What is Soil Mechanics?

Worksheet

Soil mechanics is governed by Terzaghi's effective stress principle: ' = u, where the effective stress (carried by soil grains) equals total stress minus pore water pressure.

@gamma = @frac{W}{V}

Questions

1. Terzaghi's effective stress formula is

A) ='+u
B) '=+u
C) '=u
D) '=u

2. =120 kPa, u=50 kPa. What is the effective stress?

A) 170 kPa
B) 70 kPa
C) 60 kPa
D) 50 kPa

3. A rising water table

A) increases effective stress
B) decreases effective stress
C) has no effect
D) decreases total stress

4. Effective stress is carried by

A) water only
B) air voids
C) soil particle contacts
D) nothing

5. At 5 m depth, total stress is =90 kPa and pore water pressure is u=49 kPa. Find the effective stress.

6. A soil layer has unit weight =19 kN/m. Find the total stress at 4 m depth (dry, no water table).

7. Water table is at the surface. At 6 m depth, _sat=20 kN/m and _w=9.81 kN/m. Find the effective stress.

8. Define: What is Terzaghi's effective stress principle?

9. Define: What is pore water pressure?

10. Define: Why does effective stress matter?

Answer Key

1. C) '=u - ' = u: effective stress equals total stress minus pore pressure.
2. B) 70 kPa - '=12050=70 kPa.
3. B) decreases effective stress - Higher water table more pore pressure u lower '.
4. C) soil particle contacts - Effective stress is the stress transmitted through grain-to-grain contacts.
5. ' = u = 90 49 ' = 41 kPa
6. = z = 194 = 76 kPa (u=0, so '=76 kPa too)
7. = _satz = 206 = 120 kPa u = _wz = 9.816 = 58.86 kPa ' = u = 12058.86 = 61.14 kPa
8. ' = u: the stress actually carried by soil grains equals total stress minus pore water pressure.
9. The pressure of water filling the voids between soil particles.
10. It controls soil strength, compressibility and settlement - not total stress.