GERTC Master of Science in Sanitary Engineering (MSTC) Practice Exam (Sample)

Study Guide

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Questions

1. A formal request for alteration made by the contractor is known as what?

A. Change Order

B. Supplement

C. Weather claim

D. Service order

2. What is lagging in construction?

A. Temporary supports for foundations

B. Sheeting placed horizontally in excavation

C. A type of reinforced concrete

D. Material used for caisson construction

3. What term describes the detailed characteristics of equipment or structural elements prepared by a contractor or supplier?

A. Shop drawings

B. Construction logs

C. Blueprints

D. Specifications

4. Which of the following represents storage cost?

A. Insurance and liability costs

B. Rent, maintenance for storage, and wages for guards

C. Costs related to oil and hydraulic fluids

D. Overall depreciation of equipment

5. What is the main purpose of using admixtures in concrete?

A. To solely reduce costs

B. To alter properties for improved performance

C. To increase the water content

D. To mix different types of aggregates

6. What is the purpose of the Special Conditions in a construction contract?

A. To define the overall project scope

B. To outline general expectations

C. To detail additional provisions for specific projects

D. To provide standard legal terms

7. What is the typical weight of normal-weight concrete?

A. 100 to 120 lb/cu ft

B. 140 to 160 lb/cu ft

C. 180 to 200 lb/cu ft

D. 200 to 220 lb/cu ft

8. How do pozzolans contribute to concrete mixtures?

A. By changing the aggregate size

B. By enhancing strength and reducing heat generation

C. By solely improving color

D. By acting as a lightweight substitute for aggregates

9. Cost estimating in a construction project involves what key aspect?

A. Measurement of insurance and tax costs

B. Estimating the total cost to execute project plans

C. Balancing projected income with expenses

D. Summing repair and maintenance costs

10. What is typically specified alongside 'time is of the essence' in a construction contract?

A. Payment terms

B. Contract Time

C. Change order process

D. Safety regulations

Answers

1. A
2. B
3. A
4. B
5. B
6. C
7. B
8. B
9. B
10. B

Explanations

1. A formal request for alteration made by the contractor is known as what?

A. Change Order

B. Supplement

C. Weather claim

D. Service order

A formal request for alteration made by the contractor is known as a Change Order. This is a crucial aspect of contract management in construction and engineering projects. A Change Order is a written document that specifies changes to the original construction plans or scope of work agreed upon in a contract. This can encompass modifications in the design, adjustments to the project schedule, or changes in material or labor. The necessity for a Change Order arises when unforeseen circumstances emerge, or when a client requests additional work that was not included in the original contract. These changes must be documented properly through a Change Order to ensure that all parties agree to the new terms and that the adjustments are reflected in project timelines and budgets. The other terms provided refer to different aspects of project management or contract modifications but do not specifically denote a formal request for alteration. A supplement may refer to additional documentation or information, a weather claim usually pertains to delays or extra costs caused by inclement weather, and a service order typically relates to requests for services rather than changes in construction contracts. Hence, Change Order is the precise terminology used to denote formal modifications to the contract.

2. What is lagging in construction?

A. Temporary supports for foundations

B. Sheeting placed horizontally in excavation

C. A type of reinforced concrete

D. Material used for caisson construction

Lagging in construction refers to the sheet material that is placed horizontally within excavations, primarily to provide support and stability. This material is typically used in conjunction with vertical supports or sheeting to prevent soil movement and collapsing of the excavation walls. This technique is crucial in deep excavations to maintain safety and ensure that workers can operate securely without the risk of soil cave-ins. The use of lagging is mostly associated with trenching and shoring operations where it serves as a crucial component in managing earth pressures and protecting the work environment. It is essential for ensuring that the walls remain intact, especially in unstable soil conditions. In contrast, temporary supports for foundations play a different role by providing immediate structural stability during the construction phase, and materials used for caisson construction are specific to deep foundation work. Reinforced concrete, while related to construction, describes a material rather than a technique for managing excavation stability. Thus, the choice indicating sheeting placed horizontally in excavation aligns most accurately with the definition of lagging.

3. What term describes the detailed characteristics of equipment or structural elements prepared by a contractor or supplier?

A. Shop drawings

B. Construction logs

C. Blueprints

D. Specifications

The term that describes the detailed characteristics of equipment or structural elements prepared by a contractor or supplier is known as shop drawings. These drawings serve as a crucial coordination tool in construction projects, providing specifics on the dimensions, materials, and assembly of components. They are derived from the main design blueprints and are tailored to clarify how particular elements will be manufactured and installed. Shop drawings encompass vital information necessary for the construction team to ensure that all components fit together as intended and meets project requirements. They often go through a review and approval process by the project architect or engineer before fabrication or installation begins. This process is essential to avoid discrepancies and ensure that the final product aligns with the project's design intent. Other options do not accurately describe the detailed characteristics of equipment or structural elements in the same context. Construction logs refer to records of progress and events on a construction site, blueprints typically represent overall project designs, and specifications outline the scope, materials, and quality of work but do not provide the same level of detail as shop drawings regarding specific items.

4. Which of the following represents storage cost?

A. Insurance and liability costs

B. Rent, maintenance for storage, and wages for guards

C. Costs related to oil and hydraulic fluids

D. Overall depreciation of equipment

The selection of rent, maintenance for storage, and wages for guards as the representation of storage cost is appropriate because storage costs typically encompass all expenses associated with holding and safeguarding inventory or materials. Rent refers to the cost of the physical space used for storage, while maintenance includes any expenditures required to keep that space functional, such as repairs, utilities, and upkeep. Wages for guards represent the costs incurred to ensure the security and safety of the stored items, which is particularly important for preventing theft or damage. Collectively, these elements are fundamental to calculating the total costs associated with the storage of goods or materials in a sanitary engineering context, where the protection and proper management of stored materials can impact operational efficiency and safety.

5. What is the main purpose of using admixtures in concrete?

A. To solely reduce costs

B. To alter properties for improved performance

C. To increase the water content

D. To mix different types of aggregates

The main purpose of using admixtures in concrete is to alter properties for improved performance. Admixtures are formulations added to concrete to enhance specific characteristics, such as workability, durability, strength, and setting time. By tailoring these properties, engineers and builders can ensure that the concrete meets the demands of various environmental conditions and structural requirements. For example, if a project requires concrete that sets quickly for rapid construction, a setting accelerator can be added. Alternatively, if durability in harsh weather conditions is necessary, a proper admixture can be used to enhance resistance to freeze-thaw cycles. These adjustments contribute significantly to the overall performance and longevity of concrete structures. This contrasts with the idea of solely reducing costs, which is not the primary focus of admixtures. While cost considerations may be relevant, the main intent is to improve concrete performance. Similarly, increasing water content and mixing different types of aggregates do not encompass the full range of functionalities that admixtures provide, as these adjustments could actually risk compromising the quality and structural integrity of the concrete if not managed correctly.

6. What is the purpose of the Special Conditions in a construction contract?

A. To define the overall project scope

B. To outline general expectations

C. To detail additional provisions for specific projects

D. To provide standard legal terms

The purpose of the Special Conditions in a construction contract is to detail additional provisions that cater specifically to the unique requirements of a particular project. These conditions supplement the general contract terms and may address project-specific issues such as special site conditions, unique materials to be used, specific protocols that need to be followed, or local regulations that must be adhered to. By incorporating these tailored clauses, the contract ensures that both the owner and the contractor understand and agree on the unique aspects that might not be covered by the standard terms of the contract. This specificity helps avoid misunderstandings and establishes clear responsibilities and expectations, enabling smoother project execution. In contrast, the other choices relate to broader aspects of construction contracts: defining overall project scope encompasses the entirety of the work to be performed, outlining general expectations sets a foundational understanding without the specifics that Special Conditions provide, and supplying standard legal terms establishes a baseline for legality but doesn't delve into the unique elements pertinent to a specific project.

7. What is the typical weight of normal-weight concrete?

A. 100 to 120 lb/cu ft

B. 140 to 160 lb/cu ft

C. 180 to 200 lb/cu ft

D. 200 to 220 lb/cu ft

Normal-weight concrete typically has a density that falls within the range of 140 to 160 pounds per cubic foot. This range is considered standard for most construction applications and is primarily composed of aggregates like sand and gravel, along with cement and water. This density provides a balance between strength and weight, making it suitable for a wide variety of structural applications, including buildings, bridges, and pavements. Understanding this specific weight range is crucial for engineers and architects as it impacts the design and structural integrity of concrete components. Higher or lower density variants of concrete exist, such as lightweight concrete or heavyweight concrete, but normal-weight concrete is the most commonly used in general construction practice.

8. How do pozzolans contribute to concrete mixtures?

A. By changing the aggregate size

B. By enhancing strength and reducing heat generation

C. By solely improving color

D. By acting as a lightweight substitute for aggregates

Pozzolans significantly enhance concrete mixtures by contributing to their strength and reducing heat generation during the curing process. When pozzolans, which are siliceous or siliceous and aluminous materials, are added to concrete, they react with the calcium hydroxide produced from the hydration of cement. This chemical reaction, known as pozzolanic activity, results in additional calcium silicate hydrate, the primary binding agent responsible for the concrete's strength. Additionally, using pozzolans can lower the heat of hydration, especially in larger concrete pours. This reduction in heat generation is crucial in preventing thermal cracking, which can occur when parts of the concrete cool and shrink at different rates. By improving the durability and long-term performance of concrete, pozzolans play a vital role in creating more sustainable and robust structures. In contrast, other options do not accurately reflect the role of pozzolans. While changing the aggregate size does affect concrete's properties, pozzolans do not directly impact the size of aggregates. Improving color is not a primary function of pozzolans; their main benefits lie in strength and performance rather than aesthetic properties. As for being a lightweight substitute for aggregates, pozzolans do not serve this purpose

9. Cost estimating in a construction project involves what key aspect?

A. Measurement of insurance and tax costs

B. Estimating the total cost to execute project plans

C. Balancing projected income with expenses

D. Summing repair and maintenance costs

Cost estimating in a construction project primarily focuses on developing a comprehensive understanding of the financial resources required to execute the project plans effectively. This involves calculating all relevant costs associated with materials, labor, equipment, overhead, contingencies, and any other expenses that may arise during the project's lifecycle. The goal is to provide a detailed overview of expected financial outlays, thus enabling project managers and stakeholders to make informed decisions, allocate budgets, and plan for financial resources necessary to complete the project. Estimating the total cost encompasses analyzing the project's scope, understanding various construction methodologies, and applying historical data and market trends. It ensures that all foreseeable expenses are included, facilitating accurate budget formulation and effective financial management throughout the project's execution.

10. What is typically specified alongside 'time is of the essence' in a construction contract?

A. Payment terms

B. Contract Time

C. Change order process

D. Safety regulations

In construction contracts, the phrase "time is of the essence" signifies that the completion of the project within the specified time frame is a critical obligation. This is particularly important because delays can lead to significant repercussions, including financial losses and contractual disputes. When this phrase is included in a contract, it is typically accompanied by the specification of "Contract Time." This refers to the precise duration allotted for completing the project, outlining both the start and completion dates. By clearly defining the contract time, the agreement enforces the notion that adhering to the schedule is paramount. It establishes expectations for all parties involved, ensuring that they prioritize timely performance to fulfill their contractual obligations. The other options do play important roles in construction contracts, but they do not directly connect with the concept of "time is of the essence." Payment terms establish the financial arrangements, the change order process outlines how modifications to the contract are managed, and safety regulations dictate compliance with safety protocols. While all these aspects are crucial for the overall success and legality of a project, they do not inherently emphasize the importance of timing as distinctly as the specification of contract time does in conjunction with the phrase "time is of the essence."