#Roshan Chawan 22CV013

# To find the downstream depth of open channel

# Given Data

Q= float(input("Enter the value of Discharge:"))

T= int(input("Enter the value of top width:"))

g= float(input("Enter the value of acceleration due to Gravity:"))

y1 = float(input("enter the value of upstream depth:"))

Z= float(input("Enter the Value of hump: "))

# Dicharge per meter width

q=Q/T

print ("The value of discharge per meter width is:", q)

# Area Calculation

A1= T\*y1

print ("The value of upstream area is:", A1)

# Calculation of Froude Number

Fr1 = ((Q\*Q\*T)/(g\*A1\* A1 \*A1)) \*0.5

print ("The value of Froude number is:", Fr1)

if Fr1>1:

  print("The flow is Super Critical Flow")

else:

  print("The flow is Sub Critical Flow")

#Upstream Energy

E1 = y1 + ((Q\*Q)/(2 \*g\*A1 \*A1))

print("The value of Energy at initial Section is:", E1)

# Downstream Energy

E2 = E1 -Z

print("The value of downstream Energy E2 is:", E2)

# Critical Depth

yc = (q\*q/g)\*\*0.3333

print ("The Value of critical depth is:", yc)

Ec = 1.5\*yc

print("The value of critical Energy is", Ec)

if Ec>E2:

        print("Chocking Conditlon")

else:

        print("SAFE")

# Calculation of Zmax

Zmax = E1 - Ec

print("The value of maxinmum hump is:", Zmax)

Output:-

Enter the value of Discharge:4.8

Enter the value of top width:2

Enter the value of acceleration due to Gravity:9.81

enter the value of upstream depth:1.6

Enter the Value of hump: 0.1

The value of discharge per meter width is: 2.4

The value of upstream area is: 3.2

The value of Froude number is: 0.07167431192660548

The flow is Sub Critical Flow

The value of Energy at initial Section is: 1.714678899082569

The value of downstream Energy E2 is: 1.614678899082569

The Value of critical depth is: 0.8373856872261649

The value of critical Energy is 1.2560785308392473

SAFE

The value of maxinmum hump is: 0.45860036824332173

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# To find the downstream depth of open channel

# Given Data

Q= float(input("Enter the value of Discharge:"))

B1 = float(input("Enter the value of width at upstream: "))

B2 = float(input("Enter the value of width at downstream: "))

g= float(input("Enter the value of acceleration due to Gravity:"))

yl= float(input("enter the value of upstream depth:"))

# Dicharge per meter width

ql= Q/B1

q2= Q/B2

print("The value of discharge per meter width is:'", ql)

print("The value of discharge per meter width is:", q2)

# Area Calculation

A1 = B1\*yl

print ("The value of upstream area is:", A1)

# Calculation of Froude Number

Fr1 = ((Q\*Q\*B1)/(g\*A1\*A1\*A1)) \*\*0.5

print("The value of Froude number is:", Fr1)

if Fr1>1:

  print("The flow is Super Critical Flow")

else:

  print("The flow is Sub Critical Flow")

# Upstream Energy

E1 = yl + ((Q\*Q)/(2\*g\*A1\*A1))

print("The value of Energy at initial Section is:", E1)

B2min = ((27\*Q\*Q)/(8\*g\*E1\*E1\*E1)) \*\*0.5

print("The value of minimum width to be kept to avoid Chocking is:", B2min)

if B2min > B2:

  print("Chocking Condition")

else:

  print("SAFE")

# Critical Depth

yc = ((Q\*Q)/(B2\*B2\*g)) \*\*0.3333

print ("The Value of critical depth is: ", yc)

Ec = 1.5\*yc

print("The value of critical Energy is", Ec)

Output:-

Enter the value of Discharge:15

Enter the value of width at upstream: 3.5

Enter the value of width at downstream: 2.5

Enter the value of acceleration due to Gravity:9.81

enter the value of upstream depth:2

The value of discharge per meter width is:' 4.285714285714286

The value of discharge per meter width is: 6.0

The value of upstream area is: 7.0

The value of Froude number is: 0.4837753296275688

The flow is Sub Critical Flow

The value of Energy at initial Section is: 2.234038569556263

The value of minimum width to be kept to avoid Chocking is: 2.634860603070728

Chocking Condition

The Value of critical depth is: 1.542383403140325

The value of critical Energy is 2.3135751047104876

  #Roshan Chawan 22CV013

  #Design of Efficient Channel Section

  Q= float(input("Enter the value of Discharge:"))

  n=float(input("Enter the value of Rugosity coefficient:"))

  So= float (input("Enter the value of bed slope:"))

  g= float(input("Enter the value of acceleration due to Gravity:"))

  #Manning's Formula

  #Q = (AR^2/3 S^1/2)/n

  yn = ((Q\*n\*50\*1.591)/(1.732))\*\*(3/8)

  print ("The Value of yn is", yn)

  #To encounter the effect of free board

  yn1= 1.1\*yn

  print ("The Value of ynl is", yn1)

  # Cross Sectional Area

  A = 1.732 \* yn \* yn1

  print ("The cross sectional Area is:", A)

  # Top Width

  T= 4\* yn/1.732

  print ("The value of top Width is:", T)

  # Bottom Width

  B= 2 \* yn/1.732

  print ("The value of Bottom Width is'", B)

  Fr= ((Q\*Q\*T)/(g\*A\*A\*A)) \* 0.5

  print ("The value of Froude number is:", Fr)

  if Fr>1:

  print("The flow is Super Critical Flow")

  else:

  print("The flow is Sub Critical Flow")

Output:-

Enter the value of Discharge:100

Enter the value of Rugosity coefficient:0.015

Enter the value of bed slope:0.0004

Enter the value of acceleration due to Gravity:9.81

The Value of yn is 4.89011230647273

The Value of ynl is 5.3791235371200035

The cross sectional Area is: 45.559425534364046

The value of top Width is: 11.293561908713002

The value of Bottom Width is' 5.646780954356501

The value of Froude number is: 0.0608691470073813

The flow is Sub Critical Flow