PRACTICE EXAM 2: NASCLA TRADE EXAM SIMULATION (115 QUESTIONS)

Time Allowed: 330 Minutes (5 Hours 30 Minutes)

Total Questions: 115

Passing Score: 70% (81 Correct)

DOMAIN 1: GENERAL REQUIREMENTS (Questions 1–25)

1. A contractor is reviewing the construction documents for a new commercial building and notices that the architectural floor plan shows a corridor width of 42 inches, but the specifications reference IBC corridor requirements for the occupancy type, which requires a wider corridor. When there is a conflict between the drawings and the specifications, which general rule of contract interpretation applies?

A. The drawings always take precedence over the specifications because they represent the architect's final design intent

B. The most recently dated document takes precedence regardless of whether it is a drawing or a specification

C. The contractor should use whichever document results in the least expensive construction to resolve the conflict

D. The more stringent requirement typically governs, and the contractor should submit an RFI to resolve the conflict

2. Under the IBC, a building with a Group A2 occupancy (restaurant with bar) is required to have an automatic sprinkler system when the fire area exceeds a certain threshold. What is the typical fire area threshold that triggers the sprinkler requirement for Group A2 occupancies?

A. 12,000 square feet fire area, or when the occupant load exceeds 300 in specific configurations

B. 5,000 square feet fire area regardless of the occupant load calculation

C. 20,000 square feet fire area with no additional occupant load consideration

D. 8,500 square feet fire area only when combined with a Group M occupancy on the same floor

3. A twostory commercial building is classified as Group B occupancy with Type VB construction. The architect wants to add a third story. Under the IBC, what modification would most likely be required to permit the additional story?

A. Changing the exterior wall cladding from combustible to noncombustible materials only

B. Reducing the floor area of each story by 25% to offset the additional height

C. Upgrading to a more fireresistant construction type or installing an automatic sprinkler system throughout

D. Adding a second fire alarm panel and doubling the number of manual pull stations at exits

4. The IBC defines "means of egress" as consisting of three components that form a continuous path from any occupied point to a public way. Which component of the means of egress is required to be separated from all other building spaces by fireresistancerated construction?

A. The exit access, which includes corridors, aisles, and rooms leading to the exit doors

B. The exit, which includes enclosed exit stairways, exit passageways, and horizontal exits

C. The exit discharge, which includes the exterior path from the exit door to the public way

D. All three components must be separated by fireresistancerated construction without exception

5. Under the IBC, what is the minimum tread depth required for exit stairways in commercial buildings?

A. 11 inches minimum tread depth measured horizontally from nosing to nosing

B. 9 inches minimum tread depth measured horizontally from nosing to nosing

C. 10 inches minimum tread depth measured horizontally from nosing to nosing

D. 12 inches minimum tread depth measured horizontally from nosing to nosing

6. A contractor is constructing a Group E (Educational) occupancy building that will serve as an elementary school. According to the IBC, which occupancy group classification applies to this building, and what is the occupant load factor for classroom areas?

A. Group B occupancy with an occupant load factor of 150 gross square feet per person

B. Group A3 occupancy with an occupant load factor of 15 net square feet per person

C. Group I4 occupancy with an occupant load factor of 35 net square feet per person

D. Group E occupancy with an occupant load factor of 20 net square feet per person

7. According to the IBC, when two exits are required from a building floor, the exits must be separated by a minimum distance to ensure that a single fire event cannot block both exits simultaneously. In a nonsprinklered building, what is the minimum separation distance between the two required exits?

A. Onethird of the maximum overall diagonal dimension of the floor area served

B. Onehalf of the maximum overall diagonal dimension of the floor area served

C. Onequarter of the maximum overall diagonal dimension of the floor area served

D. Twothirds of the maximum overall diagonal dimension of the floor area served

8. A contractor is evaluating a commercial building's compliance with the IBC's fire protection requirements. The building has a Group S1 (moderatehazard storage) occupancy with a fire area of 15,000 square feet. Under the IBC, is an automatic sprinkler system required for this occupancy?

A. No, because Group S1 occupancies are exempt from sprinkler requirements regardless of fire area size

B. No, because the sprinkler threshold for Group S1 occupancies is 20,000 square feet per fire area

C. Yes, because Group S1 occupancies require automatic sprinklers when the fire area exceeds 12,000 square feet

D. Yes, but only if the building exceeds two stories in height regardless of the fire area dimensions

9. Under the IBC, what is the maximum slope permitted for an accessible ramp along an accessible route?

A. 1:12 (one inch of rise for every 12 inches of horizontal run) with a maximum rise of 30 inches per run

B. 1:8 (one inch of rise for every 8 inches of horizontal run) with a maximum rise of 36 inches per run

C. 1:10 (one inch of rise for every 10 inches of horizontal run) with a maximum rise of 24 inches per run

D. 1:20 (one inch of rise for every 20 inches of horizontal run) with no maximum rise limitation

10. A building contains a Group I2 occupancy (hospital with patients incapable of selfpreservation). The IBC requires smoke barriers to divide certain institutional occupancies into smoke compartments. What is the primary purpose of these smoke compartments?

A. To eliminate the need for automatic sprinkler systems by containing fire to a single compartment

B. To allow the building to exceed normal height and area limitations for institutional occupancies

C. To provide fireresistancerated enclosures for mechanical and electrical equipment rooms

D. To allow horizontal relocation of patients to an adjacent safe compartment instead of full vertical evacuation

11. Under the IBC, what is the minimum required width for an exit stairway serving an occupant load of 50 or more persons?

A. 36 inches minimum clear width between the handrails for stairways serving fewer than 50 occupants

B. 44 inches minimum clear width between the handrails for stairways serving 50 or more occupants

C. 48 inches minimum clear width between the handrails for all commercial exit stairways

D. 60 inches minimum clear width between the handrails for stairways in assembly occupancies

12. A contractor is constructing a commercial building with a Group R1 (hotel) occupancy. Under the IBC, what fire protection system is required throughout this occupancy regardless of building size or area?

A. A fire alarm system with manual pull stations only at primary exits and the front desk

B. A standpipe system on each floor with fire hose connections in every corridor

C. An automatic sprinkler system installed throughout all areas of the Group R1 occupancy

D. A smoke control system with dedicated exhaust fans on each floor and in all elevator shafts

13. Under the IBC, what is the definition of "fireresistance rating" as applied to building elements and assemblies?

A. The period of time a building element maintains its structural integrity and acts as a barrier to fire passage when tested per ASTM E119

B. The temperature at which a building element ignites and begins to contribute fuel to a fire

C. The rate at which heat transfers through a building element measured in BTU per hour per square foot

D. The maximum number of fire exposures a building element can withstand before replacement is required

14. A contractor is designing the layout of a parking lot for a new commercial building. The lot will have 85 total parking spaces. According to IBC Table 1106.1, how many of those spaces must be designated as accessible?

A. 2 accessible parking spaces for a lot with 85 total parking spaces

B. 3 accessible parking spaces for a lot with 85 total parking spaces

C. 5 accessible parking spaces for a lot with 85 total parking spaces

D. 4 accessible parking spaces for a lot with 85 total parking spaces

15. According to the IBC, which type of construction permits the use of any material approved by the code for structural elements, including lightframe wood construction, with no fireresistance rating required for any structural element?

A. Type IIIB construction with noncombustible exterior walls and unrated combustible interiors

B. Type VB construction with no fireresistance rating required for any building element

C. Type IIB construction with noncombustible materials but no fireresistance rating required

D. Type IVHT construction with heavy timber structural elements meeting minimum dimensions

16. Under the IBC, the building official has the authority to grant modifications to specific code provisions when strict compliance is impractical. What condition must be met for the building official to approve a modification?

A. The modification must reduce the total construction cost by at least 10% compared to full code compliance

B. The modification must be approved by a majority vote of the local building code appeals board

C. The modification must achieve the intent and purpose of the code provision through alternative means

D. The modification must be limited to nonstructural elements that do not affect fire or life safety

17. A contractor is constructing a building where the fire protection engineer specifies that certain fireresistancerated wall assemblies will include penetrations for mechanical piping. Under the IBC, what is required at each penetration through a fireresistancerated assembly?

A. An approved firestop system that maintains the fireresistance rating of the assembly at each penetration

B. A minimum 6inch air gap between the penetrating item and the rated assembly with no sealant permitted

C. A steel sleeve welded to the rated assembly with hightemperature silicone caulk at each end

D. Only penetrations through fire walls require firestop systems; fire barriers and fire partitions are exempt

18. Under the IBC, what is the minimum width of an accessible route within a building, measured between walls or other obstructions?

A. 32 inches minimum width for accessible routes connecting accessible spaces within buildings

B. 44 inches minimum width for accessible routes in all commercial building corridors

C. 48 inches minimum width for accessible routes serving occupant loads exceeding 100 persons

D. 36 inches minimum width for accessible routes, with 44 inches required for corridors serving 50 or more occupants

19. A contractor receives approved construction documents showing a change of occupancy from Group S2 (lowhazard storage, parking garage) to Group B (business, office space). Under the IBC, what requirement is triggered by this change of occupancy regarding accessibility?

A. Only the altered portions of the building must meet current accessibility requirements for the new use

B. The entire building must be brought into compliance with current accessibility requirements for the new occupancy

C. The building is grandfathered under the original occupancy and no accessibility upgrades are required

D. Accessibility compliance is required only if the renovation cost exceeds 50% of the building's assessed value

20. Under the IBC, deadend corridors are limited to a maximum length to prevent occupants from traveling in the wrong direction during an emergency. In a building equipped with an approved automatic sprinkler system throughout, what is the maximum permitted deadend corridor length?

A. 20 feet maximum deadend corridor length regardless of sprinkler protection

B. 75 feet maximum deadend corridor length in fully sprinklered buildings

C. 50 feet maximum deadend corridor length in fully sprinklered buildings

D. 100 feet maximum deadend corridor length in fully sprinklered buildings

21. A commercial building has a mezzanine level within a large open warehouse space. Under the IBC, what is the maximum floor area a mezzanine may occupy relative to the room or space in which it is located before it is classified as a separate story?

A. 25% of the floor area of the room in which it is located, or 33% if sprinklered

B. 50% of the floor area of the room in which it is located regardless of sprinkler status

C. 10% of the floor area of the room in which it is located for all building types

D. Onethird of the floor area of the room in which it is located, or onehalf if sprinklered

22. According to the IBC, guardrails are required along opensided walking surfaces when the elevation change exceeds a specific height. What is the minimum height difference that triggers the guardrail requirement?

A. 30 inches or more above the floor or grade below at any opensided walking surface

B. 24 inches or more above the floor or grade below at any opensided walking surface

C. 48 inches or more above the floor or grade below at any opensided walking surface

D. 12 inches or more above the floor or grade below at any opensided walking surface

23. Under the IBC, what is the minimum height required for guardrails installed at opensided walking surfaces in commercial buildings?

A. 36 inches minimum height measured vertically from the walking surface to the top of the guardrail

B. 42 inches minimum height measured vertically from the walking surface to the top of the guardrail

C. 48 inches minimum height measured vertically from the walking surface to the top of the guardrail

D. 44 inches minimum height measured vertically from the walking surface to the top of the guardrail

24. A contractor is building a Type IVC mass timber building using crosslaminated timber (CLT) panels. Under the 2021 IBC, what distinguishes Type IVC from Type IVA and Type IVB construction?

A. Type IVC uses smaller dimensional lumber instead of mass timber products for all structural elements

B. Type IVC permits mass timber elements to be exposed without noncombustible protection

C. Type IVC requires all mass timber elements to be fully encased in concrete for fire protection

D. Type IVC is limited to singlestory buildings while Type IVA permits up to 18 stories

25. Under the IBC, a building with a single exit is permitted only under limited conditions. Which of the following conditions must generally be met for a singleexit building?

A. The building must be at least four stories tall with a fire alarm system and elevator service

B. The building must have a minimum floor area of 10,000 square feet on each level

C. The occupant load must not exceed 49, the travel distance must be within limits, and the building must meet height restrictions

D. The building must be fully sprinklered with a fire command center and voice communication system

DOMAIN 2: SITE CONSTRUCTION (Questions 26–40)

26. A geotechnical investigation includes drilling soil borings at multiple locations across a building footprint. To what minimum depth below the proposed foundation level should borings typically extend?

A. 10 feet below the proposed foundation level or to the water table, whichever is shallower

B. 15 feet below the proposed foundation level in all soil conditions regardless of bearing capacity

C. 50 feet below the proposed foundation level to ensure complete characterization of all soil strata

D. At least 25 feet below the proposed foundation level or to competent bearing material, whichever is deeper

27. A contractor is placing structural fill on a commercial building site and the specifications require compaction testing using a nuclear density gauge. How frequently are compaction tests typically performed?

A. One test per every 2,000 to 5,000 square feet of fill area, or one test per lift per defined area

B. One test at the beginning and one test at the end of each full day of fill placement operations

C. One test per every 50,000 square feet of fill area, or one test per every three lifts of fill material

D. Testing is only required when the geotechnical engineer is present onsite for scheduled inspections

28. OSHA requires that excavation protective systems be designed by a registered professional engineer when the excavation exceeds a specific depth. What is this depth threshold?

A. 10 feet deep for all soil types and excavation configurations requiring engineering design

B. 15 feet deep for all soil types except stable rock formations excavated with vertical sides

C. 20 feet deep regardless of soil type, requiring an engineerdesigned protective system

D. 25 feet deep for Type A and Type B soils, and 15 feet deep for Type C soils only

29. Under OSHA's excavation safety standard, what is the maximum allowable slope angle for a Type B soil excavation?

A. ¾ horizontal to 1 vertical (53° from horizontal) for Type B soil excavations

B. 1 horizontal to 1 vertical (45° from horizontal) for Type B soil excavations

C. 1½ horizontal to 1 vertical (34° from horizontal) for Type B soil excavations

D. Vertical sides (90°) are permitted for Type B soil excavations up to 12 feet deep

30. A construction site requires a sediment basin to capture and detain stormwater runoff before discharge. For projects disturbing 10 or more acres, what is the minimum required storage capacity for the sediment basin?

A. 1,800 cubic feet per acre of drainage area contributing to the basin

B. 5,400 cubic feet per acre of drainage area contributing to the basin

C. 900 cubic feet per acre of drainage area contributing to the basin

D. 3,600 cubic feet per acre of drainage area contributing to the basin

31. A contractor is installing a vapor barrier beneath a concrete slab on grade as part of the underslab drainage system. What is the typical minimum thickness for the polyethylene vapor barrier?

A. 10mil or 15mil polyethylene sheeting placed on top of the gravel drainage layer beneath the slab

B. 4mil polyethylene sheeting placed directly on the subgrade soil without a gravel drainage layer

C. 30mil reinforced polyethylene sheeting placed above the concrete slab as a surface treatment

D. 6mil polyethylene sheeting placed between two layers of sand above and below for protection

32. When a construction project disturbs less than one acre of land but is part of a larger common plan of development that will ultimately disturb one or more acres, is an NPDES Construction General Permit required?

A. No, projects disturbing less than one acre are always exempt from NPDES permit requirements

B. Yes, projects that are part of a larger common plan of development exceeding one acre require an NPDES permit

C. Only if the project is within 500 feet of a navigable waterway or wetland designated by the EPA

D. Only if the local jurisdiction has adopted a stormwater ordinance that requires permits for smaller sites

33. A contractor observes that silt fence sediment has accumulated to onethird the height of the fence during routine BMP inspection. What corrective action is required?

A. No action is needed until sediment reaches twothirds the height of the silt fence

B. The accumulated sediment must be removed and properly disposed of before the next rainfall event

C. The sediment must be removed to restore the fence's filtering capacity before it is overtopped

D. The silt fence must be replaced entirely with a new fence installed at a different location

34. IBC Table 1806.2 provides presumptive bearing capacities for various soil types when a sitespecific geotechnical investigation is not performed. What is the presumptive allowable bearing pressure for sandy gravel or gravel (GW, GP classifications)?

A. 3,000 pounds per square foot for sandy gravel or gravel bearing soils

B. 1,500 pounds per square foot for sandy gravel or gravel bearing soils

C. 4,000 pounds per square foot for sandy gravel or gravel bearing soils

D. 2,000 pounds per square foot for sandy gravel or gravel bearing soils

35. A contractor is constructing a drilled shaft (caisson) foundation. What distinguishes a drilled shaft from a driven pile?

A. Drilled shafts use prefabricated steel or concrete members driven into the ground by impact hammers

B. Drilled shafts are limited to depths of 20 feet and cannot penetrate through rock formations

C. Drilled shafts are smaller in diameter than driven piles and are used only for light residential loads

D. Drilled shafts are constructed by drilling a hole, placing a reinforcing cage, and filling with concrete

36. According to OSHA, who is responsible for inspecting an excavation daily before each shift, after rainstorms, and after other hazardincreasing occurrences?

A. The project owner's safety consultant must perform all daily excavation inspections per the contract

B. A competent person designated by the contractor who has the authority to take corrective measures

C. The local building inspector assigned to the project must approve the excavation before each shift

D. The OSHA compliance officer assigned to the geographic region where the project is located

37. A contractor is installing asphalt pavement for a commercial parking lot. What is the minimum ambient air temperature generally required during hotmix asphalt placement?

A. 50°F to 55°F minimum ambient air temperature during asphalt placement operations

B. 25°F to 30°F minimum ambient air temperature during asphalt placement operations

C. 40°F to 50°F minimum ambient air temperature during asphalt placement operations

D. 60°F to 65°F minimum ambient air temperature during asphalt placement operations

38. When installing concrete pavement, contraction joints (control joints) must be cut at regular intervals to control shrinkage cracking. To what minimum depth must contraction joints be cut relative to the slab thickness?

A. Onequarter of the slab thickness to create a weakened plane that controls crack location

B. Onehalf of the slab thickness to ensure complete crack penetration through the slab depth

C. The full depth of the slab to create a true expansion joint rather than a contraction joint

D. Oneeighth of the slab thickness with a surface sealant to prevent moisture infiltration

39. A contractor is backfilling a utility trench that crosses under a parking lot. What is the primary risk if the trench backfill is not properly compacted?

A. The underground pipe will float upward through the loose backfill material and break its connections

B. The utility company will refuse to accept the installation and require the pipe to be reinstalled

C. The backfill material will contaminate the municipal water supply through groundwater migration

D. The backfill will settle over time, creating depressions in the pavement above known as trench settlement

40. What type of pipe bedding material is typically placed beneath underground utility pipes to provide uniform support and prevent point loading on the pipe?

A. Native clay soil excavated from the trench and placed back without modification or treatment

B. Granular material such as sand or fine gravel placed and compacted to a uniform thickness of at least 4 inches

C. Rigid concrete cradle poured around the lower half of the pipe for maximum load distribution

D. Recycled asphalt millings compacted in 12inch lifts around and over the pipe for full encapsulation

DOMAIN 3: CONCRETE (Questions 41–46)

41. Portland cement is manufactured in five standard types for different applications. Which type of portland cement is used when concrete must gain strength more rapidly than normal, such as in cold weather or when forms need to be stripped early?

A. Type I portland cement for generalpurpose construction applications without special requirements

B. Type II portland cement for moderate sulfate resistance in foundations and belowgrade concrete

C. Type III portland cement for high early strength in cold weather and fasttrack construction

D. Type V portland cement for high sulfate resistance in severe sulfate exposure conditions

42. A concrete mix design specifies the use of an airentraining admixture. What is the primary purpose of air entrainment in concrete, and what is the typical range of air content?

A. To increase the compressive strength of the concrete by 15% to 20% above the base mix design

B. To reduce the weight of the concrete for use in lightweight structural applications

C. To accelerate the setting time of the concrete for use in cold weather placement conditions

D. To improve freezethaw resistance by introducing 4% to 7% microscopic air bubbles into the concrete

43. A contractor receives a concrete delivery ticket showing a watercement ratio of 0.45. The contractor's superintendent asks the concrete truck driver to add water to improve workability. Why is adding water to the mix at the jobsite a harmful practice?

A. Adding water increases the watercement ratio, which reduces the concrete's strength, durability, and resistance to weathering

B. Adding water causes the concrete to set too quickly, preventing adequate time for finishing operations

C. Adding water increases the density of the concrete beyond the limits permitted by the structural design

D. Adding water has no effect on concrete performance and is a standard practice approved by ACI 318

44. ACI 318 requires that concrete be cured for a minimum period to allow hydration to continue and the concrete to develop its designed strength. When using Type I portland cement and water curing or moisture‑retaining coverings, what is the minimum curing period?

A. 3 days minimum curing period for concrete using Type I portland cement

B. 7 days minimum curing period for concrete using Type I portland cement

C. 14 days minimum curing period for concrete using Type I portland cement

D. 28 days minimum curing period matching the standard compressive strength test age

45. A contractor is placing concrete for an elevated structural slab. The maximum allowable freefall height for concrete to prevent segregation — the separation of coarse aggregate from cement paste — is limited to what distance?

A. 10 feet maximum freefall height before a tremie, chute, or pump must be used

B. 8 feet maximum freefall height before a tremie, chute, or pump must be used

C. 3 feet maximum freefall height before a tremie, chute, or pump must be used

D. 5 feet maximum freefall height before a tremie, chute, or pump must be used

46. When consolidating freshly placed concrete with an internal vibrator, the vibrator should penetrate into the previous lift to bond the layers together. How deep into the preceding layer should the vibrator penetrate?

A. The vibrator should remain within the current lift only and never penetrate the previous layer

B. At least 2 feet into the preceding lift to ensure maximum consolidation between pours

C. At least 6 inches into the preceding lift to knit the layers together and prevent cold joints

D. The vibrator should penetrate the full depth of both the current and previous lifts simultaneously

DOMAIN 4: MASONRY (Questions 47–50)

47. In masonry construction, control joints are installed at specific intervals to accommodate volume changes and prevent random cracking. What is the typical maximum spacing for control joints in CMU walls?

A. 8 to 10 feet on center for all reinforced and unreinforced CMU wall construction

B. 40 to 50 feet on center for reinforced CMU walls with horizontal joint reinforcement

C. 20 to 25 feet on center, often limited to 1.5 to 3 times the wall height

D. Control joints are not required in CMU walls because the mortar joints accommodate all movement

48. A masonry contractor is grouting the reinforced cells of a CMU wall using the lowlift grouting method. What is the maximum grout pour height per lift for fine grout in lowlift grouting?

A. 5 feet maximum pour height per lift for fine grout in lowlift grouting applications

B. 8 feet maximum pour height per lift for fine grout in lowlift grouting applications

C. 12 feet maximum pour height per lift for fine grout in lowlift grouting applications

D. 3 feet maximum pour height per lift for fine grout in lowlift grouting applications

49. Under ASTM C476, masonry grout is classified into two types based on the inclusion of coarse aggregate. When is fine grout (containing only cement, sand, and water) typically used instead of coarse grout?

A. Fine grout is used in all grouted masonry applications regardless of core size or space dimensions

B. Fine grout is used when the grout must achieve a compressive strength exceeding 4,000 psi

C. Fine grout is used only in decorative masonry applications where color uniformity is required

D. Fine grout is used when the grout space is small — typically cores less than 2 inches in the smallest dimension

50. What is the minimum required bearing length for a masonry lintel on each side of an opening in a CMU wall?

A. 4 inches (half a block module) minimum bearing on each side of the masonry opening

B. 8 inches (one block module) minimum bearing on each side of the masonry opening

C. 12 inches (one and a half block modules) minimum bearing on each side of the opening

D. 16 inches (two full block modules) minimum bearing on each side of the masonry opening

DOMAIN 5: METALS (Questions 51–56)

51. A structural engineer specifies ASTM A36 steel for gusset plates and connection angles on a commercial building project. What is the minimum yield strength of A36 steel?

A. 36,000 psi (36 ksi) minimum yield strength for carbon structural steel plates and shapes

B. 50,000 psi (50 ksi) minimum yield strength for carbon structural steel plates and shapes

C. 42,000 psi (42 ksi) minimum yield strength for highstrength lowalloy structural steel

D. 65,000 psi (65 ksi) minimum yield strength for structural bolt material connections

52. The modulus of elasticity (E) is a measure of a material's stiffness. What is the approximate modulus of elasticity for all grades of structural steel?

A. 10,000 ksi (10 million psi) for all grades of structural steel regardless of yield strength

B. 36,000 ksi (36 million psi) with variation depending on the specific ASTM grade designation

C. 29,000 ksi (29 million psi) for all grades of structural steel regardless of yield strength

D. 50,000 ksi (50 million psi) for highstrength structural steel grades such as A992 and A572

53. A fillet weld is the most commonly used weld type in structural steel construction. How is a fillet weld specified on structural drawings?

A. By the depth of penetration measured from the root of the joint to the weld surface

B. By its leg size — the dimension measured along each of the two surfaces being joined

C. By the total crosssectional area of the weld metal deposited in the joint

D. By the throat thickness — the minimum distance from the root to the weld face

54. During steel erection, openweb steel joists must have bridging installed before the crane is released. What is the reason for this critical safety requirement?

A. Bridging prevents the joist from deflecting excessively under its own selfweight during erection

B. Bridging provides attachment points for safety cables used by ironworkers during decking operations

C. Bridging prevents the concrete deck from cracking due to differential deflection between adjacent joists

D. Unbridged joists can roll over (lateraltorsional buckling) under their own weight, collapsing without warning

55. Sprayapplied fireresistive material (SFRM) is the most common fireproofing method for concealed structural steel in commercial buildings. What is the primary limitation of SFRM that the general contractor must manage during construction?

A. SFRM is a fragile material that can be easily damaged by impact and abrasion during subsequent construction activities

B. SFRM cannot be applied to steel surfaces that have been painted or primed with any type of coating

C. SFRM requires a minimum ambient temperature of 80°F during application and for 72 hours after

D. SFRM adds significant structural weight to the steel frame, requiring redesign of connections and foundations

56. A contractor is reviewing structural drawings that specify HSS6×6×¼ for diagonal bracing members. What does this designation describe?

A. A hollow structural section with a 6inch diameter round tube and ¼inch wall thickness

B. A hotrolled steel section with a 6inch deep web and ¼inch thick flanges

C. A hollow structural section that is a 6inch square tube with ¼inch wall thickness

D. A heavy structural shape with 6inch equal legs and ¼inch thickness in both legs

DOMAIN 6: WOOD (Questions 57–61)

57. A lumber grade stamp indicates "No. 2 SYP KD." What do these three designations tell the contractor about the lumber?

A. The lumber is a #2 furniture grade of synthetic pine that has been kilndried for interior trim use

B. The lumber is a #2 structural grade that cannot be used for loadbearing applications

C. The lumber is a specialty #2 grade of southern yellow pine treated with a fireretardant chemical preservative

D. The lumber is #2 structural grade, Southern Yellow Pine species, kilndried to 19% moisture content or less

58. In platform framing, the double top plate serves several important structural functions. Which of the following is a key requirement for the installation of double top plates?

A. Both top plates must be the same length with joints occurring at the same location for structural continuity

B. The joints in the first and second top plates must be offset by at least 48 inches and overlapped at corners

C. Only one top plate is required for nonloadbearing interior partition walls in all construction types

D. The top plates must be fastened to each other with structural adhesive rather than nails for seismic resistance

59. A contractor is framing a wall with precut studs for a standard 8foot ceiling height. What is the length of a standard precut stud, and why is this specific length used?

A. 92⅝ inches, which combined with three plates (one sole plate and double top plate, each 1½ inches) produces a wall height that accommodates standard 8foot drywall sheets

B. 96 inches, which is exactly 8 feet and matches the height of standard drywall panels precisely

C. 93 inches, which allows a 3inch gap at the top for electrical wiring and insulation installation

D. 90 inches, which provides a 6inch gap at the bottom for base trim and floor finish installation

60. Engineered wood Ijoists offer several advantages over solid sawn lumber joists. Which of the following is NOT an advantage of engineered wood Ijoists?

A. Ijoists can span longer distances than solid sawn joists of comparable depth and spacing

B. Ijoists have consistent dimensions without the crowning, twisting, and shrinkage of solid lumber

C. Ijoists are resistant to field damage and can be freely notched, drilled, and cut without restrictions

D. Ijoists are lighter in weight than solid sawn lumber, making them easier to handle during installation

61. The IBC requires attic ventilation to prevent moisture accumulation in enclosed roof spaces. What is the standard ventilation ratio — the ratio of net free ventilation area to attic floor area — required by the IBC?

A. 1 square foot of ventilation per 300 square feet of attic floor area as the baseline for all conditions

B. 1 square foot of ventilation per 150 square feet of attic floor area as the baseline requirement

C. 1 square foot of ventilation per 50 square feet of attic floor area for all climate zones

D. 1 square foot of ventilation per 500 square feet of attic floor area for mild climate zones only

DOMAIN 7: THERMAL AND MOISTURE PROTECTION (Questions 62–66)

62. A contractor is installing extruded polystyrene (XPS) rigid board insulation on the exterior of a belowgrade foundation wall. What is the approximate Rvalue per inch of XPS rigid board?

A. R3.0 per inch for extruded polystyrene rigid board insulation

B. R6.5 per inch for extruded polystyrene rigid board insulation

C. R8.0 per inch for extruded polystyrene rigid board insulation

D. R5.0 per inch for extruded polystyrene rigid board insulation

63. What is the fundamental difference between dampproofing and waterproofing as applied to belowgrade foundation walls?

A. Dampproofing is applied to the interior face of the foundation while waterproofing is applied to the exterior

B. Dampproofing uses cementbased materials exclusively while waterproofing uses only sheet membranes

C. Dampproofing resists capillary moisture only, while waterproofing resists hydrostatic pressure from standing water

D. Dampproofing is a temporary treatment removed after backfilling while waterproofing is permanent

64. A contractor is installing a singleply TPO membrane roofing system on a commercial building. How are the seams between adjacent TPO membrane sheets joined?

A. TPO seams are joined by hotair welding that fuses the overlapping sheets into a continuous waterproof membrane

B. TPO seams are joined with coldapplied adhesive tape pressed between the overlapping sheet edges

C. TPO seams are joined by solvent welding using a chemical agent that dissolves and bonds the membrane surfaces

D. TPO seams are joined by mechanical fastening with screws and plates at 6inch intervals along every overlap

65. The IBC requires a minimum slope on lowslope commercial roofs to ensure positive drainage and prevent ponding. What is the minimum required slope?

A. ½ inch per foot minimum slope for all lowslope commercial roof assemblies

B. ¼ inch per foot minimum slope for lowslope commercial roof assemblies

C. 1 inch per foot minimum slope for all commercial roof assemblies regardless of type

D. No minimum slope is required if the roof structure is designed for full ponding water load

66. Rooftowall flashing at a parapet must be turned up the wall face to a minimum height above the roof surface. What is the typical minimum height for this flashing termination?

A. 4 inches above the finished roof surface at all rooftowall transition points

B. 12 inches above the finished roof surface at all rooftowall transition points

C. 2 inches above the finished roof surface at all rooftowall transition points

D. 8 inches above the finished roof surface at all rooftowall transition points

DOMAIN 8: DOORS, WINDOWS, AND GLAZING (Questions 67–70)

67. A commercial building specification calls for windows with a low Ufactor and a low SHGC. In a warm climate like Alabama, which of these two performance metrics is typically more important for reducing energy costs?

A. The Ufactor is more important because heating loads dominate energy consumption in Alabama

B. Neither metric matters significantly because Alabama's mild climate requires minimal heating or cooling

C. A low SHGC is typically more important because cooling loads dominate in Alabama's warm climate

D. Both metrics are equally important in all climate zones regardless of heating or cooling dominance

68. Under the IBC, the maximum force required to open an interior door along an accessible route must not exceed a specific limit to comply with ADA accessibility requirements. What is this maximum opening force?

A. 5 pounds of force maximum to fully open an interior door along an accessible route

B. 15 pounds of force maximum to fully open an interior door along an accessible route

C. 10 pounds of force maximum to fully open an interior door along an accessible route

D. 8.5 pounds of force maximum to fully open an interior door along an accessible route

69. A contractor is installing firerated door assemblies in a 2hour fireresistancerated fire barrier enclosing an exit stairway. What is the minimum required fireprotection rating for the door assemblies in this location?

A. ¾hour (45minute) fireprotection rating for doors in 2hour exit stairway enclosures

B. 1½hour (90minute) fireprotection rating for doors in 2hour exit stairway enclosures

C. 1hour (60minute) fireprotection rating for doors in 2hour exit stairway enclosures

D. 2hour (120minute) fireprotection rating matching the full wall rating for exit stairways

70. Insulated glass units (IGUs) used in commercial windows typically consist of two or more panes of glass separated by a sealed air space. What gas is commonly used to fill the sealed space between the glass panes to improve thermal performance?

A. Argon gas, which is denser than air and reduces convective heat transfer within the sealed space

B. Nitrogen gas, which is readily available and prevents oxidation of the lowE coating surface

C. Carbon dioxide gas, which provides the highest Rvalue per inch of any available fill gas

D. Helium gas, which is the lightest noble gas and provides maximum resistance to heat conduction

DOMAIN 9: FINISHES (Questions 71–75)

71. A contractor is selecting gypsum board for use as exterior wall sheathing on a commercial building. Which type of gypsum board is specifically designed for exterior sheathing applications where moisture exposure is expected?

A. Regular ½inch gypsum board with a coat of exterior latex primer applied before installation

B. Moistureresistant (green board) gypsum board designed for humid interior environments

C. Glass mat gypsum board with fiberglass mat facing instead of paper for superior moisture resistance

D. Type X fireresistant gypsum board because its glass fiber reinforcement provides moisture protection

72. When installing gypsum board on wood stud walls, what is the correct screw penetration and spacing pattern for wall applications?

A. Screws must penetrate the stud at least 1 inch, spaced at 16 inches on center along each framing member

B. Screws must penetrate the stud at least ½ inch, spaced at 24 inches on center along each framing member

C. Screws must penetrate the stud at least 2 inches, spaced at 6 inches on center along each framing member

D. Screws must penetrate the stud at least ⅝ inch, spaced at 12 inches on center along each framing member

73. A contractor is specifying tile installation for a commercial restroom shower area. Which substrate material is required beneath the tile in this wet area to prevent moisture damage to the wall assembly?

A. Regular ½inch gypsum board with a waterproof paint coating applied before tile installation

B. Moistureresistant green board gypsum board with thinset mortar adhesive for tile application

C. Plywood sheathing with a liquidapplied waterproofing membrane and tile installed with mastic adhesive

D. Cement board or equivalent waterproof substrate with a waterproof membrane and thinset mortar

74. Paint sheen levels range from flat to highgloss. In commercial construction, which sheen level is typically specified for restroom walls and other highmoisture, hightraffic areas that require frequent cleaning?

A. Flat sheen for maximum light absorption and minimal glare in restroom environments

B. Semigloss sheen for durability, moisture resistance, and ease of cleaning in wet areas

C. Eggshell sheen because it provides the most uniform appearance on large wall surfaces

D. Highgloss sheen is required by code for all restroom and kitchen wall surfaces in commercial buildings

75. A concrete floor slab in a new commercial building passes the ASTM F2170 moisture test with acceptable results. The flooring contractor begins installing luxury vinyl tile (LVT). During installation, the flooring contractor notices that the slab surface has not been primed. Why is primer application important before installing LVT over concrete?

A. Primer improves the bond between the adhesive and the concrete surface and seals the concrete pores

B. Primer is purely cosmetic and has no structural or functional purpose in flooring installation

C. Primer is required by code as a fireretardant treatment for all resilient flooring installations

D. Primer acts as the primary moisture barrier and eliminates the need for any separate moisture testing

DOMAIN 10: MECHANICAL AND PLUMBING SYSTEMS (Questions 76–81)

76. A Variable Refrigerant Flow (VRF) HVAC system is specified for a multistory commercial office building. What is the primary advantage of a VRF system over a conventional packaged rooftop unit?

A. VRF systems require no electrical power because they operate entirely on natural gas combustion

B. VRF systems cost less to install than any other commercial HVAC system type available

C. VRF systems provide individual zone control, allowing simultaneous heating and cooling in different zones

D. VRF systems eliminate the need for any ductwork, piping, or mechanical distribution throughout the building

77. A plumbing contractor is installing a backflow prevention device at the point where the building's domestic water supply connects to the public water main. What is the purpose of this device?

A. To regulate the water pressure entering the building and prevent damage to interior plumbing fixtures

B. To prevent water from flowing backward from the building's plumbing system into the public water supply

C. To filter sediment and contaminants from the incoming municipal water before it enters the building

D. To meter the water consumption for billing purposes and provide a remote reading to the utility company

78. ASHRAE Standard 62.1 and the International Mechanical Code require minimum outdoor air ventilation rates for commercial buildings. What is the primary reason mechanical ventilation is required?

A. To pressurize the building and prevent winddriven rain from penetrating the building envelope

B. To provide makeup air for combustion equipment such as boilers, furnaces, and water heaters

C. To cool the building during summer months as a substitute for air conditioning equipment

D. To dilute indoor air pollutants and maintain acceptable indoor air quality for building occupants

79. The vent system in a building's plumbing drainage system serves two critical functions. What are these two functions?

A. Allowing air to enter behind flowing wastewater to prevent trap siphoning, and allowing sewer gases to escape through the roof

B. Providing a secondary drainage path in case the primary drain pipe becomes clogged or obstructed

C. Supplying combustion air to gasfired water heaters and distributing heated air throughout the building

D. Equalizing water pressure throughout the building and preventing water hammer in supply piping

80. A contractor is building a commercial kitchen. The fire protection engineer specifies a preaction sprinkler system for the server room adjacent to the kitchen. Why is a preaction system selected for this space instead of a standard wet pipe system?

A. Preaction systems discharge water at higher pressure than wet pipe systems for better fire suppression

B. Preaction systems use a chemical suppression agent instead of water to protect electronic equipment

C. Preaction systems require dual activation — both a detection system and a sprinkler head — virtually eliminating accidental water discharge that could damage sensitive equipment

D. Preaction systems are less expensive to install than wet pipe systems in small equipment rooms

81. A fire sprinkler system's OS&Y (outside screw and yoke) valve must be maintained in a specific position at all times during building occupancy. What position must this valve be in, and how is compliance monitored?

A. The OS&Y valve must remain halfopen to reduce water pressure and prevent pipe damage from water hammer

B. The OS&Y valve must be fully open at all times, and a supervisory tamper switch triggers an alarm if the valve position changes

C. The OS&Y valve must be closed during normal occupancy and opened only during a fire alarm activation

D. The OS&Y valve position is not monitored and may be adjusted by the building maintenance staff as needed

DOMAIN 11: ELECTRICAL SYSTEMS (Questions 82–84)

82. A contractor is reviewing the electrical drawings for a commercial building and encounters the abbreviation "EMT" in the conduit schedule. The drawings also show "MC" cable in certain locations. What is the primary difference between EMT conduit and MC cable as wiring methods?

A. EMT is a rigid pipe raceway through which individual conductors are pulled, while MC cable is a factoryassembled cable with integral metal armor

B. EMT is a flexible conduit used only for short connections to equipment, while MC cable is used for all main feeders

C. EMT is an aluminum conduit for outdoor use only, while MC cable is a coppersheathed cable for indoor use only

D. EMT and MC cable are interchangeable terms for the same wiring method used in commercial construction

83. Under the National Electrical Code, what is the primary function of the equipment grounding system in a commercial building's electrical installation?

A. To provide a path for fault currents to flow safely and cause overcurrent devices to trip, protecting against electric shock and fire

B. To reduce the building's electric bill by providing a lowerresistance return path for normal operating current

C. To protect sensitive electronic equipment from voltage fluctuations and power surges during storms

D. To provide a lightning protection system that diverts lightning strikes away from the building structure

84. A commercial building has 277/480V service for lighting and large equipment, and 120/208V circuits for receptacles and small equipment. The NEC restricts the use of standard 120V receptacles and equipment on 277V circuits. What is the primary safety reason for this restriction?

A. 277V circuits use a different wire color code that is incompatible with standard 120V plug configurations

B. Standard 120Vrated devices and equipment would be damaged or could cause shock or fire if connected to 277V

C. The NEC permits 277V receptacles only in industrial occupancies and prohibits them in all commercial spaces

D. 277V circuits cannot be protected by standard circuit breakers and require specialized overcurrent devices

DOMAIN 12: PROCUREMENT AND CONTRACTING REQUIREMENTS (Questions 85–115)

85. A project owner is considering using the CM at Risk (CMR) delivery method for a new commercial building. What is the primary advantage of CMR over traditional designbidbuild for the owner?

A. CMR eliminates the need for an architect because the construction manager provides all design services

B. CMR provides early contractor involvement during design with constructability input and a guaranteed maximum price

C. CMR is always less expensive than designbidbuild because the competitive bidding process is eliminated

D. CMR transfers all project risk to the construction manager, leaving the owner with no financial exposure

86. Under AIA A201, the contractor has an obligation to review the construction documents for errors, inconsistencies, and omissions before beginning work. If the contractor discovers an apparent error, what is the contractor's obligation?

A. The contractor may silently proceed with construction and later claim additional compensation for the error

B. The contractor must independently redesign the affected portion of the work and proceed without delay

C. The contractor has no obligation to review the documents because errors are solely the architect's responsibility

D. The contractor must promptly notify the architect and owner in writing before proceeding with the affected work

87. A contractor receives a project specification that includes both performance specifications and prescriptive specifications. What is the fundamental difference between these two specification types?

A. Performance specifications describe the required end result, while prescriptive specifications describe the exact materials and methods to be used

B. Performance specifications apply only to mechanical and electrical systems, while prescriptive specifications apply to structural and architectural work

C. Performance specifications are used exclusively in designbuild projects, while prescriptive specifications are used in designbidbuild

D. Performance specifications are nonbinding suggestions, while prescriptive specifications are mandatory contract requirements

88. Under a standard construction contract, what is the contractor's obligation when the architect issues a written interpretation of the contract documents in response to an RFI?

A. The contractor may ignore the interpretation if it disagrees and proceed with its own reading of the documents

B. The contractor must follow the interpretation but may contest it through the formal claims process if it causes additional cost

C. The contractor must comply with the interpretation and has no right to dispute it under any circumstances

D. The contractor should treat the interpretation as advisory only and seek a second opinion from an independent architect

89. A subcontractor on a commercial project files a mechanics' lien against the owner's property because the general contractor has not paid for completed work. Under most standard general contracts, which type of bond protects the owner from this situation?

A. A bid bond that guarantees the subcontractor will honor its original quote to the general contractor

B. A payment bond that guarantees the general contractor will pay subcontractors and suppliers

C. A performance bond that guarantees the general contractor will complete the project on schedule

D. A maintenance bond that guarantees the subcontractor's work for a specified warranty period

90. A contractor's bid on a public project is determined to be nonresponsive. What does "nonresponsive" mean in the context of competitive bidding?

A. The contractor's bid price is higher than all other bids submitted for the same project

B. The contractor has a poor reputation and has received negative references from previous clients

C. The contractor failed to acknowledge receipt of the project addenda before the bid deadline

D. The contractor's bid did not comply with all submission requirements specified in the instructions to bidders

91. Under AIA A201, who has the initial authority to interpret the contract documents and make decisions regarding the performance of the work?

A. The architect serves as the initial interpreter of the contract documents and judge of performance

B. The general contractor has sole authority to interpret the documents because they perform the work

C. The project owner retains exclusive authority to interpret all contract documents and resolve disputes

D. A jointly appointed thirdparty arbitrator has initial interpretive authority over all contract matters

92. A contractor is negotiating a subcontract with a mechanical contractor. The general contractor wants to ensure that the mechanical contractor carries adequate insurance and names the general contractor as an additional insured. Why is additional insured status important for the general contractor?

A. Additional insured status allows the general contractor to cancel the subcontractor's insurance policy at any time

B. Additional insured status eliminates the general contractor's need to carry its own commercial general liability policy

C. Additional insured status provides the general contractor with direct coverage under the subcontractor's CGL policy for claims arising from the subcontractor's work

D. Additional insured status transfers the subcontractor's workers' compensation obligations to the general contractor

93. A project requires the contractor to submit a performance bond and a payment bond, each in the amount of 100% of the contract price. Who issues these bonds?

A. The project owner's bank issues the bonds as a condition of the construction loan financing

B. The contractor's insurance company issues the bonds as an extension of the commercial general liability policy

C. The architect issues the bonds as part of the construction administration services provided to the owner

D. A surety company issues the bonds after evaluating the contractor's financial capacity, experience, and character

94. A contractor on a commercial project discovers that the soil conditions at the foundation level are significantly different from those described in the geotechnical report included in the bid documents. Under AIA A201, what type of claim may the contractor have?

A. A breach of warranty claim against the geotechnical engineer's professional liability insurance carrier

B. A differing site conditions claim entitling the contractor to a change order for additional cost and time

C. A force majeure claim that entitles the contractor to a time extension but not additional compensation

D. A mechanic's lien claim against the property for the full contract balance remaining unpaid

95. What is the purpose of the project schedule of values in relation to the monthly progress payment process?

A. The schedule of values provides the basis for calculating the amount due to the contractor in each monthly pay application

B. The schedule of values establishes the maximum markup the contractor may charge on change orders

C. The schedule of values determines the order in which subcontractors are paid each month

D. The schedule of values replaces the project schedule as the primary tool for monitoring construction progress

96. A contractor completes a commercial project and submits the final pay application. The owner refuses to release the remaining retainage, claiming that several punch list items have not been completed. Under standard contract provisions, what amount may the owner withhold?

A. The full remaining contract balance including all retainage regardless of the value of incomplete items

B. 200% of the estimated cost of completing all punch list work as a penalty for noncompletion

C. A reasonable amount sufficient to cover the cost of completing the incomplete punch list items

D. The owner may not withhold any retainage once the contractor has submitted the final pay application

97. Under AIA A201, liquidated damages for delay are specified in the ownercontractor agreement, not in the general conditions. What makes a liquidated damages clause enforceable?

A. Liquidated damages are enforceable only if the contractor explicitly agrees to the specific daily rate during negotiations

B. The liquidated damages amount must be a reasonable forecast of actual harm from delay, and actual damages must be difficult to calculate

C. Liquidated damages are enforceable only on public projects and cannot be included in private construction contracts

D. The liquidated damages rate must be approved by the state licensing board before inclusion in the contract

98. A contractor receives a notice to proceed (NTP) from the owner. What does this notice signify, and what obligation does it create for the contractor?

A. The NTP is an informal courtesy notice with no contractual significance or binding obligation

B. The NTP authorizes the contractor to begin submitting shop drawings but not to mobilize or begin construction work

C. The NTP grants the contractor permission to begin demolishing existing structures but not new construction

D. The NTP authorizes the contractor to begin work and typically starts the contractual clock for the project schedule

99. A contractor on a lump sum contract discovers that the project specifications contain an error that increases the cost of a significant work item. The contractor notified the architect within the required timeframe. Under standard contract provisions, what is the likely resolution?

A. A change order adjusting the contract price and/or time to account for the error in the specifications

B. The contractor must absorb the additional cost because all specification errors are the contractor's risk

C. The architect must resign from the project and the owner must hire a replacement design professional

D. The project must be rebid from the beginning with corrected specifications issued to all original bidders

100. What is a "conditional waiver on progress payment" in the context of construction lien law?

A. A document that permanently waives all of the contractor's lien rights on the project upon signing

B. A document that restricts the contractor from filing any future claims regardless of payment status

C. A document that waives lien rights for a specific payment amount, but only when that payment is actually received

D. A document that conditionally extends the contractor's lien filing deadline by 30 additional days

101. Under AIA A201, what is the contractor's obligation regarding work that is covered or concealed before the architect has had an opportunity to inspect it?

A. The contractor has no obligation because the architect should schedule inspections at their own convenience

B. The contractor must uncover the work for the architect's inspection at the contractor's expense if it was concealed without proper notification

C. The contractor may refuse to uncover the work if doing so would delay the project schedule by more than one week

D. The architect loses the right to inspect any work that has been concealed for more than 48 hours

102. A project owner wants to terminate the contractor's contract for convenience — not because the contractor has breached the contract, but because the owner has decided not to proceed with the project. Under AIA A201, is this permitted?

A. No, the owner may only terminate the contractor for cause based on a material breach of the contract

B. No, the owner must complete the project once the contract is signed or pay the full remaining contract price

C. Yes, but the owner must obtain written consent from the contractor before the termination takes effect

D. Yes, the owner may terminate for convenience, but must pay the contractor for work completed, materials ordered, and reasonable overhead and profit on unperformed work

103. A contractor submits a monthly pay application that includes costs for materials stored at the jobsite but not yet incorporated into the work. Under AIA A201, is the contractor entitled to payment for stored materials?

A. Yes, the contractor may bill for materials stored onsite if properly protected and the contract permits billing for stored materials

B. No, payment is only permitted for materials that have been fully installed and incorporated into the building

C. Only materials with a value exceeding $10,000 per item may be billed while stored onsite

D. Materials may only be billed if they are stored in a bonded warehouse offsite with proof of insurance

104. A contractor is working on a project that uses the ConsensusDocs 200 standard contract instead of AIA documents. What is the primary philosophical difference between ConsensusDocs and AIA contracts?

A. ConsensusDocs contracts prohibit the use of change orders and require all scope changes to be handled through separate supplemental contracts

B. ConsensusDocs contracts eliminate the architect's role entirely and place all design authority with the contractor

C. ConsensusDocs are designed to provide more balanced risk allocation among owner, contractor, and designer compared to AIA documents

D. ConsensusDocs are exclusively for use on public projects while AIA documents are limited to private construction

105. A contractor receives a request for proposal (RFP) from a private owner for a negotiated commercial project. How does an RFP differ from an invitation to bid (ITB)?

A. An RFP is used exclusively for projects under $50,000 while an ITB is used for larger projects

B. An RFP typically evaluates proposals on multiple criteria including qualifications and approach, while an ITB typically awards to the lowest responsive, responsible bidder

C. An RFP requires the contractor to provide design services while an ITB requires only construction pricing

D. An RFP is legally binding upon submission while an ITB allows the contractor to withdraw before award

106. Under standard construction contract provisions, what constitutes a "material breach" of contract by the contractor?

A. The contractor submits a pay application one day after the contractual deadline for monthly submissions

B. The contractor uses a substitute material of equal quality when the specified material is temporarily unavailable

C. The contractor's work is completed two days late without causing any measurable harm to the owner

D. A breach so significant that it substantially defeats the purpose of the contract, such as abandoning the project or performing fundamentally defective work

107. A contractor's estimator is preparing a bid for a commercial project. The estimator receives five subcontractor quotes for the electrical trade package. The lowest quote is $180,000, the second lowest is $215,000, and the remaining three range from $225,000 to $260,000. What risk assessment should the estimator make regarding the $180,000 quote?

A. The estimator should evaluate whether the low quote may contain scope exclusions, errors, or unrealistic pricing that could create a cost gap if the subcontractor cannot perform at that price

B. The estimator must automatically use the lowest quote because using any higher quote violates competitive bidding laws

C. The estimator should average all five quotes and use the average as the electrical cost in the bid

D. The estimator should reject the lowest quote automatically because it is more than 15% below the next lowest

108. Under AIA A201, what is the architect's role during the construction phase of a project?

A. The architect serves as the contractor's supervisor and directs all construction means, methods, and sequences

B. The architect has no involvement after issuing the construction documents and plays no role during construction

C. The architect provides construction administration services including reviewing submittals, processing pay applications, interpreting documents, and observing construction for general conformance

D. The architect serves as the owner's attorney and has the legal authority to issue binding contract amendments

109. A contractor discovers that a window specification references a product that has been discontinued by the manufacturer with no direct replacement available. What should the contractor do?

A. Select any window product available at a similar price point and install it without notification

B. Submit an RFI to the architect identifying the discontinued product and requesting direction on an acceptable substitution

C. Refuse to proceed with any work on the project until the architect issues a complete redesign of the window system

D. Contact the manufacturer directly and demand that they resume production of the discontinued product

110. What is the purpose of a prebid conference held by the owner or architect before the bid deadline?

A. To negotiate the contract price with selected bidders before bids are formally submitted

B. To allow bidders to submit their bids orally rather than in writing for faster processing

C. To announce which contractor has been preselected for the project before competitive bids are received

D. To provide bidders with an opportunity to ask questions, clarify ambiguities, and visit the project site

111. Under standard contract provisions, what is the contractor's remedy if the owner fails to make a certified progress payment within the contractually specified timeframe?

A. The contractor may stop work after providing written notice to the owner and the architect, and may be entitled to interest on the late payment

B. The contractor must continue working without interruption and pursue the unpaid amount only after project completion

C. The contractor may immediately terminate the contract and demobilize from the project without any notice

D. The contractor may reduce the quality of subsequent work proportionally to the percentage of payment that is overdue

112. A construction contract includes an "order of precedence" clause that establishes which contract documents govern when there is a conflict between them. What is the typical order of precedence from highest to lowest priority?

A. Drawings, specifications, general conditions, supplementary conditions, ownercontractor agreement

B. Supplementary conditions and modifications, ownercontractor agreement, general conditions, specifications, drawings

C. General conditions, supplementary conditions, specifications, drawings, addenda, ownercontractor agreement

D. Drawings and specifications have equal weight and the contractor may choose which governs in any conflict

113. A contractor has completed a project and the architect has issued the Certificate of Substantial Completion. The owner takes possession of the building. During the movein process, the owner's movers damage several finished wall surfaces. Who is responsible for repairing this damage?

A. The contractor is responsible because the warranty period has begun and all damage is covered by the warranty

B. The general contractor's insurance company is responsible under the builder's risk policy until final completion

C. The architect is responsible because the Certificate of Substantial Completion was issued prematurely

D. The owner is responsible because the owner assumed responsibility for the building upon taking possession at substantial completion

114. Under AIA A201, what is the significance of the architect's issuance of the final Certificate for Payment?

A. It releases the contractor from the obligation to perform any warranty repairs during the warranty period

B. It transfers ownership of the construction documents from the architect to the contractor permanently

C. It certifies that the contractor has fulfilled all contractual obligations and that the remaining balance plus retainage should be paid

D. It serves as the building's certificate of occupancy and authorizes the owner to begin using the building

115. A contractor includes a contingency amount in a GMP (Guaranteed Maximum Price) contract. What is the purpose of the contractor's contingency in a GMP contract?

A. The contingency provides a fund to cover unforeseen costs and minor scope gaps within the GMP without triggering a formal change order for each occurrence

B. The contingency is the contractor's guaranteed profit margin that cannot be reduced regardless of actual costs

C. The contingency is a reserve held by the owner to fund change orders requested by the architect during design

D. The contingency replaces the need for performance and payment bonds on GMP contracts

Practice Exam 2: Answer Key and Explanations

1. D — When conflicts exist between drawings and specifications, the more stringent requirement typically governs, and the contractor should submit a request for information (RFI) to the architect for resolution. The contractor has a duty to identify apparent conflicts rather

than silently choosing the less expensive option, which could result in noncompliant construction.

2. A — The IBC requires automatic sprinklers in Group A2 occupancies when the fire area exceeds 12,000 square feet, or when the fire area has an occupant load of 300 or more, among other triggering conditions. Restaurants and bars are classified as A2, and the 12,000 square foot threshold is one of the most commonly tested sprinkler triggers on the exam.

3. C — Type VB construction has the most limited allowable height and area. Adding a third story to a Group B building in Type VB would likely exceed the allowable height from IBC Tables 504.3 and 504.4. The contractor would need to upgrade to a more fireresistant construction type (such as Type IIIA or Type IIA) or install an automatic sprinkler system to qualify for the height increase.

4. B — The exit is the only component of the means of egress that must be separated from all other building spaces by fireresistancerated construction. Exit access (corridors, rooms) is generally not rated (with some exceptions for corridors), and exit discharge (exterior paths) does not require rated construction. The firerated enclosure of exits protects occupants during vertical travel.

5. A — IBC Section 1011.5.2 requires a minimum tread depth of 11 inches for exit stairways, measured horizontally from the leading edge of one tread to the leading edge of the next (nosing to nosing). Combined with the 7inch maximum riser height, these dimensions create a comfortable and safe stair geometry.

6. D — Elementary schools serving students through the 12th grade are classified as Group E occupancy under the IBC. The occupant load factor for classroom areas is 20 net square feet per person. Note that "net" means only the actual occupied floor space is used — corridors, mechanical rooms, and restrooms are excluded from the calculation.

7. B — IBC Section 1007.1.1 requires that two exits be separated by a distance of at least onehalf the maximum overall diagonal dimension of the building or area served in nonsprinklered buildings. In fully sprinklered buildings, this minimum separation is reduced to onethird of the diagonal. This remoteness requirement prevents a single fire from blocking both exits.

8. C — The IBC requires automatic sprinklers in Group S1 (moderatehazard storage) occupancies when the fire area exceeds 12,000 square feet. At 15,000 square feet, this building exceeds the threshold and must be sprinklered. The 12,000 square foot trigger applies to several occupancy groups including A, E, F1, M, and S1.

9. A — ICC A117.1 limits the maximum slope of an accessible ramp to 1:12 (one inch of rise for every 12 inches of horizontal run), with a maximum rise of 30 inches per ramp run before a level landing is required. Handrails are required on both sides of ramp runs with a rise greater than 6 inches. The 1:12 slope is one of the most frequently tested accessibility dimensions.

10. D — Smoke barriers in Group I2 occupancies create smoke compartments that allow patients who cannot selfevacuate to be relocated horizontally to an adjacent safe compartment on the same floor, rather than requiring difficult and timeconsuming vertical evacuation down stairways. This defendinplace strategy is fundamental to hospital fire safety.

11. B — IBC Section 1011.2 requires exit stairways to have a minimum clear width of 44 inches when serving an occupant load of 50 or more persons. Stairways serving fewer than 50 occupants may be as narrow as 36 inches. The wider dimension ensures adequate flow capacity for larger numbers of evacuating occupants.

12. C — The IBC requires an automatic sprinkler system throughout all Group R1 (hotel/motel) occupancies regardless of building size, height, or area. This is one of the few occupancies where sprinklers are mandatory without a size or area threshold. The requirement reflects the heightened life safety risk of sleeping occupants in transient lodging.

13. A — Fireresistance rating is defined as the period of time, measured in hours, that a building element maintains its structural integrity and acts as a barrier to fire passage when tested in accordance with ASTM E119. The rating is determined through standardized laboratory testing, not through field performance or theoretical calculation.

14. D — IBC Table 1106.1 requires 4 accessible parking spaces for lots with 76 to 100 total spaces. The 85space lot falls within this range. The table increments from 3 spaces (5175 total) to 4 spaces (76100 total) to 5 spaces (101150 total). At least one of every six accessible spaces must be vanaccessible.

15. B — Type VB is the least restrictive construction type under the IBC. It permits any codeapproved material for structural elements, including lightframe wood construction, and requires no fireresistance rating for any building element. Type VB is used for small commercial buildings, strip malls, and lowrise structures where the height and area fall within the permitted limits.

16. C — IBC Section 104.11 authorizes the building official to grant modifications when strict compliance with a specific code provision is impractical, provided the modification achieves the intent and purpose of the code through alternative means. The modification must provide an equivalent level of safety — not merely reduce cost or simplify construction.

17. A — IBC Section 714 requires that every penetration through a fireresistancerated assembly be protected with an approved firestop system that maintains the fireresistance rating of the assembly. Unprotected penetrations are one of the most common ways firerated assemblies fail in practice, and firestop installation is subject to special inspection.

18. D — The IBC requires a minimum accessible route width of 36 inches within buildings. However, corridors serving an occupant load of 50 or more must be at least 44 inches wide per IBC Section 1020.2. The 36inch minimum applies to accessible routes generally, while the 44inch corridor width applies to higheroccupancy egress corridors.

19. B — When a building undergoes a change of occupancy, the entire building must be brought into compliance with the accessibility requirements for the new occupancy, not just the altered portions. A change from Group S2 (parking garage) to Group B (office) represents a fundamentally different use with different accessibility needs, triggering full compliance.

20. C — The IBC limits deadend corridors to 20 feet in nonsprinklered buildings and extends this limit to 50 feet in buildings equipped with an approved automatic sprinkler system throughout. The extended limit for sprinklered buildings reflects the reduced fire risk and the additional time available for occupants to reverse direction and find an alternate path.

21. D — Under IBC Section 505, a mezzanine may occupy up to onethird of the floor area of the room in which it is located. In buildings equipped with an approved automatic sprinkler system, this limit increases to onehalf. If the mezzanine exceeds these limits, it is classified as a separate story and counts toward the building's allowable number of stories.

22. A — IBC Section 1015.2 requires guardrails at opensided walking surfaces where the elevation difference is 30 inches or more above the floor or grade below. This 30inch trigger height is measured vertically from the walking surface to the lower level and applies to balconies, mezzanines, landings, and other elevated surfaces.

23. B — IBC Section 1015.3 requires guardrails to be at least 42 inches high measured vertically from the walking surface to the top of the guardrail. The 42inch height applies to commercial buildings — residential occupancies may use 36inch guardrails. The guardrail must also withstand 200 pounds of concentrated force applied at any point.

24. B — Type IVC mass timber construction permits the mass timber structural elements to be exposed without noncombustible protection, relying on the inherent fire resistance of the large wood sections. Types IVA and IVB require noncombustible protection (such as gypsum board enclosure) over the mass timber elements, with IVA requiring the most protection.

25. C — The IBC permits a single exit from a building story only under limited conditions: the occupant load must not exceed 49 persons, the maximum travel distance must be within prescribed limits, and the building must meet specific height restrictions. These strict limitations ensure that a singleexit configuration does not compromise life safety.

DOMAIN 2: SITE CONSTRUCTION (Questions 26–40)

26. D — Soil borings should extend at least 25 feet below the proposed foundation level or to competent bearing material (bedrock or dense soil), whichever is deeper. This depth ensures that the geotechnical engineer can characterize all soil layers that will be stressed by the foundation loads and identify any weak layers that could cause settlement or failure.

27. A — Compaction testing is typically performed at a frequency of one test per every 2,000 to 5,000 square feet of fill area, or one test per lift per defined area. This frequency provides adequate statistical confidence that the entire fill area meets the specified density while remaining practical for field operations.

28. C — OSHA requires that excavation protective systems be designed by a registered professional engineer when the excavation exceeds 20 feet in depth, regardless of soil type. Below 20 feet, contractors may use the tabulated data in OSHA's appendices for sloping, shoring, or shielding. Above 20 feet, the complexity and risk demand engineering analysis.

29. B — OSHA specifies a maximum allowable slope of 1 horizontal to 1 vertical (1H:1V, or 45° from horizontal) for Type B soil excavations. This is steeper than Type C (1½:1, or 34°) but flatter than Type A (¾:1, or 53°). The slope angle reflects the intermediate strength characteristics of Type B soil.

30. D — The NPDES Construction General Permit typically requires sediment basins with a minimum storage capacity of 3,600 cubic feet per acre of drainage area for projects disturbing

10 or more acres at one time. This volume is designed to capture and detain the sedimentladen runoff from a design storm event, allowing suspended particles to settle before discharge.

31. A — The vapor barrier beneath a concrete slab on grade is typically 10mil or 15mil polyethylene sheeting placed on top of the gravel drainage layer. This barrier prevents moisture vapor from migrating upward through the slab by capillary action, which can damage floor finishes, promote mold growth, and create uncomfortable interior conditions.

32. B — Projects that are part of a larger common plan of development that will ultimately disturb one or more acres require an NPDES Construction General Permit even if the individual project disturbs less than one acre. The "common plan of development" provision prevents developers from subdividing projects to avoid the permit threshold.

33. C — When sediment accumulates to onethird the height of the silt fence, the sediment must be removed to restore the fence's filtering and storage capacity. If sediment is not removed, subsequent runoff will overtop the fence, bypassing the sediment control entirely. Removal should occur before the next anticipated rainfall event.

34. A — IBC Table 1806.2 lists a presumptive allowable bearing pressure of 3,000 pounds per square foot for sandy gravel or gravel (GW and GP classifications). These presumptive values are used when a sitespecific geotechnical investigation is not performed, though most commercial projects require a full geotechnical investigation.

35. D — Drilled shafts (caissons) are constructed by drilling a cylindrical hole into the ground, placing a reinforcing steel cage inside the hole, and filling it with concrete. Unlike driven piles, which are prefabricated and forced into the ground by impact, drilled shafts are cast in place and can be constructed through virtually any soil or rock condition.

36. B — OSHA requires that a competent person designated by the contractor inspect the excavation daily before each work shift, after every rainstorm, and after any other hazardincreasing occurrence. The competent person must have the training and authority to identify hazards and take immediate corrective action, including removing workers from the excavation.

37. C — Most asphalt paving specifications require a minimum ambient air temperature of 40°F to 50°F during hotmix asphalt placement. Placing asphalt in cold temperatures causes the material to cool too rapidly, preventing adequate compaction and resulting in a poorly bonded, permeable pavement surface that will deteriorate prematurely.

38. A — Contraction joints must be cut to a minimum depth of onequarter of the slab thickness to create a weakened plane that controls the location of shrinkage cracking. The reduced crosssection at the joint induces the crack to form at the planned location rather than randomly across the slab surface. Joints must be cut within 4 to 12 hours of placement.

39. D — Improperly compacted utility trench backfill will consolidate and settle over time under traffic loads, creating visible depressions in the pavement surface known as trench settlement. Trench settlement is one of the most common and most visible postconstruction defects, requiring pavement repair and potentially triggering warranty claims.

40. B — Pipe bedding material is typically granular (sand or fine gravel) placed and compacted to a uniform thickness of at least 4 inches beneath the pipe. The granular bedding distributes the pipe's weight and applied loads uniformly, preventing point loading on the pipe bottom that could cause cracking, ovalization, or joint separation.

DOMAIN 3: CONCRETE (Questions 41–46)

41. C — Type III portland cement is ground to a finer particle size than Type I, which accelerates the hydration process and produces higher compressive strength at early ages (3 and 7 days). Type III is used in cold weather concreting (to offset the slowing effect of low temperatures), for fasttrack construction, and when forms need to be stripped quickly.

42. D — Airentraining admixtures introduce 4% to 7% microscopic air bubbles into the concrete, dramatically improving resistance to freezethaw damage. The tiny bubbles provide space for water to expand as it freezes within the concrete pores, preventing the internal pressure buildup that causes scaling and spalling. Air entrainment is required for all exterior concrete exposed to freezing.

43. A — Adding water to concrete at the jobsite increases the watercement ratio, which is the single most important factor controlling concrete strength. Higher watercement ratios produce weaker, more porous, less durable concrete. The strength loss is permanent and cannot be recovered through extended curing or any other postplacement treatment.

44. B — ACI 301 requires a minimum curing period of 7 days for concrete using Type I portland cement when cured with water or moistureretaining coverings. For Type III (high early strength) cement, the minimum is 3 days. Inadequate curing can result in the loss of 40% or more of the concrete's potential strength.

45. D — Concrete should not be dropped more than 5 feet in free fall without using a tremie, chute, or pump to control its descent. Excessive freefall causes segregation — the heavier coarse aggregate separates from the lighter cement paste, producing weak, honeycombed concrete at the bottom of the placement and excess paste at the top.

46. C — The internal vibrator should penetrate at least 6 inches into the preceding lift to knit the two layers together and prevent cold joints. This overlap ensures that the boundary between lifts is thoroughly consolidated and that no plane of weakness exists where the layers meet. The vibrator should be withdrawn slowly to allow the hole to close.

DOMAIN 4: MASONRY (Questions 47–50)

47. C — Control joints in CMU walls are typically spaced at 20 to 25 feet on center, with many specifications limiting the spacing to 1.5 to 3 times the wall height. Control joints are intentional planes of weakness that accommodate shrinkage, thermal movement, and structural movement, concentrating any cracking at predetermined locations rather than allowing random cracks.

48. A — In lowlift grouting, the maximum grout pour height per lift is typically 5 feet for fine grout. Each lift must be consolidated by puddling or vibration before the next lift is placed.

When pour heights exceed 5 feet, cleanout openings at the base of the cells are required to allow inspection and removal of debris before grouting.

49. D — Fine grout (containing only cement, sand, and water without coarse aggregate) is used when the grout space is small — typically cells or cavities less than 2 inches in the smallest dimension. Fine grout flows more easily into narrow spaces than coarse grout. Coarse grout is used when the grout space is 2 inches or greater.

50. B — The minimum bearing length for a masonry lintel is typically 8 inches (one block module) on each side of the opening. This bearing length ensures that the lintel load is adequately transferred to the supporting masonry without crushing the masonry units at the bearing points. Steel lintels typically require a minimum of 4 inches.

DOMAIN 5: METALS (Questions 51–56)

51. A — ASTM A36 steel has a minimum yield strength of 36,000 psi (36 ksi). A36 was historically the most common structural steel grade and remains standard for plates, angles, channels, and connection material. It has been largely replaced by A992 (50 ksi) for wide flange beams and columns due to the higher strengthtoweight efficiency.

52. C — The modulus of elasticity for all grades of structural steel is approximately 29,000 ksi (29 million psi). Unlike yield strength, which varies by grade (36 ksi for A36, 50 ksi for A992), the modulus of elasticity is essentially constant across all structural steel grades because it is a fundamental material property of steel's crystalline structure.

53. B — Fillet welds are specified by their leg size — the dimension measured along each of the two surfaces being joined at a right angle. Common fillet weld leg sizes in structural work are 3/16 inch, ¼ inch, 5/16 inch, and ⅜ inch. The throat thickness (the effective loadcarrying dimension) is calculated as 0.707 times the leg size.

54. D — Openweb steel joists that are not braced with bridging can undergo lateraltorsional buckling — rolling sideways — under their own selfweight, collapsing without warning. SJI and OSHA require that the first row of bridging be installed and anchored before the joist is released from the crane. Multiple fatalities have resulted from violations of this requirement.

55. A — SFRM is a lightweight, fragile material that can be damaged by impact, abrasion, and water exposure from other trades working in the same area after installation. The general contractor must coordinate the sequencing of work to minimize damage and must ensure that damaged areas are repaired to restore the full specified thickness before concealment.

56. C — HSS6×6×¼ designates a hollow structural section that is a 6inch square tube with a ¼inch wall thickness. HSS shapes are available in round, square, and rectangular crosssections. Square and rectangular HSS shapes are designated by their outer dimensions and wall thickness. Round HSS shapes include the outer diameter in the designation.

DOMAIN 6: WOOD (Questions 57–61)

57. D — The grade stamp "No. 2 SYP KD" indicates: No. 2 = the structural grade (the most commonly specified grade for general structural framing); SYP = Southern Yellow Pine (the

dominant softwood species in the southeastern United States); KD = Kiln Dried (moisture content of 19% or less at the time of grading).

58. B — The joints in the first and second top plates must be offset by at least 48 inches, and the top plates must overlap at corners and intersecting walls to lock the wall sections together structurally. This offset prevents a continuous joint across both plates at the same location, which would create a structural weakness at that point.

59. A — A standard precut stud is 92⅝ inches long. When combined with one sole plate (1½ inches) and a double top plate (3 inches total), the wall height is 92⅝ + 1½ + 3 = 97⅛ inches. This accommodates a standard 96inch (8foot) drywall sheet with a small gap at the bottom, allowing the drywall to be installed tight to the ceiling.

60. C — Ijoists are NOT resistant to field damage and cannot be freely modified. The thin OSB web is vulnerable to impact damage, and unauthorized cuts, notches, or holes in the flanges or web can cause the joist to fail. All penetrations must comply with the manufacturer's guidelines. This characteristic is a disadvantage compared to solid lumber, which is more tolerant of field modifications.

61. B — The IBC requires a baseline ventilation ratio of 1 square foot of net free ventilation area per 150 square feet of attic floor area (1:150). This ratio may be reduced to 1:300 if a vapor retarder is installed on the warm side of the ceiling or if the ventilation is balanced between upper (ridge) and lower (eave) openings.

DOMAIN 7: THERMAL AND MOISTURE PROTECTION (Questions 62–66)

62. D — Extruded polystyrene (XPS) rigid board insulation has an Rvalue of approximately R5.0 per inch. XPS is commonly used for belowgrade foundation insulation because of its excellent moisture resistance and consistent Rvalue in wet conditions. It is typically identified by its distinctive color — blue (Dow), pink (Owens Corning), or green (Kingspan).

63. C — Dampproofing resists only capillary moisture — moisture that migrates through concrete or masonry by capillary action from contact with damp soil. Waterproofing is designed to resist hydrostatic pressure — the pressure exerted by standing water against the foundation. When the water table is at or above the foundation level, waterproofing is required.

64. A — TPO (thermoplastic polyolefin) membrane seams are joined by hotair welding, in which a machine directs a stream of hot air between the overlapping membrane sheets, melting the surfaces and fusing them together as the sheets pass through pressure rollers. The resulting weld is as strong as or stronger than the membrane itself.

65. B — The IBC requires a minimum roof slope of ¼ inch per foot for lowslope commercial roof assemblies to ensure positive drainage and prevent ponding water. Ponding water adds significant weight to the roof structure and accelerates membrane deterioration. Areas of ponding indicate inadequate drainage that must be corrected.

66. D — Rooftowall flashing must be turned up at least 8 inches above the finished roof surface at all parapet and wall transitions. This minimum height prevents water from backing up behind the flashing during heavy rainfall or snow accumulation and infiltrating the wall assembly above the roof line.

DOMAIN 8: DOORS, WINDOWS, AND GLAZING (Questions 67–70)

67. C — In Alabama's warm climate (IECC Climate Zones 3 and 4), the Solar Heat Gain Coefficient (SHGC) is typically more important than the Ufactor for reducing energy costs because cooling loads dominate heating loads for most of the year. A low SHGC blocks solar heat from entering through the windows, directly reducing the air conditioning demand.

68. A — ADA and IBC accessibility standards require that the force needed to fully open an interior door along an accessible route not exceed 5 pounds. This limit ensures that individuals with limited upperbody strength, including wheelchair users, can operate doors independently. Door closers must be adjusted to comply with this maximum force.

69. B — Doors in 2hour fireresistancerated exit stairway enclosures require a minimum 1½hour (90minute) fireprotection rating. The general principle is that the door rating is threequarters of the wall rating: ¾ × 2 hours = 1½ hours. This maintains the integrity of the exit enclosure for a period proportional to the wall's rated resistance.

70. A — Argon gas is the most commonly used fill gas in insulated glass units. Argon is denser than air and has lower thermal conductivity, which reduces convective heat transfer within the sealed space between the glass panes. Argon is inexpensive, nontoxic, and widely available, making it the standard choice for improving IGU thermal performance.

DOMAIN 9: FINISHES (Questions 71–75)

71. C — Glass mat gypsum board uses fiberglass mat facing instead of paper, providing superior moisture and mold resistance compared to paperfaced products. It is specifically designed for exterior sheathing and other applications where moisture exposure is expected. Regular gypsum board and moistureresistant green board are not suitable for exterior sheathing.

72. D — Gypsum board screws for wall applications should penetrate the stud at least ⅝ inch beyond the back face of the board and be spaced at 12 inches on center along each framing member. Screws must be driven so the head is slightly recessed below the paper surface without breaking through — overdriven screws lose their holding capacity.

73. D — Cement board or an equivalent waterproof substrate is required beneath tile in wet areas such as shower surrounds. A waterproof membrane (liquidapplied or sheet) is installed over the cement board before tile installation. Regular gypsum board and moistureresistant green board are not acceptable substrates in areas of direct water exposure.

74. B — Semigloss paint is typically specified for restroom walls, kitchen areas, and other highmoisture, hightraffic spaces in commercial buildings. Semigloss finishes are more durable, more moistureresistant, and easier to clean than flat or eggshell finishes, making them ideal for environments that require frequent wiping and sanitizing.

75. A — Primer improves the bond between the flooring adhesive and the concrete surface by sealing the concrete pores and creating a uniform, nonporous surface for the adhesive to grip. Without primer, the adhesive may be absorbed unevenly into the concrete, resulting in poor bond strength and potential flooring failure.

DOMAIN 10: MECHANICAL AND PLUMBING SYSTEMS (Questions 76–81)

76. C — VRF systems provide individual zone control through multiple indoor units connected to a single outdoor condensing unit via refrigerant piping. Heat recovery VRF systems can simultaneously heat one zone while cooling another, transferring rejected heat between zones for high efficiency. This individual zone capability is the primary advantage over centralized RTU systems.

77. B — A backflow preventer prevents water from flowing backward from the building's plumbing system into the public water supply. Backflow can occur when pressure in the building system exceeds the supply pressure (backpressure) or when the supply pressure drops below atmospheric pressure (backsiphonage), potentially contaminating the public water system.

78. D — The primary purpose of mechanical ventilation is to dilute indoor air pollutants — carbon dioxide from occupant respiration, volatile organic compounds from building materials and furnishings, and other contaminants — and maintain acceptable indoor air quality. ASHRAE Standard 62.1 establishes minimum outdoor air ventilation rates based on occupancy type and density.

79. A — The plumbing vent system serves two critical functions: allowing air to enter the drainage system behind flowing wastewater to prevent negative pressure from siphoning water out of fixture traps, and providing an escape path for sewer gases to vent harmlessly through the roof rather than building up pressure and entering the occupied space.

80. C — Preaction sprinkler systems require two independent events before water is discharged: activation of an electronic detection system (smoke or heat detector) and activation of a sprinkler head's heatsensitive element. This dualactivation requirement virtually eliminates accidental water discharge, making preaction systems ideal for spaces with sensitive equipment.

81. B — The OS&Y (outside screw and yoke) control valve must be maintained in the fully open position at all times to ensure uninterrupted water supply to the sprinkler system. A supervisory tamper switch monitors the valve position and triggers an alarm at the fire alarm control panel if the valve is moved from the fully open position, alerting building management to the disruption.

DOMAIN 11: ELECTRICAL SYSTEMS (Questions 82–84)

82. A — EMT is a rigid pipe raceway (conduit) through which individual insulated conductors are pulled after the conduit is installed. MC cable is a factoryassembled cable with insulated conductors already enclosed within an interlocking metal armor sheath. EMT requires separate conductor installation; MC cable arrives ready to install with conductors already in place.

83. A — The equipment grounding system provides a lowimpedance path for fault currents to flow from the point of the fault back to the source, causing the overcurrent protective device (circuit breaker or fuse) to trip and disconnect the faulted circuit. Without proper grounding, a ground fault could energize equipment enclosures and create an electrocution hazard.

84. B — Standard 120Vrated devices, appliances, and equipment are designed and tested for safe operation at 120 volts. Connecting them to 277V — more than double the rated voltage — would damage the equipment, create a fire hazard from overheated components, and pose a severe electrocution risk. Different receptacle configurations prevent accidental crossconnection.

DOMAIN 12: PROCUREMENT AND CONTRACTING REQUIREMENTS (Questions 85–115)

85. B — CM at Risk provides early contractor involvement during the design phase, bringing constructability advice, cost estimating, and scheduling expertise to the design process while the design is still being developed. The CMR then provides a guaranteed maximum price (GMP) for the construction, giving the owner both collaborative input and price certainty.

86. D — AIA A201 Section 3.2 requires the contractor to carefully study and compare the contract documents, report any errors or inconsistencies to the architect and owner in writing, and request interpretation before proceeding. Silently proceeding despite a known error may constitute a breach of the contractor's duty to review the documents.

87. A — Performance specifications describe the required outcome (what the finished product must achieve in terms of performance criteria) while prescriptive specifications describe the exact materials, products, and installation methods to be used. Performance specs give the contractor more flexibility; prescriptive specs give the designer more control.

88. B — The contractor must follow the architect's written interpretation and proceed with the work accordingly. However, if the contractor believes the interpretation causes additional cost or time, the contractor may submit a claim through the formal claims process outlined in AIA A201. Compliance with the interpretation is required while the claim is being resolved.

89. B — A payment bond guarantees that the general contractor will pay all subcontractors, suppliers, and laborers on the project. When the general contractor fails to pay a subcontractor, the subcontractor can make a claim against the payment bond rather than filing a mechanics' lien against the owner's property, protecting the owner from liens.

90. D — A nonresponsive bid is one that does not comply with all submission requirements specified in the instructions to bidders — such as failing to acknowledge addenda, omitting required bid security, using an unauthorized bid form, or failing to include required subcontractor listings. Nonresponsiveness relates to form and procedure, not to price or qualifications.

91. A — Under AIA A201, the architect serves as the initial interpreter of the contract documents and the initial judge of the contractor's performance. This authority includes interpreting ambiguous provisions, deciding disputes about conformance of the work to the documents, and issuing initial decisions on claims. Either party may challenge the architect's decisions through the dispute resolution process.

92. C — Additional insured status provides the general contractor with direct coverage under the subcontractor's CGL policy for claims arising from the subcontractor's work. If a third party is injured by the subcontractor's operations, the general contractor can access the

subcontractor's insurance for defense and indemnification rather than relying solely on its own policy.

93. D — Surety bonds are issued by surety companies — specialized financial institutions that evaluate the contractor's financial capacity, experience, work history, and character before agreeing to guarantee the contractor's performance and payment obligations. The surety's willingness to bond a contractor is itself a statement of confidence in the contractor's ability.

94. B — A differing site conditions claim arises when the actual conditions encountered during construction differ materially from those represented in the contract documents (Type I) or from those ordinarily anticipated for the type of work (Type II). Under AIA A201, the contractor may be entitled to a change order for additional cost and time.

95. A — The schedule of values breaks down the total contract price into individual line items, and each monthly pay application calculates the percentage of work completed for each line item. The total amount billed equals the sum of all line item percentages multiplied by their respective values, less retainage and previous payments.

96. C — After substantial completion, the owner may withhold a reasonable amount sufficient to cover the cost of completing the remaining punch list items. The withheld amount should be proportional to the actual cost of the incomplete work — typically 150% to 200% of the estimated completion cost — not the entire contract balance.

97. B — A liquidated damages clause is enforceable when two conditions are met: the specified daily amount must be a reasonable forecast of the actual harm likely to result from delay, and the actual damages from delay must be difficult to calculate at the time the contract is formed. If the amount is unreasonably large and serves as a penalty, courts may refuse to enforce it.

98. D — The notice to proceed (NTP) is the formal authorization from the owner directing the contractor to begin work. The NTP typically establishes the official start date of the contract time, triggering the contractual schedule and beginning the countdown toward the required completion date. All contractual deadlines run from the NTP date.

99. A — When the contract documents contain a specification error that increases the cost of the work, and the contractor provides timely notice, the standard resolution is a change order adjusting the contract price and/or time. Specification errors are the design professional's responsibility, not the contractor's, and the owner bears the financial risk of design errors through the change order process.

100. C — A conditional waiver on progress payment waives the claimant's lien rights for a specific payment amount, but the waiver becomes effective only when the payment is actually received. If the payment check bounces or the payment is never made, the conditional waiver is void and the claimant's lien rights remain intact. This protects the claimant from waiving rights without receiving value.

101. B — Under AIA A201, if the contractor conceals or covers work before the architect has had the opportunity to inspect it, and the architect has not specifically waived the right to inspect, the contractor must uncover the work at the contractor's own expense. This provision incentivizes the contractor to request inspections at the appropriate time before concealing work.

102. D — AIA A201 permits the owner to terminate the contractor's contract for convenience at any time, even without cause. However, the owner must compensate the contractor for all work completed, costs incurred, materials ordered and delivered, and a reasonable amount for overhead and profit on the unperformed portion of the work.

103. A — AIA A201 permits the contractor to include the value of materials stored onsite in the pay application, provided the materials are properly stored, protected from damage and theft, and the contract permits billing for stored materials. The architect must verify that the materials are onsite and adequately protected before certifying payment.

104. C — ConsensusDocs were developed collaboratively by associations representing all major parties in the construction process — owners, contractors, subcontractors, designers, and sureties. This multistakeholder development process is intended to produce contracts with more balanced risk allocation compared to AIA documents, which are developed primarily by the architects' professional organization.

105. B — A request for proposal (RFP) typically evaluates proposals on multiple criteria including the contractor's qualifications, experience, technical approach, project team, schedule, and price. An invitation to bid (ITB) typically evaluates bids primarily on price, with award going to the lowest responsive, responsible bidder. RFPs support bestvalue selection.

106. D — A material breach is one so significant that it substantially defeats the purpose of the contract, such as abandoning the project, performing fundamentally defective work that must be demolished, or refusing to perform contractual obligations. Minor issues like a late pay application or a temporary material substitution of equal quality are not material breaches.

107. A — A quote that is significantly lower than all competing quotes should be scrutinized for scope exclusions, mathematical errors, or unrealistic pricing. If the low subcontractor cannot perform at the quoted price, the general contractor bears the risk — the prime contract price is fixed, and the owner will not pay more because the contractor's subcontractor underestimated.

108. C — During construction, the architect provides construction administration services including reviewing and processing submittals (shop drawings, product data, samples), processing monthly pay applications and issuing certificates for payment, interpreting the contract documents, observing construction for general conformance, and issuing supplemental instructions.

109. B — When a specified product is discontinued, the contractor should submit an RFI to the architect identifying the problem and requesting direction on an acceptable substitution. The architect will evaluate alternatives and issue a response, which may include a formal substitution approval and a change order if the substitute product differs in cost.

110. D — A prebid conference provides bidders with an opportunity to ask questions about the project, clarify ambiguities in the bid documents, visit the project site (for renovation or addition projects), and receive information that supplements the written documents. Questions and answers from the prebid conference are typically documented in a written addendum.

111. A — Under AIA A201 Section 9.7, if the owner fails to make payment within the contractually specified timeframe, the contractor may, upon 7 days' written notice to the owner

and architect, stop work until payment is received. The contractor may also be entitled to interest on the late payment at the rate specified in the contract or by applicable law.

112. B — The typical order of precedence from highest to lowest priority is: supplementary conditions and modifications (which specifically override the general conditions), the ownercontractor agreement, the general conditions, the specifications, and the drawings. This hierarchy ensures that projectspecific modifications take precedence over standard form language.

113. D — Upon substantial completion, the owner takes possession of the building and assumes responsibility for maintenance, utilities, security, and insurance. Damage caused by the owner or the owner's agents (including movers) after the owner takes possession is the owner's responsibility, not the contractor's. The contractor's warranty covers defects in workmanship, not ownercaused damage.

114. C — The architect's final Certificate for Payment certifies that the contractor has fulfilled all obligations under the contract — all work is complete, all punch list items are corrected, all closeout documentation has been submitted, and the remaining contract balance (including all retainage) should be paid to the contractor. It is the final administrative act in the payment process.

115. A — The contractor's contingency in a GMP contract is a fund set aside within the GMP to cover unforeseen costs, minor scope gaps, estimating variances, and other unplanned expenses that arise during construction. The contingency allows the contractor to address these issues without exceeding the GMP or processing a formal change