Name= Amay mourya
Enrollment=0157AL231023
Batch: 5 (MTF)
Batch Time: 10:30 – 12:10

Basic If–Else Problems:

1.Write a program to check whether a number is positive, negative, or zero.

```
num = int(input("Enter a number: ")) if
num > 0:
   print("The number is Positive") elif
num < 0:
   print("The number is Negative")
else:    print("The number is
Zero")
```

2. Write a program to check whether a number is even or odd.

```
num = int(input("Enter a number: ")) if
num % 2 == 0:
   print("The number is Even")
else:    print("The number is
Odd")
```

3. Write a program to check if a given year is a leap year or not. year = int(input("Enter a year: ")) if (year % 400 == 0) or (year % 4 == 0 and year % 100 != 0):
   print(year, "is a Leap Year") else:
   print(year, "is Not a Leap Year")

4. Write a program to find the greatest of two numbers.

```
a = int(input("Enter first number: ")) b
= int(input("Enter second number: ")) if
a > b:
   print(a, "is greater") elif
b > a:
   print(b, "is greater") else:
print("Both numbers are equal")
```

5. Write a program to check whether a person is eligible to vote (age >= 18). age = int(input("Enter your age: ")) if age >= 18:
   print("You are eligible to vote") else:
   print("You are not eligible to vote")

6. Write a program to check whether a given character is a vowel or consonant.

```
ch = input("Enter a character: ").lower()
if ch in ('a', 'e', 'i', 'o', 'u'):
print(ch, "is a Vowel") else:
   print(ch, "is a Consonant")
```

7. Write a program to check if a number is divisible by 5.

```
num = int(input("Enter a number: ")) if
num % 5 == 0:
   print(num, "is divisible by 5") else:
   print(num, "is not divisible by 5")
```

8. Write a program to determine whether a given number is a single-digit, two-digit, or more than two-digit number.

```
num = int(input("Enter a number: ")) if
-9 <= num <= 9:
   print("Single-digit number") elif
-99 <= num <= 99:
   print("Two-digit number") else:
   print("More than two-digit number")
```

9. Write a program to check whether a student has passed or failed (passing marks = 40).

```
marks = int(input("Enter your marks: ")) if
marks >= 40:
   print("You have Passed") else:
   print("You have Failed")
```

10. Write a program to find whether the entered number is a multiple of both 3 and 7.

```
num = int(input("Enter a number: ")) if
num % 3 == 0 and num % 7 == 0:
   print(num, "is a multiple of both 3 and 7") else:
   print(num, "is NOT a multiple of both 3 and 7")
```

Ladder If & Nested If:

1. Write a program to find the greatest among three numbers.

```
a = int(input("Enter first number: ")) b
= int(input("Enter second number: ")) c
= int(input("Enter third number: ")) if a
>= b and a >= c:
  print(a, "is the greatest number") elif
b >= a and b >= c:
  print(b, "is the greatest number") else:
  print(c, "is the greatest number")
```

2. Write a program to classify a person based on age: Child (<13), Teenager (13-19), Adult (20-59), Senior (60+). age = int(input("Enter age: ")) if age >= 0 and age < 13:

```
   print("Child") elif age >=
13 and age <= 19:
   print("Teenager") elif age
>= 20 and age <= 59:
   print("Adult") elif
age >= 60:
```

```
print("Senior")
else:
   print("Invalid age! Age cannot be negative.")
```

3. Write a program to assign grades based on marks: 90-100: A, 75-89: B, 50-74: C, 35-49: D, <35: Fail.

```
marks = int(input("Enter marks (0-100): "))
if 90 <= marks <= 100:     print("Grade: A")
elif 75 <= marks < 90:     print("Grade: B")
elif 50 <= marks < 75:     print("Grade: C")
elif 35 <= marks < 50:     print("Grade: D")
elif 0 <= marks < 35:     print("Grade: Fail")
else:
   print("Invalid marks.")
```

4. Write a program to check the type of triangle (equilateral, isosceles, or scalene) based on sides.

```
a = int(input("Enter first side: ")) b
= int(input("Enter second side: ")) c
= int(input("Enter third side: ")) if a
== b and b == c:
   print("Equilateral Triangle")
elif a == b or b == c or a == c:
print("Isosceles Triangle") else:
   print("Scalene Triangle")
```

5. Write a program to check if a character is uppercase, lowercase, digit, or special symbol.

```
ch = input("Enter a character: ") if ch.isupper():
   print("Uppercase Letter") elif
ch.islower():
   print("Lowercase Letter") elif
ch.isdigit():     print("Digit")
else:
   print("Special Symbol")
```

6. Write a program to calculate electricity bill based on units:Up to 100 units: ₹5 per unit, 101–200 units: ₹7 per unit, Above 200 units: ₹10 per unit.

```
units = int(input("Enter electricity units: "))
if units <= 100:     bill = units * 5 elif units
<= 200:
   bill = (100 * 5) + (units - 100) * 7 else:
   bill = (100 * 5) + (100 * 7) + (units - 200) * 10

print("Total Electricity Bill: ₹", bill)
```

7. Write a program to determine the largest of four numbers using nested if.

```
a = int(input("Enter first number: ")) b
= int(input("Enter second number: ")) c
= int(input("Enter third number: ")) d =
```

```
int(input("Enter fourth number: ")) if a
> b:    if a > c:       if a > d:
          largest = a
       else:
          largest = d
else:
       if c > d:
          largest = c
else:
          largest = d
else:    if b > c:
if b > d:
          largest = b
else:
          largest = d
else:       if c > d:
          largest = c
else:
          largest = d
print("Largest number is:", largest)
```

8. Write a program to check if a given year is a century year and also a leap year. year =

```
   int(input("Enter a year: ")) if year % 100 == 0:
  print(year, "is a Century Year")
else:
  print(year, "is NOT a Century Year") if (year % 400 == 0)
or (year % 4 == 0 and year % 100 != 0):
  print(year, "is also a Leap Year") else:
  print(year, "is NOT a Leap Year")
```

9. Write a program to classify BMI value: Underweight (<18.5), Normal (18.5-24.9), Overweight (25-29.9), Obese (30+).

```
bmi = float(input("Enter BMI value: ")) if
bmi < 18.5:
  print("Underweight") elif bmi
>= 18.5 and bmi <= 24.9:
  print("Normal") elif bmi >=
25 and bmi <= 29.9:
  print("Overweight") else:
  print("Obese")
```

10. Write a program to display the smallest number among three using nested if.

```
a = int(input("Enter first number: ")) b
= int(input("Enter second number: "))
c = int(input("Enter third number: "))

if a < b:
if a < c:
       print("The smallest number is:", a)
else:       print("The smallest number
```

```
is:", c) else:    if b < c:       print("The
smallest number is:", b)    else:
      print("The smallest number is:", c)
```

For Loop Problems:

1. Write a program using a for loop to print all Armstrong numbers between 100 and 999. (Armstrong number: sum of cubes of digits equals the number itself. Example: 153 => 13+53+33 = 153).

```
print("Armstrong numbers between 100 and 999:") for
num in range(100, 1000):
   sum_cubes = 0
temp = num    while
temp > 0:
      digit = temp % 10
      sum_cubes += digit ** 3
      temp //= 10
   if sum_cubes == num:
print(num)
```

2. Write a program to generate and display the first n prime numbers using a for loop. n = int(input("Enter how many prime numbers to generate: ")) count = 0 num = 2 while count < n:

```
   for i in range(2, num):
if num % i == 0:
         break
else:
      print(num, end=" ")
      count += 1
num += 1
```

3. Write a program to display all numbers from 1 to 500 that are divisible by 3, but the sum of their digits should not exceed 10. for num in range(1, 501):

```
   if num % 3 == 0:
      digit_sum = sum(int(digit) for digit in str(num))
if digit_sum <= 10:
         print(num)
```

4. Write a program using a for loop to print a pyramid of stars (*) of height n. Example for n=4: *

```
***
*****
*******
n = int(input("Enter height of pyramid: "))
for i in range(1, n + 1):    print("*" * (2 * i
- 1))
```

5. Write a program to accept a string and check whether it is a pangram (contains all 26 alphabets at least once) using a for loop.

```
text = input("Enter a string: ").lower()
alphabet = "abcdefghijklmnopqrstuvwxyz"
for ch in alphabet:    if ch not in text:
```

```
    print("Not a Pangram")
    break else:
  print("It is a Pangram")
```

6. Write a program using a for loop to print all twin primes between 1 and 100. (Twin primes: pairs of prime numbers with a difference of 2, e.g., (3,5), (11,13)).

```
for num in range(2, 99):    for i in range(2, int(num**0.5) + 1):    if num % i == 0:
        break
else:
    # check if num+2 is prime    for j in range(2, int((num + 2)**0.5) + 1):        if (num + 2) % j == 0:
            break
else:
        print(f"({num}, {num + 2})")
```

7. Write a program that accepts a number from the user and prints whether it is a Harshad number (number divisible by the sum of its digits) using a for loop.

```
num = int(input("Enter a number: ")) digit_sum = sum(int(digit) for digit in str(num)) if num % digit_sum == 0:
  print(num, "is a Harshad Number") else:
  print(num, "is NOT a Harshad Number")
```

8. Write a program to generate Pascal's Triangle up to n rows using a for loop.

```
n = int(input("Enter number of rows: ")) for i in range(n):
  num = 1
  print(" " * (n - i), end="")
for j in range(i + 1):
print(num, end=" ")    num = num * (i - j) // (j + 1)    print()
```

9. Write a program using a for loop to display the sum of the series: 12 + 22 + 32 + ... + n2 .

```
n = int(input("Enter the value of n: ")) total = 0

for i in range(1, n + 1):
  total += i ** 2  # add square of i to total

print("Sum of the series:", total)
```

10. Write a program that accepts a number from the user and prints whether it is a Strong number (sum of factorials of digits = number itself) using a for loop. Example: 145 => 1! + 4! + 5! = 145.

```
num = int(input("Enter a number: "))
s = 0  for digit in str(num):
fact = 1  for i in range(1, int(digit)+1):
fact *= i  s += fact  if s == num:
    print("Strong Number")  else:
```

```
    print("Not a Strong Number")
```

While Loop Problems:

Write a program using a while loop to find the reverse of a number and check if the reversed number is prime. Example: Input = 73 → Reverse = 37 → Prime.

```
num = int(input("Enter a number: ")) temp
= num
reverse = 0 while
temp > 0:
   digit = temp % 10
 reverse = reverse * 10 + digit
   temp //= 10
print("Reversed Number:", reverse) if
reverse > 1:    for i in range(2, int(reverse
** 0.5) + 1):        if reverse % i == 0:
          print(reverse, "is NOT a Prime Number")
else:        print(reverse, "is a Prime Number")
else:
   print(reverse, "is NOT a Prime Number")
```

12. Write a program that continues to accept numbers from the user until the sum of digits of all numbers entered becomes greater than 100.

```
total_sum = 0   while
total_sum <= 100:
   num = int(input("Enter a number: "))
digit_sum = sum(int(digit) for digit in str(num))
total_sum += digit_sum  # Add to total sum
print("Sum of digits of this number:", digit_sum)
print("Total sum so far:", total_sum)
print("Stopped! The total sum of digits is greater than 100.")
```

13. Write a program using a while loop to check whether a number is a Duck number (a number containing zero but not starting with zero, e.g., 202, 1203).

```
num = int(input("Enter a number: "))
temp = num
is_duck = False

while temp > 0:
   digit = temp % 10
if digit == 0:
is_duck = True
   temp //= 10

if is_duck and str(num)[0] != '0':
print(num, "is a Duck Number") else:
   print(num, "is NOT a Duck Number")
```

14. Write a program using a while loop to accept a number and check if it is a Happy number. (A number is happy if repeatedly replacing it with the sum of squares of its digits eventually reaches 1). Example: 19 is a happy number.

```
num = int(input("Enter a number: "))
```

```
seen = set() while num != 1 and num
not in seen:
   seen.add(num)
temp = num     sum_sq
= 0     while temp > 0:
       digit = temp % 10
sum_sq += digit ** 2
temp //= 10
   num = sum_sq if num
== 1:
   print("It is a Happy Number") else:
   print("It is NOT a Happy Number")
```

15. Write a program using a while loop to find the largest prime factor of a given number.

```
num = int(input("Enter a number: ")) i
= 2
largest = 0
temp = num while
temp > 1:     if
temp % i == 0:
       largest = i
temp //= i
   else:
       i += 1
print("Largest Prime Factor:", largest)
```

16.Write a program to repeatedly accept a string from the user until the string entered is a palindrome.

```
while True:
   s = input("Enter a string: ")
if s == s[::-1]:
       print("Palindrome entered:", s)
break     else:
       print("Not a palindrome, try again.")
```

17. Write a program using a while loop to compute the sum of digits of a number until the result becomes a single-digit number (Digital root). Example: 9875 => 9+8+7+5=29 => 2+9=11 => 1+1=2.

```
num = int(input("Enter a number: "))
while num >= 10:     sum_digits = 0
temp = num     while temp > 0:
sum_digits += temp % 10
       temp //= 10
   num = sum_digits
print("Digital Root:", num)
```

18. Write a program using a while loop to generate the Collatz sequence for a given number. (Rule: If n is even => n/2, if odd => 3n+1. Continue until n=1).

```
n = int(input("Enter a number: "))
print("Collatz sequence:", end=" ") while
n != 1:
   print(n, end=" ")
   if n % 2 == 0:
```

```
    n //= 2
else:
    n = 3 * n + 1 print(1)
```

19. Write a program using a while loop to accept a number and check whether it is a Kaprekar number.

(Kaprekar number: if square of the number can be split into two parts whose sum equals the number. Example: 452=2025 => 20+25=45).

```
num = int(input("Enter a number: "))
square = num ** 2 str_sq =
str(square) d = len(str(num)) right =
int(str_sq[-d:])
left = int(str_sq[:-d]) if str_sq[:-d] != '' else 0 if
left + right == num:
  print(num, "is a Kaprekar Number") else:
  print(num, "is NOT a Kaprekar Number")
```

20. Write a program to simulate an ATM machine using a while loop where a user can:

• Check balance
• Deposit money
• Withdraw money (only if balance is sufficient) • Exit balance = 1000 while True:

```
  print("\nATM Menu:")
print("1. Check Balance")
print("2. Deposit Money")
  print("3. Withdraw Money")
print("4. Exit")
  choice = int(input("Enter your choice: "))
if choice == 1:
    print("Current Balance: ₹", balance)
elif choice == 2:
    amount = int(input("Enter amount to deposit: "))
balance += amount
    print("Amount deposited. New Balance: ₹", balance)
elif choice == 3:
    amount = int(input("Enter amount to withdraw: "))
if amount <= balance:          balance -= amount
      print("Amount withdrawn. New Balance: ₹", balance)
else:
      print("Insufficient balance!")
elif choice == 4:
    print("Exiting... Thank you!")
    break
else:
    print("Invalid choice. Try again.")
```