**Practical 2: CDMA**

**Program:**

import numpy as np

# Define spreading codes

c1 = [1, 1, 1, 1]

c2 = [1, -1, 1, -1]

c3 = [1, 1, -1, -1]

c4 = [1, -1, -1, 1]

print("Enter the data bits:")

d1 = int(input("Enter D1: "))

d2 = int(input("Enter D2: "))

d3 = int(input("Enter D3: "))

d4 = int(input("Enter D4: "))

# Multiply each code by its data bit

r1 = np.multiply(c1, d1)

r2 = np.multiply(c2, d2)

r3 = np.multiply(c3, d3)

r4 = np.multiply(c4, d4)

# Sum all signals to get the combined transmitted signal

resultant\_channel = r1 + r2 + r3 + r4

print("Resultant Channel:", resultant\_channel)

# User selects which channel to decode (which code)

channel = int(input("Enter the station to listen for C1=1, C2=2, C3=3, C4=4: "))

if channel == 1:

rc = c1

elif channel == 2:

rc = c2

elif channel == 3:

rc = c3

elif channel == 4:

rc = c4

else:

print("Invalid channel selected!")

rc = None

if rc is not None:

# Calculate inner product of received signal and the selected code

inner\_product = np.multiply(resultant\_channel, rc)

print("Inner Product:", inner\_product)

# Sum the inner product and divide by code length to get the data bit

res1 = sum(inner\_product)

data = res1 / len(inner\_product)

print("Data bit that was sent:", int(data))

**Output:**

Enter the data bits:

Enter D1: 2

Enter D2: 5

Enter D3: 4

Enter D4: 3

Resultant Channel: [14 -2 0 -4]

Enter the station to listen for C1=1, C2=2, C3=3, C4=4: 3

Inner Product: [14 -2 0 4]

Data bit that was sent: 4