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#Q1:
# To Determine the bearing capacity of soil with water table
BulkDensity =float(input("Enter the value of Bulk Density of soil:"))
SatDensity = float(input("Enter the value of Saturated Density of soil:"))
WaterDensity = float(input("Enter the unit Weight of Water:"))
Df= float(input("Enter the value of depth of footing:"))
Dw = float(input("Enter the value of water table above footing level:"))
Dw1= float(input("Enter the value of Water table below the level of footing:"))
B = float(input("Enter the value of width of footing:"))
Nq= float(input("Enter the vaiue of Nq:"))
N= float(input("Enter the value of N ganna (N):"))
# Calculate Submerged Density
SubDensity = SatDensity - WaterDensity # Calculate the submerged density

print ("Submerged Weight of soil is:", SubDensity)
# The bearing capacity of soil when water table is at ground
print ("CASE A")
qu= (SubDensity* Df*Nq) + (0.5*0.8*B*SubDensity*N)
print ("The value of ultimate bearing capacity of soil is:", qu)
#Approximate calculation of Bearing capacity of soil is.
Rw= 0.5 + 0.5*(Dw/B)
print ("The value of Rw is:", Rw)
Rw1 = 0.5 + 0.5*(Dw1/B)
print ("The value of Rw1 is:", Rw1)
qu= (BulkDensity*Df*Nq*Rw) + (0.5*0.8*3*BulkDensity *N*Rw1)
print ("The value ultimate bearing capacity of soil is:", qu)
# Case B
print ("CASE B")
qu= (BulkDensity * Df*Nq) + (0.5*0.8*B*SubDensity*N)
print ("The value of ultimate bearing capacity is:", qu)
Dw = float(input("Enter the value of water table above footing level:"))
Dwl = float(input(" Enter the value of Water table below the level of footing: "))
print ("The approximate value of ultimate bearing capacity is: ")
Rw= 0.5 + 0.5*(Dw/B)
print ("The value of Rw is:", Rw)
Rw1= 0.5 + 0.5* (Dw1/B)
print ("The value of Rw1 is:", Rw1)
qu= (BulkDensity * Df * Nq * Rw) + (0.5*0.8*B*BulkDensity * N *Rw1)
print ("The approximate value of ultimate hearing capacity is: ", qu)
# Case C
print ("CASE C")
x = float(input("Enter the value of depth of water below footing:"))
# Assuming BulkDensityOfNg is defined elsewhere
qu = (BulkDensity*Df*Nq) + (0.5 *0.8* ((BulkDensity*x)+(SubDensity * (B-x))))
print ("The value of ultimate bearing capacity is:", qu)
Dw = float(input("Enter the value of water table above footing level:"))
Dw1= float(input("Enter the value of Water table below the level of footing:"))
print ("The approximate value of ultimate bearing capacity is:")
Rw= 0.5 + 0.5*(Dw/B)
print ("The value of Rw is:", Rw)
Rw1 = 0.5 + 0.5*(Dw1/B)
print ("The value of Rwl is: ", Rw1)
qu= (BulkDensity * Df * Nq * Rw) + (0.5*0.8*8*BulkDensity*N*Rw1)
print ("the value of ultimate bearing capaciy is:", qu)
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Enter the value of Bulk Density of soil:18
Enter the value of Saturated Density of soil:20
Enter the unit Weight of Water:10
Enter the value of depth of footing:2
Enter the value of water table above footing level:0
Enter the value of Water table below the level of footing:0
Enter the value of width of footing:3
Enter the vaiue of Nq:33
Enter the value of N ganna (N):34
Submerged Weight of soil is: 10.0
CASE A
The value of ultimate bearing capacity of soil is: 1068.0
The value of Rw is: 0.5
The value of Rw1 is: 0.5
The value ultimate bearing capacity of soil is: 961.2
CASE B
The value of ultimate bearing capacity is: 1596.0
Enter the value of water table above footing level:3
 Enter the value of Water table below the level of footing: 0
The approximate value of ultimate bearing capacity is:
The value of Rw is: 1.0
The value of Rw1 is: 0.5
The approximate value of ultimate hearing capacity is:  1555.2
CASE C
Enter the value of depth of water below footing:1
The value of ultimate bearing capacity is: 1203.2
Enter the value of water table above footing level:3
Enter the value of Water table below the level of footing:1
The approximate value of ultimate bearing capacity is:
The value of Rw is: 1.0
The value of Rwl is:  0.6666666666666666
the value of ultimate bearing capaciy is: 2493.6
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#Q2:
# To find the ultimate load carring capacity of pile
UCS = float(input("Enter the value of UCS of soil:"))
Cu = UCS/2
B = float(input("Enter the value of dimension of pile:"))
l=float(input("Enter the length of pile:"))
Alpha = float(input("Enter the value of adhesion factor:"))
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Nc= float(input("The value of Nc: "))
Ab = B*B
print ("the Base area of footing is:", Ab)
As = 4*B*l
print ("The value of chohesion of soil is:", Cu)
Qpu = Cu*Nc*Ab
print ("'Qpu:", Qpu)
Qf = Alpha*Cu*As
print ("Qf:", Qf)
Qu= Qpu + Qf
print ("the value of load carring capacity of pile is (Qu):", Qu)
```

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Enter the value of UCS of soil:75
Enter the value of dimension of pile:0.45
Enter the length of pile:15
Enter the value of adhesion factor:0.8
The value of Nc: 9
the Base area of footing is: 0.2025
The value of chohesion of soil is: 37.5
'Qpu: 68.34375
Qf: 810.0
the value of load carring capacity of pile is (Qu): 878.34375
```

```
# To Determine the bearing capacity of soil with water table
BulkDensity = float (input ("Enter the value of Bulk Density of soil:"))
SatDensity = float (input ("Enter the value of Saturated Density of soil:"))
WaterDensity = float (input ("Enter the unit Weight of Water:"))
Df = float (input ("Enter the value of depth of footing:"))
B = float (input ("Enter the value of width of footing:"))
Ng = float (input ("Enter the value of Ng:"))
N_Gamma = float (input ("Enter the value of N gamma (N):"))
SubDensity = SatDensity - WaterDensity
print ("Submerged Weight of soil is:", SubDensity)
M = int (input("Number of data values of Water table above footing level: "))
N = int (input("Number of data values of Water table below footing level: "))
Dw = []
Dw1 = []
for i in range (1, M+1) :
  print ("Enter the value of water table above footing level measured w.r.t.ground (Dw) : ")
  Depth_Dw = float (input ())
  Dw. append (Depth_Dw)
  Rw = 0.5 + 0.5* (Depth_Dw/B)
  print ("The value of Rw is:", Rw)
for j in range (1, N+1):
  print ("Enter the value of water table above footing level measured w.r.t.ground (Dw1): ")
  Depth_Dw1 = float (input())
  Dw.append (Depth_Dw1)
  Rw1 = 0.5 + 0.5*(Depth_Dw1/B)
  print ("The value of Rw1 is:", Rw1)
  qu= (BulkDensity*Df*Nq*Rw) + (0.5*0.8*B*BulkDensity*N_Gamma*Rw1)
  print ("'qu: ", qu, "kN/m^2")
```

```
Enter the value of Bulk Density of soil:18
Enter the value of Saturated Density of soil:20
Enter the unit Weight of Water:10
Enter the value of depth of footing:2
Enter the value of width of footing:3
Enter the value of Ng:33
Enter the value of N gamma (N):34
Submerged Weight of soil is: 10.0
Number of data values of Water table above footing level: 3
Number of data values of Water table below footing level: 3
Enter the value of water table above footing level measured w.r.t.ground (Dw) :
0
The value of Rw is: 0.5
Enter the value of water table above footing level measured w.r.t.ground (Dw) :
1
The value of Rw is: 0.6666666666666666
Enter the value of water table above footing level measured w.r.t.ground (Dw) :
2
The value of Rw is: 0.8333333333333333
Enter the value of water table above footing level measured w.r.t.ground (Dw1):
0
The value of Rw1 is: 0.5
'qu:  1357.1999999999998 kN/m^2
Enter the value of water table above footing level measured w.r.t.ground (Dw1):
0
The value of Rw1 is: 0.5
'qu:  1357.1999999999998 kN/m^2
Enter the value of water table above footing level measured w.r.t.ground (Dw1):
1
The value of Rw1 is: 0.6666666666666666
'qu:  1479.6 kN/m^2
```