ASSIGNMENT NO 7 - APPLICATION OF PYTHON IN THE FIELD OF FOUNDATION ENGINEERING

Q-1

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#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):"))
SubDensity=float(input())
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*(Dw1/8)
print("The value of Rw1 is:", Rw1)
qu=(BulkDensity*Df*Nq*Rw) + (0.5*0.8*8*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*8*SubDensity)
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* (Dw1/8)
print("The value of Rw1 is:", Rw1)
qu=(BulkDensity*Df*Nq*Rw)+(0.5*0.8*8*BulkDensity*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:"))
qu=(BulkDensity*Df*Nq)+(0.5*0.8*((BulkDensity*x)+(SubDensity*(B-x)))*N)
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= 8.5+ 8.5*(Dw/B)
print("The value of Rw is:", Rw)
Rw1 = 0.5 + 0.5*(Dw1/8)
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
10
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: 1573.2
CASE B
The value of ultimate bearing capacity is: 1220.0
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:  1216.8
CASE C
Enter the value of depth of water below footing:1
The value of ultimate bearing capacity is: 1704.8000000000002
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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: 17.0
The value of Rwl is:  0.5625
the value of ultimate bearing capaciy is: 21297.6
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Q-2

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#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:"))
a=float(input("Enter the length of pile:"))
Alpha =float(input("Enter the value of adhesion factor:"))
Nc=float(input("The value of Nc: "))
Ab=B*B
print("the Base area of footing is:", Ab)
As=4*B*a
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
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Q-3

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# 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:"))
Nq = 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")
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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 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) :
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```
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
```