5. Looping Constructs in Python

a) Write a program to find the factorial of a number

```
num =int(input("Enter a number:"))
fact= 1
for i in range(2,num+1):
    fact=fact*i
print("The factorial of",num,"is",fact)
```

b) Write a program to generate Fibonacci series of N terms

```
n=int(input("Enter the limit:"))
a=0
b=1
print("Fibnocci series upto",n,"terms")
for i in range(n):
    print(a,end=" ")
    temp=a
    a=b
    b=temp+b
```

c) Write a program using a for loop to print the multiplication table of n, where n is entered by the user.

```
n=int(input("Enter the number for multiplication table:"))
limit=int(input("enter the limit for the multiplication table:"))
for i in range(1,limit+1):
    print(n,"x",i,"=",n*i)
```

d) Generate a list of four digit numbers in a given range with all their digits even and the number is a perfect square.

```
# Program to find 4-digit numbers in a given range
# that have all even digits and are perfect squares.

# Take the starting range (4-digit minimum) from the user
start_range = int(input("Enter the starting range (4 digit min): "))

# Take the ending range (4-digit maximum) from the user
end_range = int(input("Enter the ending range (4 digit max): "))
```

```
# Create an empty list to store valid numbers
evendigit = []

# Loop through all numbers in the given range
for num in range(start_range, end_range + 1):

    # Check if all digits in the number are even
    # str(num) converts number to string so we can check each digit
    # int(digit) % 2 == 0 → True if the digit is even
    # all() returns True only if every digit passes the test
    if all(int(digit) % 2 == 0 for digit in str(num)):

        # Calculate the square root of the number
        sqrt = int(num ** 0.5)

        # Check if the number is a perfect square
        if sqrt * sqrt == num:
            # Add the number to the list if it satisfies both conditions
            evendigit.append(num)

# After checking all numbers, print the result
if evendigit != []:
    print("Numbers with all even digits and are perfect squares:")
    print(evendigit)
else:
    print("There are no numbers within the given range.")
```

''' Example: Perfect square – 1024, square root – 32 ie, 32 x 32 = 1024

Perfect square – 4624, square root – 68 ie, 68 x 68 = 4624 '''

e) Write a program to generate all factors of a number. [use while loop].

```
# Program to generate all factors of a given number using while loop

# Take input from user
num = int(input("Enter a number: "))

# Initialize a variable to check divisors starting from 1
```

```python
i = 1

# Print heading
print(f"Factors of {num} are:")

# Loop from 1 to num using while loop
while i <= num:
    # If i divides num completely, it is a factor
    if num % i == 0:
        print(i, end=" ")  # Print the factor on the same line
    i += 1  # Move to the next number
```