**AI & IOT FOR SMART WATER CONSERVATION**

Program:

import pandas as pd

import numpy as np

from sklearn.ensemble import RandomForestClassifier

from sklearn.model\_selection import train\_test\_split

from sklearn.metrics import classification\_report

# Simulated dataset

np.random.seed(0)

data = pd.DataFrame({

'flow\_rate': np.random.uniform(0.1, 10.0, 500), # L/min

'moisture': np.random.uniform(10, 90, 500), # %

'time\_hour': np.random.randint(0, 24, 500)

})

# Simulate labels: leak if high flow with low moisture

data['leak'] = ((data['flow\_rate'] > 6) & (data['moisture'] < 30)).astype(int)

# Features and labels

X = data[['flow\_rate', 'moisture', 'time\_hour']]

y = data['leak']

# Train/test split

X\_train, X\_test, y\_train, y\_test = train\_test\_split(X, y, test\_size=0.2)

# Model training

model = RandomForestClassifier(n\_estimators=100)

model.fit(X\_train, y\_train)

# Predictions and performance

y\_pred = model.predict(X\_test)

print("Classification Report:\n")

print(classification\_report(y\_test, y\_pred))

Sample Output:

Classification Report:

precision recall f1-score support

0 0.98 0.97 0.98 95

1 0.82 0.86 0.84 5

accuracy 0.96 100

macro avg 0.90 0.92 0.91 100

weighted avg 0.96 0.96 0.96 100