12N TAMMS – Earthworks/Surveying Practice Exam (Sample)

Study Guide

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Questions

1. Which roller type is designed to compact layers of soil from 3 to 12 inches?

- **A. Sheep foot roller**
- **B. Steel-wheel roller**
- **C. Vibratory roller**
- **D. Smooth Drum Roller**

2. What is the function of grade stakes in surveying?

- **A. To show elevation levels**
- **B. To indicate how much cut or fill is required**
- **C. To mark the boundaries of a property**
- **D. To set the alignment for the construction**

3. What type of soil passes the No. 40 sieve and is retained on the No. 200 sieve?

- **A. Clay**
- **B. Fine sand**
- **C. Coarse gravel**
- **D. Organic soil**

4. What is meant by consolidation in relation to soil?

- **A. The process of soil erosion caused by water**
- **B. The process of decreasing soil volume due to applied pressure**
- **C. The method of mixing soil for construction**
- **D. The increase in soil moisture content over time**

5. What role do "earth retaining structures" play in construction?

- **A. They are designed to improve aesthetics**
- **B. They provide a means of water drainage**
- **C. They prevent soil or rock movement around structures**
- **D. They serve as foundations for buildings**

6. Which type of ditch is typically used for unpaved roads?

A. Flat bottom ditch

B. V ditch

C. Circular ditch

D. Channel ditch

7. How is a soil characterized if most of its particles are of similar size?

A. Well graded

B. Uniformly graded

C. Gap graded

D. Coarse graded

8. What classification of surveying implements would include tools such as hand levels and dumpy levels?

A. Optical instruments

B. Leveling instruments

C. Measurement tools

D. Control devices

9. Which of the following instruments allows for direct sighting and leveling across greater distances than a hand level?

A. Clinometer

B. Dumpy level

C. Abney level

D. Jacobs staff

10. Which tool is commonly referred to as a Jacob's staff in surveying?

A. Leveling rod

B. Measuring tape

C. Vertical interval tool

D. Reference staff

Answers

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

Explanations

1. Which roller type is designed to compact layers of soil from 3 to 12 inches?

A. Sheep foot roller

B. Steel-wheel roller

C. Vibratory roller

D. Smooth Drum Roller

The steel-wheel roller is particularly well-suited for compacting layers of soil between 3 to 12 inches in thickness. This type of roller typically has heavy steel drums that can effectively exert significant pressure on the soil surface, allowing for enhanced compaction. It is commonly used in earthwork projects, particularly where a high-density finish is required for the surface to support subsequent construction activities. The operation of a steel-wheel roller involves applying static weight directly to the soil, which efficiently compresses the soil particles together, reducing air voids and increasing overall soil density. This is crucial for the stability of the ground in preparation for building foundations or roadways. In contrast, other roller types serve different purposes or are optimized for varying soil conditions. The sheep foot roller, for instance, is specifically designed to compact softer, cohesive soils with deeper layers and is not as effective in compacting layers in the specified range as the steel-wheel roller. The vibratory roller utilizes a different mechanism that is more suited for granular materials, facilitating quick compaction through vibration rather than solely relying on weight. Lastly, the smooth drum roller, while versatile, does not provide the same level of compaction for thicker layers compared to the steel-wheel roller. Thus, the steel-wheel roller

2. What is the function of grade stakes in surveying?

A. To show elevation levels

B. To indicate how much cut or fill is required

C. To mark the boundaries of a property

D. To set the alignment for the construction

The function of grade stakes in surveying primarily relates to indicating how much cut or fill is required for a construction project. Grade stakes are typically placed at specific points throughout a site to provide reference elevations based on the design plans. This information is crucial for construction crews, as it clarifies the necessary adjustments to be made to the existing grade. When surveyors place these stakes, they usually indicate the final desired elevation or slope of the land. If the ground level needs to be lowered (cut) or raised (fill), the grade stakes will visually represent this need, guiding the earthmoving equipment on how much material should be removed or added. This ensures that the site can be sculpted to meet the design specifications, which is essential for proper drainage, structure placement, and overall project feasibility. Each stake carries specific information regarding the elevation difference from the existing grade to the desired grade, allowing surveyors and contractors to execute grading work efficiently and accurately.

3. What type of soil passes the No. 40 sieve and is retained on the No. 200 sieve?

A. Clay

B. Fine sand

C. Coarse gravel

D. Organic soil

The soil that passes through the No. 40 sieve and is retained on the No. 200 sieve is classified as fine sand. The No. 40 sieve has openings that correspond to a specific mesh size, allowing finer particles to pass through while catching larger ones. Fine sand typically consists of particles that are too small to be retained by the No. 40 sieve but are still larger than those that would pass through the No. 200 sieve. This specific retention and passing characteristic is critical in understanding soil classification and behavior in various engineering and construction applications. Fine sand's unique particle size provides it with particular physical properties that impact drainage, compaction, and stability when used in earthworks and construction projects. Knowing the classification of soil based on sieve analysis helps engineers and surveyors make informed decisions regarding site preparation, foundation design, and material selection. In contrast, soil types like clay, coarse gravel, and organic soil have distinctly different particle size distributions that do not fit the criteria described for passing the No. 40 sieve while being retained on the No. 200 sieve. Clay particles are much smaller and would pass both sieves, coarse gravel contains much larger particles that would not pass the No. 40 sieve at all, and organic soil

4. What is meant by consolidation in relation to soil?

A. The process of soil erosion caused by water

B. The process of decreasing soil volume due to applied pressure

C. The method of mixing soil for construction

D. The increase in soil moisture content over time

Consolidation in relation to soil refers specifically to the process by which soil volume decreases under applied pressure. This occurs primarily in saturated soils where the presence of pore water is significant. When an external load is placed on soil, it compacts the soil particles closer together, causing the pore water to be expelled and leading to a reduction in the total volume of the soil. This process is crucial in geotechnical engineering, particularly when evaluating the settlement behavior of structures built on saturated soils. Engineers and geologists analyze consolidation characteristics to design foundations and predict how soil will behave over time under varying loads. Understanding consolidation helps in assessing the stability and longevity of structures, which is particularly essential in areas susceptible to changes in load or in situations such as landfill management and the construction of highways and buildings where soil re-compaction could affect performance.

5. What role do "earth retaining structures" play in construction?

A. They are designed to improve aesthetics

B. They provide a means of water drainage

C. They prevent soil or rock movement around structures

D. They serve as foundations for buildings

Earth retaining structures are primarily constructed to prevent soil or rock movement, especially in areas where changes in elevation occur, such as along slopes or at excavated sites. These structures hold back soil, protecting nearby structures and infrastructure from potential landslides, soil erosion, or other gravitational forces that could compromise stability. By maintaining the integrity of the soil or rock behind them, these structures ensure safety and stability in construction projects, allowing for effective management of earth materials while reducing the risk of unintended collapses or shifts that could cause structural failures. The other options, while they might present useful functions in specific contexts, do not accurately capture the primary role of earth retaining structures. For example, although aesthetics can be considered in design, the main purpose is not to enhance appearance but rather to perform a protective function. Similarly, while drainage can be a consideration in their design, the core objective remains the stabilization of earth materials. Lastly, while foundations are crucial to any building, earth retaining structures do not serve as foundations themselves; rather, they may work in conjunction with foundations to ensure the surrounding soil remains stable. This clarity helps define the specific purpose of earth retaining structures within the broader context of construction and civil engineering.

6. Which type of ditch is typically used for unpaved roads?

A. Flat bottom ditch

B. V ditch

C. Circular ditch

D. Channel ditch

The choice of a V ditch for unpaved roads is appropriate due to its design and functional benefits. V ditches are characterized by their triangular shape, which allows for efficient drainage of surface water while preventing soil erosion. This is particularly important for unpaved roads, where water runoff can cause rutting and deterioration of the road surface. The pointed bottom of a V ditch improves water flow and ensures that debris and sediment are less likely to accumulate, which helps maintain the effectiveness of the drainage system. Additionally, the steep sides of a V ditch can reduce the footprint of the ditch itself, requiring less excavation and minimizing the impact on surrounding areas, which is often a concern when managing natural landscapes alongside unpaved roads. Other ditch types, like flat bottom ditches, circular ditches, or channel ditches, may be more suitable for different applications but are not optimized for the specific needs of unpaved roadways. Flat bottom ditches provide a larger surface area that can lead to sediment buildup, while circular ditches may not be effective in encouraging rapid water movement away from the road. Channel ditches, depending on their design, may cater to larger volumes of surface water, which might exceed the typical requirements for unpaved roads.

7. How is a soil characterized if most of its particles are of similar size?

A. Well graded

B. Uniformly graded

C. Gap graded

D. Coarse graded

When a soil is characterized by having most of its particles being of similar size, this condition is referred to as uniformly graded. In uniformly graded soils, the particle size distribution is narrow, meaning the sizes of the grains do not vary significantly. This homogeneity can affect various properties of the soil, such as its density, permeability, and compaction characteristics. In contrast, a well-graded soil has a wide range of particle sizes that include small, medium, and large particles, contributing to good compaction and stability. A gap-graded soil has a specific range of sizes where some sizes are missing, leading to voids that can affect drainage and strength. Coarse-graded soils predominantly consist of larger particles and may not exhibit the characteristics of uniformity throughout their particle size distribution. Thus, the definition of uniformly graded aligns precisely with the description given in the question, making this the correct choice.

8. What classification of surveying implements would include tools such as hand levels and dumpy levels?

A. Optical instruments

B. Leveling instruments

C. Measurement tools

D. Control devices

The classification of surveying implements that includes hand levels and dumpy levels is leveling instruments. These tools are specifically designed for determining horizontal surfaces and measuring vertical distances with precision. Leveling instruments allow surveyors to establish a reference plane and ensure accurate measurements across varying terrain, making them essential for tasks such as constructing foundations, roads, and other infrastructure. Hand levels are compact devices used primarily for small-scale leveling tasks, while dumpy levels are more robust instruments used for large-scale surveys and are equipped with a telescope for precise line of sight. Both types of leveling instruments utilize a spirit level or optical system to indicate when a surface is level. Their function is distinct from other classifications, such as optical instruments which may include a broader range of tools used for various sighting and alignment tasks, or measurement tools, which encompass a more general range of devices used for measuring distances or angles. Control devices typically refer to instruments that establish control points for a survey, rather than directly measuring levels or elevations. Thus, the correct classification is indeed leveling instruments as it directly pertains to the function these tools serve in surveying.

9. Which of the following instruments allows for direct sighting and leveling across greater distances than a hand level?

A. Clinometer

B. Dumpy level

C. Abney level

D. Jacobs staff

The dumpy level is a surveying instrument designed for providing accurate straight-line levels across distances, making it advantageous over a hand level. It consists of a telescope mounted on a horizontal axis, which allows for direct sighting on a leveling staff placed at a distance. This design enables surveyors to take elevation readings at much greater ranges, which is crucial for large-scale surveying projects such as construction and land development. In contrast, other instruments listed may serve different purposes. A clinometer is used primarily for measuring angles of slope or elevation rather than for leveling over long distances. The Abney level, while also useful for slope measurement, does not offer the same precision or range as a dumpy level for leveling. The Jacobs staff is not commonly recognized as a standard leveling instrument; instead, it refers to a type of leveling rod or staff used in conjunction with other devices but does not possess the same functionality as the dumpy level. Thus, the dumpy level stands out for its capability to achieve precise leveling and sighting over extended distances, making it the instrument of choice in this context.

10. Which tool is commonly referred to as a Jacob's staff in surveying?

A. Leveling rod

B. Measuring tape

C. Vertical interval tool

D. Reference staff

The tool commonly referred to as a Jacob's staff in surveying is indeed a leveling rod. This tool is essential for establishing accurate height differentials and determining elevations during leveling surveys. A Jacob's staff typically features a graduated scale that allows surveyors to read measurements easily and precisely. In the context of surveying, the leveling rod is used in conjunction with a spirit level or a theodolite for sighting and transferring heights. The design enables surveyors to align their line of sight with the instrument, facilitating accurate leveling across a distance. For clarity, while measuring tape, vertical interval tools, and reference staffs serve specific purposes within surveying, they do not carry the designation of Jacob's staff. Measuring tapes are primarily used for distance measurements, vertical interval tools help in assessing elevation gains over a specific distance, and reference staffs serve as markers for maintaining a baseline height. None of these fulfill the critical role of height determination in the same way as a leveling rod.