1. What are significant characteristics of expansive soils?
a) High compaction
b) Low moisture sensitivity
c) Swelling and shrinkage
d) High load-bearing capacity

Answer: c) Swelling and shrinkage
Explanation: Expansive soils exhibit significant volumetric changes with variations in moisture content, leading to swelling when wet and shrinkage when dry. This property can cause substantial damage to structures built upon them.

2. Which of the following is a preventive measure for dealing with expansive soils?
a) Increasing moisture content
b) Reducing drainage
c) Providing adequate foundation support
d) Decreasing soil compaction

Answer: c) Providing adequate foundation support
Explanation: Adequate foundation support, such as deep footings or specialized foundations like pile foundations, can help mitigate the adverse effects of expansive soils by distributing loads and minimizing structural movement.

3. What is a characteristic of collapsible soils?
a) High density
b) Low compressibility
c) Volume increase upon wetting
d) Stable foundation support

Answer: c) Volume increase upon wetting
Explanation: Collapsible soils are characterized by a significant reduction in volume and subsequent subsidence when subjected to wetting or increased moisture content. This property can lead to foundation instability and settlement issues.

4. Which type of foundation is suitable for footing on expansive soils?
a) Shallow spread footing
b) Mat foundation
c) Floating foundation
d) Raft foundation

Answer: d) Raft foundation
Explanation: Raft foundations, also known as mat foundations, are suitable for expansive soils because they distribute the structural loads over a large area, reducing the potential for differential movement caused by soil swelling and shrinkage.

5. What is the concept behind underreamed pile foundations?
a) Increasing soil density
b) Reducing foundation depth
c) Enhancing load-bearing capacity
d) Expanding the base of the pile

Answer: d) Expanding the base of the pile
Explanation: Underreamed pile foundations involve enlarging the base of the pile through mechanical means such as drilling or excavation. This expansion provides increased bearing capacity and stability in problematic soil conditions.

6. Which factor is considered in the design of underreamed pile foundations?
a) Soil compaction
b) Structural height
c) Pile spacing
d) Soil type and properties

Answer: d) Soil type and properties
Explanation: Design considerations for underreamed pile foundations include analyzing the specific properties of the soil, such as its strength, compressibility, and potential for expansion or collapse, to ensure adequate load-bearing capacity and stability.

7. What is a function of geosynthetics in civil engineering?
a) Increasing soil permeability
b) Providing structural support
c) Enhancing soil stability
d) Reducing foundation settlement

Answer: c) Enhancing soil stability
Explanation: Geosynthetics are used in civil engineering to improve soil stability by reinforcing soil structures, preventing erosion, and controlling slope stability through their tensile strength and filtration properties.

8. Which type of geosynthetic material is commonly used for soil reinforcement?
a) Geotextile
b) Geomembrane
c) Geogrid
d) Geocell

Answer: c) Geogrid
Explanation: Geogrids are commonly used for soil reinforcement applications due to their high tensile strength and ability to distribute loads effectively, thereby enhancing soil stability and reducing settlement.

9. What is a typical use of geosynthetics in road construction?
a) Providing waterproofing
b) Enhancing drainage
c) Reinforcing soil slopes
d) Reducing soil erosion

Answer: b) Enhancing drainage
Explanation: Geosynthetics such as geotextiles and geocomposites are frequently used in road construction to improve drainage by promoting water flow away from the pavement structure, reducing the risk of water-induced damage and prolonging the road's lifespan.

10. Which characteristic makes geosynthetics suitable for environmental applications?
a) Biodegradability
b) Chemical inertness
c) High conductivity
d) Low tensile strength

Answer: b) Chemical inertness
Explanation: Geosynthetics possess chemical inertness, making them resistant to degradation from environmental factors such as exposure to chemicals, ultraviolet (UV) radiation, and biological processes, thus rendering them suitable for various environmental applications like landfill liners and containment systems.

Foundations on problematic soil & Introduction to Geosynthetics MCQs