import numpy as np

class Transmitter:

def \_\_init\_\_(self, power, frequency, radius):

self.power = power # Transmitting power in watts

self.frequency = frequency # Frequency of transmission in Hz

self.radius = radius # Radius of the transmitter coil in meters

def calculate\_magnetic\_field(self, distance):

# Calculate magnetic field strength using Biot-Savart law

mu\_0 = 4 \* np.pi \* 10\*\*-7 # Vacuum permeability

current = self.power / (2 \* np.pi \* self.radius) # Assuming uniform current distribution

magnetic\_field = (mu\_0 \* current \* self.radius\*\*2) / (2 \* (distance\*\*2)) # Magnetic field at distance

return magnetic\_field

class Receiver:

def \_\_init\_\_(self, coil\_area):

self.coil\_area = coil\_area # Area of the receiver coil in square meters

def calculate\_induced\_voltage(self, magnetic\_field, frequency):

# Calculate induced voltage using Faraday's law of electromagnetic induction

induced\_voltage = self.coil\_area \* magnetic\_field \* frequency

return induced\_voltage

def main():

# Transmitter parameters

transmitter\_power = 10 # Watts

transmitter\_frequency = 10\*\*6 # 1 MHz

transmitter\_radius = 0.1 # 10 cm

# Receiver parameters

receiver\_coil\_area = 0.01 # 1 square meter

# Distance between transmitter and receiver

distance = 1 # 1 meter

transmitter = Transmitter(transmitter\_power, transmitter\_frequency, transmitter\_radius)

receiver = Receiver(receiver\_coil\_area)

# Calculate magnetic field at the receiver

magnetic\_field = transmitter.calculate\_magnetic\_field(distance)

# Calculate induced voltage in the receiver coil

induced\_voltage = receiver.calculate\_induced\_voltage(magnetic\_field, transmitter\_frequency)

print("Transmitter Power:", transmitter\_power, "W")

print("Transmitter Frequency:", transmitter\_frequency, "Hz")

print("Transmitter Radius:", transmitter\_radius, "m")

print("Receiver Coil Area:", receiver\_coil\_area, "m^2")

print("Distance between Transmitter and Receiver:", distance, "m")

print("Magnetic Field at Receiver:", magnetic\_field, "T")

print("Induced Voltage in Receiver Coil:", induced\_voltage, "V")

if \_\_name\_\_ == "\_\_main\_\_":

main()