**Q1. Explain with an example each when to use a for loop and a while loop.**

**For Loop:** A for loop is used when you know in advance how many times you want to execute a statement or a block of statements. It's commonly used to iterate over a sequence (like a list, tuple, string) or a range.

*Example:*

python

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# Print numbers from 1 to 5 using a for loop

for i in range(1, 6):

print(i)

**While Loop:** A while loop is used when you want to repeat a block of statements an unknown number of times until a specific condition is met.

*Example:*

python

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# Print numbers from 1 to 5 using a while loop

i = 1

while i <= 5:

print(i)

i += 1

**Q2. Write a Python program to print the sum and product of the first 10 natural numbers using for and while loops.**

*Using for loop:*

python

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# Sum and product using for loop

sum\_for = 0

product\_for = 1

for i in range(1, 11):

sum\_for += i

product\_for \*= i

print(f"Sum using for loop: {sum\_for}")

print(f"Product using for loop: {product\_for}")

*Using while loop:*

python

Copy code

# Sum and product using while loop

sum\_while = 0

product\_while = 1

i = 1

while i <= 10:

sum\_while += i

product\_while \*= i

i += 1

print(f"Sum using while loop: {sum\_while}")

print(f"Product using while loop: {product\_while}")

**Q3. Create a Python program to compute the electricity bill for a household.**

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def calculate\_electricity\_bill(units):

if units <= 100:

bill = units \* 4.5

elif units <= 200:

bill = (100 \* 4.5) + ((units - 100) \* 6)

elif units <= 300:

bill = (100 \* 4.5) + (100 \* 6) + ((units - 200) \* 10)

else:

bill = (100 \* 4.5) + (100 \* 6) + (100 \* 10) + ((units - 300) \* 20)

return bill

# Input from user

units = int(input("Enter the units of electricity consumed: "))

bill = calculate\_electricity\_bill(units)

print(f"The total electricity bill is: Rs. {bill:.2f}")

**Q4. Create a list of numbers from 1 to 100. Use for loop and while loop to calculate the cube of each number and if the cube of that number is divisible by 4 or 5 then append that number in a list and print that list.**

*Using for loop:*

python

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numbers = range(1, 101)

result\_for = []

for number in numbers:

cube = number \*\* 3

if cube % 4 == 0 or cube % 5 == 0:

result\_for.append(number)

print(f"Numbers whose cube is divisible by 4 or 5 (for loop): {result\_for}")

*Using while loop:*

python

Copy code

numbers = range(1, 101)

result\_while = []

i = 1

while i <= 100:

cube = i \*\* 3

if cube % 4 == 0 or cube % 5 == 0:

result\_while.append(i)

i += 1

print(f"Numbers whose cube is divisible by 4 or 5 (while loop): {result\_while}")

**Q5. Write a program to filter and count vowels in the given string.**

python

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string = "I want to become a data scientist"

vowels = "aeiouAEIOU"

count = 0

for char in string:

if char in vowels:

count += 1

print(f"The number of vowels in the string is: {count}")