

Geodetic Engineers Pre-board Practice Test (Sample)

Study Guide



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SAMPLE

Questions

- 1. What does the term "tangent" refer to in geometry?**
 - A. A line intersecting two curves**
 - B. A straight line touching a curve at a single point**
 - C. A curve that is parallel to a straight line**
 - D. A line intersecting a point on a curve**

- 2. Which measurement directly relates to the height of a point during an underground survey?**
 - A. Horizontal distance from the station**
 - B. Vertical distance from the base reference**
 - C. Positive height above the station**
 - D. Light intensity from the station**

- 3. What are the two main branches of geodesy?**
 - A. Hydrographic and physical geodesy**
 - B. Physical geodesy and geometric geodesy**
 - C. Aeronautical and gravitational geodesy**
 - D. Satellite and terrestrial geodesy**

- 4. What type of measurement does the precision of 1/106,000 refer to?**
 - A. Accuracy of area calculation**
 - B. Precision of baseline measurement**
 - C. Quality of tangential measurement**
 - D. Precision of azimuth measurement**

- 5. What is the primary aim of plane surveying?**
 - A. To create topographic maps**
 - B. To establish vertical control points**
 - C. To conduct precise horizontal control points**
 - D. To measure elevations of land**

- 6. Define "geoid."**
- A. The total area of the Earth's surface**
 - B. The temperature distribution of the Earth**
 - C. The equipotential surface of the Earth's gravity field that coincides with mean sea level**
 - D. The layer of the Earth's atmosphere**
- 7. What is the main function of a total station in geodetics?**
- A. To measure distances and angles simultaneously**
 - B. To establish geographic coordinates**
 - C. To provide digital mapping services**
 - D. To analyze ground stability**
- 8. In surveying, why is it important to recognize systematic errors?**
- A. They are affected by human judgement**
 - B. They can lead to inaccurate data interpretation**
 - C. They can only be corrected mathematically**
 - D. They do not influence long-term surveys**
- 9. How much volume of borrow is indicated based on the provided mass diagram for an earthwork?**
- A. 300 m³**
 - B. 350 m³**
 - C. 400 m³**
 - D. 450 m³**
- 10. What does DENR DAO 2007-29 specify?**
- A. Project area design standards**
 - B. Survey accuracy requirements for project areas**
 - C. Environmental impact assessment guidelines**
 - D. Land ownership transfer protocols**

Answers

SAMPLE

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

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Explanations

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1. What does the term "tangent" refer to in geometry?

- A. A line intersecting two curves
- B. A straight line touching a curve at a single point**
- C. A curve that is parallel to a straight line
- D. A line intersecting a point on a curve

In geometry, the term "tangent" refers specifically to a straight line that touches a curve at a single point. This point is known as the point of tangency. At this point, the tangent line represents the instantaneous direction of the curve. In other words, it describes the direction in which the curve is heading at that very specific point without crossing or intersecting the curve itself at that location. This concept is particularly important in various branches of mathematics and physics, as it helps in understanding the behavior of curves and the rates of change represented by derivatives in calculus. When studying curves, the tangent line provides a linear approximation of the curve's behavior nearby. The other choices relate to different aspects of geometry but do not accurately describe the definition of a tangent. For example, intersecting curves (choice A) involves multiple points of intersection, while a line going through just a single point on a curve (choice D) does not capture the essence of tangency, which requires that the line does not cross the curve at the tangent point. Similarly, a curve parallel to a straight line (choice C) does not relate to the tangential relationship defined in this context.

2. Which measurement directly relates to the height of a point during an underground survey?

- A. Horizontal distance from the station
- B. Vertical distance from the base reference
- C. Positive height above the station**
- D. Light intensity from the station

The measurement that directly relates to the height of a point during an underground survey is found in the concept of positive height, which is a vertical measurement indicating how high that point is above a reference level, typically the station or datum used in the survey. In the context of underground surveys, understanding the vertical relationship of a point to a known reference is crucial for modeling subsurface conditions accurately and effectively managing excavation or construction work. Positive height above the station provides an essential reference to assess the elevation differences, which are key in determining the geological features, the slope of surfaces, or potential hazards underground. By focusing specifically on the vertical aspect of measurement, this approach allows surveyors to establish clear and actionable data for further planning and development. The other options, while related to measurement concepts in surveying, do not directly address the height of a point in the same way. Horizontal distance from the station and vertical distance from a base reference may offer relevant information for contextual understanding or spatial layout, but they do not specifically capture the concept of elevation in the manner that positive height does. Similarly, light intensity, which might play a role in some surveying methods, is not pertinent to height measurement in this context. Hence, the emphasis on positive height establishes a direct relationship to

3. What are the two main branches of geodesy?

- A. Hydrographic and physical geodesy
- B. Physical geodesy and geometric geodesy**
- C. Aeronautical and gravitational geodesy
- D. Satellite and terrestrial geodesy

The two main branches of geodesy are physical geodesy and geometric geodesy. Physical geodesy pertains to the measurement and understanding of the Earth's physical properties, including its shape, gravity field, and how these attributes can be used to derive information about the Earth's structure and dynamics. It involves studying phenomena such as isostasy and sea level changes, which are crucial for understanding the Earth's interactions with forces such as gravity. Geometric geodesy, on the other hand, deals with the measurement of the geometric relationships between points on the Earth's surface. This branch focuses on deriving the precise positions of points using techniques such as triangulation, trilateration, and satellite positioning systems like GNSS (Global Navigation Satellite Systems). It is essential for applications in mapping and surveying, where accurate positioning is critical. Together, these two branches provide a comprehensive framework for understanding and utilizing Earth's measurements in both theoretical studies and practical applications. The other options, while they involve geodetic concepts or applications, do not define the fundamental categories of geodesy used in academic or professional contexts.

4. What type of measurement does the precision of 1/106,000 refer to?

- A. Accuracy of area calculation
- B. Precision of baseline measurement**
- C. Quality of tangential measurement
- D. Precision of azimuth measurement

The precision of 1/106,000 typically refers to the precision of baseline measurement in geodetic applications. Baseline measurements are crucial in determining the distances between points with high accuracy, such as in network adjustments or triangulation in surveying. This precision level indicates how closely the measured value of a baseline approaches the true value. In geodetic engineering, precision is vital to ensure that the calculations and resulting positional information are reliable. A precision of 1/106,000 suggests that for every one part measured, there could be an uncertainty of one part out of 106,000 parts in the measurement, which is a high level of precision and essential for constructing accurate geodetic maps or establishing control points in surveying. The options referring to area calculations, tangential measurements, or azimuth measurements involve different facets of geodetic practice that do not specifically relate to the precision indicated by 1/106,000. These options are more about how areas or angles are derived, rather than the underlying precision of the measurements that form the basis of baseline distances between surveyed points.

5. What is the primary aim of plane surveying?

- A. To create topographic maps
- B. To establish vertical control points
- C. To conduct precise horizontal control points**
- D. To measure elevations of land

The primary aim of plane surveying is to conduct precise horizontal control points. Plane surveying focuses on measurements that are made on a flat plane, which simplifies the calculation of distances and angles. In this method, the curvature of the Earth is typically ignored, allowing surveyors to determine the relative positions of points in a two-dimensional horizontal plane with high accuracy. The generation of precise horizontal control points is crucial in various applications, including land subdivision, construction projects, and mapping. These control points serve as reference markers that facilitate further surveying tasks, ensuring accuracy and consistency in measurements. While creating topographic maps and establishing vertical control points are important aspects of surveying, they are not the primary aim of plane surveying. Topographic maps integrate both horizontal and vertical data, while vertical control typically falls under leveling operations, which is a component of geodetic surveying that focuses on elevation changes. Similarly, measuring elevations of land pertains more to vertical survey methods rather than the horizontal precision emphasized in plane surveying. Thus, the main objective remains firmly rooted in achieving accurate horizontal control.

6. Define "geoid."

- A. The total area of the Earth's surface
- B. The temperature distribution of the Earth
- C. The equipotential surface of the Earth's gravity field that coincides with mean sea level**
- D. The layer of the Earth's atmosphere

The geoid is defined as the equipotential surface of the Earth's gravity field that coincides with mean sea level. This means it is a hypothetical surface that reflects where water would naturally rest under the influence of gravity alone, without other factors like wind or tides. The geoid represents the shape of the Earth as influenced by its rotation and gravitational field, taking into account variations in mass distribution. This concept is vital in geodesy as it serves as a reference surface for measuring elevations and understanding Earth's topography. It helps in determining the relationship between the mean sea level and the ellipsoidal surface used in mapping and GPS. Other options do not pertain to the geoid. For example, one option discusses the total area of the Earth's surface, which is unrelated to gravitational effects, while another focuses on temperature distribution and the atmosphere, which are not relevant to the geoid's application in geodesy and Earth measurement.

7. What is the main function of a total station in geodetics?

A. To measure distances and angles simultaneously

B. To establish geographic coordinates

C. To provide digital mapping services

D. To analyze ground stability

A total station is an essential instrument used in geodetic surveys, and its main function is to measure both distances and angles simultaneously. This capability allows surveyors to gather precise positional data necessary for tasks such as land surveying, construction layout, and geospatial mapping. The total station combines the functions of a theodolite for angle measurement with an electronic distance measuring (EDM) device, enabling it to calculate horizontal and vertical angles while simultaneously determining the distances to survey points. This dual functionality streamlines the data collection process, increasing efficiency and accuracy compared to using separate instruments for each measurement type. While establishing geographic coordinates, providing digital mapping services, and analyzing ground stability are important tasks within geodesy and civil engineering, these activities often rely on the foundational measurements obtained from a total station. It serves as the primary tool that delivers the critical data needed to support these broader applications.

8. In surveying, why is it important to recognize systematic errors?

A. They are affected by human judgement

B. They can lead to inaccurate data interpretation

C. They can only be corrected mathematically

D. They do not influence long-term surveys

In surveying, recognizing systematic errors is crucial because these errors can lead to inaccurate data interpretation. Systematic errors are consistent and predictable deviations from the true values, often resulting from factors like equipment calibration, environmental influences, or procedural biases. Unlike random errors that fluctuate and can average out over time, systematic errors do not cancel out and instead accumulate, which can significantly distort the results of surveying tasks. When systematic errors are unrecognized, the conclusions drawn from the data may lead to incorrect decisions, such as miscalculations in land boundaries or wrong assessments of material quantities, which can have serious financial and legal implications in engineering and construction projects. Awareness and identification of these errors enable surveyors and engineers to apply corrections or calibrations, ensuring that the data interpreted leads to reliable and accurate outcomes.

9. How much volume of borrow is indicated based on the provided mass diagram for an earthwork?

- A. 300 m³
- B. 350 m³**
- C. 400 m³
- D. 450 m³

To determine the volume of borrow indicated by a mass diagram in earthwork, one typically examines the sections of the diagram that represent the cut and fill areas. The volume of borrow is calculated based on the difference in volume between these sections. The correct choice, which indicates 350 m³, suggests that this volume has been derived from a proper analysis of the mass diagram. This analysis must account for various factors such as terrain features, excavation depth, and proposed fill requirements. When assessing the mass diagram, the values are usually derived from computed areas based on cross-sections displayed within the diagram, which reflect the relationship between cut and fill volumes. A correct interpretation will show the balance or deficit in volume necessary for the project. This volume of borrow indicates an excess of earth material that can be used for filling adjacent areas or leveling the project site. In this case, other options would present different volumes either due to incorrect assessment of the mass diagram or miscalculations in the areas representing the borrow. The choice of 350 m³ accurately reflects the necessary borrow volume derived from the analysis of the mass diagram, indicating careful consideration of the details presented in the data.

10. What does DENR DAO 2007-29 specify?

- A. Project area design standards
- B. Survey accuracy requirements for project areas**
- C. Environmental impact assessment guidelines
- D. Land ownership transfer protocols

DENR DAO 2007-29 is primarily focused on establishing survey accuracy requirements specifically for project areas. This directive was issued by the Department of Environment and Natural Resources (DENR) in the Philippines to ensure that surveys conducted for various projects meet certain accuracy standards critical for land management and development. In the context of geodetic engineering, ensuring high levels of accuracy in surveys is essential for the effectiveness of land use planning, resource management, and legal land ownership matters. The standards outlined in this directive help in maintaining consistency and reliability in survey data, which is vital for effective decision-making and implementation of projects. The other options, although relevant to various aspects of land and environmental management, do not specifically pertain to the primary focus of DAO 2007-29, which is the accuracy of survey methods used in project areas.