Assignment 1: Applications of Python in the field of Reinforced Cement Concrete

**Date:**

# Find the ultimate moment carrying capacity of singly reinforced beam section 230 mm x 400 mm (effective) reinforced with 2#16 and 2#20 on tension side. Materials M20, fe415

1. **Design one way simply supported slab of 3 m effective span having support width of 230 mm. Given that LL is 4 kN/m and floor finish being**

# 1.8 KN/m. Materials M20, fe415.

Q.1

1. **# To find the downstream depth of open channel**
2. **# Given Data**
3. **Q= float (input("Enter the value of Discharge:"))**
4. **T= int(input("Enter the value of top width:"))**
5. **g=float(input("Enter the value of acceleration due to Gravity:"))**
6. **y1 = float(input("enter the value of upstream depth:"))**
7. **Z= float(input("Enter the Value of hump: "))**
8. **# Dicharge per meter width**
9. **q=Q/T**
10. **print ("The value of discharge per meter width is:", q)**
11. **# Area Calculation**

12. A1= T\*y1

1. **print ("The value of upstream area is:", A1)**
2. **# Calculation of Froude Number**
3. **Fr1 = (Q\*Q\*T)/(g\*A1\* A1 \*A1) \* 0.5 16. print ("The value of Froude number is:", Fr1)**
4. **if Fr1>1:**
5. **print("The flow is Super Critical Flow") # Indent this line to align with the 'if' block**
6. **else:**
7. **print("The flow is Sub Critical Flow") # Indent this line to align with the 'else' block**
8. **#21#Upstream Energy**

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

1. **print ("The value of Energy at initial Section is:", E1)**
2. **#24 # Downstream Energy**

25. E2 = E1 -Z

1. **print ("The value of downstream Energy E2 is:", E2)**
2. **#27 # Critical Depth**
3. **# Assuming yc is calculated as (q^2/g)^(1/3) as in the first code snippet:**
4. **yc = (q\*q/g)\*\*(1/3) # Replace 'a' and 'e' with the correct variables**
5. **print ("The Value of critical depth is:", yc)**
6. **Ec = 1.5\*yc # Use a period (.) for decimal representation instead of a comma (,) 32. print ("The value of critical Energy is", Ec)**
7. **if Ec>E2:**
8. **print ("Chocking Conditlon")**
9. **else:**
10. **print ("SAFE")**
11. **#36 # Calculation of Zmax**
12. **Zmax =E1- Ec # Assuming 'El' was a typo and should be 'E1'**
13. **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: 0.837370824744677

The value of critical Energy is 1.2560562371170154 SAFE

The value of maxinmum hump is: 0.45862266196555357 # 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: 0.5

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: 1.214678899082569 The Value of critical depth is: 0.837370824744677

The value of critical Energy is 1.2560562371170154 Chocking Conditlon

The value of maxinmum hump is: 0.4586226619655535

Q.2

1. **# To find the downstream depth of open channel**
2. **# Given Data**
3. **Q= float(input("Enter the value of Discharge:"))**
4. **B1 = float(input("Enter the value of width at upstream: "))**
5. **B2 = float(input("Enter the value of width at downstream: "))**
6. **g= float(input("Enter the value of acceleration due to Gravity:"))**
7. **yl= float(input("enter the value of upstream depth:"))**
8. **# Dicharge per meter width**
9. **ql=Q/B1**

10. q2= Q/B2

1. **print ("The value of discharge per meter width is:'", ql)**
2. **print ("The value of discharge per meter width is:", q2)**
3. **# Area Calculation**
4. **A1 = B1\*yl # Use 'yl' here instead of 'y1'**
5. **print ("The value of upstream area is:", A1)**
6. **# Calculation of Froude Number**
7. **Fr1 = ((Q\*Q\*B1)/(g\*A1\*A1\*A1)) \*\*0.5 18. print ("The value of Froude number is:", Fr1)**
8. **if Fr1>1:**
9. **pass # Replace with desired code**
10. **print("The flow is Super Critical Flow") # Indent this line to include it in the if block**
11. **else:**
12. **print("The flow is Sub Critical Flow")**
13. **# Upstream Energy**
14. **e = 1 # Define the value of 'e' here. Replace 1 with the actual value you intend to use.**

26. E1 = yl + (Q\*0)/(2\*e\*A1\*A1) # And here

1. **print ("The value of Energy at initial Section is:", E1) # Fix the typo here. It should be E1 instead of El**
2. **# (type alias) B2min: Any dition # This line seems like a comment or incomplete code, consider removing or completing it**

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

1. **print ("The value of minimum width to be kept to avoid Chocking is:", B2min)**
2. **if B2min > B2:**
3. **print ("Chocking Condition") # Indent this line to include it in the if block**
4. **else:**
5. **print ("SAFE")**
6. **# Critical Depth**
7. **yc = ((Q\*Q)/(B2\*82\*e)) \*\*0.3333 # Make sure 'e' is defined in your environment and fix the missing closing parenthesis**
8. **print ("The Value of critical depth is: ", yc)**
9. **Ec = 1.5\*yc # Fix the typo here, it should be 1.5 instead of 1,5**
10. **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: 2.0

The value of minimum width to be kept to avoid Chocking is: 3.110632107802487 Chocking Condition

The Value of critical depth is: 1.0315133935767666 The value of critical Energy is 1.54727009036515

Q.3

1. **#Design of Efficient Channel Section**
2. **Q=float(input("Enter the value of Discharge:"))**
3. **n=float(input("Enter the value of Rugosity coefficient:"))**
4. **So=float (input("Enter the value of bed slope:"))**
5. **g= float(input("Enter the value of acceleration due to Gravity:"))**
6. **#Manning's Formula 7. #Q = (AR^2/3 S^1/2)/n**

8. yn1 = ((Q\*n\*50\* 1.591)/(1.732))\*\*(3/8) # Removed unexpected indent

1. **print ("The Value of yn is", yn1) # Changed yn to yn1 since yn was never defined**
2. **#To encounter the effect of free board**
3. **yn1= 1.1\*yn1 # Changed yn to yn1 since yn was never defined**
4. **print ("The Value of ynl is", yn1)**
5. **# Cross Sectional Area**
6. **A = 1.732 \* yn1 \* yn1 # Added missing multiplication operators and changed yn to yn1**
7. **print ("The cross sectional Area is:", A)**
8. **# Top Width**
9. **T= 4\* yn1/1.732 # Changed yn to yn1**
10. **print ("The value of top Width is:", T)**
11. **# Bottom Width**
12. **B= 2\*yn1/1.732 # Added missing multiplication operator and changed yn to yn1**
13. **print ("The value of Bottom Width is'", B) # Changed 8 to B**
14. **Fr= ((Q\*\*2)/(g\*A\*\*3))\*\* 0.5 # Modified Froude number calculation**
15. **print ("The value of Froude number is:", Fr)**
16. **if Fr>1:**
17. **print ("The flow is Super Critical Flow")**
18. **else:**
19. **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: 50.115368087800455 The value of top Width is: 12.422918099584304 The value of Bottom Width is' 6.211459049792152

The value of Froude number is: 0.08999307871555554 The flow is Sub Critical Flow