```
#Q1
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: "))

# Discharge per meter width q
= Q / T
print("The value of discharge per meter width is:", q)

# Area calculation A1
= T * y1
print("Value of upstream area is:", A1)

# Froude number calculation
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 supercritical flow")
else: print("The flow is subcritical flow")

# Upstream Energy
E1 = y1 + ((Q * Q) / (2 * g * A1 * A1))
print("The value of energy at the 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("Choking Condition")
else: print("SAFE")

# Calculation of Zmax Zmax = E1 - Ec
print("The value of maximum 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
The value of discharge per meter width is: 2.4
Value of upstream area is: 3.2
The value of Froude number is: 0.3786140830096141
The flow is subcritical flow
The value of energy at the 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 maximum hump is: 0.45860036824332173
```

```
#Q2 To find the downstream depth of open channel
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 downstream: "))
g = float(input("Enter the value of acceleration due to gravity: ")) y1
= float(input("Enter the value of upstream depth: "))
# Discharge 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 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 supercritical flow") else:
print("The flow is subcritical flow")
# Upstream energy
E1 = y1 + ((Q * Q) / (2 * g * A1 * A1))
print("The value of energy at the initial section is:",E1) #
Calculation of minimum width to avoid choking B2min = ((27 *
Q * Q) / (8 * g * E1 * E1 * E1)) ** 0.5
print("The value of minimum width to be kept to avoid choking is:", B2min) if
B2min > B2:
print("Choking condition") else:
print("SAFE") #
Critical depth
yc = ((Q * Q) / (B2 * 82 * 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 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 is: 7.0
The value of Froude number is: 0.4837753296275688
The flow is subcritical flow
The value of energy at the initial section is: 2.234038569556263
The value of minimum width to be kept to avoid choking is:
2.634860603070728
Choking condition
The value of critical depth is: 0.48189408016494045
The value of critical energy is: 0.7228411202474107
```

```
#Q3
#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'", 8) 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:
    0print("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 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' 8
The value of Froude number is: 0.0608691470073813
The flow is Sub Critical Flow
```