraled lay line indicates the hose _____.

A. Has been installed with a twist that must be corrected

B. Is rated for a higher pressure

C. Has reached the end of its service life

D. Is exactly the right length for the run

37. Magnesium is notable as the _____.

A. Heaviest of the common structural metals

B. Most corrosion-resistant aircraft metal

C. Best electrical conductor among metals

D. Lightest structural metal, flammable when finely divided

38. The title block of an engineering drawing identifies the part number, name, scale, material, and _____.

A. The names of the hangar observers

B. The drawing's tolerances

C. The aircraft's resale value

D. The mechanic's home address

39. Approved data, as distinguished from acceptable data, is _____.

A. Required specifically for major repairs and alterations

B. Used only for minor maintenance tasks

C. Identical to and interchangeable with acceptable data

D. Less authoritative than acceptable data

40. A circuit breaker that trips repeatedly should prompt the mechanic to _____.

A. Investigate and correct the underlying fault

B. Replace it with a higher-rated breaker

C. Tape the breaker closed to keep power on

D. Bypass it with a jumper wire

41. Nitrogen is preferred for servicing struts and tires because it is _____.

A. A strong oxidizer that aids combustion

B. Less expensive than any other gas

C. Inert, dry, and will not support combustion

D. Heavier than air for better sealing

42. A CG located forward of the forward limit makes the aircraft _____.

A. Perfectly balanced for all loadings

B. Tail-heavy and unstable

C. Unaffected in its handling

D. Nose-heavy with heavy controls

43. Liquid penetrant inspection can detect only flaws that are _____.

A. Located deep within the material

B. Open to the surface of the part

C. Present in ferromagnetic metals

D. Larger than one inch across

44. A Service Bulletin that is not referenced by an AD or rule is generally _____.

A. Advisory in nature

B. Mandatory federal law by itself

C. A replacement for the type certificate

D. Prohibited from being accomplished

45. The moment of an item in weight and balance is found by _____.

A. Multiplying its weight by its arm

B. Dividing its weight by its arm

C. Adding its weight to its arm

D. Subtracting the arm from the datum

46. Two dissimilar metals in contact with an electrolyte will produce _____.

A. A protective oxide that prevents corrosion

B. Galvanic corrosion of the more active metal

C. An increase in the metals' strength

D. No reaction of any kind

47. A maintenance record is important because it _____.

A. Establishes the aircraft's resale value

B. Lists every tool used on the job

C. Is an internal shop courtesy only

D. Is a legal certification the next person relies on

48. Standard atmospheric pressure at sea level is approximately _____.

A. 7.5 psi or 20 inches of mercury

B. 50 psi or 60 inches of mercury

C. 14.7 psi or 29.92 inches of mercury

D. 10.2 psi or 25 inches of mercury

49. The grip length of a bolt should be selected so that _____.

A. The smooth shank, not the threads, carries the shear load

B. The threads carry the full shear load

C. The bolt extends two inches past the nut

D. The head sits flush in a countersink

50. Annealing is the heat-treatment process that _____.

A. Hardens the metal and increases brittleness

B. Softens the metal and relieves internal stresses

C. Refines grain without changing hardness

D. Adds a corrosion-resistant surface layer

51. Bernoulli's principle, applied to a wing, explains that faster air over the upper surface _____.

A. Has higher pressure than the lower surface

B. Has the same pressure as still air

C. Increases the wing's weight in flight

D. Has lower pressure, contributing to lift

52. An aircraft is legally airworthy only when it conforms to its type design and _____.

A. Has been recently washed and waxed

B. Is in a condition for safe operation

C. Has a full load of fuel aboard

D. Is stored indoors between flights

53. A fuse differs from a circuit breaker in that a fuse _____.

A. Melts and must be replaced after operating

B. Can be reset after it operates

C. Increases current to the load

D. Stores energy in a magnetic field

54. Ductility is the property that allows a metal to be _____.

A. Resistant to penetration and abrasion

B. Drawn out into wire without breaking

C. Returned to shape after a load is removed

D. Magnetized by an external field

55. Paint applied over a contaminated surface will _____.

A. Cure harder than over a clean surface

B. Add measurable strength to the panel

C. Become too thick to inspect properly

D. Fail to adhere and allow corrosion underneath

56. Intergranular corrosion is especially dangerous because it _____.

A. Produces a bright green deposit

B. Appears only as a surface stain

C. Attacks along grain boundaries and is often hidden

D. Is easily removed by light cleaning

57. The datum on an aircraft is best described as _____.

A. A fixed reference plane from which arms are measured

B. The aircraft's center of gravity

C. The heaviest structural point

D. A line that moves as fuel is burned

58. A capacitor stores electrical energy in _____.

A. A magnetic field around a coil

B. The mechanical motion of a rotor

C. An electrostatic field between plates

D. A chemical reaction within a cell

59. A composite material is formed by combining a reinforcing fiber with _____.

A. A sheet of solid aluminum

B. A layer of pure magnesium

C. A coat of zinc-chromate primer

D. A resin matrix that binds the fibers

60. A "before further flight" AD compliance time means the action must be completed _____.

A. Within the next 100 hours of operation

B. Before the aircraft is next flown

C. At the next scheduled annual inspection

D. Within 30 days of the AD's receipt

Answer Key

1. C — Stop all current flow in the circuit. A series circuit has a single path, so an open anywhere interrupts all current. This is the defining behavior that distinguishes series from parallel wiring.

2. D — Total moment by total weight. The center of gravity is found by summing all moments and dividing by total weight, giving the CG as an arm from the datum. This single relationship underlies every loading calculation.

3. B — Mandatory FAA regulation correcting an unsafe condition. An Airworthiness Directive is a legally enforceable FAA regulation issued to correct an unsafe condition, and an aircraft is unairworthy until it is complied with. It is neither deferrable nor advisory.

4. D — Flow is unrestricted and the flare seats properly. Deburring removes the internal burr that restricts flow and the external burr that prevents a proper flare. This covers both surfaces, the complete reason for deburring.

5. A — Ferromagnetic and iron-based. Magnetic particle inspection magnetizes the part, so it works only on ferromagnetic iron-based materials and cannot be used on aluminum or composites. Non-magnetic materials require other NDI methods.

6. C — The wire's safe current-carrying capacity. A circuit breaker is sized to the wire's safe current capacity, so an overload opens the circuit before the wire overheats. This is why a breaker must never be upsized to stop nuisance tripping.

7. A — Ignite spontaneously and violently. Oil in contact with high-pressure oxygen can ignite spontaneously and violently, so oxygen systems must be kept free of petroleum products. This ignition hazard is the reason for absolute cleanliness.

8. A — Unusable fuel and full operating fluids. Empty weight comprises the structure, powerplant, fixed equipment, unusable fuel, and full operating fluids. It excludes the useful load of crew, passengers, usable fuel, and cargo.

9. C — The aircraft standard and seals against the fitting. The 37-degree flare is the aircraft standard and seals against the fitting cone, distinct from the 45-degree automotive flare. The two are not interchangeable.

10. D — Increases wire tension and tightens the fastener. Safety wire must be routed so any loosening tendency increases the wire's tension and pulls the fastener tight. Installed backward, it would permit loosening.

11. A — Less than the smallest branch resistance. In a parallel circuit, adding paths gives current more routes, so total resistance is always less than the smallest branch. This is why aircraft loads are paralleled across the bus.

12. A — FAA-approved data specific to the alteration. A major alteration must be accomplished with FAA-approved data, not a handbook, brochure, or verbal description. Approved data is required for major work.

13. C — An electrolyte such as moisture. Corrosion requires an anode, a cathode, a conductive path, and an electrolyte such as moisture. Removing any one of the four halts the reaction.

14. B — High heat could degrade the fiber insert. A fiber-insert self-locking nut has a temperature limitation and must not be used where high heat would degrade the insert and reduce locking. A metal self-locking nut is used in high-heat areas.

15. A — Dissipate static and prevent vapor ignition. Bonding and grounding dissipate the static charge generated by fuel flow, preventing a spark from igniting fuel vapors. This is the central fire-prevention purpose.

16. C — Lifts the metal into layers in advanced intergranular attack. Exfoliation lifts the metal into layers or flakes, signaling advanced intergranular attack and serious structural damage. It is far more than a harmless surface stain.

17. C — The signer's signature, certificate number, and certificate type. A return-to-service entry must include the work description, the date, and the approving person's signature, certificate number, and certificate type. The other options are never required.

18. D — Stays constant regardless of location. Mass is the unchanging amount of matter and stays constant regardless of location. Weight, by contrast, is the gravitational force on that mass and varies with the field.

19. B — Allow current to flow in one direction only. A diode permits current flow in one direction and blocks it in reverse, which is why diodes rectify AC into DC. It is a solid-state device.

20. B — A cotter pin through the drilled bolt and slots. A castellated nut on a critical bolt is safetied by a cotter pin through the drilled bolt and the nut's slots. A washer, adhesive, or torque alone do not provide positive safetying.

21. D — The datum to the item's center of gravity. The arm is the horizontal distance from the datum to the center of gravity of an item. It is multiplied by weight to find the moment.

22. C — A copper alloy. A green or blue-green deposit (verdigris) is the characteristic corrosion product of copper alloys. Identifying the metal from its corrosion color guides treatment.

23. B — On an absolute scale such as Rankine. The gas laws require absolute temperature (Rankine or Kelvin) because they describe behavior measured from absolute zero. Using Fahrenheit or Celsius produces incorrect results.

24. C — May be signed by an A&P mechanic. A 100-hour inspection may be performed and approved by an A&P without an Inspection Authorization, unlike the annual, which requires an IA. It may also be overflown up to 10 hours to reach an inspection facility.

25. C — The critical angle of attack. A stall occurs when the wing exceeds the critical angle of attack, at which airflow separates and lift drops abruptly. Lift increases with angle of attack only up to that point.

26. D — One load failing open does not interrupt the others. Aircraft loads are wired in parallel so an open failure in one branch leaves the others operating on the common bus voltage. Parallel branches provide independent paths.

27. D — The weight of chocks or blocks on the scale. Tare weight is the weight of chocks or blocks on the scale, which is not part of the aircraft and must be subtracted to find true weight. Failing to subtract it inflates the empty weight.

28. A — Brittleness. Hardening by heating and quenching increases hardness and strength but also brittleness. Tempering is then used to reduce that brittleness and restore toughness.

29. C — Inhibit corrosion and improve paint adhesion. A conversion coating such as alodine forms a protective film on aluminum that inhibits corrosion and improves paint adhesion. It treats the surface rather than adding strength or weight.

30. B — Not airworthy until the overweight is corrected. Exceeding maximum gross weight makes the aircraft unairworthy even with an acceptable CG. Both the weight and CG limits must independently pass.

31. D — Undiminished and equally in all directions. Pascal's Law states that pressure applied to a confined fluid transmits undiminished and equally in all directions, which is why hydraulic systems transmit and multiply force. Liquids being incompressible makes this direct.

32. C — 100LL avgas, dyed blue. Piston engines run on aviation gasoline, commonly grade 100LL dyed blue. Jet fuel, diesel, and kerosene are not appropriate for a piston engine.

33. B — Clean the area to assess the full extent. The first step in addressing corrosion is to clean the area so its full extent can be seen and assessed. Painting or priming over corrosion seals it in and worsens the damage.

34. B — Designed for non-structural attachment only. A self-tapping screw cuts its own thread and is intended for non-structural attachment, not primary structure. A structural fitting requires structural hardware.

35. D — Crew, passengers, and usable fuel. Empty weight excludes the useful load — crew, passengers, usable fuel, and cargo — while including the structure, powerplant, fixed equipment, and unusable fuel. The useful load is what the aircraft carries above empty.

36. A — Has been installed with a twist that must be corrected. A spiraling lay line indicates the hose was installed with a twist, an unacceptable condition that stresses the hose. It must be reinstalled without the twist.

37. D — Lightest structural metal, flammable when finely divided. Magnesium is the lightest structural metal but is flammable in finely divided form such as chips or dust. Its low weight is valuable where it can be handled safely.

38. B — The drawing's tolerances. The title block identifies the part number, name, scale, material, and tolerances, framing everything else on the drawing. It does not list observers or addresses.

39. A — Required specifically for major repairs and alterations. Approved data is FAA-approved and required for major repairs and alterations, while acceptable data may be used for minor work. The two categories are not interchangeable.

40. A — Investigate and correct the underlying fault. Repeated tripping signals a fault to be found and corrected, not a protection level to be raised. Upsizing, taping, or bypassing the breaker removes essential protection.

41. C — Inert, dry, and will not support combustion. Nitrogen is preferred for servicing struts and tires because it is inert, dry, and will not support combustion. Pure oxygen is never used, and moist air invites corrosion.

42. D — Nose-heavy with heavy controls. A CG forward of the forward limit makes the aircraft nose-heavy, producing heavy controls and difficulty rotating. A CG too far aft produces the opposite — instability.

43. B — Open to the surface of the part. Liquid penetrant detects only surface-breaking flaws, because the penetrant must reach an open surface to seep into the crack. A fully internal flaw never contacts the penetrant.

44. A — Advisory in nature. A Service Bulletin not referenced by an AD or rule is generally advisory. It becomes mandatory only when an AD mandates its action or a rule requires it.

45. A — Multiplying its weight by its arm. The moment of an item equals its weight times its arm. Moments are summed and divided by total weight to locate the CG.

46. B — Galvanic corrosion of the more active metal. Two dissimilar metals in contact with an electrolyte form a galvanic cell that corrodes the more active metal. Isolating the metals with a barrier prevents it.

47. D — Is a legal certification the next person relies on. The maintenance record is a legal certification that the next person relies on to know the aircraft's true status. It is far more than an internal courtesy and does not record resale value or tool lists.

48. C — 14.7 psi or 29.92 inches of mercury. Standard atmospheric pressure at sea level is approximately 14.7 psi, equivalent to 29.92 inches of mercury. This baseline is used in pressure calculations and as a reference.

49. A — The smooth shank, not the threads, carries the shear load. Correct grip length places the smooth unthreaded shank through the joined parts so the shank bears the shear load, keeping it off the threads. This prevents fastener failure at the threads.

50. B — Softens the metal and relieves internal stresses. Annealing softens a metal and relieves internal stresses through slow heating and very slow cooling. Hardening and quenching do the opposite by increasing hardness and brittleness.

51. D — Has lower pressure, contributing to lift. Bernoulli's principle holds that faster-moving air has lower pressure, so the faster flow over the wing's upper surface lowers the pressure there, contributing to lift. This pairs with Newton's third law.

52. B — Is in a condition for safe operation. Airworthiness requires both conformity to the approved type design and a condition for safe operation. A clean exterior, full fuel, or indoor storage alone does not establish airworthiness.

53. A — Melts and must be replaced after operating. A fuse contains a metal element that melts and opens the circuit under excessive current, so it must be replaced after operating. A circuit breaker, by contrast, trips and can be reset.

54. B — Drawn out into wire without breaking. Ductility is a metal's ability to be drawn or stretched into wire without breaking. It is distinct from hardness (resistance to penetration) and elasticity (returning to shape after load).

55. D — Fail to adhere and allow corrosion underneath. Paint over a contaminated surface will not adhere and lets corrosion start beneath the finish, so the surface must be clean and treated. Surface preparation determines a finish's protective value.

56. C — Attacks along grain boundaries and is often hidden. Intergranular corrosion attacks along the metal's grain boundaries and is often hidden beneath the surface, making it more dangerous than visible surface corrosion. Exfoliation is its advanced form.

57. A — A fixed reference plane from which arms are measured. The datum is a fixed vertical reference plane from which all horizontal arms are measured. It does not move with fuel burn and is not located at the CG.

58. C — An electrostatic field between plates. A capacitor stores electrical energy in an electrostatic field between its plates and opposes a change in voltage. An inductor, by contrast, stores energy in a magnetic field.

59. D — A resin matrix that binds the fibers. A composite combines a reinforcing fiber with a resin matrix that bonds the fibers, producing a material stronger and lighter than either alone. Common matrices include epoxy, polyester, and phenolic resins.

60. B — Before the aircraft is next flown. An AD with a "before further flight" compliance time requires the action before the next flight, the most urgent compliance category. It cannot be deferred to a later interval.