```
Q 1.
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(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)
```

```
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
2.4
The value of upstream area is: 3.2
The value of Froude number is: 2.5701176212687153
The flow is Super 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
```

```
Q 2.
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:"))
y1= float(input("enter the value of upstream depth:"))
# Dicharge per meter width
q1=Q/B1
```

```
q2= Q/B2
print("The value of discharge per meter width is:'", q1)
print("The value of discharge per meter width is:", q2)
# Area Calculation
A1 = B1*y1
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 = y1 + ((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)
```

```
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
```

```
Q 3.
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 yn1 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)
```

```
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")
```

```
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 yn1 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: 0.3489101517794554
The flow is Sub Critical Flow
```