Geodetic Engineer Board Practice Exam (Sample)

Study Guide

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Questions

1. What role does the NGS play in land use management?

- **A. It directly regulates land transactions**
- **B. It provides data for zoning and planning**
- **C. It defines national parks and protected areas**
- **D. It trains land surveyors on legal issues**

2. If BM 12 has an elevation of 27.048 meters and it is higher than BM 13, what is the most probable elevation of BM 13?

- **A. 26.161**
- **B. 26.181**
- **C. 26.171**
- **D. 26.191**

3. What is meant by "remote sensing" in geodesy?

- **A. Direct measurement of land surfaces**
- **B. The analysis of soil samples**
- **C. The acquisition of information about an object or area from a distance, typically using satellites**
- **D. The process of cartography for mapping**

4. What are the two main types of geodetic surveys?

- **A. Static surveys and dynamic surveys**
- **B. Absolute surveys and relative surveys**
- **C. Field surveys and office surveys**
- **D. Horizontal surveys and vertical surveys**

5. What is a diagram where geographical areas are distorted based on an attribute's value?

- **A. Cartograph**
- **B. Thematic map**
- **C. Cartogram**
- **D. Dot map**

6. In GNSS, how does satellite geometry affect observations?

A. It has no effect

B. It improves accuracy

C. It only affects signal strength

D. It dictates coverage

7. When using UAS for lot surveys, what is the maximum size in centimeters for printing a hard copy of the ortho-image covering the entire project?

A. 52x52

B. 45x45

C. 54x54

D. 35x35

8. What is the calculated accuracy of a 2-km baseline measured with an electronic total station, given the vendor's accuracy specification of (5mm + 5ppm)?

A. 1/138,000

B. 1/128,000

C. 1/133,000

D. 1/143,000

9. What is used to correct for the curvature of the Earth in large-scale mapping?

A. Geodetic leveling

B. Trigonometric leveling

C. Geometric correction

D. Physical leveling

10. What is the primary use of the Mean Sun concept in timekeeping?

A. To establish coordinates for navigation

B. To create a standardized time system

C. To account for the seasonal changes

D. To measure the Earth's gravitational pull

Answers

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

Explanations

1. What role does the NGS play in land use management?

A. It directly regulates land transactions

B. It provides data for zoning and planning

C. It defines national parks and protected areas

D. It trains land surveyors on legal issues

The National Geodetic Survey (NGS) plays a crucial role in land use management primarily by providing essential geospatial data that informs zoning and planning processes. This data encompasses information about land boundaries, elevations, geodetic control points, and mapping technologies that are fundamental for accurate land use planning. When municipalities or organizations embark on development projects, they rely on this high-quality geospatial data to make informed decisions about land use, enabling effective zoning regulations and urban planning. By offering reliable data, the NGS supports local governments and planners in understanding land characteristics, which helps in balancing development needs with environmental conservation. The other choices address aspects that either do not accurately reflect the NGS's primary function or involve areas where the NGS does not have direct authority. For instance, the NGS does not regulate land transactions or train surveyors specifically on legal issues. Moreover, while the NGS contributes to understanding geographical frameworks, defining national parks and protected areas typically falls under governmental agencies and legislation rather than the NGS's data-focused operations.

2. If BM 12 has an elevation of 27.048 meters and it is higher than BM 13, what is the most probable elevation of BM 13?

A. 26.161

B. 26.181

C. 26.171

D. 26.191

To determine the most probable elevation of BM 13, we start with the information given: BM 12 has an elevation of 27.048 meters and is higher than BM 13. This means that the elevation of BM 13 must be lower than 27.048 meters. Each of the available options presents a different possible elevation for BM 13, all of which are below 27.048 meters, which aligns with the requirement that BM 12 is at a higher elevation. To identify the most probable elevation among the choices, we consider the smallest reasonable difference from BM 12's elevation. The options given are close to each other, and among them, 26.181 is the highest and therefore the least lower than 27.048 while remaining below it. It indicates a plausible and reasonable elevation for BM 13 that indicates a minor elevation difference, typical in practice when evaluating benchmark heights in surveying. The other choices present elevations that are more significantly lower and may not reflect typical variations in elevation found in practical applications. Therefore, the most probable elevation for BM 13, considering it should be just below BM 12 while still being a valid estimate reflecting common differences in benchmark height, would logically be 26.181 meters.

3. What is meant by "remote sensing" in geodesy?

A. Direct measurement of land surfaces

B. The analysis of soil samples

C. The acquisition of information about an object or area from a distance, typically using satellites

D. The process of cartography for mapping

Remote sensing in geodesy refers to the acquisition of information about an object or area from a distance, typically using satellites or other aerial platforms. This technology allows for the collection of data without direct contact with the target, enabling detailed observations over large areas. In geodesy, remote sensing plays a crucial role in gathering data regarding Earth's surface, including topography, vegetation, land use, and changes over time. By utilizing satellite imagery and sensors, geodetic engineers can assess geophysical properties, monitor environmental changes, and create accurate geographical models. While direct measurements of land surfaces and the analysis of soil samples are important in geodesy, they do not encompass the remote aspect that defines remote sensing. Similarly, cartography pertains to the art and science of map-making but does not specifically address the techniques used for obtaining data from a distance. Thus, option C is the correct choice as it encapsulates the essence of remote sensing within the field of geodesy.

4. What are the two main types of geodetic surveys?

A. Static surveys and dynamic surveys

B. Absolute surveys and relative surveys

C. Field surveys and office surveys

D. Horizontal surveys and vertical surveys

The classification of geodetic surveys into absolute and relative surveys is an important concept in geodesy. Absolute surveys provide the exact position of a point in relation to a specific frame of reference, often based on fixed geodetic networks and control points. They are essential for establishing a definitive location that can be universally applied or referenced. On the other hand, relative surveys focus on the position of points in relation to one another. This type of survey is more about the measurements and angles between points rather than their absolute positions. This can be particularly useful in applications where the location of a new point in relation to existing ones is sufficient. Understanding this distinction is crucial for geodetic engineers as it guides the methodology and technology they employ depending on the goals of a survey. Each type serves different purposes in the field of geodesy and has its own set of methods and tools that can be applied effectively. The chosen approach influences factors such as precision, accuracy, and ultimately the reliability of the data collected.

5. What is a diagram where geographical areas are distorted based on an attribute's value?

A. Cartograph

B. Thematic map

C. Cartogram

D. Dot map

A diagram that distorts geographical areas based on an attribute's value is known as a cartogram. This type of map visually represents data such that the size of each geographic area is scaled according to the value of the attribute being mapped, rather than its actual physical area. This allows for an immediate visual impact and aids in understanding the distribution and scale of the attribute in question, whether it be population, election results, or any other quantifiable data. For instance, in a population cartogram, countries or regions with larger populations would appear disproportionately larger compared to those with smaller populations, even if their actual land area is much smaller. This method of representation effectively highlights differences in data that may not be as apparent with traditional maps, where area size is always proportionate to land area rather than the represented data. Other types of maps, such as thematic maps, provide information based on specific themes or subjects but do not alter the size of geographical areas based on data values. Similarly, dot maps represent data using dots to indicate the presence or quantity of a phenomenon without distorting area size, and while a cartograph combines elements of maps and graphs, it does not specifically alter areas in the way cartograms do. Thus, a cartogram is the most precise

6. In GNSS, how does satellite geometry affect observations?

A. It has no effect

B. It improves accuracy

C. It only affects signal strength

D. It dictates coverage

In Global Navigation Satellite Systems (GNSS), satellite geometry refers to the configuration and relative positions of satellites in the sky at any given time. This geometry significantly impacts the accuracy and reliability of GNSS observations. When satellites are well-distributed across the sky, the geometry allows for better triangulation of positions. A more favorable satellite geometry – meaning satellites are positioned in such a way that they are not clustered together but rather are spread out – results in improved accuracy of the calculated position. It reduces potential errors in atmospheric delays, multipath effects, and increases the overall precision of the positioning data. Conversely, if the satellites are close together or almost in line, the geometry becomes less favorable, potentially leading to greater uncertainty in the measurements. This phenomenon is often represented through concepts like the Dilution of Precision (DOP), which quantitatively describes how positional accuracy is affected by satellite geometry. In summary, a good satellite configuration enhances the quality of observations and leads to improved accuracy, making it crucial for effective GNSS positioning.

7. When using UAS for lot surveys, what is the maximum size in centimeters for printing a hard copy of the ortho-image covering the entire project?

A. 52x52

B. 45x45

C. 54x54

D. 35x35

In the context of using Unmanned Aerial Systems (UAS) for lot surveys, the maximum size of the hard copy ortho-image that can be produced is influenced by the image resolution and detail required for effective analysis and presentation of the survey data. A size of 54x54 centimeters allows for sufficient detail and resolution to accurately represent the surveyed area, ensuring that key features and dimensions are clearly visible. Using larger dimensions, such as those in the other options, could lead to challenges in maintaining image clarity, especially if the original captured data does not have the resolution to support such sizes. The 54x54 cm size strikes a balance between practicality and the level of detail needed for most surveying tasks, making it an optimal choice. It allows for effective communication of the survey results to clients and stakeholders while providing a clear visual rendition of the surveyed lot. This is particularly important in geodetic engineering, where accurate representation of data is critical for decision-making and project planning.

8. What is the calculated accuracy of a 2-km baseline measured with an electronic total station, given the vendor's accuracy specification of (5mm + 5ppm)?

A. 1/138,000

B. 1/128,000

C. 1/133,000

D. 1/143,000

To determine the calculated accuracy of the 2-km baseline measured with an electronic total station, we need to analyze the vendor's accuracy specification, which is given as (5mm + 5ppm). First, break down the accuracy specification: 1. The constant error component is 5mm, which is a fixed measurement error independent of distance. 2. The variable error component is 5 parts per million (ppm). Since the baseline is 2 km (or 2000 m), we can convert this to parts for calculation: - 5 ppm of 2000 m means: \[5 \, \text{ppm} = \frac{5}{1,000,000} \times 2000 \, \text{m} = 0.01 \, \text{m} = 10 \, \text{mm} \] Next, add the fixed accuracy error and the variable accuracy error together to get the total accuracy at this distance: \[\text{Total Accuracy} = 5 \, \text{mm} + 10 \, \text{mm} = 15 \, \text{mm} \] To express this accuracy in terms

9. What is used to correct for the curvature of the Earth in large-scale mapping?

A. Geodetic leveling

B. Trigonometric leveling

C. Geometric correction

D. Physical leveling

In large-scale mapping, geodetic leveling is utilized to account for the curvature of the Earth. This technique involves measuring the elevation of points over large distances by establishing a network of benchmarks, which helps to establish an accurate representation of the Earth's surface. Geodetic leveling is critical because it considers the Earth's shape (which is not a perfect sphere, but rather an oblate spheroid) when determining elevations and creating maps. It corrects for the variations in the Earth's gravity field and accounts for the curvature over long distances, ensuring that the elevations are accurate and reflect the true topography of the area being mapped. Other methods listed do not specifically correct for the curvature of the Earth in the context of large-scale mapping. Trigonometric leveling involves using angles and distances but does not inherently correct for the Earth's curvature over extensive areas like geodetic leveling does. Geometric correction is a more general term that might refer to various adjustments in surveys and does not specifically encompass the methods required to correct for curvature. Physical leveling typically measures short distances and levels directly at the surface, which is not suitable for large-scale mapping scenarios where Earth's curvature becomes significant.

10. What is the primary use of the Mean Sun concept in timekeeping?

A. To establish coordinates for navigation

B. To create a standardized time system

C. To account for the seasonal changes

D. To measure the Earth's gravitational pull

The Mean Sun concept is primarily used to create a standardized time system, known as Mean Solar Time. This system is crucial for the consistency of timekeeping across different locations. The Mean Sun is an imaginary celestial body that moves at a uniform speed along the celestial equator, contrasting with the actual solar time, which can vary due to the elliptical shape of Earth's orbit and axial tilt, causing the apparent motion of the Sun to be irregular. By establishing the Mean Sun, time can be standardized, allowing for the division of the day into hours, minutes, and seconds that is uniform regardless of geographic location. This standardization is essential for communication, transportation, and daily activities, as it provides a consistent reference for everyone. The use of standard time zones, based on the Mean Sun concept, helps synchronize activities within and across regions, improving coordination and efficiency in society. Other options do not align with the primary function of the Mean Sun. While it relates to navigation and may indirectly account for seasonal changes in terms of day length and the angle of sunlight, these are not its fundamental purpose. Measuring the Earth's gravitational pull is unrelated to the concept of Mean Sun or timekeeping.